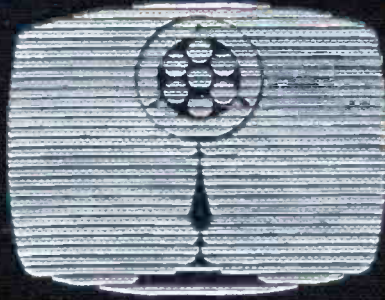


**HISTORY OF  
BROADCASTING:**



**RADIO TO  
TELEVISION**

# Federal Communications Commission

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**HISTORY OF  
BROADCASTING:  
RADIO TO  
TELEVISION**

## **HISTORY OF BROADCASTING: Radio to Television**

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SIXTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1940

(With Notation of Subsequent Important Developments)

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1940

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**COMMISSIONERS**

**MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION**

[For fiscal year ending June 30, 1940]

**CHAIRMAN**

**JAMES LAWRENCE FLY**

**PAUL A. WALKER  
NORMAN S. CASE  
T. A. M. CRAVEN**

**GEORGE HENRY PAYNE  
FREDERICK I. THOMPSON  
\*THAD H. BROWN**

\*Term expired June 30, 1940.

## LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
*Washington, D. C., December 1, 1940.*

*To the Congress of the United States:*

Herewith is submitted the Sixth Annual Report of the Federal Communications Commission, pursuant to section 4 (k) of the Communications Act of 1934, as amended.

Though this report covers in detail the activities of the Commission for the fiscal year ending June 30, 1940, subsequent important developments are incorporated in order to furnish the Congress with a more timely and broader view of the augmented duties of the Commission, particularly in connection with the coordinated national defense program.

Respectfully,

JAMES LAWRENCE FLY,  
*Chairman.*



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**CHAPTER I**

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**National Defense and Communications**

- 1. COMMISSION'S ROLE IN NATIONAL DEFENSE**
  - 2. DEFENSE COMMUNICATIONS BOARD**
- 
-

## CHAPTER I—NATIONAL DEFENSE AND COMMUNICATIONS

### 1. COMMISSION'S ROLE IN NATIONAL DEFENSE

Since making its last annual report, the Federal Communications Commission has been assigned a definite and exacting role in the coordinated national defense program. Its particular contribution to preparedness is to "police" radio communications.

A special appropriation of \$1,600,000 was authorized by the President for augmented work of this nature. The Commission received \$175,000 from Congress with which to relocate six of its seven main monitoring stations. These supplemental sums enabled the Commission to expand its field force and improve its "listening posts" for more effective surveillance of radio channels.

Recent events have demonstrated the importance of communications in time of national emergency. In addition to its normal regulation and supervision of all interstate and foreign communication by means of electrical energy, the Commission is now charged with seeing that such transmission does not run counter to our neutrality or national defense requirements. Radio, in particular, is a new and vital factor to be reckoned with in insuring the Nation's security.

In consequence, the Commission has added some one hundred new field stations to its previous score of such offices. These field posts are strategically located throughout the country and its possessions for investigation as well as routine assignments. Monitoring stations determine the bearings and characteristics of unauthorized or questionable transmission. To mobile units, which operate from field stations, falls the task of tracing the origin of such signals.

The Commission licenses citizens only for all classes of radio transmission. Heretofore it has depended upon the applicant's own statement as to that requirement. Today the Commission wants to be fully and accurately informed about the thousands of persons who operate electrical apparatus capable of farflung and almost instantaneous communication. So it is requiring all radio operators—commercial as well as amateur—to furnish documentary proof of citizenship, as well as fingerprints and photographs, for permanent identification record.

With the cooperation of radio, wire, and cable companies, which handle a considerable volume of official despatches and other Government messages, it is compiling similar data with respect to employees who engage in international communication.

In addition, the Commission last June issued an immediate ban on amateur communication with foreign countries, and further prohibited the use of portable long-distance transmitters by amateurs. At about the same time, the Commission warned all ship radio operators that it would enforce strictly the international agreement which prohibits transmission of "superfluous, unnecessary, or unidentified communications."



More specific information about these precautionary moves will be found in subsequent chapters relating to various types of communication services.

Section 1 of the Communications Act gives the Commission an express mandate to act in its regulation "for the purpose of the national defense." The act also grants the President special authority over communications during national emergency. For one thing, section 606 enables the Chief Executive, should he find it necessary, to suspend or amend existing rules and regulations governing radio communication, and permit Government use of particular facilities.

The Commission does not, of course, want to interfere with communications any more than is necessary for the national protection. It desires particularly to preserve the present linking up of radio facilities throughout the land for efficient and instantaneous communication. Maintenance of international communications is likewise important.

In its added responsibilities due to the national defense, the Commission is receiving the cooperation of all industries concerned. This collaborative spirit is reflected in all fields and groups. It not only permeates the broadcasters but extends throughout the common carrier systems and into the domain of the amateurs.

The latter constitute a valuable reservoir of operators and other experts for the military and other services in time of war. Besides working in close harmony with the Commission in normal times, the amateur has been of particular aid in the national-defense set-up by policing his own frequencies. By voluntary action, most amateurs stopped communicating with warring countries before the Commission imposed its prohibition on such foreign contacts.

It is well to stress that action of the Commission in prescribing certain general curbs is precautionary rather than disciplinary. The Commission is proud of the patriotic and cooperative response of operator and industry both.

## 2. DEFENSE COMMUNICATIONS BOARD

On September 24, 1940, President Roosevelt issued an Executive order establishing a Defense Communications Board to determine, coordinate, and prepare plans with respect to the relationship of radio, wire, and cable communications to the national defense.

As explained by the President on that occasion:

"The purpose of the Defense Communications Board, created today by Executive order, is to coordinate the relationship of all branches of communication to the national defense.

"The Defense Communications Board was initiated jointly by the various Government departments and agencies having a vital interest in this phase of the preparedness program. The board is basically a planning agency, without operating or procurement functions. As such it is charged with the important duty of charting the utilization and control of our communication systems in the best interests of the national security.

"The board will have no power to censor radio or other communications, or to take over any facilities.

"This task of planning is not confined to radio broadcasting, but also embraces common carriers, such as commercial radiotelephone and

radiotelegraph as well as other telephone, telegraph, and cable facilities.

"The board does not propose to interfere with the normal operation of broadcasting or other forms of communication any more than is necessary for the national protection. Through correlated planning, it will seek to gear the great and strategically valuable American communications system, in both the domestic and international fields, to meet any situation the national interest may require.

"The various branches of the communications industry will cooperate in an advisory capacity with the board, which will be composed of the Chairman of the Federal Communications Commission, the Chief Signal Officer of the Army, the Director of Naval Communications, an Assistant Secretary of State, and an Assistant Secretary of the Treasury. Where the activities of the board impinge upon any functions of Government departments, representatives of such departments will be placed upon appropriate committees.

"The board has had the cooperation of the radio industry in the preparation of this order. With industry cooperation, the board will appoint committees from every branch of communications—broadcast and other radio services, cable, telegraph, and telephone—as well as from labor groups. All plans involving the utilization of private facilities, or requiring industry cooperation, will be adopted only after consultation with such industry representatives, and the particular private companies whose properties may be involved."

The text of the Executive order creating the board and defining its functions and duties follows:

Whereas coordinated planning for the most efficient control and use of radio, wire, and cable communication facilities under jurisdiction of the United States in time of national emergency involves the consideration of the needs for communication of the armed forces of the United States, of other Government agencies, of industry, and of other civilian activities; and

Whereas such planning must be accomplished as a matter of preparation for national defense; and

Whereas the interest of national defense in the matter of control and use of communication facilities during any war in which the United States may become a belligerent is deemed paramount:

Now, therefore, by virtue of the authority vested in me as President of the United States, and by the Communications Act of 1934 (48 Stat. 1064), as amended, it is ordered as follows:

1. There is hereby created the Defense Communications Board, hereinafter called the Board, consisting of the Chairman, Federal Communications Commission, the Chief Signal Officer of the Army, the Director of Naval Communications, the Assistant Secretary of State in charge of the Division of International Communications, and the Assistant Secretary of the Treasury in charge of the Coast Guard.

2. The functions of the Board shall be, with the requirements of national defense as a primary consideration, to determine, coordinate, and prepare plans for the national defense, which plans will enunciate for and during any national emergency—

(a) The needs of the armed forces of the United States, of other governmental agencies, of industry, and of other civilian activities for radio, wire, and cable communication facilities of all kinds.

(b) The allocation of such portions of governmental and nongovernmental radio, wire, and cable facilities as may be required to meet the needs of the armed forces, due consideration being given to the needs of other governmental agencies, of industry, and of other civilian activities.

(c) The measures of control, the agencies to exercise this control, and the principles under which such control will be exercised over nonmilitary communications to meet defense requirements.

3. The chairman of the Federal Communications Commission shall be the chairman of the Board. In the absence of the designated chairman the temporary chairmanship shall devolve upon the remaining members of the Board in the following order:

1. The Chief Signal Officer of the Army or the Director of Naval Communications, whichever may be senior in rank.
2. The Chief Signal Officer of the Army or the Director of Naval Communications, whichever may be junior in rank.
3. The Assistant Secretary of State in charge of the Division of International Communications.
4. The Assistant Secretary of the Treasury in charge of the Coast Guard.

In the absence of any regularly designated member the agency which he represents may be represented by an alternate from that agency, designated by the head thereof, but such alternate shall not serve as chairman. The Assistant Secretary of the Treasury in charge of the Coast Guard is designated as the secretary of the Board.

4. The Board shall take no cognizance of matters pertaining to censorship. The Board shall study the physical aspects of domestic standard broadcasting and shall recommend such precautions, supplementary facilities, and reallocations as it shall deem desirable under foreseeable military conditions. It shall also make plans for the speedy and efficacious use of all necessary facilities in time of military emergency.

5. The Board shall appoint such committees as may be necessary to carry out its functions and to provide for continuing studies and for contact with other Government agencies and with the civil communication industry.

6. Except as otherwise instructed by the Board, committees appointed thereby shall have no power to make final disposition of any matter presented to them by the Board for study, but they shall express by written report their findings and recommendations. Minority reports may be submitted, if deemed of sufficient importance to warrant further consideration by the Board.

7. The Board and the committees shall call for consultation such representatives of other Government agencies and of the civilian communication industry as may be deemed advisable in obtaining full knowledge of the situation being studied, to the end that the needs of all may be considered and provided for in so far as the situation permits. Other governmental agencies are directed to cooperate in providing assistance required by the Board in its studies.

8. During any war in which the United States is a belligerent or any national emergency the existing Interdepartment Radio Advisory Committee shall act as a Committee of the Board, but only in an advisory capacity. While the Interdepartment Radio Advisory Committee is so acting as an advisory committee all of its reports, recommendations, or communications normally prepared for submission to the President shall instead be submitted to the Board for consideration from the standpoint of national defense and for disposition.

9. Reports containing the findings and recommendations of the Board shall be submitted to the President for final action through one of his administrative assistants.

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## **CHAPTER II**

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### **General**

- 1. ADMINISTRATION**
- 2. PROCEDURE**
- 3. FIELD ACTIVITIES**
- 4. INTERNATIONAL**
- 5. INTERDEPARTMENT RADIO ADVISORY COMMITTEE**
- 6. TECHNICAL INVESTIGATION**
- 7. PUBLICATIONS**

## CHAPTER II—GENERAL

### 1. ADMINISTRATION

The Federal Communications Commission functions as a unit, directly supervising all of its activities. Under this over-all direction there have been delegations of responsibility pursuant to policy determinations by the Commission for the execution of particular assignments. Committees of commissioners, usually consisting of three members, have been assigned to make special studies, conduct important hearings, and direct particular undertakings.

The Commission has provided under Administrative Order No. 2 for the disposition by individual commissioners, designated each month to serve in rotation, of interlocutory motions and of temporary broadcast authorizations. Also, the order delegates to the *Administrative Board*, consisting of the heads of the departments of the Commission, responsibility for the disposition of specified classes of applications, requests, and administrative matters in accordance with established policies.

#### ORGANIZATION

Four units comprise the staff organization of the Commission. By name and duties they are:

*Accounting, Statistical, and Tariff Department*, whose functions include matters of accounting regulation, compilation and analysis of statistics, and tariff analysis and regulations.

*Engineering Department*, whose functions include the engineering phases of broadcast, common carrier, and private and ship service regulation and enforcement; international and interdepartmental matters; supervision of the field staff; and technical engineering information and research.

*Law Department*, whose functions include the legal phases of radio licensing and of common carrier regulation; administration (including legislation, rule-making, and international matters); investigation; and litigation before the courts.

*Secretary's Office*, which has charge of all matters of internal administration, handles the issuance of licenses, maintains records, and supplies official copies of Commission orders and decisions.

The heads of the Commission's departments continued to meet regularly during the year as a *Committee on Rules* for the consideration, looking to recommendations to the Commission, of proposals for new or revised rules and regulations. These suggestions were referred to it by the Commission or its staff, or submitted by the public or industry. The *Committee on Rules* also makes recommendations upon matters of administration which contribute to the coordination of the staff activities of the Commission.

## 2. PROCEDURE

The Communications Act of 1934 provides, among other things, that the Commission may grant licenses only upon written applications, with certain exceptions for renewal of licenses and modifications of licenses in emergency conditions for vessels or aircraft of the United States without receipt of formal applications.

### APPLICATIONS

The act provides further that applications shall set forth such facts as the Commission may prescribe as to the citizenship, character, and financial, technical, and other qualifications of the applicant; the ownership and location of the proposed station, and of the stations, if any, with which it proposes to communicate; the frequencies and the power desired; the hours of the day or other periods of time during which it is intended to operate; the purposes for which the station is to be used; and such other information as the Commission may require. In this connection the Commission is authorized to obtain from an applicant or licensee further written statements of fact to enable it to determine whether an original application should be granted, or whether an existing license should be revoked.

### NEW APPLICATION FORMS

Application forms adopted pursuant to provisions of the act were revised during the year to require submission of more comprehensive information regarding applicants and their intentions. As the result of an exchange of ideas with broadcast groups, certain requirements in these forms were subsequently modified in the interests of simplification and expedition, without sacrificing essential information.

Applicants are required to show that they are qualified as to citizenship and otherwise legally entitled to hold licenses or permits. In addition, the Commission requires submission of information as to the technical, financial, and other qualifications of the applicant, including facts as to occupation and profession, also other interests of any substantial amount (25 percent or greater in other business or enterprise). In the case of applicants other than individuals, similar information is required with respect to the persons who may be interested in or have responsibility in the project as corporate officers, principal stockholders, members of a governing board, partnership or other association. Information as to financial ability and plans for financing stations is required in sufficient detail to disclose how the proposed station is to be operated and, particularly, the sources of funds to be used.

In addition, the Commission requires submission of complete technical data about the equipment to be used, and a full statement as to the service to be rendered, including information as to the staff to be engaged.

### EXAMINATION OF APPLICATIONS

The examination which the Commission makes of each application includes reports and recommendations by its engineering, accounting, and law departments. It is frequent practice, in the course of consideration of an application, to request additional information from

the applicant. Since the close of the fiscal year covered by this report there has been set up in the law department an inquiry section to conduct investigations where the application and other information are insufficient for proper determination.

It is essential to determine whether an applicant's proposal is consistent with provisions of the Communications Act, rules of the Commission, international agreements relating to allocation of radio facilities, and other requirements. Specifications as to equipment must conform to standards required by the Commission. Also, it must be determined whether particular operating assignments applied for are available. In most instances the examination of an application requires extensive study to determine the effect of the proposed operation upon other services as well as with respect to individual results which the particular applicant might be expected to obtain. It is often necessary to make simultaneous examination of applications, either because of conflicts between applicants or because of cooperative efforts by applicants involving the use of directional antennae to afford mutual protection.

Examination of applicants as to their qualifications is made sufficiently broad to cover not only the qualifications specifically required by provisions of the act, such as those relating to citizenship, but also to include information as to an applicant's responsibility to render a public service.

In addition to considering each application on its individual merits, it must also be examined in relation to its effect upon broadcasting services generally. Due to the fact that broadcasting facilities are extremely limited, the question of determining what action upon a given application would be in the public interest frequently resolves itself into choosing between several applications, or of determining whether existing facilities should be disturbed to provide for a proposed new service.

The use of the new and more comprehensive application forms coupled with the practice of requesting additional information from applicants when necessary, plus the facility for undertaking investigations in particular cases, has enabled the Commission to make more active contribution to improvements in broadcast service than at any previous time in its history, thus further safeguarding the public broadcast and communication channels.

### 3. FIELD ACTIVITIES

In administering and enforcing laws, regulations, and international treaties pertaining to radio, the Commission depends in large measure on its field staff. The ether waves are, in effect, patrolled by field offices strategically located throughout the United States and its possessions, augmented by seven main monitoring stations. The latter are at Atlanta, Baltimore, Boston, Grand Island (Nebr.), Allegan (Mich.), San Pedro (Calif.), and Portland (Oreg.).

Monitoring stations are the Commission's "listening posts." In general, they do not participate in the investigation of unauthorized transmission other than to report and record such signals as proof of operation. The task of tracing unlicensed stations is performed mainly by inspectors. The latter are radio engineers and, in addition,

are capable radio operators. Many have had previous experience in military, maritime, aviation, and other communications services. They are familiar with technical procedure, which is of material aid in uncovering illicit use of radio.

At each radio district headquarters, specially equipped automobiles are provided for investigation work. Some of these cars are equipped with all-wave receivers which, when necessary, may be removed from the car for operation. The mobile equipment is also used to transport examination and technical equipment.

Besides seeking out unlicensed operators, the Commission's field staff inspects all classes of radio stations—broadcast, police, ship, amateur, aviation, etc.; examines radio operators for various classes of licenses; monitors radio transmission for adherence to frequency, quality of emission, and compliance with prescribed procedure; conducts field strength surveys and analyzes signal characteristics; and investigates complaints of interference to radio reception. During the last fiscal year the Commission investigated more than 1,000 complaints of unlicensed operation, and the number of these and other cases pressing for investigation is growing under the present situation.

#### AUGMENTED DUTIES

Effective policing of communications under the coordinated national defense program necessitates the Commission augmenting its field force with additional fixed monitoring facilities, long-range direction-finder stations, as well as new bases of operation for mobile units, and adding several hundred inspectors and other experts to its field staff.

This supplemental force is needed to maintain a comprehensive surveillance of all communication channels. Besides increased monitoring duties, the field division is required to watch radiotelegraph and radiotelephone circuits for superfluous signals, record same, and translate foreign-language broadcast material when necessary. It must also make certain of the citizenship of all persons engaged in the types of communications which come under Commission jurisdiction. This figure covers about 100,000 licensed radio operators—commercial and amateur—and thousands of wire and cable operators. (Details of such supervision are treated more fully elsewhere in this report.)

#### FIELD OFFICE LOCATIONS

At the close of the fiscal year the location of Commission monitoring stations and field offices was as follows:

- \*Atlanta (Federal Annex).
- \*Baltimore (Fort McHenry).
- \*Boston (customhouse).
- Buffalo (Federal Building).
- Chicago (courthouse).
- Cleveland (old post office).
- Dallas (United States Terminal Annex).
- Denver (customhouse).
- Detroit (new Federal Building).
- Galveston (Federal Building).
- \*Grand Island, Nebr. (Central Frequency Monitoring Station).
- \*Allegan, Mich.
- Kansas City, Mo. (courthouse).

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\*Monitoring stations.



Los Angeles (post office—Court House Building).  
 Miami (Federal Building).  
 New Orleans (customhouse).  
 Newport News (post office—ships only).  
 New York (641 Washington Street).  
 Norfolk (new post office).  
 Philadelphia (customhouse).  
 \*Portland, Oreg. (new courthouse).  
 Port Arthur, Tex. (post office—ships only).  
 St. Paul (post office—Federal Courts Building).  
 San Diego (customhouse—Court House Building).  
 San Francisco (customhouse).  
 \*San Pedro (post office—Court House Building—ships only).  
 Savannah (post office).  
 Seattle (Federal Office Building).  
 Tampa (post office).  
 Honolulu, Hawaii (Aloha Tower).  
 Juneau, Alaska (Shattuck Building).  
 San Juan, Puerto Rico (Ochoa Building).

#### 4. INTERNATIONAL

In view of the world situation, the Commission's International Division has collaborated actively with the Department of State in matters involving international use of radio, wire, and cable services.

The Commission has made a comprehensive survey of all existing international communication facilities operated between the United States and foreign countries. It has also completed a study of existing plant facilities, both cable and radio, and their capacities for handling traffic between this country and foreign points.

This was in addition to the work of handling routine records and correspondence relating to international communications, compiling lists of international broadcast stations, with individual listings of broadcast stations in the North American countries, issuing semi-monthly radio service bulletins, and notifying the International Telecommunications Union at Berne, Switzerland, of new broadcast stations authorized and frequencies assigned.

E. K. Jett, chief engineer, and Gerald C. Gross, chief of the International Division, represented the Commission at the principal international communications conference held during the fiscal year, namely, the Second Inter-American Radio Conference, which convened at Santiago, Chile, January 17, 1940. They were members of the United States delegation. The Commission also participated in preparatory work for future international conferences, notably the meeting of the International Consulting Committee on Radio (C. C. R. I.), scheduled for Stockholm, Sweden, in June 1940, and the International Telecommunications Conference, slated to meet at Rome, Italy, in 1942, both now postponed because of the war.

#### SECOND INTER-AMERICAN RADIO CONFERENCE

The Second Inter-American Radio Conference was held in Santiago, Chile, January 17 to 23, 1940. This conference resulted in revising certain provisions of the existing Inter-American Arrangement Concerning Radiocommunications, particularly in regard to allocation of frequencies to services in accordance with the latest

\*Monitoring stations.

developments of the art. Resolutions were introduced providing for studies to be made with respect to securing additional frequencies for aviation, and for providing inter-American route frequencies on the basis of sectors of communication control. Also resolutions were introduced concerning the requirements of aeronautical point-to-point frequencies for the inter-American route; for division of time in the use of route frequencies; for study of aircraft radio equipment requirements in general, and for control stations; for exchange of information regarding air navigation aids; and for an interchange of meteorological information. Resolutions to further foster friendly relations between the peoples of the American Nations were introduced relative to increasing the short-wave broadcasting services and providing for the exchange of program schedules of such broadcasts, and calling upon the American nations to reaffirm reciprocally the principle of freedom in radio communications as a public service.

#### EIGHTH AMERICAN SCIENTIFIC CONGRESS

The Commission was represented officially at the Eighth American Scientific Congress held in Washington from May 10 to May 18, 1940.

#### NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

On March 29, 1940, Mexico deposited its ratification of the North American Regional Broadcasting Agreement which had previously been ratified by Canada, Cuba, Haiti, and the United States. The agreement specifies that its effective date will be 1 year from the date of the ratification by the last of the four countries to do so. Hence it will become operative March 29, 1941. It will result in eliminating many international interference problems among broadcasting stations in the North American region. [This agreement is discussed more fully in another section of the report.]

#### INTERNATIONAL BROADCASTING

The Commission has studied at great length the problem of increasing the value of the United States international broadcasting stations so that they compare favorably with similar stations of the other great nations of the world. With this end in view, on May 23, 1939, it issued rules requiring that by July 1, 1940 [subsequently extended to January 1, 1941], all such stations have a minimum of 50 kilowatts in power, and that directional antenna systems be installed with a power gain of at least 10 in the desired direction, which would insure the maximum signal strength to be delivered to the country or countries to which the transmissions are directed. Even now, reports from foreign countries, South America in particular, indicate a vast improvement in the reception of United States broadcast stations.

#### INTERCONTINENTAL AVIATION

Except for Government stations, all aeronautical radio in the United States is subject to the licensing authority of the Commission. Any arrangements made in regard to allocation of frequencies and other use of radio by aircraft flights to and from the United States must be coordinated with the Communications Act and the policies of the

Commission. The Commission has studied this problem thoroughly and in cooperation with the Civil Aeronautics Administration.

#### COMMITTEE ON COOPERATION WITH AMERICAN REPUBLICS

The chief of the International Division has participated regularly in the work of the Committee on Cooperation with the American Republics which has met periodically under the chairmanship of the Under Secretary of State, Mr. Sumner Welles.

#### 5. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

Representatives of the Commission have devoted a great deal of time and effort during the fiscal year to the work of the Interdepartment Radio Advisory Committee. This committee is the Government unit established for the purpose of advising the President with reference to the assignment of frequencies to Government radio stations or classes of Federal stations under the Communications Act. The committee has met once a month or oftener and has approved the assignment of 5,295 frequencies for Government radio stations during the past year. At the present time, there are 14,446 active assignments to Government radio stations, all of which have been recommended by the committee since its establishment.

Of particular note during the year was an equitable exchange of frequencies between the Commission and the Government departments which was accomplished through the medium of the Interdepartment Radio Advisory Committee (see chapter on Nonstandard Broadcast).

#### 6. TECHNICAL INVESTIGATION

The Communications Act requires the Commission to "study new uses for radio, provide for experimental use of frequencies, and generally encourage the larger and more effective use of radio in the public interest." In following out this mandate, the Commission's engineering staff is investigating many techniques and refinements in all branches of communication. Some of these activities are mentioned under the respective chapter subjects in this report. Following is a brief survey of some pertinent engineering studies conducted during the year.

##### GREAT LAKES STUDY

Progress was made throughout the year on the problem of determining the best practicable frequency for the distress signal to be used on the Great Lakes and inland waterways. Studies were completed to determine the electrical constants of the lakes and the required communication ranges. Measurements were made of minimum required signal-to-noise ratio, of relative sky wave field intensities, and of atmospheric noise. Theoretical curves of ground wave field intensities at various distances were computed for the entire frequency range available. Work continues on measurements of transmission on the ultra-high frequencies over the lakes and on the radiation efficiency of typical ship antennas. Final evaluation of these factors will furnish the information needed for the technical phase of this problem.

**STUDY OF ULTRA-HIGH-FREQUENCY GROUND-WAVE PROPAGATION**

Results of a technical study of ultra-high-frequency-wave propagation were summarized in a report at the television hearing of January 15, 1940. The general characteristics of transmission on these frequencies were shown in a set of curves depicting (1) the effects of changes in operating frequency; (2) the influence of polarization; (3) the effect of transmitting antenna height at distances within and beyond the line of sight; (4) the effect of air refraction; (5) the effect of diffraction caused by the curvature of the earth; and (6) the comparative effect of antenna height and power on the service range.

**TELEVISION SYSTEMS STUDY**

Reports for the use of the Commission in connection with the television hearing were prepared on the practicability of various proposed systems of television. A joint report with the law department was also made on the patent situation in the television field, covering the ownership of important patents and patent licensing agreements. The department also participated in the formulation of rules and regulations governing the operation of television stations. (See more detailed television reference elsewhere in this report.)

**STUDY OF TROPOSPHERIC WAVES**

A special study was made for the purpose of developing an approximate theory explaining the nature of tropospheric waves, those waves which at the ultra-high frequencies are reflected back to the earth from the troposphere. The troposphere is a region above the earth's surface extending to a height of approximately 6 miles. From this theoretical study it was concluded that tropospheric waves will vary widely in intensity throughout days and seasons because of their dependence on atmospheric conditions (weather); that fading-free service areas will increase in proportion to transmitting antenna heights; that fading will be more severe as the operating frequency is increased and will occur at the shorter distances for the higher frequencies.

**FIELD INTENSITY SURVEY OF ULTRA-HIGH-FREQUENCY STATIONS**

A field intensity survey of several broadcast stations operating on the ultra-high frequencies was made in January and February of 1940. The observations on the frequency-modulated signals were made in a moving test car. Because of the greater variability of field intensities with distance characteristic of ultra-high frequencies propagation as compared with that at lower frequencies, a new method of analysis of the data was employed in which the field intensities exceeded for various percentages of the distance were indicated rather than those exceeded for various percentages of the time. New methods of determining antenna radiation characteristics were also necessary at these frequencies.

**FREQUENCY MODULATION STUDY**

In preparation for the hearing on aural broadcasting on frequencies above 25,000 kilocycles, a report was prepared in cooperation with the law department on the history and characteristics of ultra-high-frequency radio transmission, a comparison of the relative merits of

amplitude modulation (the method used in standard broadcast band) and frequency modulation (a new noise-reducing method) for aural broadcasting, the allocation problems involved, the probable economic effects of the new system on the standard broadcast system, and the patent situation on frequency modulation. (Frequency modulation is more fully discussed on subsequent pages.)

#### HIGH-FREQUENCY BROADCAST ENGINEERING STANDARDS

Fundamental differences in the propagation of ultra-high and standard broadcasting frequency bands necessitated a special study in connection with licensing requirements for ultra-high-frequency stations.

In the standard broadcast band, service areas are dependent on frequency and ground constants, while at the ultrahigh frequencies it is the transmitting and receiving antenna heights and the topography of the terrain which determine the service area. For this reason, it becomes feasible to adopt "the area to be served" rather than "the power and antenna height" as a basis for authorizations.

A chart was prepared for the convenience of prospective licensees in submitting their applications, to aid in determining the antenna height and the power necessary to obtain specific service ranges.

#### WAVE PROPAGATION STUDY

During the year an important study, namely, the formulation of graphical methods of computing ground-wave field intensity, was completed. The rigorous solution for the computation of ground waves has been known for a number of years. The difficulty has been that the solutions for the various cases, i. e., short distances, long distances, antennas on the ground, elevated antennas, etc., involve extremely complicated functions necessitating very tedious calculations. As a result graphical solutions have been available for only a few of the more simple cases. In the graphical solution which was presented at the March 18th FM [frequency modulation] hearing the complicated functions have been calculated once and for all and are available in the form of graphs.

#### 11-YEAR SUNSPOT CYCLE RECORDS

The 11-year sunspot cycle recording program mentioned in the fifth annual report was begun in the spring of the year 1938. Since that time continuous 24-hour automatic recordings of field intensities and noise have been made on from 15 to 20 broadcast stations by the Commission's monitoring stations. In view of the fact that measurements of field intensities and noise were being recorded simultaneously, it became possible to greatly facilitate the analysis of data by adjustments in the equipment in the field so that average field intensities are now recorded rather than the peak field intensity.

There are now on hand at the Washington office approximately 5,500 24-hour records of sky wave field intensity and some 3,000 similar records of atmospheric noise on frequencies throughout the broadcast band. More than half of these data were analysed during the year, most of this work being done at the field offices and the remainder at Washington.

## DEGREE OF FREQUENCY STABILITY ANALYSIS

Because of the importance of technical progress whereby an increasingly greater portion of the available radio spectrum may be usefully employed, investigation was made to secure a general picture of the results being obtained by radio stations in meeting the requirements of frequency stability specified in the Cairo and Havana tolerance tables.

The data collected consisted of measurements of frequency stability made during a period of 2 years on stations in the United States and other countries. Included in the data were some 20,000 observations made on approximately 1,000 land stations and some 42,000 made on approximately 600 fixed stations.

## 7. PUBLICATIONS

As a convenience, most of the detailed statistical data which has heretofore been appended to the Commission's annual reports is, in the case of this year's figures, being printed separately in a statistical yearbook. The latter compilation of charts, graphs, and tables includes even more recent statistics than for the fiscal year which ended 6 months ago. As is the procedure with the textual annual report, the supplemental "Statistics of the Communications Industry in the United States" is sold by the Superintendent of Documents.

Volume 6 of the "Federal Communications Commission Reports," covering the period July 1, 1938, to February 28, 1939, and containing about 135 decisions of the Commission, was being printed by the Government Printing Office at the close of the fiscal year. Compilation of volume 7 of these reports had been started and will cover the period from March 1, 1939, to February 29, 1940, containing approximately 135 decisions of the Commission. These, too, will be sold by the Superintendent of Documents.

During the past fiscal year the Commission made available its first printed general information pamphlet, "An ABC of the FCC." Containing slightly more than a dozen pages, this pocket-size compilation of questions and answers supplies fundamental facts about the Commission and its work. It is obtainable upon request to the Commission.

In connection with its decisions and other activities, the Commission issued numerous public notices, press releases, and general information releases. Important decisions relating to new or changed rules and regulations were ordered printed. A list of the Commission's current printed matter sold by the Superintendent of Documents will be found in the statistical chapter of this report.

Technical advances in the radio art permitted a number of important alterations in the rules of the Commission during the year. Among these was adoption of the new rules authorizing operation of high-frequency broadcast stations employing FM (frequency modulation) on a commercial basis. These new rules were adopted after extensive public hearings and their substance is discussed more fully elsewhere in this report. Because the general rules covering broadcasting were made applicable also to this class of broadcast station, the new high-frequency broadcast rules and the standard-broadcast rules have been combined under a single title, "Part 3—Rules Governing Standard and High-Frequency Broadcast Stations." At the close of the year part 3, as augmented, was in the process of reprinting.

Rules governing the operation of television stations were revised after hearing, and after a further hearing again amended, so that at the end of the year television operation remained upon an experimental basis. (See discussion elsewhere in this report.) The provisions applicable to television are now contained in part 4 of the Commission's Rules and Regulations.

"Part 7—Rules Governing Coastal and Marine Relay Services (revised to November 14, 1939)" and "Part 8—Rules Governing Ship Service (revised to November 14, 1939)" were amended since those rules appeared in pamphlet form, and at the close of the fiscal year were in process of final revision, looking to a complete reprint.

"Part 31—Uniform System of Accounts, Class A and Class B Telephone Companies," and "Part 32—Units of Property; Telephone Companies," at the close of fiscal year were being printed in a single pamphlet.

A comparative reference table was compiled and printed in the August 4, 1939, issue of the Federal Register to facilitate reference to the rules of the Commission under the new numbering system put into effect July 15, 1939, which was adopted to comply with the Code of Federal Regulations.

In the effort to make Commission rules currently and readily available, there was inaugurated a system of releasing loose-leaf amendment sheets for substitution in the single volume of rules or in the pamphlet parts. Due to lack of appropriations, these substitute pages were available only for limited distribution. However, single copies may be secured upon individual request. The material is so arranged that it can be duplicated readily by private means.

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## **CHAPTER III**

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### **Legislation**

- 1. RECOMMENDATIONS TO CONGRESS**
- 2. REPORTS TO CONGRESS**
- 3. NEW LEGISLATION**
- 4. REPORT OF THE SECRETARY**



## CHAPTER III—LEGISLATION

### 1. RECOMMENDATIONS TO CONGRESS

Recommendations to Congress with respect to new legislation supplementing the Communications Act were submitted during the year. The subject matter of these recommendations is reflected in the ensuing comment. The Commission makes specific proposals for legislation when the need therefor arises, particularly upon the completion of special studies which merit such recommendation. Accordingly, this report makes no specific recommendation for additional legislation at this time.

### 2. REPORTS TO CONGRESS

In response to S. Res. 95, 75th Congress, 2d Session, approved June 19, 1939, which authorized an investigation of the telegraph industry by the Interstate Commerce Committee of the United States Senate, the Commission furnished a report on the domestic aspects of telegraph merger and a supplemental report on the international phases of this problem. These findings were presented to a subcommittee of the Interstate Commerce Committee headed by Senator Burton K. Wheeler, of Montana. [The subject is covered elsewhere in this report.] The Commission continued to cooperate with this subcommittee in the furnishing of statistical data and in lending its facilities and records as requested. Also, representatives of the Commission appeared and gave testimony at the subcommittee hearings.

### 3. NEW LEGISLATION

The Commission functions under the Communications Act of 1934, as amended. Following is a brief review of acts of Congress during the fiscal year 1940 which amended this basic law and conferring additional authority on the Commission.

The Commission submitted to Congress near the close of the fiscal year a recommendation that section 4 (f) of the Communications Act be amended to provide that shipowners who request overtime service by inspectors of the Commission for the purpose of obtaining certificates of inspection for their vessels, pursuant to the provisions of section 360 (b) of the act, shall be required to pay for such overtime service at rates to be fixed by statute. This matter was pending at the close of the year.

Section 602 (e) relating to a study of radio requirements necessary or desirable for safety purposes for ships navigating the Great Lakes and inland waters of the United States, was amended by Public. No. 441, 76th Congress, 3d Session (H. R. 7863), approved March 18, 1940, so as to extend until January 1, 1941, the time for filing the Commission's report and recommendations. [This subject is discussed elsewhere in this report.]

Public, No. 649, Seventy-sixth Congress, third session, approved June 24, 1940, authorized the Commission to purchase a site and building in Massachusetts for use as a radio monitoring station to supplant the existing one at Boston.

Section 210 of the Communications Act was amended by Public, No. 659, same Congress session, approved June 25, 1940, so as to permit common carriers to render to any Government agency free service in connection with the national defense, subject to Commission rules and regulations.

In addition, a number of measures which were introduced in Congress affecting activities of the Commission were commented on at the request of the congressional committees having charge of the bills. A list of legislative proposals on which the Commission furnished information, data, and recommendation, including personal appearances of Commission representatives at committee hearings, appears in the statistical chapter.

#### BILLS COMMENTED ON BY COMMISSION

During the fiscal year ended June 30, 1940, the Commission, at the request of various committees of Congress, commented on the following bills:

H. Res. 234—Dealing with the subject of power in excess of 50 kilowatts for standard broadcast stations.

H. Res. 4546—To regulate the practice of shorthand reporting, and for other purposes.

H. Res. 6324—To provide for the more expeditious settlement of disputes with the United States, and for other purposes.

H. Res. 7188—To remove certain restrictions on the character of international broadcast and, specifically, to nullify the provisions of section 42.03 (a) of the Commission's rules.

H. Res. 7737—To amend the Judicial Code by adding a new section thereto designated as section 266 [a], to provide for intervention by States in the courts of the United States in certain cases.

H. Res. 7863—To amend section 602 (e) of the Communications Act of 1934, as amended, relating to the study of radio requirements for ships navigating the Great Lakes and inland waters of the United States.

H. Res. 8509—To amend the Communications Act of 1934 in order to preserve and protect liberty of expression in radio communications.

S. Res. 224—Would authorize and direct the Committee on Interstate Commerce to make an investigation of alleged instances of interception of certain wire communications and of installation of dictographs.

S. Res. 251—To request the Senate Committee on Interstate Commerce to investigate the actions of the Federal Communications Commission in connection with the development of television.

S. 2611—To authorize the purchase of a site and the erection of a building in the State of Massachusetts for use by the Federal Communications Commission as a radio monitoring station, and for other purposes.

S. 3018—To amend section 210 of the Communications Act of 1934 so as to permit communication utilities to contribute free services to the national defense.

S. 3745—To limit the powers of the Federal Communications Commission in certain cases.

## 4. REPORT OF THE SECRETARY

For the fiscal year ending June 30, 1940, there was appropriated \$1,838,175. This sum is accounted for as follows:

"Salaries and Expenses":	
Personal services, District of Columbia-----	\$1,146,917
Personal services, field-----	486,030
Supplies and materials-----	27,991
Gasoline and oil-----	3,573
Storage and care of vehicles-----	5,079
Communication service-----	19,014
Travel expense-----	36,741
Carfare-----	1,347
Transportation of things-----	3,597
Stenographic reporting-----	6,427
Heat, light, power, and water-----	4,500
Rent expense-----	14,151
Repairs and alterations-----	3,825
Special and miscellaneous-----	2,280
Equipment-----	38,528
	<u>1,800,000</u>
"Printing and Binding"-----	<u>25,000</u>
"Study of Radio Requirements of Inland Waterways".	
Personal services, District of Columbia-----	7,007
Supplies and materials-----	183
Communication service-----	80
Travel expense-----	4,741
Reserve unexpended-----	1,164
	<u>13,175</u>
Total-----	<u>1,838,175</u>

At the close of the fiscal year, the Commission had 434 employees in Washington and 191 in the field. With few exceptions, the Commission personnel is under Civil Service.

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## CHAPTER IV

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# Telephone and Telegraph

1. GENERAL REGULATION
2. TELEGRAPH INVESTIGATION
3. TELEPHONE RATE REDUCTIONS
4. RATES AND TARIFFS
5. SUPERVISION OF ACCOUNTS
6. FINANCIAL AND OTHER STATISTICAL DATA
7. WIRE TELEPHONE FACILITIES
8. WIRE TELEGRAPH FACILITIES

## CHAPTER IV—TELEPHONE AND TELEGRAPH

### 1. GENERAL REGULATION

The Commission is charged with the regulation of all telephone and telegraph companies doing business as common carriers in interstate or foreign communication. Such authority extends over wire and radio facilities both. The discussion in this chapter concerns rates and tariffs, supervision of accounts, complaints and investigations, extension of facilities, and technical developments in both fields. Matters relating to the licensing of these carriers will be found in a separate chapter of the report.

War conditions in Europe have brought about increased work in connection with international rates and services. In addition to regular supervision and reports on these matters, special studies have been made and particular data assembled.

### 2. TELEGRAPH INVESTIGATION

Pursuant to request of a subcommittee of the Interstate Commerce Committee of the Senate, acting under Senate Resolution 95 of the Seventy-Sixth Congress, the Commission conducted an investigation into conditions of the telegraph industry and submitted its report of findings and recommendations in two parts. That portion of the report covering the domestic service was transmitted December 23, 1939, and the part relating to the international field was submitted February 21, 1940.

On the basis of its findings the Commission recommended to Congress the enactment of legislation to permit consolidation of telegraph carriers into one or more unified systems for economic and national-defense reasons.

It was suggested that this legislation be broad in scope, leaving to the appropriate authority the administration of the details important to the consummation of any particular plan which may be proposed. While the recommendation was that the legislation permitting consolidations be in general terms, it was requested that Congress indicate its specific intent with respect to the following subjects: The protection of labor; the adoption of sound and simplified corporate and financial structures; the retention of the American character of the communications system by prohibition against the ownership or voting of stock by aliens, or the holding of any managerial office by an alien; and the requirement for the abandonment of services or facilities in those situations in which the Commission finds them to be no longer necessary.

It was further suggested that the creation of a single international carrier would provide a more effective device for securing equitable communication arrangements with foreign administrations.

### 3. TELEPHONE RATE REDUCTIONS

Effective May 1, 1940, the American Telephone & Telegraph Co. reduced rates on long-distance telephone calls in excess of 420 miles, resulting in an estimated annual saving to the public of \$5,300,000. This reduction was effected as a result of conferences between the Commission and the company without the necessity of legal proceedings.

An indicated saving of \$850,000 a year on interstate message toll service is provided in revised rate schedules of the New York Telephone Co. and the New Jersey Bell Telephone Co., which became effective December 1, 1940.

A new and reduced schedule of interstate message toll telephone rates for service in the Southeastern States over the lines of the Southern Bell Telephone & Telegraph Co. was filed with the Commission in June, to take effect August 1, 1940. Similarly negotiated, this reduction amounts to approximately \$525,000 a year.

The Bell Telephone Co. of Pennsylvania, the Diamond State Telephone Co., and the New Jersey Bell Telephone Co. reduced their toll message service rates between points in Pennsylvania, Delaware, and New Jersey, effective May 1, 1940, with annual saving of \$91,400 to customers in those States.

Reductions made since the establishment of the Commission aggregate nearly \$30,000,000 a year. If the reductions achieved since 1934 were computed on a cumulative basis, the savings to telephone users will have amounted to almost \$100,000,000 by the end of 1940, without taking into consideration savings on increased traffic.

### 4. RATES AND TARIFFS

#### RATE SCHEDULES

At the close of the fiscal year 361 communication carriers had tariffs and concurrences on file with the Commission, an increase of 131 over June 30, 1939. Filed during the year were 23,330 tariffs containing changes in rates, regulations, practices, and classifications of service, or establishing new communication services or of concurrences. Of this total, 12,679 related to telephone services; 8,064 to telegraph services, and 2,587 to both telephone and telegraph services. A total of 144 tariffs were rejected for failure to conform to statutory requirements.

These schedules are subject to correction of rates and regulations therein which are unjustly discriminatory or otherwise unlawful. Numerous irregularities in rates were corrected or eliminated through correspondence with carriers. In this connection, 1,528 letters were written as contrasted with less than 700 such letters written in the previous year.

Special and successful effort was made to secure the filing of schedules by carriers that had not filed before, particularly public ship licensees and Alaskan radio licensees engaging in public service. Effort was also made to obtain concurrences from carriers engaging in joint "through" service with other carriers.

Tariff schedules are open to public inspection at the Washington offices of the Commission, and there continues to be increased reference to these records by the public.

## RATE CHANGES

Various rate reductions were effected during the fiscal year as a result of negotiations by the Commission. In addition to those mentioned, these cases were recorded:

*Private-line service.*—During the fiscal year the American Telephone & Telegraph Co. and the associated Bell System companies reduced rates for private-line services (including Morse, teletypewriter, telephone, press, and Government) with a resultant annual saving to the public estimated to be in excess of \$1,200,000. Comparable reductions were made by The Western Union Telegraph Co. in its private-line service rates, with annual saving to the public of approximately \$130,000.

*Program transmission service.*—Effective September 11, 1939, the American Telephone & Telegraph Co. reduced rates for overtime on schedule A program transmission service where arranged for in advance, with an estimated annual saving of \$75,000 to the users of such service.

*Message toll telephone service.*—Effective September 1, 1939, the American Telephone & Telegraph Co. rearranged routings to points in Mexico, resulting in annual savings to the public of approximately \$60,000.

## RATES FOR GOVERNMENT MESSAGES

As required under the Post Roads Act of 1866, as amended, the Commission promulgated its annual order fixing rates for United States Government messages handled by companies subject to the act and to certain cable-landing licenses. The carriers involved requested an increase in the rates for the messages handled. After a hearing the Commission authorized an increase of from 40 to 60 percent in the rates applicable to Government messages for the period January 1, 1940, to June 30, 1940. By a subsequent order, the increased rates were continued for the current fiscal year.

## INVESTIGATIONS AND SUSPENSIONS

*Pacific coast telephone rates.*—In the 1939 annual report mention was made of a complaint filed with the Commission by the Department of Public Service of the State of Washington against the rates, charges, and practices of The Pacific Telephone & Telegraph Co. applicable to interstate service between points within and without the State of Washington. On its own motion, the Commission issued its order instituting an investigation into the rates, charges, and practices, with respect to the interstate communications service furnished by The Pacific Telephone & Telegraph Co. and its two wholly owned subsidiaries, Southern California Telephone Co. and Bell Telephone Co. of Nevada, which materially broadened the scope of the matter. Hearings were held in Seattle and San Francisco, and the record was closed on April 6, 1940. Respondents submitted their brief containing proposed findings of fact and conclusions in May 1940. A proposed report, adopted by the Commission on August 15, 1940, held the rate scale to be "unjust and discriminatory."

*Foreign special contract press service.*—Charges, practices, classifications, and regulations for and in connection with foreign special contract press service from London, England, to New York,

N. Y., were the subject of investigation and hearing. Decision was pending at the close of the fiscal year.

*Multiple address press service.*—Multiple address press charges, practices, classifications, and regulations applicable to service to outlying territories and possessions of the United States were the subject of investigation and hearing. The matter was disposed of by the carrier involved filing revised tariff schedules placing the territories and possessions on a parity with the continental United States and Canada.

*Reforwarding of messages.*—Regulations and practices of telegraph carriers concerning the reforwarding of telegraph messages were the subject of investigation and hearing. The matter was pending decision at the end of the year.

*Ship telephone service on Great Lakes.*—Tariff schedules of two carriers containing charges and regulations with respect to the furnishing of radiotelephone service to and from vessels on the Great Lakes were suspended and ordered investigated. Hearings were held and the matter was pending decision at the close of the fiscal year. The carriers meanwhile are operating under accounting orders requiring the maintenance of records to account for all charges collected at rates that were suspended to facilitate determination of the differential, and for other purposes.

*Interzone telephone rates.*—The action of one large telephone carrier in withdrawing certain rates for interstate telephone service to and from points in the vicinity of a large metropolitan center, and the establishment by such carrier of an alleged local exchange service through the alleged extension of the local service area of the metropolitan center for a considerable distance to include certain interstate points was investigated. Decision was pending.

*Common carrier as agent of another.*—The Commission suspended schedules of charges which purported to discontinue charges and regulations of three carriers on the ground that such carriers were acting as agent of a fourth carrier and not as carriers, as such, in the course of furnishing communication services to the public. The proceeding was dismissed when the suspended schedules were voluntarily withdrawn.

*Increased rates for multiple address press service.*—The Commission suspended schedules of charges which proposed to increase charges for multiple address service to the press on certain holidays. The proceeding was dismissed when the carrier voluntarily filed revised schedules withdrawing the proposed increased rates.

*New domestic telegraph carriers.*—The Commission entered upon an investigation to determine whether it would be in the public interest to permit a new telegraph carrier to enter the domestic telegraph field in competition with existing carriers serving the same places. The matter was pending proposed findings.

*Discriminatory rates (local).*—At the instance of the Portland (Oreg.) Chamber of Commerce, the Commission investigated possible discrimination against that city in the matter of certain transpacific rates. A hearing on this matter has been indefinitely suspended, at the request of the Portland Chamber of Commerce, pending the application of a carrier to construct and operate a radiotelegraph station in Portland and thereby remove the alleged discrimination.



*Urgent cable rates.*—The Commission entered upon an investigation of the reasonableness of the ratio between rates for “urgent” and “ordinary” messages between the United States and overseas points. Proposed findings of the Commission, promulgated prior to the close of the fiscal year, were to the effect that the existing ratio is reasonable.

*Timed wire service.*—The Commission investigated the lawfulness of the TWS [timed wire service] classification of domestic telegraph messages. Proposed findings, promulgated prior to the close of the fiscal year, were to the effect that such classification is unlawful.

*Restriction of rates to individuals.*—The Commission investigated and suspended message-telegram service schedules of certain telegraph carriers, which schedules published rates lower to certain individuals than to the general public. The proceeding was dismissed upon the filing of revised schedules of charges discontinuing the practice.

*Payment of telegraph charges in stamps.*—The Commission, on September 12, 1940, approved a proposal by the Western Union Telegraph Co. to sell and accept private stamps in payment of telegraph service.

*Telegraph pick-up and delivery services.*—The Commission has ordered an investigation into the practices of the telegraph carriers with respect to the pick-up and delivery of messages, and the studies were under way at the close of the fiscal year.

*Qualified toll-line service.*—The Commission investigated schedules of qualified toll line service rates of certain telephone companies. It was found that additional charges, contained in contracts between the telephone companies but not provided for in the tariff schedules filed with the Commission, were being made for service via certain routes. The proceedings were dismissed upon the filing of revised tariff schedules.

*Miscellaneous.*—Enforcement of the statutory provisions which declare rebating unlawful and which prohibit common carriers from engaging in service without tariff schedules on file with the Commission has been carried out by field investigations of the records of carriers, followed by indictments in certain cases. Fines were assessed in two cases and other investigations are pending.

### 5. SUPERVISION OF ACCOUNTS

Among the Commission's activities in the matter of accounting regulations were the following:

*Uniform system of accounts—wire telegraph and ocean cable carriers.*—On October 29, 1940, the Commission adopted a revised uniform system of accounts for wire telegraph and ocean cable carriers, to go into effect January 1, 1942. The new system, which conforms to Government principles, will supplant one in use since 1914, and which has been found inapplicable to many modern operations.

*Uniform system of accounts—radiotelegraph carriers.*—A uniform system of accounts for radiotelegraph carriers having average annual operating revenues in excess of \$50,000 was prescribed by the Commission in June 1939 and became effective January 1, 1940.

*Restatement of plant accounts on basis of original cost.*—Considerable progress has been made by telephone carriers in the restatement of their plant accounts on the basis of original cost as prescribed by the Commission. This matter and that of appropriate disposition of

amounts recorded in plant-acquisition adjustment accounts as a result of such restatements have been important features of the cooperative activities between State and Federal regulatory bodies.

*Depreciation.*—The Commission has been cooperating with the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners by assisting in the preparation of a report on depreciation. An effort is being made to bring about consistency in the treatment of depreciation to the end that the same elements which are taken into consideration in determining the annual depreciation expense includible in the cost of furnishing service shall be given corresponding consideration in determining the amount of accrued depreciation deductible in establishing the base upon which a fair rate of return is allowed to be earned. The matter is important to the public from the standpoint of its effect upon rates.

In accordance with section 220 (b) of the act, classes of depreciable plant were prescribed for radiotelegraph carriers in the Uniform System of Accounts for Radiotelegraph Carriers mentioned above.

*Relief and pensions.*—Telephone, telegraph, cable, and radiotelegraph carriers proposed for welfare purposes during the current year expenditures of \$55,000,000 to \$60,000,000. These provisions include large increases in certain items aggregating over \$16,000,000 annually, which have necessitated special consideration.

Financial, actuarial, and accounting data have been prepared in Docket 5188 in connection with such proposed increased annual charges in the amount of approximately \$10,000,000, for the purpose of determining the reasonableness of such increases. Decision in this matter was under consideration by the Commission at the close of the fiscal year.

Analyses have continued with respect to filings of all communication carriers in compliance with a standing order of the Commission relating to changes in relief and pension plans and accounting practices. Pending decision in Docket No. 5188, controversial points arising from these analyses remain unsettled.

#### FIELD EXAMINATIONS

Field examinations to enforce accounting regulations and to assemble necessary factual data have been confined largely to carriers located in New York City, where the Commission maintains its only accounting field office.

Two general examinations were made of the accounts of ocean-cable carriers and two major field examinations were in progress at the close of the year. Nine special examinations were made of certain telephone and telegraph carriers, and data with respect to financial and operating conditions in the telegraph industry were compiled for inclusion in the Commission's report on the telegraph industry noted elsewhere in this report.

The Commission has been without sufficient funds to provide an adequate field force to examine the records of carriers for the purpose of testing compliance with the prescribed accounting rules or for the other regular and continuing duties contemplated by section 220 of the act (relating to the accounts and records of communication carriers) and by section 215 of the act (relating to the accounts and records of affiliated companies including manufacturing

subsidiaries and others furnishing equipment, supplies, or services, the cost of which affects the rates charged for communication service).

It is important to effective regulation to be able to gather at first hand the information and facts upon which the Commission must base decision. Otherwise, the Commission is forced to rely upon *ex parte* statements made in response to questionnaires and inquiries.

## 6. FINANCIAL AND OTHER STATISTICAL DATA

### ANNUAL AND MONTHLY REPORTS

Annual reports for the calendar year 1939 (containing comprehensive information of a financial and statistical nature) were filed by 167 companies. Of this number, 91 were telephone carriers, 14 were wire-telegraph or ocean-cable carriers, 19 were radiotelegraph carriers, and 43 were holding companies. Monthly reports were filed during this calendar year by 111 companies. Of this number, 94 were telephone carriers, 8 were wire-telegraph or ocean-cable carriers, and 9 were radiotelegraph carriers. A few carriers not subject to section 219 of the act, which requires the filing of annual reports, file such reports voluntarily and a considerable number of carriers file monthly reports voluntarily.

Only those telephone carriers having average annual operating revenues in excess of \$50,000 were required to file annual reports, and only those having such revenues in excess of \$250,000 were required to file monthly reports. All telegraph carriers subject to Commission jurisdiction were required to file annual reports, but only those having average operating revenues in excess of \$50,000 were required to file monthly reports. Telephone carriers having revenues in excess of \$1,000,000 were required to file additional monthly reports showing various income and balance-sheet items.

Annual reports for the calendar year 1939, relating to traffic damage claims, were filed by 111 carriers engaged in telegraph service by wire or radio, or various industries incidently performing radiotelegraph services.

### STATISTICAL COMPILATIONS AND PUBLICATIONS

The following regularly published statistical summaries were issued by the Commission during the fiscal year:

Selected financial and operating data from the annual reports of telephone carriers for the year ended December 31, 1938.

Selected financial and operating data from the annual reports of telegraph, cable, and radiotelegraph carriers for the year ended December 31, 1938.

Selected financial data from the annual reports of holding companies for the year ended December 31, 1938.

Intercorporate relations of carriers and controlling companies, 1938, including index to companies.

Salary report of telephone and telegraph carriers and holding companies, 1938.

Summary of the monthly reports of large telephone carriers in the United States.

Operating data from the monthly reports of telegraph carriers.

Telephone hand-set charges and changes since January 1, 1939.

Various other statistical studies were made during the year relating to such vital matters as international traffic and the status of domestic telegraph carriers mentioned elsewhere in this report.

## COMPARATIVE DATA RELATING TO COMMON CARRIERS

The following table shows important financial and operating data concerning 74 class A and 17 class B telephone carriers for the calendar year 1939, with comparative data for 1938. It includes returns from two carriers located outside of the continental limits of the United States. Similar information pertaining to 9 telegraph, 5 cable, and 19 radiotelegraph carriers is shown in an additional table. Comprehensive statistical data relating to common carriers and controlling companies subject to Commission jurisdiction will be found in the separate statistical yearbook which supplements this textual report. A considerable portion of the information shown in the yearbook was formerly included in the annual report appendices.

*Telephone carriers*

	1939	1938	Increase or decrease	
			Amount	Ratio percent
Number of carriers.....	1 91	92		
Investment in telephone plant.....	\$4,909,103,693	\$4,798,794,098	\$110,309,595	2.30
Capital stock.....	\$4,299,311,729	\$4,292,431,374	\$6,877,355	.16
Funded debt.....	\$1,074,375,300	\$1,033,504,535	\$40,870,765	3.95
Depreciation reserve.....	\$1,375,794,730	\$1,321,458,355	\$54,336,375	4.11
Total surplus.....	\$381,047,645	\$363,439,869	\$17,607,776	4.84
Operating revenues.....	\$1,201,427,364	\$1,143,287,173	\$58,140,191	5.09
Operating expenses.....	\$904,246,420	\$786,457,139	\$117,789,280	2.26
Operating taxes.....	\$163,979,026	\$152,112,021	\$11,867,005	7.80
Net operating income.....	\$233,202,103	\$204,690,908	\$28,511,195	13.93
Total interest deductions.....	\$52,852,140	\$54,269,547	\$1,417,407	2.61
Dividends declared.....	\$346,525,984	\$338,611,226	\$7,914,758	2.34
Miles of wire.....	89,797,535	87,592,000	2,205,535	2.52
Number of telephones.....	18,333,043	17,503,915	829,128	4.74
Number of employees at end of December.....	287,333	286,440	493	.17
Total compensation of employees.....	\$511,892,396	\$503,062,615	\$8,829,781	1.76

<sup>1</sup> Deficit or other reverse item.

<sup>2</sup> Excludes three carriers merged with others and includes two additional carriers.

NOTE.—The above amounts represent combined totals of the companies included, and do not give effect to elimination of intercompany items.

*Telegraph, cable, and radiotelegraph carriers*

Item	1939	1938	Increase or decrease	
			Amount	Ratio percent
Number of carriers.....	1 32	34		
Investment in plant and equipment.....	\$534,474,851	\$537,943,572	\$3,468,721	0.63
Capital stock.....	\$165,051,257	\$165,199,511	\$148,254	.08
Unmatured funded debt.....	\$88,206,275	\$111,026,210	\$22,819,935	26.55
Reserve for accrued depreciation.....	\$169,021,984	\$164,352,579	\$4,669,405	1.48
Total corporate surplus.....	\$44,232,698	\$67,194,086	\$22,961,388	31.17
Operating revenues.....	\$140,455,654	\$133,650,346	\$6,805,308	5.09
Operating expenses.....	\$121,729,571	\$120,074,182	\$1,655,389	1.38
Operating taxes.....	\$8,400,200	\$7,955,671	\$444,529	5.59
Operating income.....	\$9,739,095	\$5,109,741	\$4,629,354	90.60
Total interest deductions.....	\$8,489,291	\$8,553,738	\$64,447	.75
Dividends declared.....	\$420,855	\$422,210	\$1,355	.22
Miles of wire.....	2,436,139	2,428,245	7,894	.33
Estimated number of revenue messages transmitted.....	209,258,068	205,382,652	3,875,416	1.89
Number of employees at end of December.....	66,022	65,573	449	.68
Total compensation of employees.....	\$84,245,195	\$82,793,030	\$1,452,165	1.75

<sup>1</sup> Deficit or other reverse item.

<sup>2</sup> Excludes two carriers which discontinued operations.

NOTE.—The above amounts represent combined totals of the companies included, and do not give effect to elimination of intercompany items.

## 7. WIRE TELEPHONE FACILITIES

## APPLICATIONS

The 76 applications for extension and consolidation of lines or facilities from telephone carriers handled during the year include those for (1) acquisition and construction under section 214; (2) the supplementing of existing facilities under the second-proviso clause of section 214 (a); and (3) authority to consolidate under section 221 (a).

*Wire telephone applications approved by the Commission from July 1, 1934, to June 30, 1940*

Period	Number of applications	Estimated construction cost	Miles of cable placed	Miles of open wire placed
July 1, 1934, to June 30, 1935.....	7	\$1, 145, 851	<sup>1</sup> 234.3	-----
July 1, 1935, to June 30, 1936.....	15	275, 625	24	475
July 1, 1936, to June 30, 1937.....	50	5, 551, 702	206	17, 045
July 1, 1937, to June 30, 1938.....	45	3, 921, 000	499	1, 212
July 1, 1938, to June 30, 1939.....	45	6, 960, 123	<sup>2</sup> 646	1, 967
July 1, 1939, to June 30, 1940.....	72	9, 070, 952	<sup>3</sup> 1, 209.2	3, 501
Total.....	234	26, 925, 253	2, 818.5	24, 200

<sup>1</sup> Of which 94.5 miles is coaxial cable containing 2 coaxial units.

<sup>2</sup> Of which 186 miles is coaxial cable containing 4 coaxial units.

<sup>3</sup> Of which 42 miles is coaxial cable containing 4 coaxial units.

## ACQUISITIONS UNDER SECTION 214

Among the applications for authority to acquire and operate facilities were the following grants by the Commission:

The New England Telephone & Telegraph Co., to acquire toll facilities of the Central Telephone Co. of Vermont.

The American Telephone & Telegraph Co., to acquire the property of the American Telephone & Telegraph Co. of Massachusetts.

The Southwestern Associated Telephone Co., to acquire the property of the Haskell Telephone Co.

## SUPPLEMENTING EXISTING FACILITIES UNDER SECTION 214

The second proviso of section 214 (a) gives the Commission power to authorize the supplementing of existing facilities without regard to other provisions of the section requiring hearings, notices, etc. During the year 75 applicants requested authority to supplement existing facilities. Seventy-one were analyzed and approved by the Commission, one of which had been filed at the end of the 1939 fiscal year. Two applications were returned to the applicants. Action on three applications was pending.

Most of these applications were from the Bell Telephone System, only six being filed by other companies. The expenditures for construction in the individual projects approved ranged from a few thousand dollars to \$2,815,200, with a total of \$9,070,952. This represents an increase over any previous year—in number of applications, total expenditure, and miles of toll cable constructed.

In connection with these projects, it is the policy of the Commission to require periodic construction and progress reports and a full report on their completion. The reports are received and analyzed by the engineering and accounting departments.

## PETITIONS TO CONSOLIDATE UNDER SECTION 221 (a)

Section 221 (a) of the act provides that telephone carriers desiring to consolidate their properties may file with the Commission a petition requesting a certificate to the effect that the proposed consolidation, merger, acquisition, or control of the property of one or more telephone companies by another will be of advantage to the persons to whom service is to be rendered, and in the public interest. Such a certificate exempts the carriers from provisions of the antitrust act.

A joint petition was filed by the Michigan Bell Telephone Co. and the Eaton County Telephone Co. on March 31, 1939, requesting the Commission to certify that the proposed acquisition by the Michigan Bell Telephone Co. would be of advantage to the persons to whom service would be rendered and in the public interest. A public hearing upon this petition was held on June 12, 1939. The petition was granted on July 12, 1939, and a certificate was issued.

The Michigan Bell Telephone Co. filed a petition requesting the Commission to certify that the proposed acquisition by the Michigan Bell Co. of the Hillandale Telephone Co. would be of advantage to the persons to whom service is to be rendered and in the public interest. The Michigan Bell Telephone Co. operated an exchange at Benton Harbor, Mich. The properties of the Hillandale company consisted of rural lines in the vicinity of Benton Harbor which connected with the lines of the Michigan Bell company's Benton Harbor exchange at or near the city limits. Under the then existing arrangements, the Hillandale company was responsible for the rendering of service from its subscribers to the exchange area of the Michigan Bell company, the latter being responsible for rendering the remaining portion of the service. The Commission found, after a public hearing, that the proposed acquisition would be of advantage to the persons to whom service is to be rendered and in the public interest. The petition was granted and a certificate was issued.

## TECHNICAL DEVELOPMENTS IN WIRE TELEPHONE

During the past calendar year the Commission authorized about \$10,000,000 worth of new telephone line construction. Some of the important technical developments and improvements achieved in wire telephone communication during the fiscal year are here listed:

*New York-Philadelphia coaxial system.*—New 3-megacycle repeater equipment was installed at 5-mile intervals along the route. Experimental television modulating equipment was installed in both New York and Philadelphia. Tests were made of television transmission over the 190-mile coaxial loop from the Bell Laboratories in New York to Philadelphia and return, using special terminal equipment which gave greater brightness, range, and definition than the usual commercial television receiver. Film pictures were employed with 441-line scanning, 30 frames interlaced. By switching the coaxial cable loop in and out, comparison was made of transmission over the coaxial loop with local transmission. To casual observation there was no appreciable difference, although in test patterns and in a few of the pictures a slight difference could be detected by the expert. Further refinement and testing of the system is being carried on.

During the National Republican Convention at Philadelphia beginning June 24, 1940, television programs were transmitted by means of coaxial and wire cable conductors from Philadelphia to New York, where the television programs were broadcast via radio by the National Broadcasting Co. From Convention Hall to the American Telephone & Telegraph Co.'s Long Lines Building at Philadelphia, regular cable pairs were used. As such wire circuits do not transmit television signals as readily as do coaxial conductors, it was necessary to install repeaters at 1-mile intervals. From the Long Lines Building in Philadelphia to the Bell Telephone Laboratories in New York, the New York-Philadelphia coaxial cable was used. From the laboratories to Radio City a new type of cable was installed which has the advantage of requiring no intermediate repeaters for the distance involved.

*Stevens Point-Minneapolis coaxial cable.*—The construction of this cable, which was started last year, is progressing satisfactorily and it was expected that its entire 195 miles will be completed and placed in service in December 1940.

*Washington-Baltimore coaxial cable.*—The American Telephone & Telegraph Co., the Chesapeake & Potomac Telephone Co., and the Chesapeake & Potomac Telephone Co. of Baltimore City filed a joint application for the installation of two cables between Baltimore and Washington (42 miles). One cable will contain four coaxial units together with a number of quadded and nonquadded wire conductors. A second cable containing a larger number of quadded conductors will be simultaneously plowed into the ground. The wire conductors will be used for type K carrier (12-channel) systems, while one pair of the coaxial conductors may provide for 480 telephone channels and the second pair will be set aside for emergency use.

*Carrier systems.*—There has been considerable activity in the development of new and the improvement of existing carrier telephone systems in this country in the past year. A number of type K carrier installations have been made on cable, a few of which are on the following cables: Boston-New York, St. Louis-Joplin, Mo., and Glens Falls-Albany, N. Y.

*Crossbar switching system.*—During the year, important developments were made in the crossbar dial-telephone central office switching system. A number of installations of this system are now being made in the metropolitan areas of New York and Washington, D. C.

*Weather announcing machine.*—Machines have been developed and installed in telephone central offices in the New York metropolitan area, Chicago, Baltimore, Washington, and Detroit. With this machine, telephone subscribers may receive forecasts of weather conditions by dialing a particular number. Information for these announcements is supplied hourly by local officers of the Weather Bureau over a direct teletype connection. The information is then transmitted by means of an operator's voice to a microphone, from which it is recorded on a magnetic tape. This pattern remains on the tape and can be "picked up" electrically and transmitted to subscribers many thousands of times until erased, which is done by an operator pushing a switch and saturating the tape with a heavy magnetic field.

## 8. WIRE TELEGRAPH FACILITIES

## APPLICATIONS

The number of applications for wire telegraph certificates under section 214 of the act was small during the fiscal year. All applications requested authority for the lease of telegraph circuits. There were no applications involving new construction. Approximately 65 miles of circuit were authorized to be leased for permanent use and approximately 163 miles were authorized for temporary use.

## TECHNICAL DEVELOPMENTS IN WIRE TELEGRAPH

The carrier telegraph system has been improved notably by the adaptation of frequency modulation. The principle of frequency modulation has been developed to provide an important increase in the reliability of carrier current operation with no enlargement of the frequency band width required for telegraph working.

*Automatic facsimile equipment.*—A new type receiving machine for installation in central offices has been designed which permits complete automatic reception of telegrams. The new unit provides for the use of a large roll of recording paper continuously fed as messages are recorded. Received messages are cut off from the roll automatically and dropped on a conveyor system for distribution to the sending trunk channel. The recording paper, known as "Teledeltos," has been greatly improved in quality during the year.

*Automatic switching of teleprinter circuits.*—A system has been developed so that a relatively small number of trunks are utilized to provide direct tie-line service to many patrons in a distant city. A speedier service results through the elimination of an intermediate relay at the city with the tie-line connections.

*Varioplex circuit.*—Continuing engineering work in development has resulted in an improved system which operates on a single channel of multiplex circuit. This has resulted in the expansion of varioplex facilities to smaller cities, and as a result teletypewriter service has been made available to many smaller cities during the year.

*"Metallic operation."*—A large number of principal trunk circuits between large cities have been converted to "metallic" operation, thereby making these circuits immune to disturbances from parallel power lines and magnetic storms.

*"Channel repeaters."*—A number of "channel repeaters" have been installed to permit rapid setting up of emergency printer circuits when abnormal traffic conditions prevail.

*Reperforator-switching system.*—Development to provide a more accurate, rapid, and efficient method of relaying telegrams through large central offices has continued, the installation of the system being under way at one of the large relay offices. Supplementary development work has adapted the system for "private-line" switching in patrons' offices.

*Semiautomatic system.*—An experimental installation of a semiautomatic system for improving the handling of relay traffic is under observation in New York City.



**PROSECUTION FOR VIOLATION**

It was necessary during the fiscal year for the Commission to turn over to the Department of Justice a case involving the unauthorized extension of a wire telegraph line between Baltimore and Belcamp, Md.; a case of rebating to a customer at Philadelphia; and a case involving the rendition of service at Breezy Point, Minn., without having proper tariffs on file. Convictions were had in all three cases.

**EFFECT OF WAR ON CABLES**

The European war has had a serious effect on the international communications services of the American cable companies. The direct circuits of Western Union & Commercial Cable between New York and Emden, Germany, were interrupted in September 1939 by the severance of the Deutsche Atlantische Telegraphengesellschaft cable between the Azores and Emden. The cutting of the Italcable between the Azores and Malaga, Spain, interrupted cable communications to Italy. Cable service to Belgium and Holland, which formerly was routed via leased cables between London and these countries, has been interrupted, as well as direct cable service between the United States and Havre and Paris.

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## CHAPTER V

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### Standard Broadcast

1. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT
2. INVESTIGATION OF CHAIN BROADCASTING
3. RULES AND REGULATIONS
4. STANDARDS OF GOOD ENGINEERING PRACTICE
5. DISTRIBUTION OF BROADCAST FACILITIES
6. FOREIGN LANGUAGE BROADCAST
7. HEARINGS
8. COMPLAINTS AND INVESTIGATIONS
9. REVOCATIONS
10. LITIGATION
11. ACCOUNTING

## CHAPTER V—STANDARD BROADCAST

### 1. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

In conformity with provisions of the North American Regional Broadcasting Agreement, the Federal Communications Commission on September 11, 1940, filed with the State Department its proposed reallocation of frequencies in the standard broadcast band, to go into effect simultaneously with the pact, on March 29, 1941.

Changes necessitated by the Havana agreement will affect 777 of the 862 radio stations now operating in the standard broadcast band (550 to 1600 kilocycles) in the United States. In shifting the United States frequencies the Commission plans but minimum alteration in the present broadcast service.

Here, in general, is how the domestic shift will be accomplished:

Eighty-five stations now operating on channels of from 550 to 720 kilocycles, inclusive, will retain their present assignments.

Twenty stations operating between 740 and 780 kilocycles will move up 10 kilocycles (which is the engineering equivalent to one channel).

Twenty-six stations using from 790 to 870 kilocycles will move up 20 kilocycles (two channels).

Six hundred and fourteen stations between 880 and 1450 kilocycles will generally advance 30 kilocycles (three channels); 25 will advance 40 kilocycles (four channels).

Twenty-five clear channel stations will shift from 1460-1490 kilocycles to 1500-1530 kilocycles.

Sixty-four local stations now on 1500 kilocycles will move down one channel— to 1490 kilocycles.

Twenty-eight miscellaneous stations will undergo irregular shifts.

#### EFFECT ON LISTENER

The chief noticeable difference to the average listener will be that his favorite station above 730 kilocycles will occupy a slightly different place on his receiver dial—usually higher. Receivers with push-button tuning will have to have these controls readjusted for all stations higher on the dial than 720 kilocycles. Otherwise, the general tuning-in process will be no different than at present. The extent of the broadcast band remains the same and station service is unchanged.

However, the correlated shifting of the frequencies of some 100 broadcast stations in Canada, and of numerous stations in Mexico and Cuba will serve to eliminate in considerable measure the long-complained of interference from these sources, and thereby improve broadcast reception in the North American continent generally. Interference from Mexican and Cuban stations has been particularly objectionable to the rural listeners. The Havana pact contains no provision for continued operation of high-powered stations just across the Mexican border.

#### EFFECT ON BROADCASTER

The United States broadcaster, on his part, does not have to replace present transmission and other expensive equipment. His chief con-

cern will be to change the quartz crystals which control a station's operating frequency. Though this is a small item, it will take some time to obtain the 2,000 or more needed crystals from the comparatively few manufacturers who grind and calibrate them to order.

In carrying out the agreement, the Commission has made every effort "to preserve the broadcast structure in the United States so that minimum interference in frequency assignments would be required." Of course, blanket shifts are not possible in every instance, and a few stations have to be considered individually in their relation to the new set-up as a whole. Where a considerable change in frequency is found imperative, the Commission's engineers have striven to provide a new assignment with less potential interference than exists on the present frequency, or the licensee is afforded opportunity to increase his power to maintain substantially his present service area. In making the general reallocation it is necessary for the Commission to amend its rules governing standard broadcast stations in some technical particulars.

#### GENERAL EFFECT OF AGREEMENT

The practical effect of the agreement is to establish principles paralleling the allocation and engineering standards put into effect by the Commission in 1939. In fact, the existing set-up was drafted to meet the changes proposed in the then impending agreement. In preparation for reallocation, the Commission set all outstanding standard broadcast authorizations to expire October 1. This date was subsequently extended to be coincident with the effective date of the Havana pact.

The agreement itself does not specify the changes which must be made in the operating frequencies of broadcast stations in the United States. Nor does it designate the operating assignment of individual stations. However, the assignment of certain classes of stations in Canada, Cuba, and Mexico very nearly controls the assignments in the United States.

It was necessary, as a basis for agreement, to provide six additional clear channels which could be used by Mexico. This is the number provided for Canada. Mexico prior to the agreement had no channels reserved for high-power stations in the broadcast band, whereas Canada already had five such channels. Two clear channels were obtained by taking the United States stations on the present 1010-kilocycle regional channel and the present 1180-kilocycle clear channel and reassigning these stations to different frequencies. Three additional clear channels were provided by shifting the assignments of stations, commencing with the 740-kilocycle channel, upward by one channel. Another channel was provided at 800 kilocycles and still another at 900 kilocycles by 20-kilocycle and 30-kilocycle frequency shifts, respectively. Another clear channel was obtained at 1570 kilocycles in the band 1510 to 1600 kilocycles which had not been completely utilized by the United States.

By these several means it was possible to make available six clear channels at 730, 800, 900, 1050, 1220, and 1570 kilocycles for use by Mexican stations. Canada retained the use of 690 kilocycles and was assigned 740, 860, 990, 1010, and 1580 kilocycles in lieu of the other clear channels now used by Canada. A clear channel at 1540

kilocycles was provided for use by Cuba and the 940-kilocycle clear channel was assigned for joint use by Canada and Mexico.

Under the reassignments all the nations party to the agreement will use the 6 local channels and 41 regional channels, which is a reduction from 42 such channels now provided by the Commission's rules. The number of clear channels increases from 44 to 59. The United States has priority of use with respect to 32 such channels and joint use of 12 with other nations party to the agreement. The use of the 15 remaining clear channels will be under such restrictions as may be set up by the agreement or bilateral arrangements with Canada or Mexico.

Under the reassignments, the United States will retain six local channels. Its number of regional channels will be reduced from 42 to 41. On the other hand, its number of clear channels increases from 44 to 59, and it can use 15 additional clear channels under certain restrictions set out in the pact.

The compact is a mutual arrangement to allocate frequencies for the best public service in the countries involved and typifies the high spirit of cooperation among the participating nations. Under the arrangement, lists of proposed station assignments of these countries are exchanged in advance of the effective date of the agreement. This is done in order that any remaining technical problems may be worked out before actual operations begin.

The North American Regional Broadcasting Agreement was reached at Havana on December 13, 1937. It was ratified by the four countries concerned. Formal filing by the fourth of these (Mexico) on March 29, 1940, confirmed the agreement and makes it operative 1 year from that date. Previously there was no real compact with respect to sharing of frequencies by the principal countries of this continent for the best mutual advantage.

The Commission stresses that the agreement should not, in any sense, be interpreted as creating any vested rights to broadcasters in the new frequencies thus established. That broadcast channels are public domain for use in the public interest, convenience, and necessity is attested by the statutory requirement that licenses are for limited terms and broadcasters are relicensed at stated intervals only upon showing of proper public service.

## 2. INVESTIGATION OF CHAIN BROADCASTING

As the result of a 2-year investigation of chain broadcasting methods, a special committee of the Commission, on June 12, 1940, made public a 1,300-page report recommending "reformation" of certain practices while retaining the advantages of network service. In connection with its consideration of this report, the Commission received briefs from interested parties and heard oral argument for December 2 and 3, 1940.

The report was submitted by a committee comprising Commissioner Thad H. Brown, chairman, and Commissioners Paul A. Walker and Frederick I. Thompson. Its seven mimeographed volumes were premised on more than 10,000 pages of testimony and nearly 800 exhibits, largely obtained through hearings which continued for 73 days. The inquiry was pursuant to Commission order No. 37 of March 18, 1938.

Subject matter in this committee report relates to the history and development of network broadcasting, policies of the major networks, discussion of major and regional networks, the electrical transcription business, management, or operation of stations by others than the licensees, ownership of broadcast stations, network service and duplication, and the economic effect on stations of network operation.

### 3. RULES AND REGULATIONS

As stated in the Fifth Annual Report, the Commission on June 23, 1939, adopted new "Rules and Regulations Governing Standard Broadcast Stations" (these rules define a broadcast station operating in the band 550 to 1,600 kilocycles as a standard broadcast station) and the "Standards of Good Engineering Practice" covering standard broadcast stations, effective August 1, 1939.

Few new principles of allocation are involved in the present rules, other than those necessary to make the plan of allocation of broadcast stations within the United States conform to those established by the North American Regional Broadcasting Agreement. Otherwise, only such changes are made as are essential for clarification, and to keep pace with the progress of broadcast.

There are certain other changes to meet problems which have arisen in administering the Communications Act, particularly with respect to the classification of stations in order to bring about a fuller use of the facilities in rendering both urban and rural service. The principal features of present requirements are:

*Classes of standard broadcast channels.*<sup>1</sup>—The three classes of channels are clear, regional, and local. Definitions clarify the purpose of each class and, in general, establish the normal protection provided for stations operating on these channels.

*Classes of standard broadcast stations.*—There are four general classes of stations—Classes I, II, III, and IV.

*Class I stations* are divided into two groups, both operating on clear channels and designed to render extensive primary service and, at night, secondary service over an extended area and at relatively long distances. Stations of the first group are required to operate with power of 50 kilowatts and no other station will be assigned to the channels occupied except for limited time or daytime operation only. These stations are protected from interference to the primary service areas at all times, and at night to the secondary service areas within the limits of the United States. The second group of class I stations operate on channels on which nighttime operation of class II stations or other class I stations is permitted. Stations in this group are required to operate with not less than 10 kilowatts nor more than 50 kilowatts unlimited time. Class II stations (class II stations subsequently discussed) may be assigned in accordance with the rules and standards. Mutual interference is controlled by the mileage separation and the use of directional antennas.

There are 26 channels on which no nighttime duplication is permitted, that is, the class I stations thereon fall within the first described group, and 18 channels on which class I stations operate with other class I stations or with class II stations operating unlimited time. This permits a maximum usage of clear channels, both for the benefit of the remote rural areas as well as for the general coverage throughout the particular sections in which the stations are located.

A *class II station* is a secondary station operating on a clear channel and designed to render service over a primary service area limited by and subject to such interference as may be received from class I stations. A class II station may

<sup>1</sup>The classification of station is purely for administrative convenience of the Commission in acting on applications and does not impart any right of retention of the classification by the licensee, nor furnish a conclusive guide as to the coverage of a particular station.

operate with power not less than 250 watts nor more than 50 kilowatts. A class II station can be required to use directional antenna or other means to avoid interference with class I stations and with other class II stations. Class II stations include daytime and limited stations assigned to clear channels, also unlimited time stations on clear channels on which duplicate nighttime operation is permitted. Although class I stations are not required to protect class II stations, the latter are normally located as not to receive interference during daytime within the 500 uv/m. ground wave contour and during nighttime within the 2,500 uv/m. ground wave contour.

A class III station operates on a regional channel and renders service primarily to a metropolitan district and adjacent rural area. Class III stations are subdivided into two classes:

A class III-A station operates on a regional channel with power of not less than 1 kilowatt nor more than 5 kilowatts. Provision is made for protection of the daytime service area to the 500 uv/m. contour and of the nighttime service area to the 2,500 uv/m. contour.

A class III-B station operates on a regional channel with power of not less than 500 watts nor more than 1 kilowatt night and 5 kilowatts daytime. The daytime service area is protected to the 500 uv/m. contour and of the nighttime service area to the 4,000 uv/m. contour. Regional channels are not allocated exclusively for class III-A or III-B stations. Classification of these stations depends upon conditions surrounding the particular station. However, on a large percentage of the regional channels cooperation of all or part of the stations on a class III channel in the installation of proper directional antennas may so modify the mutual interference as to permit their classification as class III-A stations. Otherwise class III-B classification would be necessary.

A class IV station operates on a local channel and renders service primarily to a city or town and contiguous areas. A station of this class is limited to not less than 100 watts nor more than 250 watts power, and provision is made for the protection to the 500 uv/m. contour daytime and the 4,000 uv/m. contour nighttime. On local channels the separation required for the daytime protection also determines the nighttime separation. Class IV stations may be assigned to regional channels if interference will not be caused to any class III station and the regional channel is fully utilized for class III stations. In such cases class III stations are not required to protect the class IV stations. However, the class IV stations are so located that the interference received is not greater than to the 4,000 uv/m. ground wave contour nighttime and the 500 uv/m. contour daytime.

*License period.*—Under former rules the license of a standard broadcast station was limited to 6 months. Licensing is now on a 1-year basis. Under the Communications Act the maximum license period which could be authorized is 3 years.

*Power of stations.*—At the present time the Commission licenses standard broadcast stations to operate with 100 watts to 50 kilowatts (50,000 watts) power. These are the minimum and maximum standards deemed necessary for effective and economic service.

*Flexible regulations.*—The Rules and Standards of Good Engineering Practice have been made as flexible as possible. It is believed that by this means the fullest use can be made of the broadcast facilities and at the same time provide for future needs as advancements are made in the art.

*Applicant requirements.*—The rules set forth the showing which applicants for new standard broadcast stations or increased facilities of existing stations must make before the Commission. Previously there has been no guide for such applicants. While the necessary showing varies considerably with individual cases, the general principles set out provide a guide which is valuable to applicants.

*Experimental authorizations.*—Provision is made for special experimental authorizations in the broadcast band. This encourages experimentation and at the same time maintains the desired control over such authorizations.

*Special service authorizations.*—Provision is also made for authorizations for special service by existing stations, beyond that provided for in their licenses and not involving experimentation.

*Determining station power.*—To provide uniformity in determining the operating power of stations employing different types and makes of equipment, every new broadcast station after June 1, 1941, will be required to determine operating power by the direct method; that is, from the resistance and current in the antenna system. Existing stations are permitted to continue determining the

operating power by the indirect method (from the plate input power to the last radio stage) until that date, and for temporary periods thereafter subject to certain conditions.

*Start of broadcast day.*—The rules formerly specified that the broadcast day began at 6 a. m., local standard time. However, during the winter months this was considerably prior to local sunrise, causing rather severe interference due to nighttime propagation conditions prevailing, while during the summer months, sunrise occurred considerably before 6 a. m. Therefore, by amending the rules to provide for the broadcast day beginning at local sunrise instead of 6 a. m., interference during winter months has been materially reduced and, at the same time, beginning of operation with daytime facilities is provided at an earlier time during the summer months which is desirable particularly in the areas where daylight saving time is employed. The Commission has also permitted daytime and limited time stations to begin operation at 4 a. m., primarily to provide additional service to rural people.

#### 4. STANDARDS OF GOOD ENGINEERING PRACTICE

The present "Standards of Good Engineering Practice" are the result of hearings held in 1938 and 1939 (see last year's report). Provisions represent the majority agreement of broadcasters, broadcast engineers, and broadcast equipment manufacturers.

These standards supplement the rules and regulations by incorporating changes necessitated by recent developments in broadcasting. The rules and regulations cover the basic and more general principles; the standards detail the technicalities and use of facilities.

There are three main divisions of the standards:

1. Substantive reference to principles enunciated in the rules and regulations.

2. Provisions augmenting the rules and regulations by defining policy of allocation and regulation.

3. Detailing of methods to guide applicants and licensees in compiling and submitting data, operation, etc.

Specific subjects dealt with in the standards are:

- Engineering Standards of Allocation.
- Field Intensity Measurements in Allocation.
- Data Required with Applications Involving Directional Antenna Systems.
- Locations of Transmitters of Standard Broadcast Stations.
- Minimum Antenna Heights or Field Intensity Requirements.
- Standard Lamps and Paints.
- Further Requirements for Direct Measurements of Power.
- Power Rating of Vacuum Tubes.
- Requirements for the Approval of the Power Rating of Vacuum Tubes.
- Plate Efficiency of Last Radio Stage.
- Operating Power Tolerance.
- Construction, General Operation and Safety of Life Requirements.
- Indicating Instruments Pursuant to Section 3.58.
- Requirements for Approval of Broadcast Transmitters and Automatic Frequency Control Equipments.
- Requirements for Approval of Frequency Monitors.
- Requirements for Approval of Modulation Monitors.
- Use of Low Temperature Coefficient Crystals by Broadcast Stations.
- Money Required to Construct and Complete Electrical Tests of Stations of Different Classes and Powers.
- Use of Common Antenna by Standard Broadcast Stations or Another Radio Station.
- Use of Frequency and Modulation Monitors at Auxiliary Transmitter.
- Approved Frequency Monitors.
- Approved Modulation Monitors.
- Approved Equipment.
- Standard Broadcast Application Forms.
- Field Offices of the Commission.
- Average Sunrise and Sunset Time.



## 5. DISTRIBUTION OF BROADCAST FACILITIES

Both the fourth and fifth annual reports gave results of studies made in 1938 of the distribution of broadcast facilities within the United States under the old rules. Application of the new rules has made considerable change in such distribution. However, since these changes are still being made at a rapid rate, a detailed study of the population and areas served has not been considered warranted, particularly in view of the greatly increased work due to the large number of applications with resultant complications. Application of the new rules has materially improved service conditions in general, and further betterment will be obtained when the North American Regional Broadcasting Agreement goes into effect.

## NUMBER OF STATIONS

The distribution of standard broadcast facilities throughout the United States on the basis of classification<sup>1</sup> and authorized hours of operation as of June 30, 1940, is shown below.

*United States standard broadcast stations in operation or under construction on June 30, 1940*

Hours of operation	Class							Total
	I-A	I-B	II	III-A	III-B	III	IV	
Unlimited time.....	24	16	16	156	98		380	660
Limited time.....			27					27
Day time.....			17			25	19	61
Sharing time.....	4	3	5	16	24		17	69
Specified time.....					2	4	23	29
Total.....	28	19	65	172	94	29	439	1 846

<sup>1</sup> Two additional stations, WDAH and WMBQ, are licensed but not operating.

## NEW STATIONS

The following table shows the class and hours of operation of the 79 new broadcast stations which were authorized during the fiscal year:

Class of station	Hours of operation	Number
I-A.....	Unlimited.....	
	Other than unlimited.....	
I-B.....	Unlimited.....	
	Other than unlimited.....	
II.....	Unlimited.....	1
	Other than unlimited.....	1
III-A.....	Unlimited.....	1
	Other than unlimited.....	
III-B.....	Unlimited.....	3
	Other than unlimited.....	
III.....	Daytime.....	3
IV.....	Unlimited.....	62
	Other than unlimited.....	8
Total.....		79

<sup>1</sup> These classifications are made as accurately as possible under present operating or authorized conditions. However, when assignments under the new rules and the North American Regional Broadcasting Agreement have been completed, the classification of a number of individual stations may be materially different.

## DIRECTIONAL ANTENNAS

The following table shows the number of directional antenna systems in use or authorized at the close of each fiscal year from 1932 to 1939. As pointed out in previous reports, this type of antenna has proven very useful in reducing interference and directing the signals to desired areas, thus improving service. The new rules and standards contemplate still more extended use of this type of antenna on regional and clear-channel frequencies. It is not considered feasible from an economic or allocation standpoint to use directional antennas in connection with local channel stations (class IV stations under the new classification). In addition to the new directional antennas indicated by the table, a number of those already installed have been readjusted, redesigned, or rebuilt in order to improve station operation or to provide for changes in conditions affecting their operation.

*Number of directional antennas in use or authorized for use, fiscal year ended June 30, 1940*

	1932	1933	1934	1935	1936	1937	1938	1939	1940
Stations on clear channels.....	0	2	4	7	8	9	11	14	22
Stations on regional channels.....	2	4	11	20	25	39	53	68	97
Total.....	2	6	15	27	33	48	64	82	119

Attention is invited to the chart in the appendices showing increase in number of broadcast stations since 1927. It will be noted that the discrepancy between the total number of stations and simultaneous operations at night is becoming less due to the increased usage of directional antennas and the application of the new rules and standards. It is hoped that further reduction in this difference can be made. Where nighttime operation is not permitted, the service which a station can render is materially curtailed. And when events of special interest arise special request must be made therefor. This is not only an inconvenience to the licensee but materially adds to the duties of the Commission, besides causing interference to and reduction of service by other stations.

## 6. FOREIGN LANGUAGE BROADCAST

There are approximately 200 broadcast stations in this country which, at times, carry programs in 30 different languages for the benefit of the foreign-born populations in areas in which these stations are located. In order to secure more detailed information concerning the extent and character of such service, the part these broadcasts play in the lives of the foreign-language groups, and the comparative value of foreign-language broadcasts to advertisers and others interested in reaching such groups, the Commission, on October 8, 1940, addressed a questionnaire to the stations concerned.

On October 23, 1940, the Commission adopted a new rule requiring international broadcast stations to make verbatim mechanical records of all international programs transmitted, and to keep such records for a period of 2 years, furnishing the Commission with scripts, translations, and other record upon request.

## 7. HEARINGS

### EXPEDITING GRANTS

The number of hearings held in connection with broadcast matters was substantially less than during the previous fiscal year. This is attributed in large part to changes in the Commission's method of handling applications. In the past it had been the practice to designate for hearing, without seeking additional information from the applicants, applications which upon their face did not contain sufficient information to warrant the Commission in finding that grants would meet the statutory standard. During the past year particular effort was made to obtain in considerable detail additional facts which might enable the Commission to have before it information as full and complete as could be obtained through a formal hearing. New application forms were adopted with a view to eliciting, so far as possible, all pertinent information in the first instance, thus eliminating the necessity of requiring applicants to file additional material.

Not only has the Commission been able to grant applications which in no way conflict with others, but it has been possible in the case of conflicting applications, where interference precludes the granting of all pending requests, to select the proposal which will result in the greatest benefit to the public and designate the others for hearing. Ample protection is afforded through petitions for reconsideration, petitions for rehearing, hearings, and the right of appeal to the courts provided by the statute. Should the Commission find, after hearing, that a conflicting application should be granted, it has full authority to make such grant effective, even though it involves modification of previously granted authorizations, or even deletion of previously licensed stations. The principal beneficial result of eliminating unnecessary hearings has been to provide broadcast service where needed without long delays.

In a substantial number of cases, applicants whose applications have been designated for hearing petition the Commission for reconsideration, either pointing out facts believed to have been overlooked or furnishing additional data. Such petitions are given full consideration by the Commission, and if the need therefor is shown, the original application will be set aside and other application granted. In some instances where a hearing has been ordered, amendments may be made, thereby eliminating the factor which necessitated designation for hearing.

### CONDUCT OF HEARINGS

Even though a majority of the hearings in broadcast matters were conducted by members of the legal staff of the Commission specifically designated in each instance for the purpose, a substantial amount of time was devoted to hearings by the Commission, committees of commissioners, and individual commissioners. In addition to holding hearings for the purpose of establishing new rules governing television stations, the Commission as a whole conducted the hearing upon the order issued against the licensee of WMCA, New York City, to show cause why its license to operate that station should not be revoked because of alleged interception and broadcasting of secret

radio communications sent by the Governments of Germany and Great Britain containing orders to naval vessels of those Governments, in violation of the provisions of section 605 of the Communications Act. Opinion and order of the Commission was entered on October 25, 1939.

Hearings for the purpose of establishing rules and regulations, as well as engineering standards, for the new FM [frequency modulation] service were conducted by a committee of commissioners, and hearings upon revocation orders against nine stations were conducted by individual Commissioner.

The Commission attorney designated to preside at a hearing has the responsibility of ruling upon the admissibility of evidence, of producing testimony on behalf of the Commission, which is generally confined to that of members of the Commission's engineering staff, and, in general, of compiling a record which will contain a full and complete basis for findings upon the pertinent issues. In exceptional instances only, a member of the legal staff is assigned to participate in a hearing as counsel for the Commission.

After hearing, proposed findings of facts and conclusions, and briefs, if desired, are submitted by the parties concerned. Thereafter the Commission publishes its own tentative findings and conclusions, which are subject to exceptions, briefs, and oral argument. If, upon consideration of the exceptions, briefs, and oral argument, corrections or modifications of the Commission's proposed findings and conclusions are necessary, a final decision, containing statements of facts and grounds for decision, is prepared and issued; otherwise an order, adopting as final the proposed findings and conclusions is entered. A party who is dissatisfied with the decision is provided by the statute with a right to petition for rehearing.

#### PETITIONS FOR REHEARING

The burden of the Commission in disposing of petitions for rehearing continued to be heavy. This was due in part to interpretations placed on a decision of the Court of Appeals for the District of Columbia in the *Red River Broadcasting Company* case (see Fourth Annual Report) that in order to exhaust administrative remedies, petitions for rehearing must be filed and disposed of before the Commission prior to taking an appeal. The volume of such petitions was also enlarged by the adoption by the Commission of a policy of granting applications without hearing. Reconsideration of Commission action where grants are made without hearing is sought by means of petitions for rehearing under the present rules of practice.

During the year 56 petitions for rehearing in radio broadcast cases were filed, 41 of which were denied, 6 granted, and 9 dismissed. Also, there were 5 petitions for rehearing filed in common carrier cases; 4 of these were denied and 1 granted. In a large number of these cases the Commission published, together with its orders, formal decisions setting forth the reasons for the action taken. A list of the petitions filed and disposed of is contained elsewhere.

### 8. COMPLAINTS AND INVESTIGATIONS

#### "NO CENSORSHIP"

The Commission receives thousands of letters annually complaining about matters incident to program broadcasts. The Communi-

cations Act states that "nothing in this act shall be understood or construed to give the Commission the power of censorship over the radio communications or signals transmitted by any radio station." As the greater part of the complaint mail concerns individual radio performers, the Commission consequently has responded that it does not order particular programs or individuals either on or off the air.

Complaints about particular radio programs run the gamut from taking issue with an announcer's English and differing with the speaker's conclusions, to objections to advertising and protesting refusal of time on the air. In many of these cases the Commission is, in effect, asked to exercise the power of censorship. In such instances the complainant is advised that the Commission is without jurisdiction to act. In some cases the Commission refers complaints to the particular station or network involved, or to the Code Compliance Committee of the National Association of Broadcasters referred to hereafter.

With respect to advertising continuities, the Commission entertains complaints where the action of the station appears to have been against the public interest, and also occasionally refers complaints alleging unfair trade practices to the Federal Trade Commission.

In the matter of refusal of time on the air, complainants are informed that broadcast stations are expressly declared by the Communications Act not to be common carriers. Accordingly, determination as to who shall appear on programs is a matter resting in the first instance with the individual broadcast station which may refuse or permit the use of its facilities to particular persons as it sees fit. By the same token the station may give free time or charge for time or make charges at varying rates. But broadcast stations have the duty of serving public interest, convenience, and necessity. The discretion left to the broadcasters in the selection of who may use the facilities and the conditions with respect to such use is subject to this legal requirement. In carrying out the obligation to render a public service, stations are required to furnish well-rounded rather than one-sided discussions of public questions. The duty of serving the public interest does not, however, imply any requirement that the use of broadcast facilities shall be afforded to the particular individual or group, in view of the principals enumerated above. The Commission has the duty of determining whether the past conduct of stations has been consistent with their obligations under the law.

Some program inquiries have to do with the right of free speech. The Communications Act provides that "no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication." This, of course, does not imply that all who may wish to do so must be given the right to speak on the air. The number of hours available in the day over the limited number of broadcast stations makes this impossible. The Commission, of course, has made no regulation or condition interfering with the right of free speech.

#### PROHIBITED BROADCASTS

Certain broadcasts are definitely barred from the radio by the Communications Act. Hence, cases which involve violation of the specific injunction against programs containing lottery information,

or containing obscene, indecent or profane language are investigated by the Commission and referred to the prosecuting authorities for appropriate action.

#### RADIO FACILITIES FOR CANDIDATES FOR PUBLIC OFFICE

Because of the widespread interest in politics during the year, the Commission received a considerable number of complaints coming under the provision of the Communications Act requiring that if a licensee permits any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office. The Commission was called on to make a number of rulings under this section of the law. Inquirers were informed that the section does not require stations to permit broadcasts by any candidate unless the station has previously voluntarily permitted a broadcast by another candidate for the same office. The provision does not apply to persons other than the legally qualified candidates themselves and has no reference to persons speaking on behalf of candidates. The provision applies only to broadcasts by candidates speaking in furtherance of their candidacy, and the mere fact that a station has permitted a person who is a candidate to use its facilities to speak on a nonpolitical subject does not result in a requirement that equivalent time shall be given other candidates for the office.

The Commission also received a number of requests for rulings on behalf of minority political parties as to the effect of the exclusion of candidates of the particular party from the general election ballot in the State in which the station was located. The Commission ruled that the words "legally qualified candidate" are not to be construed to be limited to persons whose names appear on the general election ballot. This is for the reason that if the particular person possesses the statutory and constitutional qualifications to hold an office, his name may be written into the ballot by the voters or supplied by "sticker" and a valid election may result.

The Commission recognized that the mere fact that any name may be written in does not entitle all persons who may publicly announce themselves as candidates to demand the use of broadcast facilities, for all citizens possessing the requirements are potential candidates and the limited broadcast facilities will not accommodate all who might desire to speak.

The Commission also recognized that broadcasters may make suitable and reasonable requirements with respect to proof of candidacy of an applicant for the use of facilities. A showing that the candidate's name is included on the election ballot should be accepted as such proof. In the absence of a showing that the candidate's name will appear on the general election ballot, other factors may properly be taken into account in determining whether a person is a "legally qualified candidate." Among them are: (1) A showing that the candidate has been duly nominated by a political party; (2) a showing that the party has a substantial membership composed of persons entitled to vote; or that, historically and currently, it has been and is recognized as a political party in the United States; (3) a showing by certificate of a substantial number of eligible voters in the com-

munity or by other means that the applicant is, in fact, a bona fide candidate for office.

BROADCAST "CODE"

The National Association of Broadcasters has adopted a code of ethics setting forth certain standards of conduct which that organization believes are conducive to the best interests of broadcasting. The code represents an effort by broadcasters at self-regulation and its provisions should not be confused with rules and regulations of the Commission. Acceptance of the provisions of the code by stations does not relieve the latter of their duties and responsibilities under the law.

PUBLIC SERVICE CONSIDERATION

The Commission can and does review the general public service rendered by stations in determining if renewal of license is in the public interest. The statute requires the Commission in acting upon renewals to consider the same factors as it must consider before granting a new application. In either case the service rendered to the public is the dominant consideration.

INVESTIGATIONS

Of the investigations pending against 42 broadcast stations at the close of the preceding fiscal year, 22 were closed without hearing and 5 after hearing. Three stations were deleted after hearing, 2 of which involved orders of revocation. Of these investigations, 12 are still uncompleted, 11 of which are pending on the hearing docket. They involve the following types of complaint:

Violations of section 310 (b) .....	7
Program matters .....	3
Engineering violations .....	2

During the fiscal year investigations made involved 106 broadcast stations. Of this number, 70 were adjusted without hearing and 3 after hearing. Construction permit for 1 station was cancelled. Investigations are now pending against 33 stations of which 16 are in hearing, 7 involving revocation orders. The investigations instituted involve the following types of complaint (more than one complaint may have been filed against a station in a particular case):

Ownership and control .....	21
Lottery programs .....	21
Failure to receive prizes or merchandise offered .....	15
Allegedly false or misleading statements .....	13
Alleged violations of provisions of the act (sec. 605, 1; sec. 315, 2; sec. 317, 3) .....	6
Medical programs .....	5
Miscellaneous program matters .....	5
Foreign language programs and alleged propaganda .....	6
Engineering violations .....	3
Generally inferior program service .....	3
Allegedly false statements in applications .....	3
Horse-race information .....	2
News programs .....	2
Financial qualifications .....	2
Labor programs .....	1
Interference with Coast Guard communications .....	1
Obscene language .....	1
Fortune telling programs .....	1
Miscellaneous complaint not involving program matter .....	1

## 9. REVOCATIONS

During the fiscal year nine standard broadcast stations figured in hearings upon revocation orders. Seven of the revocation orders involved stations located in Texas and were based upon alleged misrepresentation to the Commission at the time original authorizations were secured as to the real parties in interest and upon transfers of control of the stations without the consent of the Commission being first obtained as required by statute. Final decisions upon these orders had not been entered at the close of the fiscal year.

One of the remaining revocation hearings arose out of false testimony of the licensee at the original hearing concerning his financial standing as well as an unauthorized assignment of license or transfer of control, while the other involved solely an illegal transfer of control of the station. Final orders, revoking the licenses, have been entered in the two last-mentioned cases.

## 10. LITIGATION

### GENERAL REVIEW

During the fiscal year the conduct of litigation in the courts has been one of the most important of the Commission's activities. Of particular significance are the United States Supreme Court decisions, hereinafter discussed, defining the jurisdiction of the United States Court of Appeals for the District of Columbia and the powers and the duties of this Commission. These decisions are pertinent to the general field of administrative law.

At the beginning of the fiscal year there were pending 16 cases<sup>1</sup> to which the Commission was a party, all of which were in the United States Court of Appeals for the District of Columbia. During the fiscal year, 15 additional appeals were taken to the Court of Appeals for the District of Columbia from decisions of the Commission, making a total of 31 cases pending in that court during the entire fiscal year; 1 injunction suit against the Commission was instituted in the United States District Court for the District of Columbia, and 7 petitions for writs of certiorari were filed in the Supreme Court.

Of the 31 cases in the Court of Appeals for the District of Columbia, one resulted in an affirmance of the Commission's decision, 19 were dismissed,<sup>2</sup> and 11 were still pending at the end of the fiscal year.<sup>3</sup> The suit for injunction in the United States District Court for the District of Columbia was ordered dismissed by the court upon the Commission's motion.

Of the seven petitions for certiorari filed in the Supreme Court, five were filed by the Commission and two by other parties. The latter two were denied and the five filed by the Commission were granted. Decisions upholding the action of the Commission were rendered by the Supreme Court in three of these five cases; the other two were still pending.<sup>4</sup>

<sup>1</sup>One of these cases was a suit for writs of prohibition and mandamus against the Commission.

<sup>2</sup>Including the suit for writs of prohibition and mandamus.

<sup>3</sup>Included in the eleven pending cases are two cases in the Supreme Court at the close of the fiscal year which involve interlocutory matters. Since these two cases had not yet been decided on the merits by the Court of Appeals at that time, they are also listed as cases pending in that court. By November 26, 1940, three of the 11 pending cases had been dismissed by the Court of Appeals.

<sup>4</sup>Both cases were decided in the Commission's favor on November 25, 1940. See p. 61, footnote 1.



## RECORD OF COURT CASES

The following tabulation shows the status of all cases for the fiscal year:

Nature of the case	Number	Final decision for Commission	Final decision against Commission	Pending at end of fiscal year
Cases in the Court of Appeals.....	31	20	0	1 11
Original suits in District Court.....	1	1	0	-----
In Supreme Court on writ of certiorari.....	5	3	0	2

<sup>1</sup> See footnote 3, p. 58.

<sup>2</sup> This figure does not include the two cases in which petitions for certiorari from decisions by the Court of Appeals favorable to the Commission were denied.

<sup>3</sup> See footnote 1, p. 61.

A list of the cases in litigation, and a detailed statement of the facts and principles of law involved in those cases in which decisions were rendered during the past year will be found in the statistical section of this report.

Because of the general importance, mention should be made here of the cases decided by the United States Supreme Court during the past year, and of the cases now pending in that court.

*Federal Communications Commission v. Sanders Brothers Radio Station*, 309 U. S. 470.—Sanders Brothers, a licensee of an existing radio station, appealed to the Court of Appeals for the District of Columbia from a decision of the Commission granting the application of Telegraph Herald Co. for a new radio station in the same community. The basis of the appeal was that the Commission's action was erroneous in that the Commission had failed to consider the adverse economic effect which the proposed competition of Telegraph Herald would have upon Sanders Brothers' station. The Court of Appeals reversed the Commission's decision and held that the Commission erred in not making findings concerning the adverse economic effects which would result to the existing station from the competition of the proposed new station. The Supreme Court reversed the judgment of the Court of Appeals and affirmed the Commission holding that economic injury to an existing station is not a separate and independent element to be considered by the Commission, or as to which the Commission must make findings, in determining whether it should grant or deny a license. The court stated that the Communications Act does not essay to regulate the business of licensees and was not intended to protect licensees against competition but was designed to preserve competition in broadcasting. This decision sustained the contention of the Commission that the economic effect on an existing station is not an element which the Commission must consider in passing upon an application for a new station. The Commission also contended that Sanders Brothers did not have standing to maintain the appeal, but the Supreme Court rejected this contention.

*Federal Communications Commission v. Pottsville Broadcasting Company*, 309 U. S. 134; *Fly v. Heitmeyer*, 309 U. S. 146.—Both of these cases involved suits for writs of prohibition and mandamus against the Commission. In the *Pottsville* case the Commission denied the appellant's application for a construction permit. Upon appeal from this denial, the Court of Appeals reversed the Commis-

sion's decision upon the ground that it had been based upon an erroneous interpretation of Pennsylvania law [98 F. (2d) 288]. During the pendency of the appeal two new applications for the same facilities had been filed with the Commission. Upon reversal and remand of the case by the Court of Appeals, the Commission designated the *Pottsville* application and these two new applications for argument upon the question of the comparative merits of the three applicants. Pottsville thereupon petitioned the Court of Appeals for writs of prohibition and mandamus directing the Commission to set aside its order designating the application for argument on a comparative basis and to hear and consider that application on the basis of the record originally made and in accordance with the mandate of that court. The Court of Appeals issued the writs as requested. On certiorari the Supreme Court reversed the judgment of the lower court, and held that the Court of Appeals erred in issuing these writs. In its decision, the Supreme Court pointed out that the sole function of the Court of Appeals on appeal from Commission decisions is to correct any errors of law in such decisions. However, the Court further declared:

But an administrative determination in which is imbedded a legal question open to judicial review does not impliedly foreclose the administrative agency, after its error has been corrected, from enforcing the legislative policy committed to its charge. \* \* \*

The Commission's responsibility at all times is to measure applications by the standard of "public convenience, interest, or necessity." The Commission originally found respondent's application inconsistent with the public interest because of an erroneous view regarding the law of Pennsylvania. The Court of Appeals laid bare that error, and in compelling obedience to its correction, exhausted the only power which Congress gave it. At this point the Commission was again charged with the duty of judging the application in the light of "public convenience, interest, or necessity." The fact that in its first disposition the Commission had committed a legal error did not create rights or priority in the respondent, as against the later applicants, which it would not have otherwise possessed. Only Congress could confer such a priority. It has not done so. The Court of Appeals cannot write the principle of priority into the statute as an indirect result of its power to scrutinize legal errors in the first of an allowable series of administrative actions. Such an implication from the curtailed review allowed by the Communications Act is at war with the basic policy underlying the statute. It would mean that for practical purposes the contingencies of judicial review and of litigation, rather than the public interest, would be decisive factors in determining which of several pending applications was to be granted.

In the *Heitmeyer* case substantially identical facts and the same principle of law were involved. The Supreme Court, citing its decision in the *Pottsville* case, reversed the judgment of the Court of Appeals and rendered judgment for the Commission.

*Associated Broadcasters, Inc., v. Federal Communications Commission*, No. 7282, and *Columbia Broadcasting System of California, Inc., v. Federal Communications Commission*, No. 7283, in United States Court of Appeals for the District of Columbia, decided November 29, 1939: These cases involve two appeals to the Court of Appeals from an order of the Commission refusing after a hearing to give its consent to an assignment of a license. In the *Associated* case the appellant is the proposed transferor, and in the *Columbia* case the appellant is the proposed transferee. The Court denied the Commission's motions to dismiss these appeals, holding that a proposed assignee of a license who requests Commission consent for the assignment of a

license may appeal to the Court of Appeals from a decision of the Commission refusing to give such consent because such person is in reality an "applicant for a station license" within the meaning of the appeals section of the Communications Act of 1934. By the same reasoning, the Court held that the proposed transferor is a person "aggrieved or whose interests are adversely affected," within the meaning of the appeals section, by the Commission's decision refusing such consent. In an earlier decision (*Pote v. Federal Radio Commission*, 62 App., D. C., 303, 67 F. (2d) 509, cert. den., 290 U. S. 180) the court had held that a proposed assignee was not included within the words "applicant for station license" in the appeals section of the Radio Act of 1927. The Commission had contended that this construction had presumptively been approved by Congress because the provision governing the jurisdiction of the Court had been re-enacted without any substantial change after the decision in the *Pote* case, but the Court of Appeals rejected this contention. The Supreme Court has granted certiorari in both these cases.<sup>1</sup>

## 11. ACCOUNTING DATA

Reports dealing with financial or accounting matters have been prepared and considered by the Commission in connection with a large number of applications for construction permits, transfers of control, and assignments of licenses.

*Annual financial report.*—A new and simplified form of an annual financial report was instituted and made available for use by all standard broadcast stations and networks in reporting to the Commission for the calendar year 1939. Simplification of the form was accomplished in collaboration with representatives of the broadcast industry. The purpose of this report is to collect financial and statistical data from the industry on an annual basis. In addition to their use in serving the needs of the Commission, the reports are analyzed and compilations of financial and other data for the information of the industry and the general public have been released.

*Report on chain broadcasting.*—The data introduced in evidence in the hearing held on chain broadcasting (docket 5060) pursuant to Commission Order No. 37 were digested, and analyses from such evidence are now compiled in a report entitled "Digest and Analysis of Evidence Presented in the Hearing on Commission Order No. 37 and of the Files of the Commission."

*Field investigations.*—Field investigations dealing with matters of finance involved in broadcast applications (also some operating stations) have been undertaken in several instances. As a result of hearings in which there was presented the evidence obtained in these investigations, one station has been deleted, proposed order of revocation has been ordered in each of five others, and proposed findings are pending in each of three more stations.

*Financial and operating data.*—The accompanying compilation gives the salient items of financial and operating data with respect to the major networks and the 705 standard broadcast stations reporting for the calendar year 1939. Supplemental figures will be found in the statistical yearbook issued simultaneously with this report.

<sup>1</sup> On November 25, 1940, the Supreme Court, in an opinion by Mr. Justice Frankfurter, reversed the order of the Court of Appeals in denying the Commission's motion to dismiss each appeal.

*Operating and financial data concerning 3 major networks and licenses of 705 broadcast stations*

[For the calendar year 1939]

Total time sales by networks and stations-----	\$129,968,026
Deduct: Commission to agencies, representatives and brokers--	17,405,414
Revenue from sale of time-----	112,562,612
Miscellaneous revenues-----	11,319,252
Total broadcast revenues-----	123,881,864
Broadcast expenses (including taxes, depreciation, compensation, etc.)-----	100,043,920
Broadcast service income-----	23,837,944
Number of employees (December 31)-----	24,605
Total compensation-----	51,620,305
Investment (at cost) in tangible broadcast property <sup>1</sup> -----	64,424,626
Less: Accumulated depreciation to date-----	28,978,081
Net amount of broadcast assets-----	35,545,645

<sup>1</sup> Five station licensees reported no owned plant. Broadcast property owned by Mutual Broadcasting System, Inc., reported at a nominal value of \$1.

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## CHAPTER VI

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### Nonstandard Broadcast

1. GENERAL DEVELOPMENTS
2. REALLOCATION OF HIGH-FREQUENCY BANDS
3. FREQUENCY MODULATION
4. CALL LETTERS
5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE
6. TELEVISION BROADCAST SERVICE
7. INTERNATIONAL BROADCAST SERVICE
8. RELAY BROADCAST SERVICE
9. FACSIMILE BROADCAST SERVICE
10. DEVELOPMENTAL BROADCAST SERVICE

## CHAPTER VI—NONSTANDARD BROADCAST

### 1. GENERAL DEVELOPMENTS

There have been substantial developments in the nonstandard broadcast services, which include high frequency, noncommercial educational, television, international, relay developmental, and facsimile broadcast. Of major interest has been the evolution of high-frequency broadcast service from the experimental stage to a regular service.

Rules and regulations, as well as Standards of Good Engineering Practice, were adopted by the Commission on June 22, 1940, providing for the regular licensing of these stations in the band of frequencies from 43000 to 50000 kilocycles, using frequency modulation [FM] on a commercial basis similar to that of standard broadcast stations.

### 2. REALLOCATION OF HIGH-FREQUENCY BANDS

Under past experimental authorization, high-frequency broadcast stations, together with facsimile stations, were licensed in the band between 42000 to 44000 kilocycles. The Commission, finding that high-frequency broadcasting using frequency modulation had developed to a stage where a regular service could safely be inaugurated, was confronted with the problem of finding sufficient space in the radio spectrum to accommodate this new service. Sufficient channels were necessary in order to provide for a large number of stations throughout the nation on a competitive basis.

In consideration of the needs of high-frequency broadcasting and also the needs of television, the Commission found that 40 channels should be allocated to the broadcasting service between 40000 and 50000 kilocycles while continuing 7 television channels 6000 kilocycles wide below 108000 kilocycles, the present practical limit for television broadcasting.

This was accomplished by reallocating the band 44000 to 50000 kilocycles previously allotted to television to the high frequency broadcast service. The band of frequencies from 42000 to 50000 kilocycles was made available for aural broadcasting. The same number of television channels below 108000 kilocycles was maintained by assigning the band 60000 to 66000 kilocycles to television in place of 44000 to 50000 kilocycles.

The band 60000 to 66000 kilocycles was previously assigned to Government stations. The Commission in turn released 41000 to 42000 kilocycles and 132000 to 140000 kilocycles to Government use. This equitable exchange of frequencies between the Commission and the Government departments, accomplished through the medium of the Interdepartment Radio Advisory Committee, has resulted in satisfactory solutions for frequencies for all stations concerned. The services previously operating between 132000 to 140000 kilocycles

were assigned frequencies between 156000 to 162000 kilocycles, which was used by adjunct television stations and 116000 to 119000 kilocycles which was assigned to broadcasting.

In the band 42000 to 50000 kilocycles, five 200-kilocycle channels comprising 42000 to 43000 kilocycles have been allocated to noncommercial educational broadcast stations while 43000 to 50000 kilocycles (35 200-kilocycle channels) were set aside for commercial high-frequency stations.

### 3. FREQUENCY MODULATION

#### HEARING AND REPORT

The Commission has licensed experimental stations on frequencies above 25000 kilocycles over a number of years for the development of such frequencies to render a regular broadcast service. When the frequency modulation [FM] hearing started on March 18, 1940, 31 such experimental stations were authorized to use amplitude modulation and 22 stations for frequency modulation. A total of 173 applications were filed for new frequency modulation stations before and subsequent to the hearing.

As a result of the evidence adduced at two weeks of hearing, and investigations conducted by its staff, the Commission concluded that frequency modulation had advanced to a stage where the establishment of a commercial service was desirable in the public interest.

In the Commission's Report on Frequency Modulation dated May 20, 1940, the Commission stated:

Frequency modulation is highly developed. It is ready to move forward on a broad scale and on a full commercial basis. On this point there is complete agreement amongst the engineers of both the manufacturing and the broadcasting industries. A substantial demand for FM (frequency modulation) transmitting stations for full operation exists today. A comparable public demand for receiving sets is predicted. It can be expected, therefore, that this advancement in the broadcast art will create employment for thousands of persons in the manufacturing, installation, and maintenance of transmitting and receiving equipment and the programming of such stations.

#### HOW "FM" OPERATES

In brief, the basic difference between amplitude [used by standard broadcast] and frequency modulation is as follows: Modulation is a process of imparting sound or other signals (intelligence) to the transmitted radio wave. Radio waves have two defining characteristics—amplitude (intensity) and frequency. With amplitude modulation the sound controls the amplitude of the radio wave transmitted, while the frequency remains constant. Conversely, frequency modulation varies the frequency of the radio wave in accordance with the sound, while the amplitude remains constant. The principle of frequency modulation has long been known but its advantages for a wide range system were not developed until recently.

Frequency modulation has advantages over amplitude modulation. Foremost is the reduction of noise present in the received signal. Man-made, electrical, and atmospheric radio noises consist primarily of amplitude variations. Frequency modulation signals have an inherent advantage in discriminating against noise since the amplitude is maintained constant throughout the frequency modulation system. Secondly, experimental operations have developed the fact that a

greater signal from another station in the same channel could be tolerated than with amplitude modulation, making for a closer possible geographical separation of stations. Frequency modulation has the characteristic of excluding all except the strongest signal.

The fact that stations may be operated at relatively close geographical separations on the same channel counters the disadvantage that frequency modulation signals occupy a greater place in the spectrum than do amplitude modulation signals. (An amplitude modulation channel occupies 40 kilocycles while a wide band frequency modulation channel occupies 200 kilocycles.)

#### WIDE BAND USE

The high frequency broadcast service has been developed on frequencies above 30000 kilocycles because of the wide band required (200 kilocycles) and because the signals received must be confined principally to the ground wave for satisfactory results. Sufficient space is available in this region for the wide bands of frequencies required for frequency modulation signals. The coverage of high frequency broadcast stations in the band 42000 to 50000 kilocycles is substantially the same at night as it is during the day. However, such stations have not exhibited long distance coverage properties as obtained, particularly at night, with present high-power clear-channel standard broadcast stations.

#### "FM" COVERAGE

A high frequency broadcast station using frequency modulation with the highest present day practical power (50 kilowatts) and antenna of reasonable height (1,000 feet or so) has a primary service area approximately 100 miles in radius over reasonably level ground. Accordingly, amplitude modulation in the standard broadcast band may be required indefinitely for the purpose of giving widespread rural coverage.

For the coverage of centers of population and trade areas, this new class of station offers a distinct improvement. Since its useful signal is propagated along the ground, the coverage obtainable with high frequency broadcast stations is dependent upon two factors: the effective radiated power and the height of the antenna above the service area. The operating power alone is not an indication of the coverage of the station. Doubling the height of the antenna increases service area equivalent to increasing the transmitting power four times. All of the frequencies in the band 42000 to 50000 kilocycles have substantially the same characteristics as regards coverage, while the standard broadcast band stations of equal power operating at the extremities of the band have widely different service areas.

#### HIGH FREQUENCY RULES AND STANDARDS

The Commission on June 22, 1940, promulgated its rules governing high-frequency broadcast stations. These stations are to be governed by the applicable sections of the "Rules Governing Standard Broadcast Stations." Three groups of frequencies have been set aside for stations on the basis of coverage to be given.

Unlike standard broadcast stations, frequency modulation stations are licensed to serve "basic" and "limited" trade areas, with particular consideration for rural service where possible.



Under Commission rules and regulations governing this new high frequency broadcast service, FM stations are available to every community. Not subject to the same interference as standard broadcast stations, they can operate on the same channel with less mileage separation. However, FM stations serving the same area are not assigned adjacent channels. Consequently, a number of FM stations using alternate channels may operate in the same area without interfering with one another.

FM stations are authorized to serve specified areas in square miles. Service in places where more than one station may be located is comparable except for variables due to antenna height and other engineering considerations.

Twenty-two channels are open to stations serving basic and limited trade areas with populations of more than 25,000 each. Six channels are allocated for service areas with less than that population, and 7 channels are reserved for stations intended to each primarily serve a rural area at least 15,000 square miles in extent.

To obviate possible monopoly, and to encourage local initiative, no person or group is permitted to control more than one FM station in the same area, and not more than six in the Nation as a whole. At the outset, the Commission is requiring a daily (except Sunday) minimum operating schedule for FM stations of at least 3 hours during the day and 3 hours at night. To demonstrate the capabilities of the new service, an hour a day minimum must be devoted to programs not duplicated simultaneously in the same area, which means programs distinct from standard broadcast. Otherwise, FM operation is governed largely by the standard broadcast rules.

FM and standard broadcast will not mutually interfere because, as previously explained, these two types of service are on widely separated bands. Because of their different positions in the spectrum, FM cannot be received on standard broadcast receivers and, likewise, standard broadcast cannot be received on FM sets. Also, the two services require different transmitting equipment.

The Commission has also promulgated "Standards of Good Engineering Practice" wherein a procedure is set forth for determining the coverage expected from a proposed station. Account must necessarily be taken of the topography of the service area. Since stations are licensed on the basis of their coverage, provision has been made in the standards for subsequent measurement of the actual coverage and adjustments to enable the station to establish that it in fact actually serves the area for which it is licensed. It is difficult to accurately predict the service area of a proposed FM station because of the large number of variables encountered.

#### 4. CALL LETTERS

Under international agreement, the first letter (in some cases the first two letters) of a call signal indicates the nationality of a radio station. The United States is assigned the use of three letters—N, K, and W. Hence the present domestic assignment of combinations beginning with these letters.

Call letters beginning with N are reserved for the exclusive use of the Navy and Coast Guard.

Call letters beginning with **K** are assigned to broadcast stations located west of the Mississippi River, and in the Territories.

Call letters beginning with **W** are assigned to stations east of the Mississippi River.

Any existing call letters not in accordance with this procedure is due to the fact that the station was licensed before the allocation plan was adopted.

Though limited to the use of **K** or **W** as the initial letter, the Commission has provided distinctive calls for FM broadcast stations by adopting a new system of call letters with interposed numbers. Following the initial letter two numbers are utilized to indicate the frequency assignment. This is possible because all FM stations are on the odd hundreds of kilocycles in the 42000-50000 kilocycles band. Thus, the first figure and the last two figures of the frequency assignment can be dropped. In addition, and where possible, the city or area will be indicated by the second letter or combination of a second and third letter—as “**B**” for Boston, “**NY**” for New York City, etc. For example: **W41B** would indicate that the station is located in Boston and operates on 44100 kilocycles. The letter “**E**,” however, is reserved for noncommercial educational broadcast stations.

This arrangement will not disturb the approximately 15,000 remaining 4-letter call combinations which are being assigned to the older services at the rate of between 40 and 50 a week. This means a supply of such combinations for about 6 years only. It should also be noted that under international treaty, ship stations have priority in the assignment of 4-letter calls.

### 3. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

Licenses for noncommercial educational broadcast stations are issued to organized nonprofit educational agencies upon showing that the station will be used to advance the agency's educational program, particularly pertaining to its use in a system comprising several units. In addition, educational and entertainment programs may be directed to the public. Sponsored or commercial programs or announcements are not permitted.

The Commission's Order No. 67 provided for the reallocation of the frequency band assigned to noncommercial educational broadcast stations, the only change being that the band for such stations has been placed 1000 kilocycles higher in the spectrum. This arrangement provides for five 200-kilocycle channels adjacent to the high frequency broadcast band. These stations are to use frequency modulation unless a showing of need for amplitude modulation is made. The 1000 kilocycles set aside in the lower part of the band allocated to commercial broadcast stations not only places the educational stations on an entirely independent basis but also gives them the benefits of the developments in the service rendered by commercial stations.

At the end of the fiscal year two noncommercial educational broadcast stations were in operation and one construction permit was outstanding for a new station in Beattyville, Ky., to be operated by the University of Kentucky. The station proposes to furnish an educational program service to 50 or 60 mountain schools, as well as to

adjacent communities. In August 1940, the Board of Education of San Francisco was granted authority to use frequency modulation in educational broadcasts by the San Francisco Unified School District. The following month the Cleveland City Board of Education was authorized to change its system from amplitude modulation to FM.

With the increased interest in high-frequency broadcasting and the establishment of a commercial service in this band, the number of receivers that will receive the educational stations will increase substantially. It is expected that there will be an increase in the number of noncommercial educational broadcast stations during the coming fiscal year.

#### FEDERAL RADIO EDUCATION COMMITTEE

In December 1939, the Federal Radio Education Committee reported to the Commission on the former's activities in cooperating with broadcasters in promoting education through the medium of radio. "It is a mutual necessity," commented this FREA report, "that broadcasters and educators shall work together for the solution of the problems of education through radio in the truly democratic manner represented by the Federal Radio Education Committee." The latter, created in 1935, has conducted studies and otherwise operated under various grants from broadcasters, educational groups, and foundations.

#### 6. TELEVISION BROADCAST SERVICE

At the beginning of the fiscal year, the Television Committee of the Commission, composed of Commissioners T. A. M. Craven, Norman S. Case, and Thad H. Brown, was charged with the duty of investigating and submitting findings with regard to the fixing of television transmission standards by the Commission and the disposition of a number of applications pending before the Commission for new television stations. The results of its studies were published in the committee's second report on November 15, 1939. The committee noted that certain progress had been achieved in television broadcasting since its first report of May 22, 1939. It was felt by the committee that although the television industry had not advanced beyond the experimental stage, it had arrived at the point where more rapid progress could be expected by the licensing of a class of station to render sponsored programs to the public on a limited basis. A revision of the Commission's rules to make this proposal effective was recommended although the committee recognized that the development of television was still in a state of flux and asserted that—

No interests should be permitted to raise public hopes falsely, nor to encourage public investments where the state of scientific or economic development leaves any doubt that such hopes and expenditures are justified for the use of the public property in the radio spectrum.

On December 22, 1939, the entire Commission tentatively adopted the rules recommended in this second report of the Television Committee, with minor modifications, and on the same date all parties interested in these proposed rules were invited to participate in a public hearing on January 15, 1940, before the Commission.

## JANUARY HEARING

Leading concerns engaged in experimentation and research in the television field appeared and gave evidence upon the matters under investigation. This hearing extended over a period of 8 days, voluminous evidence was presented by the parties, and expression of opinion of different members of the industry with respect to the proposed rules was offered. The witnesses differed considerably in their views regarding the Commission recognizing or adopting the transmission standards which had been previously submitted to the Commission by the Radio Manufacturers Association.

Upon consideration of the record of the January hearing, the Commission adopted rules governing television broadcast stations which provided for two classes of television stations—class I and class II stations—indicating experimental research stations and experimental program stations, respectively. The rules provided that beginning September 1, experimental-program stations could defray the cost of producing programs by limited sponsorship. However, the Commission, in its report on said hearing, found:

Actual demonstrations to members of the Commission indicate the need for further improvement in the technical quality of television. The evidence before the Commission reveals a substantial possibility that the art may be on the threshold of significant advances. Research in fact does and should continue in significant phases of the field. \* \* \* The issuance or acceptance of transmission standards by the Commission, especially in combination with the more extensive experimental program service which will in all probability develop under these rules, would have a tendency to stimulate activity on the part both of manufacturers and the public in the sale and purchase of receivers for home use. It is inescapable that this commercial activity inspired and then reinforced by the existence of Commission standards would cause an abatement of research. To a greater or less extent the art would tend to be frozen at that point. Even more important, nothing should be done which will encourage a large public investment "in receivers which, by reason of technical advances when ultimately introduced, may become obsolete in a relatively short time. \* \* \* It will be realized, \* \* \* that the loss to the public by premature purchase in a rapidly advancing field might in a relatively short period exceed many times the present total cost of research."

## APRIL HEARING

On March 22, the Commission took cognizance of promotional activities in connection with the sale of television transmission and receiving equipment by a certain firm. Appreciating that such activities were contrary to the public interest by unduly retarding further research and development in the achievement of higher standards for television, the Commission suspended the effective date of the beginning of limited commercial operation of television stations and a further hearing was held on April 8. The parties who appeared and submitted evidence at this hearing were, with few exceptions, the same as those who participated in the Commission's January hearing.

Upon the evidence given at the April 8 hearing, the Commission decided that in order to insure to the public a television system which is the product of comprehensive research, the standards of transmission should not be determined at that time. It was further decided that no commercial broadcasting with its possible adverse effects on technical experimentation would be permitted until such time as the problem of

transmission standards was fully explored. It was stated that a single uniform system of television broadcasting was essential and that the Commission would authorize full commercialization whenever the industry agreed upon standards insuring a satisfactory level of performance.

#### PRESENT PROMOTIONAL RULES

The Commission adopted rules embodying the principles arrived at pursuant to the April hearing and announced the conditional granting of 23 pending applications for new stations, provided that the applicants for these facilities submit experimental proposals for the development of a uniform system of transmission standards of acceptable technical quality. Subsequent grants gave assurance that television research would be undertaken throughout the Nation. Various licensees reported that an aggregate of \$8,000,000 was available for this developmental work.

As previously noted, the advent of frequency modulation made it necessary to remove from the television service the band 44000 to 50000 kilocycles, substituting therefor 60000 to 66000 kilocycles, and allocating 156000 to 162000 kilocycles to other services licensed by the Commission, although the total facilities available for future use of television below 108000 kilocycles remained the same.

By the close of the fiscal year a National Television Systems Committee had been organized under the auspices of the Radio Manufacturers Association to explore existing television systems with a view to developing and formulating standards which would be acceptable to the industry as a whole and expedite the inauguration of a basically sound national system of television. With the Commission licensing a widespread number of stations for the purpose of developing standards and the coordinated work of this committee, it is hoped that sufficiently efficient transmission standards may be evolved which will enable the Commission to establish a commercial television broadcast service.

#### OTHER DEVELOPMENT

Meanwhile, promising experiments with color television are under way, licensees are developing a special studicraft for television production, and there is increased use of larger screens for projection purposes.

Portable television equipment has been developed whereby programs may be originated outside of main television studios. This equipment is light weight and readily transportable and operates on frequencies above 300000 kilocycles. On many occasions outdoor events have been successfully broadcast by television stations. In some cases television programs have been originated in aircraft. As stated in another section of this report the proceedings of a recent political convention in Philadelphia were transmitted to New York by coaxial cable and there broadcast to a number of home television receivers.

There is under development a system of television relay stations for the distribution of television programs between cities similar to the national standard broadcast networks.

#### 7. INTERNATIONAL BROADCAST SERVICE

The program service of international broadcast stations has improved during the past fiscal year, particularly as regards South

America. In foreign countries there has been increased interest in the news programs by such stations located in the United States.

The Commission's rules now require domestic international broadcast stations to operate with a power of not less than 50 kilowatts. This is to enable the privately owned United States stations to compete more effectively with government-owned stations of other countries. This provision, originally scheduled to become effective July 1, 1940, was subsequently extended to January 1, 1941. By September 1940, nine such stations were using or were authorized to use the minimum power (50 kilowatts) deemed by the Commission as necessary for satisfactory international service. A domestic international broadcast station is required to use directional antennas which increase the effective radiated power by a factor of 10 in the direction of the country or countries which it is desired to serve.

South America is subjected to a barrage of transmissions from European stations, which are more favorably located for such communications, but it is anticipated that henceforth the United States stations will obtain better coverage in the Latin-American republics. A number of United States broadcasting and manufacturing companies expend large sums of money annually in the operation of these international broadcast stations to promote goodwill abroad for the United States although very little monetary return is received.

During the year a hearing was held on the petition of Mayor Fiorello H. LaGuardia of New York City to amend the Commission's rules so as to permit noncommercial and nonprofit standard broadcast stations to rebroadcast the programs of international stations for home consumption. Upon consideration of the evidence at this hearing the Commission amended its rules so that all standard, high-frequency, and noncommercial broadcast stations may pick up and rebroadcast the noncommercial programs of international stations on an equally non-commercial basis.

#### 8. RELAY BROADCAST SERVICE

The use of relay facilities by standard broadcast stations for the transmission of outside programs from locations where wire facilities are not available has increased. At the close of the fiscal year 503 such stations were licensed by the Commission.

Relay stations have been utilized in the broadcasting of many events of national interest and importance. In certain cases it was desirable to relay programs over long distances where wires or other communication services were not available. For that purpose frequencies having long-distance characteristics were granted by special temporary authorization to licensed relay broadcast stations.

The Commission has amended its rules so as to permit a maximum power of 100 watts for stations operating between 30000 and 40000 kilocycles so as to make possible a better service by these stations. The use of 100 watts is authorized on the condition that no interference is caused to Government stations operating on adjacent frequencies.

There has been a certain amount of interest in the use of frequency modulation by relay broadcast stations. A group of four 200-kilocycle channels is available for such stations in the region between 156000 and 162000 kilocycles.

In some cases relay broadcast stations are authorized to transmit standard broadcast programs between the studio and transmitter in the absence of wire facilities. In many cases the fidelity possible with existing telephone lines is limited, so the Commission may soon authorize the use of relay broadcast facilities to high-frequency broadcast stations which are required to transmit programs with a wide range of frequencies and low background noise content.

#### 9. FACSIMILE BROADCAST SERVICE

At the close of the fiscal year there were 16 outstanding authorizations for facsimile broadcast stations and 7 special experimental authorizations to standard broadcast stations to transmit facsimile signals between the hours of midnight and local sunrise.

The hearing on high-frequency broadcasting developed the fact that facsimile signals could be multiplexed with the regular program when using FM (frequency modulation) transmission. In other words, the aural and facsimile programs could be sent independently yet simultaneously over the same station. The Commission has made provisions for authorizing high-frequency broadcast stations to transmit facsimile signals by multiplexing on a secondary basis together with the aural broadcast program. It is likely that this mode of operations will encourage facsimile broadcasting during the regular broadcast day.

#### 10. DEVELOPMENTAL BROADCAST SERVICE

The term "Developmental Broadcast Station" means a station licensed to carry on development and research for the advancement and improvement of various kinds of broadcast services. This type of authorization aims at developing equipment useful to broadcasting in general. Regular program service by such stations is not generally authorized.

Research conducted during the past year includes the development of a polyphase broadcasting system whereby operating economies may be effected for high power standard broadcast stations, experimentation pertaining to the development of tubes and apparatus for operation at powers of 100 to 500 kilowatts, and the further improvement of transmitters and associated equipment for high frequency amplitude and frequency modulation transmission. A revision of some of the high frequency channel assignments for developmental broadcast stations became necessary following the reallocation under order No. 67 providing for commercial high frequency broadcasting.

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**CHAPTER VII**

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**Safety of Life and Property**

- 1. GREAT LAKES AND INLAND WATERS**
- 2. MARINE SERVICE**
- 3. AVIATION SERVICE**
- 4. EMERGENCY SERVICE**
- 5. EXPERIMENTAL SERVICES**
- 6. ALASKAN STATIONS**
- 7. MISCELLANEOUS SERVICES**



## CHAPTER VII—SAFETY OF LIFE AND PROPERTY

### 1. GREAT LAKES AND INLAND WATERS

#### GREAT LAKES SURVEY

The special study of radio requirements necessary or desired for safety purposes for ships navigating the Great Lakes and inland waters has been concluded, and the final report of the Commission to the Congress was in preparation at the close of the year.

The survey as submitted to the Commission on December 11, 1939, by Commissioner Thad H. Brown, contains 621 pages analyzing 3,167 pages of testimony and 341 exhibits which were introduced at hearings. This study was made pursuant to Section 15 of Public Order No. 97 approved by the 75th Congress May 20, 1937. By Public Resolution No. 441 of the 76th Congress, the time for making Commission report to Congress was extended from December 31, 1939, to January 1, 1941.

Following conferences in 1933 with officials of the Department of Transport, Dominion of Canada, representatives of the Commission and other interested departments of the United States Government again conferred informally with Canadian officials at Montreal, Canada, on October 12 and 13, 1939. Consideration was given to mutual problems concerning the increased voluntary use of radiotelephone communication in the short-distance maritime mobile service of Canada and the United States, and considerable factual data which had been accumulated during the course of the survey were carefully reviewed. In addition, a satisfactory basis was established for further cooperation between the two governments looking toward possible adoption of uniform ship radio requirements for safety purposes on the Great Lakes.

#### GREAT LAKES RADIOTELEPHONE SERVICE

With the cooperation of the State Department, the temporary regional arrangement providing for uniform frequency assignments and standardized operating procedure in the Great Lakes radiotelephone service, which had been placed in effect by the Commission and the Department of Transport of the Dominion of Canada for the year ending March 31, 1940, was revised and renewed on May 1, 1940.

It was agreed that this arrangement will continue until need arises for further changes, unless it is previously renounced by either of the two governments. Temporary rules of the Commission in accordance with the regional arrangement, which were initially promulgated in the early part of 1939, expired February 1, 1940, and were replaced on April 1, 1940, by similar rules (applicable only to stations in the Great Lakes area) presently included in the regular rules of the Commission governing ship and coastal services. It is the purpose of these rules to provide for the most effective use of radiotelephone frequencies and equipment, to minimize interference, and to afford interested ship-owners and radio-station licensees the proper opportunity to voluntarily develop and increase the effectiveness of short-distance maritime

telephony for safety purposes on an internationally uniform basis in the Great Lakes area. An increase during the fiscal year in the number of vessels on the Great Lakes having licensed radiotelephone stations from 146 to 226 American vessels and from 50 to 71 Canadian vessels indicates the trend toward telephony and illustrates the need for the joint regional operating arrangement.

From March 4 to March 8, 1940, a hearing was held at Cleveland, Ohio, to determine whether frequencies between 4000 and 15000 kilocycles should be made available for use in the Great Lakes region in order to provide radiotelephone communication between vessels on the Great Lakes and points on shore over distances comparable to those successfully covered on frequencies in the regular coastal-harbor band 2000 to 3000 kilocycles along the seacoast, where the presence of salt water is favorable to efficient use of these lower frequencies. It was shown that the required distances cannot be obtained economically on the lower frequencies over the fresh water of the Great Lakes. Consequently, the Commission on April 16, 1940, made available for this service, in the Great Lakes area only, three pairs of frequencies between 4000 and 9000 kilocycles to supplement use of the basic 2000 to 3000 kilocycle band.

Experience gained during the 1939 season of navigation on the Great Lakes emphasized the desirability, particularly for safety purposes, of having a uniform radiotelephone communication service on the assigned frequencies between 2000 and 3000 kilocycles, which are used primarily for short distance ship-shore and inter-ship telephony. To this end, further changes were made, effective May 1, 1940, in the joint arrangement between Canada and the United States. Briefly, it provides for the use on a regular basis of a common calling and safety frequency for all Great Lakes ship telephone and coastal-harbor stations, including government stations; for an exclusive frequency pair for communication between United States ships and shore, and a similar pair for Canadian ships. A third frequency pair was made available for the ship-to-shore radiotelephone service of ships of any nationality on the Great Lakes. Recommendations for operating procedure to minimize interference between Great Lakes radio stations of Canada and the United States operating in the maritime radiotelephone service were agreed upon and incorporated in the regular rules effective April 1, 1940.

#### GREAT LAKES ENGINEERING STUDIES

From July 26 to August 29, 1939, a temporary monitoring station was operated by the Commission's engineers at the United States Coast Guard Station, Marblehead, Ohio, on the shore of Lake Erie. The equipment used consisted of six radiotelegraph and radiotelephone receivers of modern design, together with automatic instruments for recording in graphic form the currently prevailing atmospheric noise-level or "static" on radio frequencies within the bands most useful for maritime safety communications. Electrical noise interference to radio reception, other than natural static, was practically nonexistent at this location, which condition was very desirable for the purpose of the measurements. Considerable data were accumulated at this monitoring station during the month of August 1939 pertaining to the intensity of the prevailing static levels and

the practical operation of ship and shore radiotelephone stations in the Great Lakes region. Important points of operation brought out by these observations were incorporated into the record of the September hearing at Washington.

Approximately 1,500 pages of radiotelephone logs from ships navigated on the Great Lakes were examined at Cleveland. These logs had been compiled by licensed radiotelephone operators and navigating officers on board cargo vessels operating on regular trade routes during the period July 15 to August 14, 1939, a time of the year when atmospheric interference to radiocommunication occurs frequently and at high intensities. Subsequently, the data obtained from these logs were analyzed to bring out certain information of fundamental value to the survey and the results were made the subject of engineering testimony at the final hearing.

## 2. MARINE SERVICE

### EXEMPTION FROM COMPLIANCE WITH TITLE III, PART II

The International Convention for the Safety of Life at Sea, London, 1929, and part II of title III of the Communications Act authorize the Commission to grant exemptions from prescribed radio requirements to certain vessels or classes of vessels when navigated under specified conditions, provided the Commission considers that the route or other circumstances of the voyage are such as to render compliance unnecessary or unreasonable.

During the fiscal year requests received for such exemption were few in number in contrast to the period immediately following the enactment of title III part II of the act.

The Commission renewed the exemption previously granted to numerous small passenger vessels of United States registry below 100 gross tons. Under the conditions of this exemption, the permissible distance of navigation from the nearest land is restricted to not more than 20 nautical miles (except as indicated) in the following areas:

- (1) Between Beaufort, S. C., and Fernandina, Fla.
- (2) In the vicinity of Miami, Fla., between Hillsboro Light and Triumph Reef Beacon.
- (3) Between Naples, Fla., and New Orleans, La.
- (4) Between Point Conception, Calif., and Los Coronados, Lower California.
- (5) Between Key West, Fla., and Dry Tortugas, Fla. (not more than 5 nautical miles from the nearest land).

The general exemption originally granted by the Commission on May 17, 1938, to small passenger vessels of United States registry up to and including 15 gross tons, as a class, was again renewed, as were the exemptions previously granted to a few United States vessels of more than 100 gross tons which are subject to navigation in accordance with the various restrictions and distance limitations specified by the Commission.

Exemption of a temporary nature was granted to several vessels engaged on trial voyages immediately after construction, or to permit continued operation with existing radio equipment pending procurement and installation of radio equipment required by law, which was not readily available in these instances.

The passenger vessels to which extended exemption has been granted, with few exceptions, are engaged in the sport-fishing, sight-seeing, pleasure, and water-taxi business, and in many cases are equipped with low-power radiotelephone or radiotelegraph equipment which can be used for communication with Coast Guard, coastal-harbor radiotelephone and ship stations in event of emergency.

#### VIOLATIONS AND DEFICIENCY REPORTS

During the past year some 3,467 deficiency reports were served in connection with enforcement of the operation, maintenance, and installation of ship radio equipment required by part II of title III of the Communications Act and relevant regulations of the Commission. This represents a decrease of 633 from the number served during the preceding fiscal year. It may be attributed to the fact that those responsible for compliance were more familiar with the law and its application, and also because 14,107 ship inspections were conducted during the past year in contrast to 16,341 ship inspections performed the previous year.

Flagrant violations of part II of title III of the Communications Act necessitated the application of forfeiture in the sum of \$3,000 against one vessel, and of \$2,500 in another instance, as well as a \$100 forfeiture against the master in the latter case. A forfeiture of \$100 was also declared against the master of an additional vessel, but was remitted by the Commission because of his death.

#### COASTAL TELEPHONE

There has been no change in the number of coastal telephone stations as reported in the previous fiscal year. There are seven American transatlantic and transpacific passenger vessels licensed to handle public telephone communications with this class of station. The number of foreign ocean-going ships communicating with coastal telephone stations of the United States has diminished greatly from the previously reported figure of 23, mainly due to their withdrawal from commercial service or loss during the current European war.

#### COASTAL-HARBOR STATIONS

During the past year licenses were granted for new public coastal-harbor stations at Galveston, Tex., and Port Sulphur, La., and for a second communication channel at the New York station. The experimental status of two stations located at Philadelphia and Port Petrol [Calif.], respectively, operating on frequencies above 30000 kilocycles, was discontinued and they were licensed for public coastal-harbor service. After formal hearings permits were granted for the construction of new coastal-harbor stations at Cape Girardeau, Mo., Mackinac Island, Mich., Tampa, Fla., Delaware City, Del., Charleston, S. C., and at Astoria and Portland, Oreg. As of June 30, 1940, there were 18 coastal-harbor stations in the United States and Puerto Rico licensed to provide public radiotelephone service. Applications were pending for new coastal-harbor stations at Rogers City, Detroit, Port Huron, Houghton, and Manistee, all in Michigan; at West Dover, Ohio; and at Buffalo, N. Y. Hearings were held May 18 to 29 on these applications and on applications for additional facilities for the existing Great Lakes coastal-harbor stations. Decisions were pending at the close of the fiscal year.

## MISSISSIPPI RIVER SERVICE

According to information presented at the Great Lakes survey hearings, commerce on the Mississippi River and its tributaries is rapidly assuming an increased importance. The Commission has been requested by several applicants to allocate additional frequencies within the band 2000 to 3000 kilocycles to provide radiotelephone communication for safety and commercial purposes between ship and shore on these waterways. Public coastal-harbor stations have been authorized at Memphis, Tenn., and Cape Girardeau, Mo., and a number of applications have been received for authority to establish land stations at other points on these rivers to provide public radiotelephone service to boats. Recognizing that the additional frequencies requested are not available under present circumstances and that special allocation problems are involved if a comprehensive radiotelephone service is to be provided for this area, the Commission conducted an informal hearing October 28, 1940, at Memphis to acquire more complete information concerning the need and nature of the desired service.

## COASTAL TELEGRAPH

During the past year the licenses were voluntarily surrendered for the general public service coastal telegraph stations at Portland, Oreg., and Fort Morgan and Mobile, Ala. A construction permit was issued for a new station of this class at Mobile and a license was granted for a public coastal telegraph station at Boulder City, Nev., to provide a communication service, fundamentally for safety purposes, for boats on Lake Mead, the lake formed by impounding the waters of the Colorado River behind Boulder Dam. Otherwise there has been no change in the number of coastal telegraph stations licensed by the Commission other than those in the Territory of Alaska.

Owing to the European war and the consequent withdrawal from service of many transatlantic ships, there has been a marked decrease in the activity of many American coastal telegraph stations. The volume of message traffic handled by these stations has been further affected adversely by the reluctance of the masters of ships of belligerent countries to permit the use of the ships' radio transmitting equipment during time of war.

## SHIP TELEPHONE AND TELEGRAPH

As of June 30, 1939, there were 1,561 vessels equipped with ship radiotelephone stations licensed by the Commission to communicate with coastal-harbor stations. On June 30, 1940, this number had increased to 2,773 vessels. More than 226 ship radiotelephone stations were licensed by the Commission for service on the Great Lakes. At the same time there were 91 Great Lakes ship radiotelegraph stations of United States registry, representing a 40-percent reduction in the number licensed for telegraphy the preceding year. Of the total number of 4,314 ships licensed for radio communication as of June 30 last, 1,541 ships were licensed for telegraph service.

With the considerable growth in the number of ship radiotelephone stations there have arisen serious interference problems. These problems are caused principally by the corresponding increase in the volume of radiotelephone messages handled free of charge between ships, and by the fact that only one message frequency (except

for certain ultra-high frequencies not fully developed) is available for this intership telephone communication at present. Consequently, the Commission has adopted and placed into effect new rules prohibiting unnecessarily long and superfluous conversations, as well as rules pertaining to procedure in the ship radiotelephone service designed to minimize interference and expedite the exchange of message traffic. Notwithstanding the adoption of these measures, the Commission has been urged by the operators of small boats equipped with radiotelephones to provide additional communication channels for the intership telephone service and consideration is being given to the allocation problem which this involves. To relieve congestion on the intership frequency of 2738 kilocycles, the Commission on September 4, 1940, modified its rules to permit the use of the 2638 kilocycles frequency for radiotelephone communication between vessels.

During the past year, a frequency suitable for reliable communication over short distances was made available by the War Department for use by nongovernment ship stations to provide radiotelephone communication between vessels navigated on bays, sounds, and inland waters and the official dispatching stations located along the Chesapeake and Delaware Canal and the Cape Cod Canal. The use of this radiotelephone service has been beneficial in arranging for the safe and expeditious passage of vessels through these waterways.

By regional arrangement with the Canadian Government, adopted in 1929, the radiotelegraph stations in the maritime mobile service on the Great Lakes have utilized 410 kilocycles for calling and distress purposes instead of the internationally established 500 kilocycles used at sea. This arrangement provided a frequency separation between these stations in the marine service on the Great Lakes and the nearest broadcast station frequencies which was generally adequate to avoid interference between the two services. Gradual improvements in the design of radio receiving equipment since 1929 and the abolition of the use of all damped wave transmitting apparatus by ship radio stations of the United States and Canada during the past year have made it possible for the ship and coastal radiotelegraph stations on the Great Lakes to adopt the standard 500-kilocycle wave for calling purposes and for distress communication in conformity with the world-wide use of this frequency.

#### MARINE RADIO EQUIPMENT

There was marked improvement during the year in the radio equipment used on board ships in the maritime mobile service. Particularly is this true with respect to radio transmitting equipment in use on board vessels subject to title III, part II of the Communications Act. This improvement has been brought about as the direct result of two separate and distinct movements in the interest of safety of life and property at sea, the one national and the other international in scope. The first, in point of time, was an international movement to prohibit, except under certain limiting conditions, the use of equipment employing damped wave emissions, culminating in the adoption by the Cairo Conferences in 1938 of a provision that the use of damped wave emissions be prohibited beginning

January 1, 1940, except for ship transmitters with less than 300-watts input. The purpose of this action was to make possible a larger number of simultaneous communications in a given band of frequencies without serious interference. The other was a movement to raise ship radiotelegraph transmitter standards with respect to both quality of emissions and adequacy of available power for the transmission of intelligence in cases of emergency to a degree commensurate with present-day conceptions of safety.

As previously reported,<sup>1</sup> the antenna power requirement for ship stations deemed necessary by the Commission to satisfy the 200 nautical mile distance provision of section 354 (d) of the Communications Act met with objection from certain shipowners and, on the Commission's own motion, the matter of investigation of power requirements for ship radio transmitters was designated for hearing. Upon the basis of a formal public hearing conducted from November 14 to 18, 1938, by Commissioner T. A. M. Craven, and the presentation of oral argument before the Commission by representatives of the ship owners on July 13, 1939, the Commission, on July 26, 1939, adopted Commissioner Craven's report as the report of the Commission. It accordingly further modified its "Ship Radiotelegraph Safety Rules" upholding the initial antenna power requirement, but alternately expressing the same in terms of field intensity at a distance of 1 nautical mile over sea water.

The modified rules provided that a main transmitter having an operating power somewhat less than that required by these rules would be temporarily approved not later than January 1, 1940, and that an existing main transmitter installed prior to July 26, 1939, on board a subject vessel would be approved on the basis of a demonstration, before January 1, 1940, of its capability, when operated on the international distress frequency, to produce a field of specified intensity at a distance of 1 nautical mile over a sea-water path. There were no shipowners, however, who took the opportunity under the modified rules to demonstrate the adequacy of the transmitters which did not meet the power requirement of the original rules.

In order to promote uniformity in its various regulations, the Commission on October 1, 1939, approved its "Rules Governing Ship Service," superseding its "Ship Radiotelegraph Safety Rules."<sup>2</sup> The sections of the rules governing ship service which relate to ship radiotelegraph transmitters required for vessels subject to the provisions of title III, part II of the Communications Act contain substantially the same requirements as those of the superseded safety rules.

The discontinuance, on January 1, 1940, of the use by ship stations of the United States of all transmitting equipment employing damped wave emission in compliance with the General Radio Regulations (Cairo Revision, 1938) and the rules of the Commission promulgated in pursuance thereof, has<sup>2</sup> brought about the replacement of obsolete spark transmitters with the installation of modern transmitting equipment employing vacuum tubes. On the same date, the use of relatively low-powered main radiotelegraph transmitters

<sup>1</sup> See p. 63 of Fifth Annual Report of Federal Communications Commission for Fiscal Year Ending June 30, 1939.

<sup>2</sup> See art. 7, sec. 10, of the General Radio Regulations (Cairo Revision), 1938, and sec. 8.71 of the Commission's Rules Governing Ship Service.

in favor of transmitters having higher power on board ships of the United States was discontinued in compliance with the Commission's<sup>3</sup> new rules.

In anticipation of a demand, on the part of United States Government departments and private shipowners of the United States, for new and improved types of marine radiotelegraph equipment, and in order to meet new international and United States Government requirements, the leading manufacturers of radio equipment of this classification have developed a number of new models which reflect recent advancements made in the radio art.

In line with the Commission's policy to approve types of equipment after satisfactory demonstration of their capability of meeting the requirements of the rules governing a specific service, and in accordance with sections<sup>4</sup> of its "Rules Governing Ship Service," certain types of ship radiotelegraph transmitters have been approved as capable of meeting the requirements of applicable sections of these rules as listed in the statistical chapter of this report.

The approval of specific types of radio receivers, radio direction-finders, radio lifeboat equipment and automatic alarm-signal keying devices, for use on vessels required by law to be equipped with apparatus of these classifications, has been held in abeyance pending further detailed studies looking toward the promulgation of "Standards of Good Engineering Practice for Ship Stations."

Studies have been made and are being continued for the purpose of ascertaining the needs of the maritime mobile service with reference to the promotion of safety of life and property at sea. The results of these studies will be reflected in the "Standards of Good Engineering Practice for Ship Stations."

#### AUTOMATIC ALARMS

The results of the Commission's studies of automatic alarm receivers as used in compliance with law on board ships at sea are further reflected in its final approval of three types of these alarms heretofore tentatively approved. Order No. 66, of March 29, 1940, provides that approval of a particular individual automatic alarm receiver of any one of the three approved types shall not extend beyond 7 years following the date when the particular alarm in question was first put in service on board a ship; with the reservation that approval may be withdrawn, should it be determined at any time that an alarm no longer meets the specific requirements of the Commission. A further reservation is included which contemplates revision of the specific requirements of the Commission relating to automatic alarm receivers when deemed necessary or desirable. It is to be expected that such a revision will be made from time to time in order that this important item of radio safety equipment may be improved in accordance with the latest technical developments.

As of June 30, 1939, there were approximately 1,100 automatic alarm receivers, approved under the Commission's order No. 66, installed on board ocean-going cargo vessels of United States registry.

<sup>3</sup> See sec. 8.143, par. (c), of the Commission's Rules Governing Ship Service.

<sup>4</sup> See secs. 8.141 and 8.148 of the Commission's Rules Governing Ship Service.



[A list of approved types of automatic alarm receivers is contained in the statistical chapter.]

#### SEA DISASTERS

During the fiscal year, there were at least 63 instances of distress in which the international automatic alarm signal was transmitted, 49 of which occurred in European waters as a result of the war. In the early part of that conflict, prior to passage of the Neutrality Act and before ships of United States registry were forbidden by law to enter designated combat areas. American vessels participated in the rescue of hundreds of persons from foreign vessels which had met disaster. Some of these cases on which the Commission accumulated information relative to the use of radio are outlined in the following paragraphs:

On September 3, 1939, the auto alarm signal was sent at 2210 GMT by the British coastal station at Valentia, England, for the British passenger liner *Athenia*. Two hundred and twenty-three survivors were rescued by the Swedish yacht *Southern Cross* and through arrangements made by radio communication were thereafter transferred to the American steamship *City of Flint* and finally disembarked at Halifax, Nova Scotia.

On September 7, 1939, the passenger steamship *Washington* of United States registry rescued 33 persons from the British steamer *Olive Grove*. The British coastal station at Valentia, England, sent the warning signal "SSSS" at 1424 GMT, thus indicating the presence of a submarine in the vicinity of the *Olive Grove*.

The crew of the Irish steamer *Inverliffey* was rescued by the United States tanker *R. G. Stewart* on September 11, 1939. The warning signal "SSSS" was transmitted by the *Inverliffey* at 1359 GMT on the same date.

The steamship *American Shipper* of United States registry deviated 150 miles from its course to pick up 32 survivors from the British freighter *Blairlogie*, for which the British coastal station at Valentia sent "SSSS" at 0400 GMT on September 11, 1939.

The United States steamship *Seawayman* rescued the crew of the British steamer *Firby* on September 11, 1939. "SSSS" was sent at 1456 GMT by the latter.

At 1609 GMT on September 17, 1939, the British coastal station at Lands End, England, sent "SSSS" for the British steamer *Kafristan*, after which the steamship *American Farmer* of United States registry rescued 29 persons from the distressed vessel.

Fifty-five members of the crew of H. M. S. *Courageous* were rescued by the United States ship *Collingsworth* on September 18, 1939.

The United States passenger steamship *President Harding* saved the entire 36 members of the crew of the British steamer *Heronspool* while proceeding to the distress of the French tanker *Emile Mignet* on October 12, 1939.

The United States steamship *Black Hawk* rescued 39 of the crew of 40 of the French tanker *Emile Mignet*. The British coastal station at Lands End sent "SSSS" at 1835 GMT on October 12, 1939, on behalf of the latter vessel.

Two hundred and twenty-three survivors from the British steamers *Yorkshire* and *City of Mandalay* were rescued by the steamship *Independence Hall* of United States registry on October 17, 1939, subsequent to the transmission of the warning signal "SSSS" by an unidentified station at 0833 and 1730 GMT on that date.

The United States motor vessel *Crown City* picked up 60 survivors from the British steamers *Ledbury* and *Mavin Ridge* on October 24, 1939, following the transmission of "SSSS" by an unknown station at 0858 GMT on that date.

These rescues serve to effectively demonstrate the important element of safety at sea which is afforded by the presence of radiotelegraph installations and watches by qualified operators on board oceangoing vessels.

The passage of the Neutrality Act and related Proclamation by the President of the United States on September 5, 1939, forbade the

operation of merchant vessels of United States registry in designated combat areas, thus removing the possibility of American ships thereafter being in positions whereby they could proceed to the assistance of distressed vessels in those waters.

Although there were no major distress cases which occurred during the past fiscal year in waters adjacent to the continental United States, the following two cases on which available information was reviewed are believed to be of significant interest to warrant mention.

On April 27, 1940, at 2400 GMT, the American steamship *Yankee Arrow* transmitted the auto alarm signal in an attempt to contact any ship within the vicinity for the purpose of obtaining the services of a doctor and medicine to revive a man who apparently had been drowned. Through the radio facilities of the coastal telegraph station at Savannah, Ga., the Public Health authorities had prescribed the use of adrenalin, which was not available on board the *Yankee Arrow*. Although attempts were made to obtain this drug, unfortunately these were not successful. This is the first case on record whereby the auto alarm signal was used in an attempt to save the life of a man by attracting the attention of vessels in the vicinity which might have had a physician on board. In this case, automatic alarms on 16 American vessels responded to the signal transmitted by the *Yankee Arrow*.

At 2200 GMT, July 18, 1939, the American steamer *Associated* received a distress message from the Japanese steamer *Bokuyo Maru* in latitude north 36.38 and longitude east 159.03, stating that the vessel was foundering following an explosion and fire. The Japanese vessel was approximately 80 miles from the *Associated* which was 1,200 miles east of Yokohama, en route to San Francisco from Manila. The *Associated* proceeded to the scene and rescued 209 of the 212 passengers and crew of the Japanese steamer, mostly Oriental and Hindu women and children returning home from Chile. The following day, all the survivors were transferred to the Japanese steamer *Florida Maru* which was en route to Japan.

Studies carried on in preceding years of the use and operation of radio stations and wire-line service in connection with furnishing emergency aid to ships at sea and the maintenance of special marine safety watches at Baltimore, Md., and Portland, Oreg., were continued during the past fiscal year to a limited extent in view of the abnormal conditions created by the war. Studies of distress cases and conclusions reached under these circumstances obviously are not indicative of the normal procedure followed in times of peace.

#### SHIP AND COASTAL SERVICE RULES CLARIFIED

Substitution of the term "limited (governmental)" for "private" is involved in modification and clarification of the rules governing ship and coastal services by action of the Federal Communications Commission, effective March 1, 1941. This was prompted by the fact that the word "private" does not adequately describe such a limited service station. A station of this class is restricted to use for governmental purposes and is available to Federal, State, county and municipal agencies, and to other persons or organizations only for the purpose of performing services for such governmental units.

### 3. AVIATION SERVICE

In general, the development of aviation and communication has gone forward with the increase in volume of air transportation. The Commission's rules reported in the last annual report were found satisfactory and it has only been necessary to provide additional frequencies to accommodate the increased aircraft schedules.

## DOMESTIC AVIATION

At the close of the fiscal year a total of 1,875 stations were licensed in the aviation service, including 1,294 aircraft, 345 aeronautical, 141 aeronautical fixed, 82 airport, and 13 flying-school stations.

Increasing passenger, mail, and express loads have resulted in the addition of many aircraft flights to scheduled operation. Requirements of air-traffic control with respect to the frequent report of aircraft positions have been reflected in an increase in the volume of communications required to be handled. Although additional frequencies necessary to accommodate this increasing communication load have been found, it is becoming more and more apparent that the frequency bands at present used cannot continue to handle the mounting volumes of communication. In order to find room for expansion a great deal of experimental research has been conducted into the possibility of using frequencies of the order of 130 megacycles for air-ground communications, and it is expected that during the next fiscal year equipment will be installed on board communication air transports for the purpose of giving this new band of frequencies service tests.

Air transport routes have for some time connected the United States and Canada. The Commission has enjoyed the utmost cooperation with the Canadian administration in handling the communication problems arising through this international operation. Specifically, in connection with the routes from Montreal to New York City and the projected route from Toronto to New York City arrangements were made for the use of frequencies by United States stations on which Canada had prior rights.

## AIRPORT TRAFFIC CONTROL

As a result of the development of equipment and because of technical reasons, the band of 200 to 400 kilocycles has been used generally for radio ranges. Within this band the single frequency 278 kilocycles has been designated as the frequency to be used by airport control towers in directing the movements of air traffic in the vicinity. A single frequency has now become insufficient to handle all the communications that are necessary for airport traffic control purposes. Preliminary research having indicated their suitability, the Commission has allocated six frequencies above 130 megacycles for use for airport traffic control. In order that the undesirable conditions now existing on 278 kilocycles may be corrected as soon as possible, the Commission required all those submitting applications for airport control stations after January 1, 1940, to make provision for the use of both 278 kilocycles and one of the six ultra high frequencies. In addition, the Commission requires that those desiring renewal of authorizations issued before that date must, by January 1, 1941, make provision for use of an ultra high frequency.

To illustrate the importance of this situation, two cases coming to the attention of the Commission are discussed in detail.

The first involved the opening of the LaGuardia Field in New York to commercial air transports. Within 30 miles of this new airport there were existing four airport stations: Roosevelt Field, Garden City, N. Y.; Floyd Bennett Field, Brooklyn, N. Y.; Newark Municipal Airport, Newark, N. J.; and the Islip Field, Islip, N. Y. Each of these airports was in active operation and it was obviously

impossible to expect a single frequency to handle the communications then existent as well as the communications expected to be required by the installation to be made at LaGuardia Field. As a result of conferences, authority was obtained from the Interdepartment Radio Advisory Committee for this Commission to license the airport stations at LaGuardia Field to use the frequency 362 kilocycles primarily assigned for radio ranges.

The second case involved the four airports in the Los Angeles metropolitan area. Here the United Airport at Burbank and the Municipal Airport in the City of Long Beach were both licensed to use 278 kilocycles and permission was sought by Santa Monica and Los Angeles to erect airport control stations at their respective municipal airports. These requests proceeded to a formal hearing, at Los Angeles, at which it was definitely established that the air traffic in the vicinity of Los Angeles required the use of four airports and that the four airports could in no way share the use of single frequency and adequately protect the landing and take-off operations of the number of aircraft in daily operation. In this case authority was obtained to license frequency 272 kilocycles for the shared use of the two new airport stations.

With the installation of equipment in aircraft and on ground for the use of ultrahigh frequencies this situation will be remedied. However, until such frequencies are in general use, congestion is to be expected at many points where aircraft operation is concentrated in a small geographical area.

#### NONSCHEDULED AIRCRAFT OPERATION.

Considerable improvement has been noted in the standards of operation maintained by the nonscheduled operator. Many new lines of equipment designed specifically for use by this group of airmen have been placed on the market, and an ever increasing number of private aircraft operators are availing themselves of the benefits of radio communication even though the installation of two-way apparatus is not mandatory.

In cooperation with the private fliers and their representative organizations, the Commission has endeavored to make its rules as simple as possible consistent with its responsibility to promote the safety of life and property through the use of radio.

#### INTERNATIONAL AVIATION

Article 7 of the General Radio Regulations annexed to the International Telecommunication Convention (Cairo revision) establishes a number of intercontinental routes. In four of these the United States has primary interest: (1) Inter-American routes, (2) Trans-Pacific route, (3) European-North American route by North Atlantic, and (4) European-North American route by the Arctic.

Flights of the Inter-American routes (route 1) have continued with the steadily increasing number of schedules and an excellent record of safety. Stations licensed by the Commission serve these routes at Los Angeles, Calif.; Brownsville, Tex.; Miami, Fla.; and San Juan, P. R. In addition, communication facilities have been installed at various airports throughout Central and South America. During the year new aircraft equipment was provided which permitted the establishment of an airway directly across the interior

of Brazil. This reduced the distance between Miami and South American airports by more than 1,000 miles.

The disturbed conditions in the Orient curtailed service over the Trans-Pacific route (route 2). Regular flights have continued from San Francisco to Manila, and Los Angeles has been included as a regular stop on the portion of the route from San Francisco to Honolulu. Operation on that portion of the route from Manila to Shanghai and Peiping has been suspended. However, service to Canton was established, and a new route from San Francisco to New Zealand via Honolulu was placed in operation. Extension of this last route to Australia is contemplated.

The development of service over the European-North American route by the North Atlantic has been greater than was anticipated. However, it has proceeded along a different line because of the war situation. Service was inaugurated on May 20, 1939, but operations were affected by the Neutrality Act and the President's proclamation barring American ships from the combat zones. On September 1, 1939, European terminals were transferred from Southampton, England, to Foynes, Ireland, on the north lane, and from Marseilles, France, to Lisbon, Portugal, on the south lane. On October 7, 1939, service in the north lane was completely suspended. However, service on the south route was increased to twice weekly. Because of difficulties experienced in inspections at Bermuda, stops at that point were discontinued and service was changed from New York to the Azores and thence to Lisbon.

Exchange of weather information in the North Atlantic service suffered when ships of foreign registry discontinued such transmission. This necessitated a special provision for the collection and distribution of weather reports. Although the Commission is in no way responsible for this weather service, it was able to cooperate in the negotiations which have led to satisfactory service.

During the year the Civil Aeronautics Authority promulgated a standard procedure to be used in handling communications arising from cases of distress involving aircraft flight over the seas. The Commission and its licensees collaborated in the preparation of this document.

No regular flight from Europe to North America has been conducted by way of the Arctic (route 4). Several survey flights have been made, principally by the U. S. S. R. over this route, and it may well be that with the termination of hostilities regular service will be inaugurated. Service to Alaska from Seattle was initiated on June 24, 1940, and since such a route would logically be extended to Europe, it was established as a portion of the Arctic route, using the frequencies set aside for the route under the Cairo regulations.

The entire international system flown by the United States aircraft reaches 269 terminals and uses 146 radio communication stations.

#### 4. EMERGENCY SERVICE

Under the "Emergency service" classification are included all stations devoted to the promotion of safety of life and property. Included are stations in the following classifications: State, municipal, inter-zone, and zone police; marine fire, forestry, and special emergency. During the past year there has been a tremendous increase in

the number of instrumentalities of government which have entered into the operation of equipment utilizing the ultra-high frequencies, only recently made available to these services on a regular basis.

#### NUMBER AND CLASSES OF STATIONS

The number of licensees operating facilities in the emergency service, together with the number of transmitters under license or construction permit, is shown in the table below :

Classes of stations	Number of licensees	Number of stations
State police.....	30	246
Municipal police.....	944	5,953
Interzone police.....	27	27
Zone police.....	26	64
Marine fire.....	4	14
Forestry.....	15	1,045
Special emergency.....	76	452
Total.....	1,122	7,801

This represents an increase of approximately 52 percent in number of licensees and 40 percent in number of stations under license or construction permit over the past fiscal year. The relatively tremendous growth of the emergency services is shown vividly by the fact that it has the third largest number of applications of any service, being exceeded only by applications for broadcast and ship service facilities.

At the present time, a number of facilities which ordinarily would be included under the emergency service classification are placed in the experimental class because of the fact that frequency modulation, rather than amplitude modulation, is being employed. It is considered likely that, before the end of the next fiscal year, enough data will have been secured on the stations using frequency modulation to permit their being included under their normal classifications. [For a more complete discussion of frequency modulation, see other sections of this report.]

#### POLICE STATIONS

There are at this time 37 intermediate frequencies and 29 ultra-high frequencies allocated to the various police services. All of the police stations formerly operating on an experimental basis on the ultra-high frequencies have been transferred to the emergency service on a regular basis, with the exception of those stations recently authorized to use frequency modulation. Even with the total of 66 frequencies which are available, the very large increase in the number of stations has caused the problem of interference to remain of paramount importance.

Experience has proved that the ultra-high frequencies are technically suitable for use by land, portable, and portable-mobile police stations when the area to be covered is not unusually large. In particular, these frequencies have been of great value to the smaller municipalities. These small towns and cities have a real need for radio in their police organizations, and since the cost of installation of the usually low-powered ultra-high-frequency equipment is more in line with their smaller budgets, hundreds of these municipalities have been able to avail themselves of the service. This would have been quite impossible had it been necessary for them to make a large monetary outlay for the

medium- or high-power conventional-frequency equipment and radiation systems.

Of particular interest is the rapidly growing group of interzone and zone police stations. To aid in relieving the serious congestion on the radiotelephone channels, as previously reported, the Commission has allocated certain frequencies for point-to-point communication by radiotelegraph only. These stations, all operated by various instrumentalities of government, are rapidly taking over the job of handling all necessary police point-to-point communications, thereby permitting the radiotelephone channels and facilities to be reserved for communications involving mobile units.

In general, police radio has proved itself of inestimable value to the law-enforcing agencies for the prevention and suppression of crime in all its phases, and for the quick apprehension of culprits after a crime has been committed. It is a matter of record that many criminals will avoid entering a town or city known to have a police radio system in operation, because they are fully aware of its effectiveness and know that their chance of escaping detection or evading capture is thereby minimized.

#### FORESTRY STATIONS

Radio is playing an increasingly important role in forest conservation work. It is not only a great aid in coordinating efforts to extinguish large forest fires, but is particularly valuable in preventing such fires by its ability to dispatch men to extinguish small fires before they reach the destructive stage.

In 1934 the Federal Radio Commission issued licenses for special emergency stations to be used in forest protection, and in 1939 the Federal Communications Commission established forestry stations as a separate classification and allocated specific frequencies for their use.

The United States Forest Service, the State departments of conservation, and private agencies owning and operating forest lands have equipped hundreds of fire lookout towers with radio equipment, and they have also equipped both men and vehicles with portable and mobile equipment so that a communication network is provided, permitting reliable and instantaneous communication between the bases of forest operation and the crews.

As the portable and mobile stations used in the forestry service must, of necessity, be very light and low-powered, they are unable to communicate over great distances. In order to make possible direct communication between the man in the field and his headquarters a number of experimental stations have been licensed in order that an automatic relay system making use of repeater stations may be developed.

#### MARINE FIRE STATIONS

The Commission has made available one intermediate and two ultra-high frequency channels for marine fire stations. This class of stations includes land stations for communication between fireboats and the shore. Such a station justifies its existence by permitting the rapid dispatch of marine fire-fighting apparatus to the scene of fires and explosions occurring both aboard ship and at docks, wharves, or marine warehouses.

The use of marine fire radio facilities has resulted in an appreciable

saving to the taxpayers. It permits continuous communication to the fire-fighting apparatus, enabling its immediate recall if the fire has been brought under control by other means, or if the alarm has subsequently been reported as false, etc. Also, a considerably smaller number of pieces of fire-fighting equipment is needed, since the same or a greater amount of protection can be assured by keeping the available units on actual fire patrol duty, rather than holding a larger number of units available at fixed locations while awaiting a call.

#### SPECIAL EMERGENCY STATIONS

Special emergency stations under one terminology or another have been licensed by this Government since before the establishment of the Federal Radio Commission in 1927. In December 1938 an informal engineering conference was authorized by the Federal Communications Commission, to which all parties interested were invited. The present rules governing special emergency stations are based on this conference, and on the knowledge of the problems gained from subsequent study of the uses made of radio in this connection.

Section 10.23 of these rules specifies that "Authorizations for special emergency stations will be issued only to (a) organizations established for relief purposes in emergencies and which have a disaster communication plan; (b) to persons having establishments in remote locations which cannot be reached by other means of communication; (c) to public utilities." On July 24 the Commission stressed that this type of station "may be used only during an emergency jeopardizing life, public safety, or important property" and that its employment "for the handling of routine or nonemergency communications is strictly prohibited."

When gaps occur in wire telephone or telegraph circuits caused by wind, storm, floods, or other causes, service must be restored as quickly as possible. A portable transmitter and receiver equipment has been developed which can be rushed to the scene, installed at each side of the gap, connected to the two remaining ends of the wire lines and thereby make connection between the talking or telegraph circuits through the use of radio. As soon as the wire lines have been replaced, these special emergency stations are removed and stored at strategic locations for use in the next emergency.

Stations for bridging gaps were extensively used by the telephone and telegraph companies in the New England hurricane. In many instances this was the only means of maintaining vital communications for long periods of time and until the repair crews could get through to restore the wire lines. Similar experiences occurred during the Mississippi and Ohio River floods.

In addition to the so-called disaster service, this type of station has its day-to-day use in emergencies. For example, the cable connecting Block Island with the mainland was broken through accident. One special emergency station placed on the island and another on the mainland provided telephone and telegraph service to that remote location until the cable was repaired. In another case, Tangier Island in Chesapeake Bay was cut off from the mainland by ice conditions during a severe winter storm. Special emergency stations provided the only means by which the inhabitants of the island could make known their needs for medical attention and food. As a result, supplies were flown in by air and dropped by parachutes.



## 5. EXPERIMENTAL SERVICES

Continued progress has been made in the perfection of transmitting and receiving equipment for operation on the ultra-high frequencies.

The ultra-high frequencies are ideally suited for certain services such as airport traffic control stations, instrument landing devices, and similar services requiring line-of-sight transmission.

In general, these frequencies are relatively free from static interference. They are not appreciably reflected from the Heaviside-Kennedy layers and hence are confined to an area extending but slightly beyond the optical path from the transmitting antenna. As a result, they cause little or no interference with distant stations. The radiation patterns are easily controlled and the physical dimensions of the antenna systems and equipment are materially reduced.

Experimental authorizations have been granted providing facilities to interested parties to investigate the possible extension of the use of the ultrahigh frequencies to existing services. The experimental reports indicate that in many cases these frequencies can furnish better service than is being obtained through the use of the conventional lower frequencies. The frequency separation band width provided in the present allocation plan permits the use of relatively wide-band frequency modulations with a correspondingly greater fidelity and static-free reception.

### FREQUENCY MODULATION EXPERIMENTATION

Considerable interest has been shown in the past year in the possible extension of FM [frequency modulation] to services other than broadcast.

As explained elsewhere, frequency modulation is claimed to offer certain definite advantages over the existing AM [amplitude modulation] systems in the reduction of interference resulting from static, automobile ignition systems, and other similar sources. In addition, it appears that the geographical separation between stations can be materially reduced without serious mutual interference even though the stations are operating on the same frequency. In view of the present traffic congestion on the frequencies available for assignment, particularly with respect to services such as police, the duplication of frequencies within a relatively small area would be highly desirable.

In the police service, each system is under the direct control of one licensee who can plan and control the installation and operation of the complete communication network. The successful introduction of frequency modulation into the existing service is contingent upon the frequency band of emission required for clarity of messages and the possibility of interference to existing amplitude modulated stations. There are approximately 1,000 police radio systems with over 6,000 transmitters (including headquarters and cars) now using amplitude modulation. Before a permanent policy can be established with respect to the licensing of frequency modulation on a regular service basis, further investigations and studies will be required, both from the standpoint of the equipment requirements and the effect of simultaneous operation of amplitude and frequency modulation, on the frequencies now allocated.

In services such as the aviation service where there is intercommunications between the various licensees, a single national standard

of either amplitude or frequency modulation must obviously be adopted in the interest of safety.

In view of the numerous problems raised by the introduction of FM and the limited research that has been conducted to date, it was deemed advisable to obtain more factual data through experimental application of frequency modulation. The Commission accordingly announced on January 25, 1940, that it would accept applications for experimental authorizations permitting the use of FM in these services.

The limited number of frequencies available precludes the assignment of separate frequencies for amplitude and frequency modulation to the many types of radio services. Under the present plan, stations using frequency modulation are required to operate on the frequencies allocated to the particular service, and such authorizations are granted subject to the condition that no interference is caused to existing stations in the same service or to stations operating on adjacent channels. In view of the relatively wide frequency band required for frequency modulation in the present state of the art, it was deemed necessary to restrict such operations to frequencies above 30000 kilocycles and to require that the total band of emission plus tolerance be within the frequency separation band width as set forth in the present allocation plan.

At the end of the fiscal year nine applicants had filed for experimental authorizations to conduct a program of research and experimentation in the application of frequency modulation to services such as aeronautical, municipal and State police, and special emergency. Notable among these is the Connecticut Department of State Police. Its present plan contemplates the construction of ten 250-watt fixed police stations to be located at strategic points within that State and two hundred 25-watt mobile units. These stations when completed and in operation will provide a statewide police communication network using frequency modulation exclusively.

On the basis of the experimental reports covering the actual operation of these stations and from observations by the Commission's engineers, it is hoped that sufficient factual data can be obtained within the coming fiscal year to reach a decision as to whether and under what conditions frequency modulation can be regularly authorized for use in services other than broadcast.

#### RELAY OR REPEATER CIRCUITS

Another interesting development which has promise of a possible extension of the police service is the use of relay or repeater circuits.

The primary purpose of these stations is to provide facilities for relaying messages from mobile units in outlying districts back to headquarters in those cases where the intervening terrain is such as to prevent direct communications. These stations are in general located at high elevations intermediate between the mobile units and the main station and are provided with directive antennas oriented in the direction of the main station. The transmitter is operated automatically by a crystal-controlled receiver tuned to the frequency being used by the patrol cars. Messages originating at the patrol car are picked up by the receiver which automatically turns on the transmitter and relays the message to the main station. In this manner the possible service area of the system is greatly enlarged.

especially in mountainous country where the effective coverage of the police mobile transmitter is restricted to a relatively small area.

Reports reaching the Commission indicate that satisfactory service is being obtained through the use of the frequencies above 116000 kilocycles. As in the proposed use of frequency modulation, there is insufficient data available for the formulation of specific rules and regulations establishing the service on a regular basis. Until such data is obtained this class of station is granted only on an experimental basis.

#### RAILROAD DISPATCHING

During the year the Commission granted an experimental authorization to the General Railway Signal Co. of Proviso, Ill., for the purpose of investigating the possible application of radio to rail transportation. The proposed service provides a radio telephone communication link between the central control tower of a railway classification yard and the locomotives used in the switching operation.

The messages to be transmitted over these stations will consist of orders relative to the classifying or sorting process that is required at certain strategic points in moving freight between different sections of the country.

From information received by the Commission it appears that these classification yards form a bottleneck in the present transportation system, and a large percentage of time required for the shipment of freight is lost at that point. With the use of radio it is hoped to effect a coordinated managerial control from the central tower which should expedite the sorting processes and greatly facilitate the smooth flow of traffic through the various sections of the yard. Whether stations of this class can be authorized on a regular basis will depend on the results of experimentation.

#### 6. ALASKAN STATIONS

The growth of Alaska is indicated by the increase in the number of its radio stations. The various types of service in Alaska for the last 2 fiscal years are shown in these figures:

Service:	<i>Number and classes of stations</i>	
	<i>Fiscal year</i>	
	1939	1940
Fixed public.....	300	342
Public coastal.....	150	167
Aviation.....	210	246
Special emergency.....	0	6

In general, it may be said that the operation of these stations has been satisfactory. Much obsolete equipment has been replaced and the standard of communication engineering evidenced in their operation is much higher. However, the situation with respect to the aviation service in Alaska has been considered unsatisfactory.

Air transportation in Alaska is not conducted in the same manner as elsewhere in the United States. There is a large number of independent operators who do not fly on regular schedules over fixed routes. Competition is very keen and in general there has not been cooperation in the use of available radio communication sys-

tems. This situation was deemed to be so serious that applications for renewal of all existing aeronautical and aeronautical fixed stations in Alaska and application for construction permits for new stations were designated for a hearing, which hearing was held at Fairbanks and Juneau, Alaska, beginning October 2, 1939.

Although no decision has as yet been reached as a result of the hearing, salutary effects of the Commission's action are already apparent. There was an evident misunderstanding in Alaska as to the fact of limitation in the numbers of frequencies which could be made available for aircraft communication and the resultant absolute necessity for cooperation in the use of frequencies. Since the hearing, steps have been taken in Alaska which tend to eliminate duplication of services now existing and extend service to new territories with resultant benefit both to the aircraft operator and to the public making use of air transportation.

### 7. MISCELLANEOUS SERVICES

The rules governing miscellaneous services comprise part 11 of the Commission's rules and regulations and govern the following services and five classes of radio stations:

- (1) Geophysical service:
  - (a) Geological stations.
- (2) Special press service:
  - (a) Relay press stations.
  - (b) Mobile press stations.
- (3) Intermittent service:
  - (a) Motion picture stations.
  - (b) Provisional stations.

*Geological stations* are the only ones now licensed in the geophysical service. Under this general classification there might also be included: (1) ionosphere stations; (2) meteorological stations; (3) radio sounding stations; (4) hydrological stations; (5) oceanography stations; (6) geodesy stations; (7) seismology stations; and (8) volcanology stations. A number of these classes of stations are operated by various Federal agencies. However, there has been insufficient commercial interest for licensees under these classifications to justify their recognition on a regular basis, and to warrant the allocation of frequencies for their use. In those few cases where a need has been shown for the transient operation of stations in these categories they have been licensed on an experimental basis, using a frequency allocated to experiment stations. No such licenses are now outstanding. There are, however, 304 geological stations now licensed, and reports indicate that the needs of national defense have resulted in great activity on the part of these stations in the detection of probable localities where oil may be obtained if and when present operating oil fields show signs of depletion.

*Special press service* embraces two classes of stations—relay and mobile. Three mobile press stations now provide a radiotelegraph press service to maritime mobile stations. There are seven relay press stations, which is a new classification established by the preceding fiscal year and first reported in the last annual report. The number of relay press stations now existing is too few, and their use has been too limited to justify a report as to the economic benefits gained by the public from their use.

*Intermittent service* designates motion picture stations and provisional stations. There are 12 stations now licensed under the former classification and, as has been previously reported, their use has contributed to the production of many excellent motion pictures.

At the present time there are only three systems operating under the classification of provisional station. This type of station was established to provide a classification in which could be placed those communications needed for a temporary period pending completion of a specific project.

In connection with the erection of a bridge across Lake Washington, King County, Wash., one fixed station and seven associated portable and mobile stations are in use. The construction of a bridge at the Narrows, Pierce County, Wash., is facilitated by the use of one fixed station at Tacoma with five portable mobile stations. The latest system authorized is in connection with the construction of the Shasta, Dam, Shasta County, Calif., for which purpose one fixed station and three portable mobile stations have been authorized.

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**CHAPTER VIII**

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**Operators**

- 1. COMMERCIAL RADIO OPERATORS**
  - 2. AMATEUR RADIO OPERATORS**
  - 3. TELEGRAPH AND CABLE OPERATORS**
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## CHAPTER VIII—OPERATORS

### 1. COMMERCIAL RADIO OPERATORS

The licensing of radio operators is a function performed by the Commission under the provisions of section 303 of the Communications Act. Among other things, this section confers upon the Commission authority to prescribe the qualifications of station operators, to classify them according to the duties to be performed, to fix the form of such licenses, and to issue them to such citizens of the United States as the Commission finds qualified.

On July 1, 1939, revised rules governing commercial radio operators were made effective by the Commission. The most important change was the establishment of a new procedure respecting the examining of radio operators. For administrative convenience, the examinations have been divided into six elements. Any class of operator license may be obtained by combining one or more elements as may be required for the class of license applied for. Credit is allowed for elements represented by the class of license which an operator holds so that only the additional elements need be completed to obtain a higher class of license.

#### REVISED EXAMINATIONS

During the past year revised examinations were adopted. The majority of questions are of the multiple-answer type, which have the advantage of permitting a greater number of questions to be answered in a specified time, thus making feasible examinations of wider scope to better sample the applicant's knowledge. Also important is the type of answer required which promotes accuracy in grading and requires less of an inspector's time.

To apprise applicants of the scope of the new examinations, the Commission has prepared and made available for sale by the Superintendent of Documents a publication entitled "Study Guide and Reference Material for Commercial Radio Operator Examinations." This publication contains more than 1,300 questions covering the scope of the examinations for all classes of commercial operator licenses. In addition to questions, there have been included, for ready reference, extracts from the Communications Act, the General Radio Regulations, and excerpts from rules and regulations of the Commission.

#### NATIONAL DEFENSE PRECAUTIONS

In view of the prevailing international situation, the Commission considered it necessary to caution ship radio operators and ship station licensees that both the General Radio Regulations (Cairo revision, 1938) annexed to the International Telecommunications Convention (Madrid, 1932), to which this Government is a party, and the Communications Act of 1934 specifically prohibit the transmission of superfluous, unnecessary, or unidentified communications. Both

the International Regulations and the Communications Act place the radio service of a ship station under control and authority of the master of the ship. The Commission stated its intention to enforce vigorously these provisions of law and treaty and will hold ship station licensees, masters of ships, and radio operators on board fully responsible for any violations.

Acting in the interest of national defense, the Commission on June 18, 1940, promulgated order No. 75, requiring all persons holding any class of radio operator's license and all persons subsequently applying for an operator's license to exhibit proof of their United States citizenship. All licensed radio operators were to file with the Commission under oath the response on Form 735 not later than October 15, 1940. In addition to the questionnaire, every person affected by the order was to file a copy of his fingerprints, photograph, and birth certificate, or other data tending to establish citizenship.

## 2. AMATEUR RADIO OPERATORS

The increase in the number of amateur stations licensed by the Commission during the past year is an indication of the continued widespread interest in the amateur service. There were approximately 56,300 licensed amateur stations on June 30, 1940, as compared with 53,000 such stations at the close of the previous fiscal year.

### TECHNICAL DEVELOPMENTS

Continuing the Commission's policy to encourage technical developments and operating proficiency in the amateur service, a number of regulations were revised with the view of broadening their activities and extending experimentation into new fields. The adoption of regulations authorizing radiotelephone frequency modulation in the 58500 to 60000 kilocycles portion of the 56000 to 60000 kilocycles amateur frequency band was probably the most important change, thus making available to amateurs a frequency band possessing characteristics most suitable for experimentation directed toward elimination of objectionable interference originating from operation of various electrical devices or natural atmospheric electrical discharges. Occasion was also taken to modify a number of rules in the interest of clarity.

The majority of amateur stations employ radiotelegraph using the International Morse Code as the means of communication between stations; others use radiotelephony. However, renewed interest in communicating by International Morse Code was noted during the year, there being many amateur stations transmitting code instructions that amateurs may increase proficiency thereby. Likewise, members of organizations affiliated with the Army and Navy engage in drills in radiotelegraphy and yearly events are arranged in which a large number of amateurs participate in copying transmissions prepared to test their skill in the International Morse Code.

Other groups of amateurs have established networks for operation in times of a communication emergency and have performed valuable service during the past year in many sections of the country by establishing communication facilities in areas visited by storms, floods, and other catastrophes when normal communication channels were disrupted. Amateurs also assisted a number of scientific expeditions by furnishing communication facilities for the exchange of scientific information between the expeditions and their sponsors.



## REVISED EXAMINATIONS

In order that the examinations for amateur radio operator licenses keep pace with the progress made in technical developments and changes in law, treaty, and regulation, the amateur examinations were revised during the year. Questions of the multiple-answer type have been adopted, since experience with this type of question in the commercial operator examinations has proved highly satisfactory. In connection with the new examinations, a booklet entitled "Study Guide and Reference Material for Amateur Radio Operator License Examination" has been made available upon application to the Commission. This publication contains extracts from law, treaty, and regulations pertinent to the amateur service, as well as a list of questions of the essay type which cover the scope of the examinations but are so paraphrased as to give no indication of the actual examination questions.

## NATIONAL DEFENSE SAFEGUARDS

As a result of the international situation, the Commission promulgated a number of orders affecting the amateur service. The frequencies allocated to amateur stations and the type of equipment used make possible the establishment of international communications and international interception of domestic communications. With the large number of amateurs it is very difficult to monitor this service to guard against deliberate or unintentional breaches of neutrality. For this reason the Commission on June 4, 1940, issued Order 72, prohibiting the exchange of communications with radio operators or radio stations of any foreign government or located in any foreign country. However, provision was made to permit communication between licensed amateur operators and licensed amateur stations in the United States and its possessions, and between licensed amateur operators and licensed amateur stations in the continental United States and United States citizens authorized to operate amateur radio stations in the Philippine Islands or the Canal Zone, and between licensed amateur operators and licensed amateur stations in the several Territories and possessions of the United States.

Following this, Order 73, issued on June 7, 1940, prohibited operation of portable and portable-mobile radio stations pending further order of the Commission. However, an exception provided that licensed portable and portable-mobile amateur stations may operate on frequencies above 56000 kilocycles at locations within the United States and its possessions. Also, the order was held not to apply to licensed amateur portable and portable-mobile stations participating in the field day tests sponsored by the American Radio Relay League held June 22 and 23, 1940.

Order 73-A, effective June 7, 1940, provided that Order No. 73 shall not apply to the operation of licensed portable and portable-mobile amateur stations actually engaged in supplying or attempting to supply domestic communication in the public interest during a bona fide communications emergency when normal facilities are inadequate or nonexistent, or when actually engaged in the domestic testing and developing of self-powered portable and portable-mobile equipment intended for use in domestic communications emergencies, during the hours between sunrise and sunset on Saturdays and Sundays, provided notice of such testing and developing operation shall have been given

at least 48 hours in advance to the Commission inspector in charge of the district in which such operation is contemplated. Order 72-A, issued June 29, 1940, amended Order 72 to the extent of authorizing amateur Station W2USA, located at the New York World's Fair, to communicate with ship Station WHFZ on Board the *Effie M. Morrissey*, which was on an expedition, and desired amateur communication facilities for the protection of life and property.

By Order 75 the Commission required that each radio operator who holds an outstanding commercial or amateur radio operator license file with the Commission his response under oath to questionnaire Form No. 735, which concerns the citizenship of the licensee, his family and past history. Also, fingerprints were to be furnished, as well as a passport-size photograph of the licensee. This was to have been done not later than October 15, 1940.

### 3. TELEGRAPH AND CABLE OPERATORS

#### CITIZENSHIP PROOF OF EMPLOYEES HANDLING INTERNATIONAL COMMUNICATIONS

In order to establish the citizenship status of employees of cable and telegraph companies handling international communications, the Federal Communications Commission on August 21, 1940, announced that it was enlisting the cooperation of such companies in having these workers fill out a jointly compiled questionnaire and furnish photographs and fingerprint records. This information is akin to that required of commercial and amateur radio operators in connection with the coordinated national defense program.

Proof of citizenship and accompanying identification are not desired of all communication company employees, but only of those who, in the course of their duties, handle international messages or have access to information passing over international circuits. The need for such data was mutually agreed in conferences between representatives of the companies and the Commission.

As a result of consultation with these companies, special forms were worked out for the purpose—FCC Form No. 737, Questionnaire for Employees of Communications Companies, and fingerprint and photograph record on FCC Form 738.

These forms are supplied in number to each company to take care of the necessary personnel. The companies indicated that they would assist their respective employees to execute the forms with the least possible inconvenience. In certain cases the Commission offered to send field men to offer facilities and other aid.

As in the case of commercial and amateur radio operators, forms were to be mailed to the Commission's Washington offices for permanent record. However, in the case of communication company employees the supervision of filling out the forms and mailing them to the Commission was to be under company direction, without direct contact between the individual employee and the Commission.

This extension of proof-of-citizenship requirement is necessary for effective policing of communications in the present emergency.

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## CHAPTER IX

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### Licensing

[OTHER THAN BROADCAST]

1. COMMON CARRIERS
2. RADIOTELEGRAPH LICENSES
3. RADIOTELEPHONE LICENSES
4. COMMERCIAL OPERATOR LICENSES
5. AMATEUR OPERATOR LICENSES
6. UNLICENSED OPERATION

## CHAPTER IX—LICENSING

### 1. COMMON CARRIERS

Licensees in the fixed public radiotelephone and radiotelegraph services (except Alaska) are engaged as common carriers of radio communications offering a world-wide international service and a limited domestic radiotelegraph service. The Commission has the duty, in addition to the licensing function, of regulating their rates, practices, classifications of services and tariffs, and supervision of accounts. The matter of regulation having been dealt with in previous chapters, the following discussion is limited to the licensing phase. The Commission exacts no charge of any kind for licensing operators or stations.

The radiotelegraph service as operated under our system is highly competitive, yet is necessarily limited by its state of development and by economic demands. The Commission must have before it full information and facts prior to determination upon any application. Many applications, other than those involving minor changes in equipment and renewal licenses of existing stations, can be finally acted upon only after extensive hearings.

#### LICENSING PROCEDURE MODERNIZED

The Commission in October 1939 further revised its rules governing radio common carriers in order to modernize its licensing procedure and relieve the carriers from an unnecessary burden in accommodating their operating practices with seasonal needs and changes. Heretofore a separate license was issued for each frequency used in the international service. While this license specified definite points of communication and transmitter, licensees were permitted under an alternative clause contained in the license for flexibility of operation to communicate with any point contained in a license granted by the Commission or to use any transmitter of the same type and description. This method of licensing led to a large number of routine modification of licenses to accommodate seasonal changes and operating practices. Consequently, the Commission adopted new rules providing that all the facilities at any given transmitter location be licensed by a single document. Under this provision a licensee may use any frequency or transmitter to any point of communication so long as the maximum power specified for the individual frequency is not exceeded. This reduced the number of licenses issued from 435 to 87 and eliminated an unnecessary burden of modification of many of the licenses during the year.

#### TRAFFIC STUDIES

Shortly after commencement of the fiscal year it was recommended that activities in the fixed public radio services be expanded so that extremely important work could be accomplished and adequate rec-

ords maintained. It was proposed that studies and records show the flow of traffic to all parts of the world, the routing of traffic, extensions of existing radio circuits, actual use made of frequencies by licensees, and other pertinent data which would not only be available for use by the Commission but by other Government departments as well. In the light of recent world developments such studies and information have become exceedingly important. Certain information was obtained by the Commission for a typical day. However, with conditions changing so rapidly, these records must be maintained continuously in order to be of practical value.

#### CIRCUITS DISRUPTED BY WAR

The existing war in Europe has had a marked effect upon communications facilities to and from that continent, both as to the direct facilities available and as to the content of the message which is dependent upon the restrictions placed by the administration or agency operating the foreign end of the circuit. Many direct circuits formerly operated from this country have been disrupted. This has necessitated the rerouting of traffic via devious routes and additional restrictions. Although some of circuits have been reestablished, many circuits heretofore operated are nonexistent. The Commission has acted promptly in granting special temporary authority for the establishment of circuits to new or temporary points in order that important Government, diplomatic, and commercial messages may be efficiently and expeditiously handled.

#### 2. RADIOTELEGRAPH LICENSES

As of June 30, 1940, there were 16 radiotelegraph common carriers operating transmitting equipment at 71 stations and approximately an equal number of receiving stations for the reception of incoming traffic. The majority of these companies operate principally in the international field, although there is a limited domestic service between 11 cities of the United States, between certain points on the Great Lakes serving the maritime interests, between isolated cities in the southwest oil fields, and interisland service in Hawaii and Puerto Rico. The companies operating in the international field offer a comprehensive service direct to 64 foreign points and indirect service to practically any country.

The radiotelegraph companies may transmit only public correspondence pursuant to tariffs on file with the Commission, and service messages incidental to and necessary for the expeditious movement of traffic. In addition to the regular classifications of telegraph messages handled in accordance with established tariffs, these companies handle other types of traffic, such as addressed program material to and from overseas points for rebroadcast to the listening public, facsimile and radiophotographs, and multiple point press service for reception principally by newspapers and broadcast stations. The latter service is widely used in the United States, thereby providing broadcast stations with the latest press bulletins available.

#### WAR CONDITIONS

Most of the changes due to conditions in Europe occurred either during the latter part of the summer of 1939 or in the early spring of

1940. Circuits to the following countries were at one time or another disrupted and direct service suspended: Poland, Czechoslovakia, Norway, Denmark, Belgium, Holland, Iceland, and France. However, direct circuits to Denmark and France were reestablished during the year and indirect service to portions of the other countries has been available from time to time under certain restrictions.

In addition to the normal channels of communication, the Commission authorized special temporary authority on various occasions to provide adequate facilities to keep abreast of developments. In the main, such authority consisted of control circuits to Italy, Belgium, Holland, and Germany to regulate the heavy flow of incoming press dispatches, direct circuits to Eire, Italy, and Greenland, and direct circuits to various points in France during the invasion of that country and the disruption of the facilities normally operated from Paris.

#### "INACTIVE POINT" AND ROME-WARSAW CASES

During the year the Commission disposed of several docket cases affecting radiotelegraph common carriers which had been pending for a number of years. These actions determined the many so-called "Inactive point" cases and Rome-Warsaw case.

In the "Inactive point" cases the Commission issued "show cause" orders on all licenses authorized to communicate with designated foreign points but to which no circuits were actively operated. Most of these points were voluntarily relinquished and new licenses issued. However, the R. C. A. Communications, Inc., requested a hearing with respect to the deletion of Sydney and Melbourne, and the Mackay Radio & Telegraph Co. (Delaware) with respect to the deletion of Madrid, Paris, and Berlin. As a result of the hearing, the Commission determined that the licensees should be permitted to retain these points for the period ending December 1, 1941, under certain specified limitations.

The applications of the Mackay Radio & Telegraph Co. (Delaware) to communicate with Rome and Warsaw were denied in March 1940. In the case of Rome, the Commission found, among other things, that there were ample communication facilities serving that area, that traffic would be diverted from existing carriers, and that the applicant did not propose either new or improved service or at reduced rates. However, upon the entrance of Italy into the war and the disruption of the Italy cable, the Commission granted special temporary authority to operate a direct radiotelegraph circuit to Rome. In the case of Warsaw, the issues upon which the application was heard no longer existed due to the invasion of Poland.

#### GLOBE WIRELESS SERVICE

As a result of the filing of tariffs for a limited domestic service by Globe Wireless, Ltd., which had previously been engaged principally in trans-Pacific operations, the Commission in January 1940 issued a "show cause" order which would limit the use of frequencies assigned to that company to the handling of trans-Pacific traffic only upon the grounds that domestic points were adequately served by existing companies; that this company had always taken the position that its frequency assignments were insufficient to handle both trans-Pacific and domestic traffic; that additional frequencies had been

requested and authorized on such basis, etc. Globe Wireless, Ltd., requested a hearing, which commenced on April 17, 1940. In May 1940 the respondent filed a petition for final disposition which assented to the limitation that its frequencies would not be used for the handling of traffic originating in and destined to points within the 48 States and the District of Columbia. The Commission granted the petition and inserted such limitation in each of the licenses of the respondent.

#### NEW FREQUENCIES AND STATIONS

In the course of the last year several new frequencies were authorized to meet the needs of the various companies in the expeditious handling of traffic. Most of these assignments were the result of increased activity due to the war by countries having priority of registration. While no new companies were licensed to engage in radiotelegraph communications for hire, the Commission authorized the construction of two transmitting stations at two new locations. Globe Wireless, Ltd., built a new station at Portland, Oreg., for radiotelegraph traffic, and Press Wireless, Inc., constructed a station in the vicinity of Los Angeles for press and facsimile traffic originating principally from activities in Hollywood and destined to Honolulu, Tokyo, and European points. Both of these stations are, however, limited to transoceanic traffic.

In addition to this expansion of new stations, the Commission granted the application of R. C. A. Communications, Inc., to add Quito, Ecuador, as a point of communication. This had been pending from the previous year as a result of a hearing and the application of Globe Wireless, Ltd., to add the point of Havana. In the latter case the Commission granted the application without hearing. Existing companies serving that point did not file objection or request hearing.

### 3. RADIOTELEPHONE LICENSES

#### WAR CONDITIONS

As in the case of the radiotelegraph services, war conditions in Europe have had their effect upon the growth of the transatlantic telephone traffic due to the restrictions placed upon calls and the disruption of direct circuits. However, the total number of messages handled during the calendar year of 1939 was 51,762, as compared with 51,389 for the previous year.

Just after the outbreak of the war in September 1939, the direct circuit to Rome was established and telephone messages to that country, Germany, and hinterland countries were so routed. In addition, the Commission granted special temporary authority to establish a new direct circuit to Amsterdam in order to serve Belgium, Denmark, and the Scandinavian countries. In May 1940 the direct circuits to Berlin and Berne commenced operation on a commercial basis, while the direct circuits to Amsterdam and Paris were disrupted by the invasion. To date circuits to these countries have not been reestablished.

#### NEW CIRCUITS

Since it had become necessary, due to the importance of Government and diplomatic messages, to maintain direct circuits to each

country on a 24-hour basis, the Commission granted additional frequencies for another circuit to Europe, even though all circuits are not continually handling message traffic. The increase in traffic loads to Buenos Aires and San Juan as a result of economic and trade activities necessitated the establishment of exclusive circuits rather than forked circuits as heretofore operated and the assignment of additional frequencies to accomplish this purpose. It is anticipated that traffic to Central and South America will materially increase during the coming year.

#### GENERAL SERVICE

Radiotelephone service from the United States is rendered to practically all points in the world through facilities of the American Telephone & Telegraph Co. located at three primary distribution centers, namely, New York, Miami, and San Francisco. Telephone service to points in Europe, Africa, South America (except Venezuela and Colombia), and the Near East is handled via New York, while that for Asia and Oceania is routed through San Francisco. Messages destined for Central America and northern South America are transmitted from Miami.

In Puerto Rico service is rendered by the Radio Corporation of Porto Rico at San Juan, and in Hawaii by the joint facilities of the Mutual Telephone Co. and the R. C. A. Communications, Inc.

#### 4. COMMERCIAL OPERATOR LICENSES

World events during the fiscal year aroused interest in radio operators as well as radio operation. Government agencies and commercial interests sought information as to number and qualification of operators, particularly in those classes who would be available in a national emergency to maintain vital channels of communication and man essential new ones.

The Commission continued to license commercial operators in two main groups—radiotelegraph and radiotelephone—dividing each group into three classes. Many individuals qualified for a class in each group. Actual licensing has been decentralized among 27 widely separated field offices of the Commission. Approximately 40,000 commercial-operator applications were handled during the year and relayed to a central file.

This record reflected the increasing demands on radio in old and new fields, such as the particularly rapid growth of two-way radio for police purposes. Thus, the number of individuals who had obtained only the lowest radiotelephone class of license was rapidly approaching 50,000. Most of these were police officers, but included were many aviators, owners of small boats, and others. The holders of higher radiotelephone classes, required at broadcast transmitters, substantially exceeded 10,000. Substantially less than that number, including several thousand of the same persons, were holders of radiotelegraph licenses usable at sea or at land radiotelegraph stations.

The ages of these licensed commercial operators vary, but a substantial number are in their twenties and thirties. Less than 10 percent are below the age of 21. A fourth of all were minors when first licensed, but this was not true of the recent new applicants, nearly 90 percent of whom had attained majority before applying. While related figures differ with classes and groups, the foregoing



statements apply to radiotelegraph or radiotelephone operators generally.

Regulations contained but one age restriction, rendering a minor ineligible to radiotelegraph operator first class. This was one of numerous additions and changes in the Commission's regulations governing radio operator licenses at the beginning of the fiscal year. At the same time the license examinations were revised in scope and character, fixing standards in code tests and in the main converting written tests to a multiple-choice form that proved very satisfactory.

Toward the end of the fiscal year the Commission adopted its Order 75, calling for more information regarding each licensed operator, including a more complete showing than heretofore of the basis of his United States citizenship, required by law for eligibility for such a license.<sup>1</sup> The first effect of the order was the surrender and cancellation of a number of licenses. [See more detailed discussion of commercial operators in previous chapter.]

### 5. AMATEUR OPERATOR LICENSES

All amateur operators were likewise called upon for citizenship proof by the Commission's Order 75, and a number preferred to surrender their amateur privileges.

Of a total approximating 55,000 licensed amateur operators at the close of the year, half held class B, more than a third held class A, and less than a sixth held class C privileges. Class B is basic. Class A allows wider choice of frequency for radiotelephone, while class C indicates qualification through nonassembled examination. The latter card is issued subject to call at any time for class B qualification or forfeiture. Applicable regulation renders such a call automatic if a class C holder moves within 125 miles of any point where the class B examination could be taken as often as quarterly, with some exceptions for physical disability or service connections.

More than a thousand examinations a month were given to applicants for amateur license or change of license, including an increasing number of class C holders due to the regulation above mentioned. During the year the Commission took a number of actions affecting its regulations governing amateur operators and their stations. [See previous chapter for more information about this type of radio operation.]

### AMATEUR STATION LICENSES

The Commission's Order 72 of June 4, 1940, suspended communication between United States amateur stations and those in foreign countries. Its Order 73 of June 7 suspended operation of portable and portable-mobile amateur stations on frequencies below 56 megacycles. The response of licensed amateurs, not only in immediate compliance with these orders but in expressing their understanding of such precaution during the existing conditions, was highly gratifying.

Amateurs continued their experiments and intercommunication between their home stations throughout the States, Territories, and possessions, for which upwards of 56,000 amateur station licenses were outstanding on June 30. Amendment of regulations earlier in the fiscal year facilitated their experiments with frequency modulation and

<sup>1</sup> Communications Act, sec. 303 (1).

removed a prohibition against an unmodulated carrier on the short range frequencies assigned for their use above 60 megacycles.

The amateurs continued to offer their facilities for use in emergencies and otherwise volunteered their services without compensation, and applications for amateur licenses continued in substantial number. There were received during the year nearly 38,000 applications for amateur operator and station licenses, and nearly 50,000 amateur licenses (operator or station) were issued or reissued in that period.

#### 6. UNLICENSED OPERATION

Many cases of alleged unlicensed operation of radio stations were investigated during the year. Because of the desirability of affirmatively proving the interstate characteristics of the transmissions, investigation of these cases frequently presents a most difficult problem. There were 25 cases, however, in which proof was satisfactory and in which other circumstances warranted reference to the Department of Justice. Of these, a conviction or plea of guilty was obtained in 7 cases, 4 persons have been indicted but not sentenced, 10 cases are pending, 1 proceeding was dismissed by the Commission, no true bill was returned in another, and the United States attorneys did not prosecute in 2 instances.

In addition to prosecutions by the Department of Justice, the Commission has revoked the licenses of 3 amateur stations and has suspended the licenses of 13 operators.

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## **CHAPTER X**

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### **Statistics**

- 1. STATISTICAL COMPILATIONS**
- 2. STATISTICS ON BROADCAST LICENSING**
- 3. STATISTICS ON COMMERCIAL LICENSING**
- 4. STATISTICS ON AMATEUR LICENSING**
- 5. STATISTICS ON FIELD ACTIVITIES**
- 6. ACTIONS ON BROADCAST REHEARING PETITIONS**
- 7. ACTIONS ON COMMON CARRIER REHEARING PETITIONS**
- 8. APPROVED TYPES OF MARINE RADIO EQUIPMENT**
- 9. PUBLICATIONS**

## CHAPTER X—STATISTICS

### 1. STATISTICAL COMPILATIONS

Section 219 of the Communications Act authorizes the Commission to require annual reports containing financial and operating data from all carriers subject to its authority, and from persons controlling or controlled by any such carrier. In addition, the Commission may require communication carriers to file monthly reports of earnings and expenses, and periodic or special reports concerning any matters under Commission jurisdiction. Various other provisions of the statute, such as contained in sections 215 and 218, make necessary the gathering of factual data of financial and statistical nature by the Commission.

Radio broadcasters are not deemed common carriers but the Commission requires annual, periodic, and special reports from such persons under authority of the provisions contained in title III of the act.

Report forms are prescribed by the Commission on which specific answers to all questions are required. From these reports, financial and operating data are tabulated for annual, monthly, or selected periods. Economic and statistical research is made on problems in the regulation of communication carriers. Review and analysis of statistical methods and forms is made with a view to their improvement to meet present-day statistical needs and requirements.

General summaries of statistical data received from reporting companies are prepared for analysis and use by the Commission. Included are annual and monthly summaries of financial and operating data of telephone, telegraph, cable, and radiotelegraph carriers; annual and special summaries of information on the broadcast industry; and miscellaneous summaries, such as intercorporate relations of communication carriers and their controlling companies, and statistics of international telegraph traffic reported by United States carriers.

Much of the Commission's statistical material, including figures, charts, and tables heretofore appended to the annual report, will be found in the "Statistics of the Communications Industry of the United States" now published separately and sold by the Superintendent of Documents.

These statistics are useful to other governmental agencies, educational institutions, research groups, and by firms and individuals interested in details of the communications industries. A public reference room is maintained at the Commission's offices in Washington where the public can examine the reports and other records of the communication carriers.

## 2. STATISTICS ON BROADCAST LICENSING

Number of stations in all classes of broadcast service for fiscal year ending June 30, 1940

Class of station	As of 7-1-39	New	Deleted	As of 7-1-40
Standard broadcast.....	774	79	10	1 847
Special broadcast.....	4	0	0	1 0
High-frequency broadcast.....	46	16	12	50
Low-frequency relay.....	199	40	14	225
High-frequency relay.....	275	46	43	278
Developmental.....	12	1	6	7
Television.....	23	7	4	26
International.....	14	0	1	13
Facsimile.....	12	5	1	16
Noncommercial educational.....	2	1	0	3
Total.....	1,361	195	91	1,465

<sup>1</sup> Special broadcast stations were reclassified as standard broadcast stations.

Applications received for all classes of broadcast stations for fiscal year ending June 30, 1940

## Applications for new stations:

Broadcast.....	312
Relay broadcast.....	81
International broadcast.....	3
Television broadcast.....	59
Facsimile broadcast.....	5
High-frequency broadcast.....	240
Noncommercial educational broadcast.....	9
Developmental broadcast.....	7
Total.....	716

## Applications for construction permits:

Broadcast.....	452
Relay broadcast.....	51
International broadcast.....	11
Television broadcast.....	9
Facsimile broadcast.....	0
High-frequency broadcast.....	18
Noncommercial educational broadcast.....	0
Developmental broadcast.....	1
Total.....	542

## Applications for modification of construction permits:

Broadcast.....	246
Relay broadcast.....	20
International broadcast.....	1
Television broadcast.....	3
Facsimile broadcast.....	4
High-frequency broadcast.....	17
Noncommercial educational broadcast.....	0
Developmental broadcast.....	3
Total.....	294

## Applications for modification of licenses:

Broadcast.....	394
Relay broadcast.....	47
International broadcast.....	16
Television broadcast.....	25
Facsimile broadcast.....	4
High-frequency broadcast.....	7
Noncommercial educational broadcast.....	0
Developmental broadcast.....	0
Total.....	493

Application for licenses:		
Broadcast	249	
Relay broadcast	151	
International broadcast	3	
Television broadcast	6	
Facsimile broadcast	4	
High-frequency broadcast	27	
Noncommercial educational broadcast	0	
Developmental broadcast	4	
Total		444
Applications for assignment of licenses:		
Broadcast	44	
Relay broadcast	13	
International broadcast	0	
Television broadcast	0	
Facsimile broadcast	1	
High-frequency broadcast	1	
Noncommercial educational broadcast	0	
Developmental broadcast	0	
Total		59
Applications for assignment of construction permits:		
Broadcast	4	
Relay broadcast	1	
International broadcast	0	
Television broadcast	0	
Facsimile broadcast	0	
High-frequency broadcast	0	
Noncommercial educational broadcast	0	
Developmental broadcast	0	
Total		5
Applications for transfer of control of corporations:		
Broadcast	44	
Relay broadcast	1	
International broadcast	0	
Television broadcast	0	
Facsimile broadcast	0	
High-frequency broadcast	0	
Noncommercial educational broadcast	0	
Developmental broadcast	0	
Total		45
Applications for transmission of foreign programs:		
Broadcast	12	
Total		12
Applications for special experimental authorizations:		
Broadcast	59	
Relay broadcast	0	
International broadcast	1	
Television broadcast	0	
Facsimile broadcast	0	
High-frequency broadcast	0	
Noncommercial educational broadcast	0	
Developmental broadcast	0	
Total		60
Applications to install automatic frequency control equipment:		
Broadcast	16	
Total		16
Applications to determine operating power by direct measurement:		
Broadcast	289	
Total		289
Total		2,975

Applications for renewal of licenses:

Broadcast.....	1,947
Relay broadcast.....	495
International broadcast.....	14
Television broadcast.....	18
Facsimile broadcast.....	12
High-frequency broadcast.....	41
Noncommercial educational broadcast.....	2
Developmental broadcast.....	6

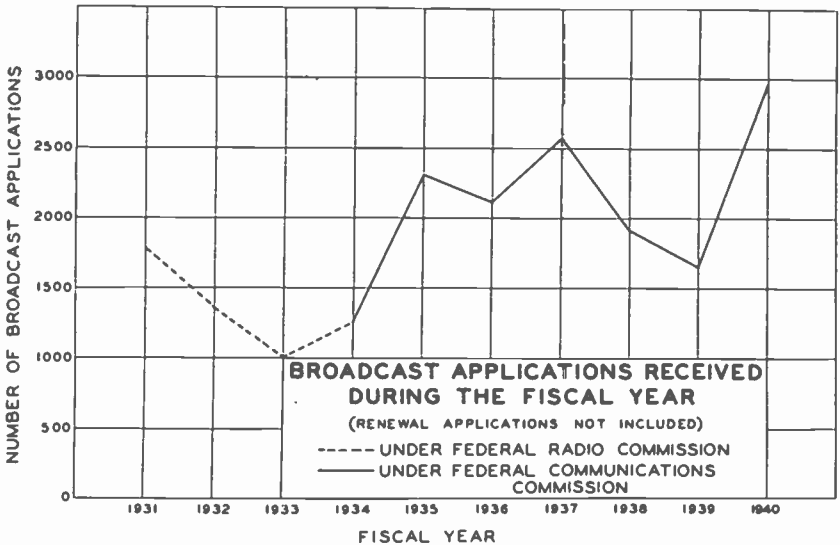
Total..... 2,535

Informals:

Broadcast.....	1,303
Relay broadcast.....	123
International broadcast.....	16
Television broadcast.....	36
Facsimile broadcast.....	11
High-frequency broadcast.....	59
Noncommercial educational broadcast.....	0
Developmental broadcast.....	3

Total..... 1,551

Grand total..... 7,061



Authorizations issued for all classes of broadcast stations for fiscal year ending June 30, 1940

Formal:

Broadcast.....	1,553
Relay broadcast.....	630
International broadcast.....	32
Television broadcast.....	19
Facsimile broadcast.....	32
High-frequency broadcast.....	105
Noncommercial educational broadcast.....	3
Developmental broadcast.....	16

Total..... 2,390

Renewals:

Broadcast.....	2,400
Relay broadcast.....	436
International broadcast.....	15
Television broadcast.....	41
Facsimile broadcast.....	17
High-frequency broadcast.....	65
Noncommercial educational broadcast.....	2
Developmental broadcast.....	6

Total..... 2,982

Special authorizations:

Broadcast.....	789
Relay broadcast.....	121
International broadcast.....	15
Television broadcast.....	29
Facsimile broadcast.....	11
High-frequency broadcast.....	43
Noncommercial educational broadcast.....	0
Developmental broadcast.....	4

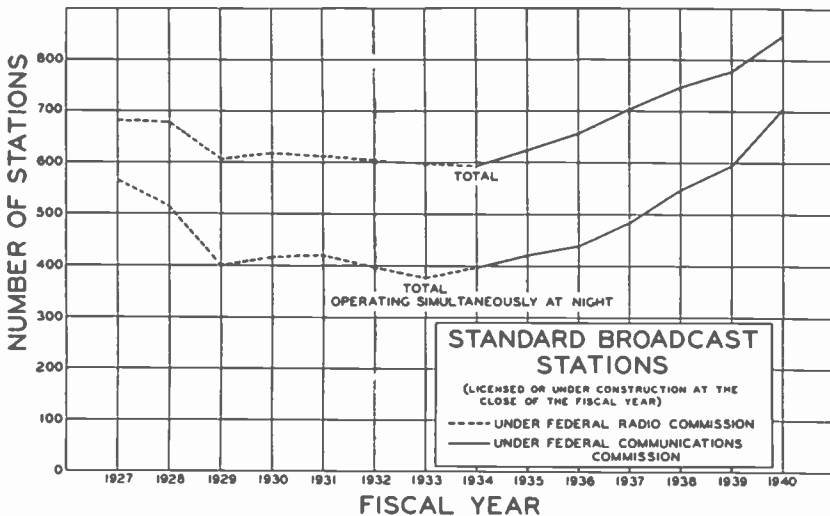
Total..... 1,012

Informal:

Broadcast.....	310
Relay broadcast.....	5
International broadcast.....	0
Television broadcast.....	0
Facsimile broadcast.....	1
High-frequency broadcast.....	3
Noncommercial educational broadcast.....	0
Developmental broadcast.....	0

Total..... 319

Grand total..... 6,703





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New standard broadcast stations authorized for fiscal year ending June 30, 1940

Call letters	Applicant and location	Power	Frequency	Hours of operation
KENO....	Geo. Penn Foster, Maxwell Kelch, and Calvert Chas. Applegate, doing business as Nevada Broadcasting Co., Las Vegas, Nev.	100 250-LS	1370	Unlimited.
KFUN....	Las Vegas Broadcasting Co., Inc., Las Vegas, Nev.	100 250-LS	1420	Do.
KHAS....	The Nebraska Broadcasting Co., Hastings, Nebr.	100 250-LS	1200	Do.
KMYC....	Marysville Yuba City Broadcasters, Inc., S. E. of Marysville, Calif.	100	1420	Do.
KMYR....	F. W. Meyer, Denver, Colo.	100 250-LS	1310	Do.
KODL....	Western Radio Corp., The Dalles, Oreg.	100 250-LS	1200	Do.
KONB....	MSB Broadcasting Co., Omaha, Nebr.	250	1500	Do.
KORN....	Nebraska Broadcasting Corp., Fremont, Nebr.	100 250-LS	1370	Do.
KPHO....	M. C. Reese, Phoenix, Ariz.	100 250-LS	1200	Do.
KUIN....	Southern Oregon Broadcasting Co., Grants Pass, Oreg.	100	1310	Do.
KVFD....	Northwest Broadcasting Co., Ft. Dodge, Iowa	100 250-LS	1370	Specified hours.
KVIC....	Radio Enterprises, Inc., N. of Victoria, Tex.	100 250-LS	1310	Unlimited.
KWAT....	Midland National Life Insurance Co., Watertown, S. Dak.	250	1210	Do.
KWBD....	W. B. Dennis, Plainview, Tex.	100	1200	Daytime.
KWFC....	Clyde E. Wilson and Howard A. Shuman, doing business as Hot Springs Broadcasting Co., Hot Springs, Ark.	100 250-LS	1310	Unlimited.
KWLM....	Lakeland Broadcasting Co., Willmar, Minn.	100	1310	Do.
KYAN....	J. Cecil Bott, Matilda Lannen, and Nettie Bott, doing business as The Western Broadcasting Co. of Wyoming, Cheyenne, Wyo.	250	1370	Do.
KYUM....	Yuma Broadcasting Co., Yuma, Ariz.	100 250-LS	1210	Do.
WAJR....	West Virginia Radio Corp., Morgantown, W. Va.	250	1200	Do.
WAKR....	Summit Radio Corp., Akron, Ohio	1,000	1530	Do.
WAOV....	Vincennes Newspapers, Inc., Vincennes, Ind.	100	1420	Do.
WARM....	Union Broadcasting Co., Scranton, Pa.	100 250-LS	1370	Do.
WATW....	WJMS, Inc., Ashland, Wis.	100	1370	Do.
WBML....	Middle Georgia Broadcasting Co., Macon, Ga.	250	1420	Do.
WBOC....	The Peninsula Broadcasting Co., Salisbury, Md.	250	1500	Do.
WBRW....	McDowell Service Co., Welch, W. Va.	250	1310	Do.
WCAR....	Pontiac Broadcasting Co., Pontiac, Mich.	1000	1100	Daytime.
WCBI....	Birney Imes, Columbus, Miss.	250	1370	Unlimited.
WCBT....	J. Winfield Crew, Jr., Roanoke Rapids, N. C.	250	1200	Do.
WCED....	Tri-County Broadcasting Co., Du Bois, Pa.	250	1200	Do.
WDAK....	L. J. Duncan, Leila A. Duncan, Josephine A. Keith, Effie H. Allen, and Aubrey, Gay, doing business as Valley Broadcasting Co., West Point, Ga.	250	1310	Do.
WERC....	Presque Isle Broadcasting Co., Erie, Pa.	100 250-LS	1500	Do.
WESX....	North Shore Broadcasting Co., Salem, Mass.	100	1200	Do.
WFCI....	Pawtucket Broadcasting Co., Pawtucket, R. I.	1000	1390	Do.
WFHR....	Wm. F. Huffman, Wisconsin Rapids, Wis.	100 250-LS	1310	Do.
WFIG....	J. Samuel Brody, Sumter, S. C.	100 250-LS	1310	Do.
WFPG....	Neptune Broadcasting Corp., Atlantic City, N. J.	100 250-LS	1420	Do.
WFTL....	Tom M. Bryan, Ft. Lauderdale, Fla.	100 250-LS	1370	Do.
WFTM....	Fort Myers Broadcasting Co., Fort Myers, Fla.	100 250-LS	1210	Do.
WGGA....	Henry Estes, Austin Dean, and L. H. Christian, doing business as Gainesville Broadcasters, Gainesville, Ga.	250	1210	Do.
WGOV....	E. D. Rivers, Valdosta, Ga.	100 250-LS	1420	Do.

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Call letters	Applicant and location	Power	Frequency	Hours of operation
WGRB....	Grand Rapids Broadcasting Corp., Grand Rapids, Mich.	250	1200	Unlimited.
WGTC....	J. J. White, tr. as Greenville Broadcasting Co., Greenville, N. C.	250	1500	Daytime.
WHAL....	Harold F. Gross and Edmund C. Shields, Saginaw, Mich.	500	950	Do.
WHKY....	Catawba Valley Broadcasting Co., Inc., Hickory, N. C.	100 250-LS	1370	Unlimited.
WHLD....	The Niagara Falls Gazette Publishing Co., Niagara Falls, N. Y.	1000	1260	Daytime.
WHOP....	Paducah Broadcasting Co., Inc., northwest of Hopkinsville, Ky.	250	1200	Unlimited.
WHPC....	Herald Publishing Co., Albany, Ga.	1000	1230	Daytime.
WHUB....	M. L. Medley, Cookeville, Tenn.	100 250-LS	1370	Unlimited.
WINX....	Lawrence J. Heller, Washington, D. C.	1 250	1310	Do.
WIZE....	Radio Voice of Springfield, Inc., Springfield, Ohio	100	1310	Do.
WJHO....	Yetta G. Samford, C. S. Shealy, Thos. D. Samford, Jr., and J. H. Orr, doing business as Opelika-Auburn Broadcasting Co., Opelika, Ala.	100 250-LS	1370	Do.
WJPF....	Orville W. Lyerla, N. of Herrin, Ill.	100 250-LS	1310	Do.
WJPR....	John R. Pepper, Greenville, Miss.	100 250-LS	1310	Do.
WKIP....	Poughkeepsie Broadcasting Corporation, Poughkeepsie, N. Y.	250	1420	Do.
WKPA....	Allegheny-Kiski Broadcasting Co., New Kensington, Pa.	250	1120	Daytime.
WKPT....	C. P. Edwards, Jr., and Howard Long, doing business as Kingsport Broadcasting Co., Kingsport, Tenn.	250	1370	Unlimited.
WLAV....	Leonard A. Versluis, Grand Rapids, Mich.	250	1310	Do.
WLOF....	Hazlewood, Inc., Orlando, Fla.	250	1200	Do.
WLOG....	Clarence H. Frey and Robert O. Greever, Logan, W. Va.	100	1200	Daytime.
WLOL....	Independent Merchants Broadcasting Co., Minneapolis, Minn.	1000	1300	Unlimited.
WLPM....	Suffolk Broadcasting Corporation, Suffolk, Va.	100 250-LS	1420	Do.
WMAN....	Richland, Inc., Mansfield, Ohio	250	1370	Daytime.
WMGA....	Frank R. Pidcock, Sr., Moultrie, Ga.	100 250-LS	1370	Unlimited.
WMJM....	Cordele Dispatch Publishing Co., Inc., Cordele, Ga.	100 250-LS	1500	Do.
WMOG....	Coastal Broadcasting Co., Brunswick, Ga.	100 250-LS	1500	Do.
WMRC....	Textile Broadcasting Co., Greenville, S. C.	250	1500	Do.
WMVA....	Wm. C. Barnes and Jonas Weiland, doing business as Martinsville Broadcasting Co., Martinsville, Va.	100 250-LS	1420	Do.
WMVD....	The Delmarva Broadcast Co., Salisbury, Md.	250	1200	Do.
WOLF....	Civic Broadcasting Corporation, Syracuse, N. Y.	100	1500	Do.
WORD....	Spartanburg Advertising Co., Spartanburg, S. C.	100 250-LS	1370	Do.
WOV....	Greater New York Broadcasting Corporation, New York, N. Y.	5000	1100	Do.
WPAB....	Portorican American Broadcasting Co., Inc., Ponce, Puerto Rico.	1000	1340	Do.
WSAM....	Saginaw Broadcasting Co., Saginaw, Mich.	100 250-LS	1200	Specified hours.
WSLB....	St. Lawrence Broadcasting Corporation, Ogdensburg, N. Y.	250	1370	Unlimited.
WSOO....	Hiawathaland Broadcasting Co., Sault Ste. Marie, Mich.	100 250-LS	1200	Do.
WSPB....	WSPB, Inc., Sarasota, Fla.	100 250-LS	1420	Do.
WSSJ....	Puerto Rico Advertising Co., Inc., San Juan, Puerto Rico.	250	1500	Do.
WSTV....	The Valley Broadcasting Co., Steubenville, Ohio	250	1310	Specified hours. (All hours not used by WSAJ.)

<sup>1</sup> 50w amplifier.

*Standard broadcast stations deleted for fiscal year ending June 30, 1940*

Call letters	Grantee and location	Date of deletion
KECA.....	Earle C. Anthony, Inc., Los Angeles, Calif. (License surrendered and canceled.)	July 31, 1939
KFJZ.....	Fort Worth Broadcasters, Inc., Fort Worth, Tex. (License surrendered and canceled.)	Sept. 6, 1939
KUMA.....	Albert H. Schermann, Yuma, Ariz. (2-20-39 Commission revoked the license and all temporary extensions thereof, effective 3 a. m., E. S. T., 4-1-39; petition filed by KUMA on 3-25-39; 1-24-40 order of revocation made final, effective 3 a. m., E. S. T., 2-1-40.)	Feb. 1, 1940
KWBD.....	W. B. Dennis, Plainview, Tex. (Order of cancellation 5-28-40.) (C. P. only.)	May 28, 1940
KWTN.....	The Greater Kampska Radio Corporation, Watertown, S. Dak. (Application for renewal of license denied 5-25-38; effective 6-4-38; 6-3-38 Commission granted petition extending effective date 30 days; 11-28-38 issued temporary license pending decision U. S. Court of Appeals; mandate received reaffirming Commission's decision in denying application and station deleted as of 11-6-39.)	Nov. 6, 1939
WBIL.....	Arde Bulova, New York, N. Y. (License surrendered and canceled.)	Jan. 3, 1940
WMVD.....	The Delmarva Broadcast Co., Salisbury, Md. (C. P. only; facilities voluntarily surrendered; deleted 5-21-40.)	May 21, 1940
WVOV.....	International Broadcasting Corporation, New York, N. Y. (License surrendered and canceled.)	Jan. 3, 1940
WPG.....	City of Atlantic City, Atlantic City, N. J. (License surrendered and canceled.)	Jan. 3, 1940
WSAL.....	Frank M. Stearns, Salisbury, Md. (10-24-39 Commission revoked license of Station WSAL, effective 3 a. m., E. S. T., 11-13-39; 11-14-39 Commission granted petition to hold hearing on order of revocation; 3-28-40 Commission made final its order of revocation dated 10-24-39, revoking license of WSAL, effective 3 a. m., E. S. T., 3-31-40.)	Mar. 31, 1940

## 3. STATISTICS ON COMMERCIAL LICENSING

As compared with the previous fiscal year, there has been an increase of 20 percent in the number of applications in the commercial service received. The gain was made, in large part, in the emergency and ship services. A fact frequently overlooked in the emergency service is that the 2,388 licenses authorize the operation of more than twice that number—5,829 to be exact—of portable-mobile and portable stations with an operating power of one watt or less.

The Commercial License Section continued to issue the radio service bulletin semimonthly and revised the list of coastal stations. Forms 401, 403, 407 and 501 were revised during the year. A total of 3,884 new call letters were assigned in the commercial services during that period.

*Number of applications and authorizations for all classes of commercial service for fiscal year ending June 30, 1940*

	Applications received	Authorizations issued	New stations authorized	Total stations June 30, 1940
<b>Aviation:</b>				
Aeronautical.....	701	742	40	345
Aeronautical point to point.....	221	257	19	141
Aeronautical and Aeronautical point to point.....	47	68	0	0
Public-aeronautical.....	0	0	0	0
Aircraft.....	2,686	2,039	1,730	1,294
Public-aircraft.....	0	0	0	0
Airport.....	144	121	18	66
Radio marker beacon.....	0	0	0	0
Flying school.....	18	17	13	7
Instrument landing.....	0	0	0	0
Subtotal.....	3,817	3,242	818	1,853

<sup>1</sup> Includes Alaskan stations.

	Applica- tions re- ceived	Authoriza- tions issued	New sta- tions au- thorized	Total sta- tions June 30, 1940
<b>Private:</b>				
Coastal telegraph.....	3	3	0	3
Coastal harbor.....	0	0	0	0
<b>Public:</b>				
Coastal telegraph.....	70	63	2	52
Coastal harbor.....	110	113	10	27
Coastal telephone.....	4	4	0	4
Marine relay.....	81	77	0	36
Subtotal.....	268	260	12	122
<b>Emergency:</b>				
Municipal police.....	3,214	2,517	270	1,053
State police.....	457	423	63	246
Zone police.....	180	107	14	64
Interzone police.....	83	81	2	27
Forestry.....	1,118	1,168	379	617
Marine fire.....	28	17	8	12
Special emergency.....	667	577	128	309
Subtotal.....	5,747	4,896	868	2,328
<b>Experimental:</b>				
Class 1.....	382	437	60	223
Class 2.....	321	253	45	70
Class 3.....	0	0	0	0
Subtotal.....	703	690	105	293
<b>Point to point telegraph:</b>				
Public.....	688	699	( <sup>1</sup> )	67
Press.....	66	185	( <sup>2</sup> )	<sup>1</sup> 5
Private.....	0	0	0	0
Agriculture.....	7	7	0	7
Subtotal.....	761	891	0	79
<b>Point to point telephone:</b>				
Public.....	58	115	( <sup>1</sup> )	<sup>1</sup> 13
<b>Miscellaneous:</b>				
Geological.....	359	307	42	304
Motion picture.....	14	12	2	12
Provisional.....	10	10	5	7
Mobile press.....	3	3	0	3
Relay press.....	9	7	2	7
Subtotal.....	395	339	51	333
<b>Ships.....</b>	<b>8,285</b>	<b>7,427</b>	<b><sup>1</sup> 1,423</b>	<b>4,314</b>
<b>Alaskan:</b>				
Aeronautical.....	98	105	25	90
Aeronautical point to point.....	77	82	20	71
Aeronautical and aeronautical point to point.....	50	30	0	0
Aircraft.....	102	115	( <sup>1</sup> )	85
Coastal telegraph.....	48	57	1	47
Coastal telephone.....	0	0	0	0
Coastal harbor.....	151	130	10	120
Coastal and point to point.....	8	8	0	0
<b>Private:</b>				
Point to point telegraph.....	0	0	0	0
Point to point telephone.....	0	0	0	0
<b>Public:</b>				
Point to point telegraph.....	138	146	14	100
Point to point telephone.....	428	324	50	242
<b>Emergency:</b>				
Special emergency.....	13	9	0	6
<b>Experimental:</b>				
Class 1.....	3	2	0	2
Class 2.....	22	11	0	0
Class 3.....	0	0	0	0
Subtotal.....	1,138	1,019	120	653
<b>Totals.....</b>	<b>21,152</b>	<b>18,879</b>	<b>3,397</b>	<b>9,988</b>

<sup>1</sup> Includes Alaskan stations.

<sup>2</sup> When renewal of licenses for this class of station was considered, the practice of issuing a separate license for each frequency was discontinued and a single license for each location was adopted. For this reason, the total number of stations shown does not represent a decrease in facilities for this type of service.

<sup>1</sup> Included in aircraft stations classified in the United States.

*Wire certificates year ending June 30, 1940*

	Received	Granted
Telephone.....	54	49
Telegraph.....	8	11

## 4. STATISTICS ON AMATEUR LICENSING

*Amateur radio applications*

Received:	
Pending July 1, 1939.....	1,220
Received during the fiscal year.....	37,951
	39,180
Disposed of:	
Approved.....	25,362
Returned to applicants.....	5,891
Referred to other Federal agencies, etc.....	256
Failed required examinations.....	4,756
	36,265
Pending, close of June 30, 1940.....	2,915

*Amateur radio authorizations*

Station licenses:	
New.....	6,019
Renewed.....	7,724
Modified and reissued.....	10,805
	24,548
Operator licenses.....	24,605
Operator license endorsements.....	8
Duplicates of lost or destroyed.....	513
	25,126
Total.....	49,674

*Amateur radio station licenses*

Valid at close of fiscal year 1939.....	53,558
Plus:	
Expired but not deleted June 30, 1939.....	1,111
New issues, fiscal year 1940.....	6,019
	60,688
Less eliminations, fiscal year 1940:	
Revocations.....	3
Cancellations.....	174
Deletions.....	2,833
Expirations (renewal yet possible).....	1,383
	4,393
Valid June 30, 1940.....	56,295

## 5. STATISTICS ON FIELD ACTIVITIES

An unprecedented number of requests for investigations, recordings, reports of unlicensed operative and subversive activity by users of radio were received by the field division during the year. The demand far exceeded the capabilities of personnel and equipment until special funds were forthcoming to assume extra tasks imposed by the national-defense program.

The demand for commercial radio operators will necessitate extending the examination service to applicants throughout the United States and Territories during the next fiscal year.

TABLE I.—Ship stations—Inspections and notices

District No. and location	United States Ships					Foreign ships						
	Stations inspected		Notices served				Stations inspected		Notices served			
	Compulsorily equipped	Voluntarily equipped	Violation of laws	Violation of regulations	Advisory notices	Violations cleared during inspection	Compulsorily equipped	Voluntarily equipped	Violation of law and S. Conv.	Violation of treaty	Advisory notices	Violations cleared during inspection
1. Boston, Mass.....	686	38	92	30	241	0	493	5	102	0	8	0
2. New York, N. Y.....	1,391	11	162	34	502	661	1,137	155	74	9	155	75
3. Philadelphia, Pa.....	547	17	34	28	154	219	435	55	71	11	59	21
4. Baltimore, Md.....	1,090	14	61	72	323	260	715	155	155	10	224	37
5. Norfolk, Va.....	293	8	7	13	79	163	359	55	123	0	11	25
6. Atlanta, Ga.....	151	12	13	5	28	122	115	18	18	0	0	17
7. Miami, Fla.....	332	36	35	20	131	130	146	1	12	0	3	26
8. New Orleans, La.....	398	9	52	6	100	272	534	0	65	4	10	93
9. Galveston, Tex.....	656	10	45	29	188	219	224	0	54	0	5	19
11. Los Angeles, Calif.....	569	323	19	119	99	264	758	0	80	0	5	93
12. San Francisco, Calif.....	532	7	75	26	174	125	252	0	21	1	0	13
13. Portland, Oreg.....	189	6	11	6	42	63	118	0	13	1	17	6
14. Seattle, Wash.....	425	128	21	8	52	368	190	0	6	0	0	15
17. Kansas City, Mo.....	0	7	0	0	0	0	0	0	0	0	0	0
18. Chicago, Ill.....	9	1	0	0	0	0	0	0	0	0	0	0
19. Detroit, Mich.....	16	33	0	1	3	10	0	1	0	0	0	0
20. Buffalo, N. Y.....	7	130	0	0	0	0	0	0	0	0	0	0
21. Honolulu, T. H.....	197	21	28	22	77	44	77	0	5	1	5	14
22. San Juan, P. R.....	149	0	5	1	28	83	45	2	8	0	3	15
Total.....	7,637	814	659	420	2,219	3,003	5,598	58	807	36	354	463

TABLE II.—Land-station inspections

District No. and location	Telegraph										Telephone						Broadcast							Violation notices served as result of inspection
	Aircraft	Emergency	Special emer-gency	Coastal	Marine relay	Aeronautical	Amateur	Forestry	Marine fire	Experimental	Point-to-point	Coastal	Coastal harbor	Ship	Experimental	Point-to-point	Regular	International	High frequency	Experimental	Relay	Television	Radio	
1. Boston, Mass.....	40	93	0	6	5	21	20	7	1	3	3	0	1	0	0	112	9	6	0	0	15	0	0	25
2. New York, N. Y.....	235	151	4	6	3	16	12	2	2	3	7	0	0	0	0	70	10	15	0	0	0	8	5	125
3. Philadelphia, Pa.....	64	142	9	3	1	14	8	47	0	0	0	0	0	0	0	63	3	0	0	23	3	0	0	58
4. Baltimore, Md.....	23	18	0	1	0	17	10	10	0	0	4	0	0	0	0	25	0	1	0	0	0	0	0	6
5. Norfolk, Va.....	9	46	1	0	0	5	1	0	0	0	0	0	0	0	0	58	0	0	0	18	0	0	0	48
6. Atlanta, Ga.....	32	99	13	4	4	60	6	0	0	0	0	0	0	0	0	131	0	0	0	5	21	0	0	140
7. Miami, Fla.....	121	71	21	6	4	31	11	1	0	0	23	0	0	0	0	47	2	0	0	3	8	0	0	47
8. New Orleans, La.....	15	44	5	3	3	21	7	0	0	1	0	0	0	0	0	63	0	0	0	1	13	0	0	57
9. Galveston, Tex.....	34	20	0	11	3	34	2	0	0	1	0	0	0	0	0	21	0	0	0	0	0	0	0	21
10. Dallas, Tex.....	109	125	0	0	0	42	7	0	0	0	0	0	0	0	0	142	0	0	0	0	3	0	0	80
11. Los Angeles, Calif.....	71	131	34	3	3	31	7	9	1	7	0	0	0	1	0	71	0	0	0	4	53	4	1	139
12. San Francisco, Calif.....	44	107	36	5	2	19	6	0	0	0	0	0	0	0	0	58	1	0	0	0	7	0	0	125
13. Portland, Ore.....	15	27	5	2	1	10	5	1	0	0	0	0	0	0	0	46	0	0	0	0	4	0	0	25
14. Seattle, Wash.....	36	99	2	12	0	39	0	0	0	0	0	0	0	0	0	81	0	0	0	0	0	0	0	72
15. Denver, Colo.....	25	14	4	0	0	24	0	0	0	0	0	0	0	0	0	56	0	0	0	0	0	0	0	139
16. St. Paul, Minn.....	1	34	2	6	1	27	7	3	0	0	0	0	0	0	0	101	0	5	0	0	0	0	0	25
17. Kansas City, Mo.....	58	87	10	1	0	17	0	0	0	0	0	0	0	0	0	117	0	0	0	2	39	1	0	67
18. Chicago, Ill.....	126	251	0	0	0	26	4	0	0	0	0	0	0	0	0	120	1	0	0	0	0	0	0	12
19. Detroit, Mich.....	101	219	18	7	4	33	13	8	1	2	9	0	0	0	0	130	2	4	0	0	0	0	0	140
20. Buffalo, N. Y.....	25	77	15	1	2	16	6	44	0	8	1	0	0	0	0	97	4	0	0	0	145	0	0	102
21. Honolulu, T. H.....	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	115
22. San Juan, P. R.....	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	8
Total.....	1,193	1,890	180	79	41	509	134	132	4	51	96	2	18	231	4	29	1,613	32	63	16	769	21	30	1,474





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TABLE IV.—Applicants for radio operator licenses examined

District No. and location	Commercial							Amateur except class C	
	First telegraph	Second telegraph	Telegraph permit	First telephone	Second telephone	Telephone permit	Code test only	Class A	Class B
1. Boston, Mass. ....	49	125	10	109	89	1,609	183	256	657
2. New York, N. Y. ....	55	140	23	272	166	2,207	219	328	1,221
3. Philadelphia, Pa. ....	10	32	2	52	102	537	48	113	310
4. Baltimore, Md. ....	24	46	4	80	57	390	69	51	114
5. Norfolk, Va. ....	10	16	5	43	29	713	31	57	134
6. Atlanta, Ga. ....	10	33	3	83	59	589	49	147	374
7. Miami, Fla. ....	15	38	16	55	58	841	68	52	77
8. New Orleans, La. ....	21	54	3	51	23	531	79	68	96
9. Galveston, Tex. ....	20	61	30	55	79	290	96	45	90
10. Dallas, Tex. ....	5	47	11	97	56	1,873	71	138	377
11. Los Angeles, Calif. ....	59	142	17	166	85	1,840	218	237	794
12. San Francisco, Calif. ....	27	78	16	99	58	870	124	135	378
13. Portland, Oreg. ....	8	29	9	55	27	281	46	67	128
14. Seattle, Wash. ....	21	44	18	84	75	1,137	38	112	283
15. Denver, Colo. ....	2	12	10	63	71	314	22	82	128
16. St. Paul, Minn. ....	3	27	9	96	49	647	32	106	230
17. Kansas City, Mo. ....	13	140	13	324	133	757	166	226	728
18. Chicago, Ill. ....	20	104	12	228	122	7,362	134	248	752
19. Detroit, Mich. ....	18	103	28	202	154	1,473	144	270	1,195
20. Buffalo, N. Y. ....	6	60	7	106	31	790	10	123	463
21. Honolulu, T. H. ....	10	18	7	11	3	162	38	30	135
22. San Juan, P. R. ....	11	3	0	5	5	18	4	3	16
Total .....	417	1,352	253	2,336	1,531	25,221	1,889	2,894	8,680

TABLE V.—Commercial operators licensed

District number and location	First telegraph	Second telegraph	Telegraph permit	First telephone	Second telephone	Telephone permit
1. Boston, Mass. ....	136	82	23	231	58	2,133
2. New York, N. Y. ....	304	107	21	383	151	2,826
3. Philadelphia, Pa. ....	51	37	6	116	77	868
4. Baltimore, Md. ....	96	52	8	148	55	491
5. Norfolk, Va. ....	29	15	4	79	12	739
6. Atlanta, Ga. ....	34	33	3	152	30	606
7. Miami, Fla. ....	80	64	9	104	48	999
8. New Orleans, La. ....	132	54	8	142	14	523
9. Galveston, Tex. ....	67	57	22	82	50	330
10. Dallas, Tex. ....	13	41	14	162	39	1,851
11. Los Angeles, Calif. ....	125	108	20	285	86	2,184
12. San Francisco, Calif. ....	148	87	11	159	73	941
13. Portland, Oreg. ....	34	25	7	91	40	327
14. Seattle, Wash. ....	71	50	14	133	70	1,252
15. Denver, Colo. ....	5	9	7	89	52	343
16. St. Paul, Minn. ....	11	24	5	122	41	633
17. Kansas City, Mo. ....	18	89	18	320	107	957
18. Chicago, Ill. ....	51	98	18	318	98	4,357
19. Detroit, Mich. ....	44	76	26	312	111	1,893
20. Buffalo, N. Y. ....	14	19	6	122	25	823
21. Honolulu, T. H. ....	35	18	4	19	5	170
22. San Juan, P. R. ....	16	5	1	10	1	21
Total .....	1,514	1,150	255	3,579	1,243	25,267

TABLE VI.—Complaints and investigations

District No. and location	Cases received						Cases closed						
	Amateur	Unlicensed broadcast	Unlicensed other	Electric and power	Broadcast	Miscellaneous	Amateur	Unlicensed broadcast	Unlicensed other	Electric and power	Broadcast	Miscellaneous	Outstanding cases
1. Boston, Mass.....	178	1	24	60	14	50	176	1	24	60	14	50	2
2. New York, N. Y.....	284	29	31	93	47	26	284	29	31	93	47	26	0
3. Philadelphia, Pa.....	163	1	15	25	4	34	146	1	12	25	4	33	21
4. Baltimore, Md.....	51	0	11	14	5	15	48	0	5	14	5	13	11
5. Norfolk, Va.....	42	2	5	16	2	13	42	0	5	16	2	13	2
6. Atlanta, Ga.....	66	8	22	10	5	7	60	8	20	10	4	7	9
7. Miami, Fla.....	65	1	11	40	16	52	64	1	11	40	16	49	4
8. New Orleans, La.....	72	2	3	14	14	6	57	2	3	14	10	6	19
9. Galveston, Tex.....	20	0	6	4	0	5	20	0	6	4	0	5	0
10. Dallas, Tex.....	79	4	34	6	12	27	75	4	21	5	11	25	22
11. Los Angeles, Calif.....	377	1	26	89	11	70	363	1	7	89	3	69	42
12. San Francisco, Calif.....	137	0	1	157	1	114	135	0	1	157	1	114	2
13. Portland Oreg.....	51	0	3	11	1	6	51	0	3	10	1	6	1
14. Seattle, Wash.....	59	0	9	18	4	27	51	0	9	18	4	27	8
15. Denver, Colo.....	22	0	0	3	0	1	20	0	0	3	0	1	2
16. St. Paul, Minn.....	56	0	1	1	0	1	53	0	1	1	0	1	1
17. Kansas City, Mo.....	82	2	16	4	0	3	66	0	6	3	0	2	30
18. Chicago, Ill.....	321	0	54	25	0	10	316	0	53	25	0	10	9
19. Detroit, Mich.....	216	2	59	26	6	78	194	2	40	25	6	72	50
20. Buffalo, N. Y.....	122	1	26	1	1	14	122	1	23	1	1	14	3
21. Honolulu, T. H.....	38	0	0	31	29	17	37	0	0	31	29	17	1
22. San Juan, P. R.....	0	3	11	0	1	1	0	2	8	0	0	1	5
Total.....	2,499	57	368	648	173	577	2,380	52	289	644	158	561	244

6. PETITIONS FOR REHEARING IN BROADCAST CASES

PETITIONS FOR REHEARING IN BROADCAST CASES ACTED UPON DURING FISCAL YEAR ENDING JUNE 30, 1940

[These do not include petitions in common-carrier cases, which are listed separately]

1. Petition for rehearing filed by Asheville Citizen Times (WWNC) (re application of Ohio State U (WOSU)). *Denied* July 12, 1939.
2. Petition for reconsideration and rehearing filed by Central New York Broadcasting Corp. (WSYR) (re application of Ohio State U (WOSU)). *Denied* July 12, 1939.
3. Petition for rehearing filed by KANS Broadcasting Co. (KANS) (re application of Farmers & Bankers Broadcasting Corp. (KFBI)). *Denied* July 12, 1939.
4. Petition for rehearing filed by The Radio Station KFH Co. (KFH) (re application of Farmers & Bankers Broadcasting Corp. (KFBI)). *Denied* July 12, 1939.
5. Petition for rehearing filed by applicant, The Baltimore Radio Show, Inc. (WFBR). *Denied* September 12, 1939.
6. Petition for rehearing filed by the applicant, WIS, Inc. *Denied* September 12, 1939.
7. Petition of applicant, F. W. Meyer, for rehearing. *Granted* October 24, 1939.
8. Petition to reconsider or rehear, filed by The Times Dispatch Radio Corp. (WRTD) (re application of Havens & Martin, Inc. (WMBG)). *Denied* October 31, 1939.
9. Petition to reconsider or rehear, filed by Richmond Radio Corp. (WRNL) (re application of Havens & Martin, Inc. (WMBG)). *Denied* October 31, 1939.
10. Petition for rehearing filed by applicant, Owensboro Broadcasting Co. *Denied* August 8, 1939.
11. Petition for rehearing filed by Baton Rouge Broadcasting Co. (WJBO) (re application of R. J. Laubengayer (KSTL)). *Denied* September 6, 1939.
12. Petition of Harrisburg Broadcasting Co. (WEBQ) (re application of Orville W. Lyerla). *Granted* October 10, 1939, and set for reargument.

13. Petition of Allen T. Simmons for rehearing (re application of Summit Radio Corp.). *Granted* October 10, 1939.
14. Petition of WJW, Inc., for rehearing (re application of Summit Radio Corp.). *Dismissed* October 10, 1939.
15. Petition for rehearing filed by First State Television, Inc. (KITE) (re application of Allen T. Simmons). *Granted* October 10, 1939.
16. Petition of applicant, Yuma Broadcasting Co., for reconsideration and oral argument. *Denied* October 31, 1939.
17. Petition of Louis R. Spiwak and Maurice R. Spiwak, doing business as L. & M. Broadcasting Co., for rehearing and intervention (re application of Mason City Globe-Gazette Co. (KGLO)). *Denied* November 7, 1939.
18. Petition for rehearing filed by E. C. Palmer (re application of Clyde E. Wilson and Howard A. Shuman, doing business as Hot Springs Broadcasting Co.). *Denied* October 17, 1939.
19. Petition for rehearing filed by the applicant, Hildreth & Rogers Co. (WLAW). *Denied* November 14, 1939.
20. Petition of The Gateway Broadcasting Co. for hearing or rehearing (re application of Northside Broadcasting Corp.). *Denied* February 7, 1940.
21. Petition of Sentinel Broadcasting Corp. for rehearing (re application of Civic Broadcasting Corp.). *Denied* November 27, 1939.
22. Petition of American Broadcasting Co. (WOL) for rehearing (re application of Lawrence J. Heller). *Dismissed* May 7, 1940.
23. Petition for rehearing filed by Kentucky Broadcasting Corp. (re application of Northside Broadcasting Corp. (WGRC)). *Denied* November 20, 1939.
24. Petition filed by Queen City Broadcasting Co., Inc. (KIRO) (re application of The Station of the Stars, Inc. (KMPC)). *Dismissed* December 2, 1939.
25. Petition of the applicant, Hampden-Hampshire Corporation, for rehearing. *Dismissed* December 12, 1939.
26. Petition of the applicant, Thumb Broadcasting Co., for rehearing. *Granted* January 17, 1940.
27. Petition of Colorado Radio Corp. (KVOD) for rehearing (re application of F. W. Meyer). *Denied* January 9, 1940.
28. Petition for rehearing filed by Eugene P. O'Fallon, Inc. (KFEL) (re application of F. W. Meyer). *Denied* January 9, 1940.
29. Petition of Virgil V. Evans (WSPA) (re application of Spartanburg Advertising Co.). *Denied* January 9, 1940.
30. Petition for rehearing filed by KGKO Broadcasting Co. (re application of Red River Valley Broadcasting Corp.). *Denied* January 17, 1940.
31. Petition for rehearing filed by applicant, Gateway Broadcasting Co. *Denied* February 7, 1940.
32. Petition for rehearing filed by Samuel M. Emison (re application of Vincennes Newspapers). *Denied* January 29, 1940.
33. "Protest" of Julio N. Conesa (re application of Portorican American Broadcasting Co., Inc.). *Denied* January 29, 1940.
34. Petition for reconsideration and rehearing filed by Puerto Rico Advertising Co., Inc. (re application of Portorican American Broadcasting Co., Inc.). *Denied* January 29, 1940.
35. Petition for rehearing filed by Hildreth & Rogers (WLAW) (re application of WPTF Co.). *Denied* March 12, 1940.
36. Petition for reconsideration filed by Debs Memorial Fund, Inc. (WEVD) (re application of Greenville News Piedmont Co. (WFBC)). *Denied* March 12, 1940.
37. Petition for rehearing filed by The Watch Tower Bible & Tract Society, Inc. (WBBR) (re application of Greenville News Piedmont Co. (WFBC)). *Denied* March 12, 1940.
38. Petition for rehearing filed by Earl C. Anthony (KFI) (re applications of McClatchy Broadcasting Co. (KERN) and The Bee, Inc. (KOH)). *Denied* March 12, 1940.
39. Petition for rehearing filed by Mosely, Inc. (KGVO) (re application of Golden Empire Broadcasting Co. (KHSI)). *Dismissed* May 7, 1940.
40. Petition for rehearing filed by KTHR Broadcasting Co. (re application of M. C. Reese). *Denied* March 12, 1940.
41. Petition for rehearing filed by Salt River Valley Broadcasting Co. (KOY) (re application of M. C. Reese). *Denied* March 12, 1940.
42. Petition for rehearing filed by the applicant, Plattsburg Broadcasting Corporation. *Denied* March 12, 1940.

43. Petition for hearing, protest, and request to vacate action, filed by William H. Amesbury (re application of Independent Merchants Broadcasting Co.). *Dismissed* March 12, 1940.

44. Petition for hearing or rehearing filed by Scripps Howard Radio, Inc. (WCPO) (re application of WCOL). *Denied* March 29, 1940.

45. Petition for rehearing filed by Golden Gate Broadcasting Corporation (re application of Marysville Yuba City Broadcasters, Inc.). *Denied* May 7, 1940.

46. Protest and request for hearing filed by Albuay Broadcasting Co., Inc. (WGPO) (re application of E. D. Rivers). *Denied* May 7, 1940.

47. Petition for rehearing filed by Caribbean Broadcasting Association, Inc. (re application of Puerto Rico Advertising Co., Inc.). *Denied* May 7, 1940.

48. Petition for rehearing filed by applicants, Chester A. Thompson and the Brush Moore Newspapers, Inc. *Granted* June 6, 1940.

49. Petition for rehearing filed by Congress Square Hotel Co. (re application of Thompson L. Guernsey). *Denied* June 18, 1940.

50. Petition for rehearing and request for special relief, filed by Oregon State Agricultural College (KOAC) (re application of Salt River Valley Broadcasting Co. (KOY)). *Dismissed* June 4, 1940.

51. Petition for rehearing filed by Orlando Broadcasting Co., Inc. (re application of Hazelwood, Inc.). *Denied* June 4, 1940.

52. Petition of WLEU Broadcasting Co. for rehearing (re application of Presque Isle Broadcasting Co.). *Denied* June 25, 1940.

53. Petition for rehearing filed by Puget Sound Broadcasting Co. (re application of Queen City Broadcasting Co. (KIRO)). *Denied* June 1, 1940.

54. Petition for reconsideration, filed by Radio Corporation of Orlando (re application of Hazelwood, Inc.). *Dismissed* June 4, 1940.

55. Petition for reconsideration and further hearing, filed by Sanders Bros. Radio Station (WKBB) (re application of Telegraph Herald). *Dismissed* June 18, 1940.

56. Petition of WCBD, Inc. for rehearing (re application of Evangelical Lutheran Synod). *Denied* June 25, 1940.

## 7. ACTIONS ON COMMON CARRIER REHEARING PETITIONS

*Petitions for rehearing in common carrier cases acted upon during fiscal year ending June 30, 1940*

### TELEGRAPH

Docket No.:

5796 } No-Bel Radio Burglar Alarm Co. Petition for Rehearing filed by above  
5797 } on February 21, 1940. *Granted* 3/22/40.

4557 Howton Radio Alarm Co. Petition for Rehearing filed by above on  
December 27, 1939. *Denied* 1/29/40.

4396 Mackay Radio & Tel. Co. (Rome, Italy).

4397

4398 } Petition for Rehearing filed by Mackay 4/1/40. *Denied* 5/7/40.

4399 }

### TELEPHONE

5594 Eddie Erlbacher. Motion to Remand for further hearing filed by Warner & Tamble on May 4, 1940. *Denied* 5/22/40.

5327 Thorne Donnelley. Petition to set aside Commission's decision filed by Central Radio Telegraph Co. on April 22, 1940. *Denied* 5/7/40.

## 8. LIST OF APPROVED TYPES OF MARINE RADIO EQUIPMENT

### AUTOMATIC ALARM RECEIVERS<sup>1</sup>

Manufacturer:

Federal Telegraph Co. for Mackay Radio and *Type No.*

Telegraph Co.----- 101-A.

Do----- 101-B.

Radiomarine Corporation of America----- AR-8600.

<sup>1</sup> As provided in Commission Order No. 66 of March 29, 1940, approval of individual automatic alarm receivers of any one of the approved types listed, installed on a ship for the purpose of complying with title III, part II, of the Communications Act of 1934, as amended, is limited to a date 7 years following the date when the particular receiver in question was first placed in service on board a ship.

## TRANSMITTERS\*

*Main* radiotelegraph transmitters approved as capable of meeting the requirements of Section 8.142 of the Commission's Rules Governing Ship Service.

Manufacturer:	Type No.
Federal Telegraph Co.....	150-A and B.
Do.....	155-A.
Radiomarine Corporation of America.....	ET-3626-B, BR and C.
Do.....	ET-3674-A and R.
Do.....	ET-8006.
Do.....	ET-8010 and 8010-B.
Do.....	ET-8017.
States Steamship Co.....	HF-100 and 100-A.

*Main* radiotelegraph transmitters approved as capable of meeting the requirements of section 8.143 (a) and (b) of the Commission's Rules Governing Ship Service.

Manufacturer:	Type No.
Federal Telegraph Co.....	120-M.
Radiomarine Corporation of America.....	ET-3627-S, AS and BS.
Do.....	ET-3628.
Do.....	ET-3629.
Do.....	ET-3630.
Do.....	B-1-C.

*Main and emergency* transmitters approved as capable of meeting the requirements of sections 8.142 and 8.144 of the Commission's Rules Governing Ship Service.

Manufacturer:	Type No.
Federal Telegraph Co.....	123-B.
Do.....	150-A-101-A.
Do.....	150-B-101-A.
Do.....	155-A-101-A.
Heintz & Kaufman, Limited.....	935.
Radiomarine Corporation of America.....	ET-9010 and BA.

*Main and emergency* transmitters approved as capable of meeting the requirements of sections 8.143 (a) and (b) and 8.144 of the Commission's Rules Governing Ship Service.

Manufacturer:	Type No.
Federal Telegraph Co.....	104-M.
Do.....	147-A and M.

*Emergency* transmitters approved as capable of meeting the requirements of section 8.144 of the Commission's Rules Governing Ship Service.

Manufacturer:	Type No.
Federal Telegraph Co.....	142-A, B, and C.
Do.....	149-A.
Radiomarine Corporation of America.....	ET-3650.
Do.....	ET-8003 and 8003-A.

\* Marine radiotelegraph transmitters are approved as capable of meeting the applicable specific requirements of sections 8.142, 8.143, and 8.144 of the Commission's rules governing ship service and the relevant technical requirements of section 354 of the Communications Act of 1934, as amended, particularly paragraphs (c) and (d) in their entirety and the normal range requirement of paragraph (f) of this section of the act. A list of designated spare parts to be associated with each approved type of transmitter has been approved in accordance with the provisions of section 8.234 of the Commission's rules governing ship service and section 356 of the Communications Act of 1934, as amended. Copies of these lists are made available to interested parties upon request.

## 9. PUBLICATIONS

## LIST OF PRINTED MATTER PREPARED DURING YEAR

The following printed material was placed on sale by the Superintendent of Documents during the fiscal year.

## Rules and Regulations of the Commission :

- Part 1.—Rules of Practice and Procedure (effective Aug. 1, 1939).
- Part 2.—General Rules and Regulations (effective June 15, 1939).
- Part 3.—Rules Governing Standard Broadcast Stations (effective August 1, 1939).
- Part 4.—Rules Governing Broadcast Services other than Standard Broadcast (effective May 23, 1939).
- Part 5.—Rules and Regulations Governing Experimental Radio Services (effective October 1, 1939).
- Part 6.—Rules Governing Fixed Public Radio Service (effective December 1, 1939).
- Part 7.—Rules Governing Coastal and Marine Relay Services (revised to November 4, 1939).
- Part 8.—Rules Governing Ship Service (revised to November 14, 1939).
- Part 9.—Rules and Regulations Governing Aviation Services (revised to November 20, 1939).
- Part 10.—Rules Governing Emergency Radio Service (revised to February 27, 1939).
- Part 11.—Rules Governing Miscellaneous Radio Services (effective January 1, 1939).
- Part 12.—Rules Governing Amateur Radio Station and Operators (revised to April 18, 1940).
- Part 13.—Rules Governing Commercial Radio Operators (effective July 1, 1939).
- Part 14.—Rules Governing Radio Stations in Alaska (effective December 5, 1938).
- Part 41.—Telegraph and Telephone Franks (effective August 11, 1939).
- Part 42.—Rules Governing the Destruction of Records of Telecommunication Carriers (effective September 6, 1938).
- Part 43.—Reports (rules governing the filing of information, contracts, periodic reports, etc.) (effective August 11, 1939).
- Part 61.—Tariffs (effective September 1, 1939).
- Part 62.—Rules Governing Applications under Sec. 212 of the Act to Hold Interlocking Directorates (effective September 1, 1939).

Study Guide and Reference Material for Commercial Radio Operator Examinations (July 1, 1939).

In addition, the Commission in May issued its first printed general information booklet, "An ABC of the FCC" (more than a dozen pages of basic questions and answers), which is obtainable without cost upon request to the Commission.

## LIST OF PRINTED MATTER FOR SALE BY SUPERINTENDENT OF DOCUMENTS

Following is a list of Federal Communications Commission publications of general interest sold by the Government Printing Office, Superintendent of Documents, Washington, D. C., with price, and the approximate number on hand at that office:

Title	Price	Approximate number on hand at Government Printing Office Dec. 6, 1940
Communications Act of 1934 with Amendments and Index Thereto.	\$0.15	Now being reprinted.
Federal Communications Commission reports (bound volumes of decisions and orders, exclusive of annual reports):		
Volume 1—July 1934, July 1935.....	1.00	90.
Volume 2—July 1935, June 1936.....	2.00	206.
Volume 3—July 1936, Feb. 1937.....	2.00	283.
Volume 4—March 1937, Nov. 15, 1937.....	1.50	285.
Volume 5—Nov. 16, 1937, June 30, 1938.....	1.50	410.
Volume 6—July 1, 1938, to Feb. 28, 1939.....	1.50	495.
Annual reports of the Commission:		
First Annual Report—Fiscal Year 1935.....	.15	467.
Third Annual Report—Fiscal Year 1937.....	.30	35.
Fifth Annual Report—Fiscal Year 1939.....	.30	78.
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	.15	None [reprinting].
Rules and Regulations of the Federal Communications Commission:		
Part 1, Practice and Procedure.....	.10	Now being reprinted.
Part 2, General Rules and Regulations.....	.10	Now being reprinted.
Part 3, Rules Governing Standard Broadcast Stations.....	.10	None [reprinting].
Part 4, Rules Governing Broadcast Services (other than standard broadcast).	.10	1,580.
Part 5, Experimental Rules.....	.05	2,838.
Part 6, Rules Governing Fixed Public Radio Services.....	.05	Now being reprinted.
Part 7, Rules Governing Coastal and Marine Relay Services.....	.05	Now being reprinted.
Part 8, Ship Rules.....	.10	None [reprinting].
Part 9, Rules and Regulations Governing Aviation Services.....	.05	None [reprinting].
Part 10, Rules Governing Emergency Radio Services.....	.05	None [reprinting].
Part 11, Rules Governing Miscellaneous Radio Services.....	.05	1,860.
Part 12, Rules Governing Amateur Radio Stations and Operators.....	.10	8,905.
Part 13, Rules Governing Commercial Radio Operators.....	.05	405.
Part 14, Rules Governing Radio Stations in Alaska (other than amateur and broadcast).	.05	252.
Part 41, Rules Governing Telegraph and Telephone Franks.....	.05	720.
Part 42, Rules Governing the Destruction of Records of Telecommunication Carriers.....	.10	160.
Part 43, Rules Governing the Filing of Information, Contracts, Etc., of Telecommunication Carriers.....	.05	660.
Part 61, Tariffs—Rules Governing the Construction, Filing, and Posting of Schedules of Charges for Interstate and Foreign Communications Service.....	.10	225.
Part 62, Rules Governing Application under Sec. 212 of the Act to Hold Interlocking Directorates.....	.05	785.
Standards of Good Engineering Practice Concerning Standard Broadcast Stations (550-1600 kc), revised to July 20, 1940.	.30	1,000

SEVENTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1941

(With Notation of Subsequent National Defense  
and Other Important Activities)



**COMMISSIONERS**

**MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION**

[As of December 15, 1941]

**CHAIRMAN**

**JAMES LAWRENCE FLY**

**PAUL A. WALKER**

**NORMAN S. CASE**

**T. A. M. CRAVEN**

**GEORGE HENRY PAYNE**

**\*RAY C. WAKEFIELD**

**\*\*CLIFFORD J. DURR**

\*Took office March 22, 1941; succeeded Thad H. Brown, whose term expired June 30, 1940.

\*\*Took office November 1, 1941; succeeded Frederick I. Thompson, whose term expired June 30, 1941.

## LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,  
*Washington, D. C., December 15, 1941.*

*To the Congress of the United States:*

The Seventh Annual Report of the Federal Communications Commission, submitted herewith, is brought up to date in major developments so that the Congress may be more currently informed about the Commission's national defense work and events in radio and wire regulation which have occurred since the fiscal year ended June 30 last.

The war-time emergency and new considerations in the field of electrical communications impose increasing and exacting burdens on the Commission. The showing made has, in large measure, been possible by employee devotion to duty beyond that which might reasonably be expected, even in the face of unusual conditions.

Respectfully,

JAMES LAWRENCE FLY,  
*Chairman.*

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## CHAPTER I

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# National Defense

1. COMMISSION'S NATIONAL DEFENSE ACTIVITIES
  2. NATIONAL DEFENSE OPERATIONS SECTION
  3. FOREIGN BROADCAST MONITORING SERVICE
  4. DEFENSE COMMUNICATIONS BOARD
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### 1. COMMISSION'S NATIONAL DEFENSE ACTIVITIES

Solving the many communications problems arising from the Nation's defense effort is a primary concern of the Federal Communications Commission. The rapid expansion of the Army and Navy, especially their air forces, the development of civilian defense plans and projects, the rise of new and perilous conditions on the high seas, the interruption of all direct cable service to the continent of Europe (the United Kingdom, Eire, and the Azores excepted), the need for adequate presentation of United States broadcasts via short waves to other countries, especially in Latin America, the increase in telephone, telegraph, and radio communications traffic concurrent with the defense program—these and a variety of other developments during the past year have profoundly affected the day-to-day business of the Commission. No part of the Commission's work has been left unaffected by emergency requirements, and two new sections—the National Defense Operations Section and the Foreign Broadcast Monitoring Service—have been established to meet particular defense needs.

Typical of the many Commission defense activities are the licensing of and granting additional power to short-wave stations beamed on foreign countries; work with the Interdepartmental Committee on Cooperation with American Republics; the approval of 66 telegraph line-extension applications, 35 of which were for lines to military or naval establishments and one of which concerned a 1,800-mile addition to the 30,000-mile weather-reporting system of the Civil Aeronautics Administration; special studies of our radiotelegraph links with other countries; rapid expansion of the channels available for aviation services, including special frequencies for aviation schools in connection with the Army's pilot-training program; and a variety of technical studies and research projects directly related to national defense needs. Details of these and other defense activities of the Commission will be found throughout the various subdivisions of this report.

The defense program has made necessary the expansion of plant and equipment in a variety of communications fields; and the Commission has sought to expedite and facilitate such expansion in every appropriate way. Shortages of strategic materials and skilled labor essential to communications work have made it especially important to determine which types of expansion are essential to present or anticipated defense requirements.

In addition to aiding in the development of new facilities and services as part of the defense effort, the Commission has been concerned with forestalling any possible misuse of existing facilities. Amateur radio communication in the United States, its territories and possessions was banned December 7, coincident with the outbreak of war with Japan; a Nation-wide system of 24-hour monitoring stations has been established, each station policing a particular area much as a policeman patrols his beat; the citizenship of operators and of many communications employees is being checked; and international carriers are being required to keep on file originals of all overseas cable and radio communications, all of which is discussed in appropriate sections of this report.

In many of its defense activities, the Commission has had the advice and has acted on the request of the Defense Communications Board.

## 2. NATIONAL DEFENSE OPERATIONS SECTION

The National Defense Operations Section is a new adjunct of the Field Division, which is under the Engineering Department. Created July 1, 1940, the National Defense Operations Section insures a continual and effective policing of all radio communication channels for the purpose of detecting and locating unauthorized stations operating in violation of laws, treaties, or war-time regulations.

Using funds made available from the special emergency and current appropriations, the Commission is setting up 91 monitoring stations at strategically chosen locations throughout the United States, its territories and island possessions. Of these, 11 are primary monitoring stations, and 80 are secondary monitoring stations. Each of the latter is supplemented by a mobile direction-finder intercept station.

For obvious reasons, the locations of these stations are not made public. It may be stated, however, that every State has at least 1 secondary station. Each station is equipped with highly specialized direction finders, recorders, directive antenna arrays, frequency measuring equipment, and associated apparatus. At the close of the fiscal year 10 primary and 78 secondary stations were in operation.

Monitoring to see that radio transmissions obey ordinary ether traffic rules has been a necessary practice since the early days of radio regulation. The various types of radio transmissions are assigned particular ether lanes in which to travel. If one signal strays over its assigned "white line" there is collision with and confusion to other services. Likewise, if a transmission appears in the ether paths without identifying call letters it is as quickly spotted as an auto without license plates trying to traverse a land highway.

Today the Commission's monitoring service must be particularly alert for signals which might be inimical to the national interest. Such a signal may be picked up by a monitoring station or reported by



broadcasters and other licensees—often by amateurs, who do an excellent job of policing their own bands.

When an intruder or "reckless driver" is detected in the ether lanes, direction-finding apparatus is called into play. Three or more monitoring stations collaborate in getting a bearing on the moot signal. Their beams are plotted on a map. Eventually and inevitably two lines will cross. The point, or "fix", marks the general location of the origin of the transmission in question.

The final task of running down the offender is performed by monitoring officers, men highly skilled in radio technique, using automobiles which are fitted with the latest and most efficient type of detection equipment. Included are direction-finders, all-wave receivers, and recorders. All this apparatus can be operated from the auto's battery or, upon being removed from the car, from the power supply of a dwelling, store, or tourist camp.

Operation of the mobile equipment follows much the same procedure employed by the monitoring stations in the first instance. Directional beams finally "fix" at the exact location of the transmitter in question. Even if the hunt narrows to an apartment house, hotel, or other large building a monitoring officer can by using a device carried in his hand or in his pocket proceed from floor to floor and from door to door until he determines the exact room in which the equipment is being used.

Thus, as George Creel commented in a recent issue of *Collier's*, "the Federal Communications Commission has worked out a system by which it polices the ether as methodically and efficiently as a policeman patrols his beat."

The fact that the ether highways are now so effectively policed invites serious complications for the operator or "prankster" who does not conform to requirements of the present emergency. The National Defense Operations Section works very closely with other intelligence and investigative agencies of the Federal Government as well as with State and municipal law-enforcement bodies.

At the beginning of an investigation there is no way of knowing whether or not a violation has national security implications. However, defense ether-policing requires each and every case to be investigated thoroughly.

If it is determined that the offense is a minor one, routine proceedings are instituted against the culprit. Should the case have more serious aspects, it is turned over to the appropriate Federal agency.

During the past fiscal year the National Defense Operations Section handled several thousand complaints of various illegal radio operations or suspected violations of radio laws and treaties. A total of 251 transmitters were found to be operating without license.

As the result of monitoring by the National Defense Operations Section, the licenses of four stations were revoked for cause, and the licenses of some two score operators were suspended for violations of emergency regulations.

### 3. FOREIGN BROADCAST MONITORING SERVICE

The Foreign Broadcast Monitoring Service, created February 26, 1941, by the Federal Communications Commission in cooperation with the Defense Communications Board, is now actively translating,

transcribing, analyzing, and reporting on from 600,000 to 900,000 words transmitted daily by foreign broadcast stations throughout the world as recorded by the Commission's National Defense Operations Section.

Working in three shifts of 8 hours each, a special force of technicians, translators, analysts, and other experts is keeping abreast of overseas broadcasts, 24 hours of the day, 7 days a week. Speeches, news, and entertainment to the inclusion of some musical programs, are carefully watched for intelligence and trends, which are reported immediately to Government officials responsible for counterpropaganda or other action, if necessary.

The importance of listening in on foreign transmissions is attested in the fact that propaganda instigated abroad almost invariably follows the example set in short-wave broadcasts, but follows it with a lag. Almost every political, diplomatic, or military move is presaged by shifts in propaganda treatment. Consequently, through study of the short wave "model" it is often possible to predict such moves. A new course in policy can be reflected in broadcasts long before it is announced officially, or rumored in the press. For example, the altered tone of certain foreign broadcasts gave the first indication that Japan intended to occupy Indo-China.

To keep informed on such trends, the Foreign Broadcast Monitoring Service operates in a sort of "belt line" process.

Four "listening posts" of the FCC's National Defense Operations Section are exclusively attuned to foreign broadcasts. They are so located that each can best hear transmissions from a particular region of the world. Thus, one of these "ears" at Silver Hill, Md., listens to broadcasts from Europe, the Near and Middle East and Africa, with particular attention to transmissions beamed to North America. Another, at Santurce, P. R., intercepts broadcasts directed to Latin America. A third, at Kingsville, Tex., concerns itself with broadcasts from South and Central America, while the fourth, at Portland, Oreg., tunes in on transmissions from the Far East. These monitoring stations have quick communication with a central Washington office by means of radio, telephone, teletype, and telefax.

Monitors record major foreign broadcasts, and information about content significant either from the intelligence or propaganda point of view is flashed immediately to appropriate Government officials. Decentralization of the Foreign Broadcast Monitoring Service force makes each listening post, in effect, a complete unit in itself, with engineers, translators, transcribers, stenographers, and persons who prepare reports. Thus, each can tackle an overseas broadcast as quickly as it is recorded. However, all analysis work is done at the Washington office.

From this central control office, pertinent information is dispatched to a selected list of military and other Government officials in the form of spot bulletins, daily reports with over-all content and analysis, weekly summaries of propaganda methods on the long-range basis, and special reports and analyses.

The volume of international broadcasts is tremendous. The German radio bombards the United States alone with nearly 11 hours of emissions daily, the British send us about 6½ hours, Japan 4½ hours, and Italy more than 4 hours, and a score of other nations in

lesser proportions. Significant to our Foreign Broadcast Monitoring Service are the different treatments accorded the same news by a country in broadcasting to various nations. Seventy-five percent of the programs intercepted from abroad are in languages other than English.

Broadcasting is new to war. In the World War there was only wireless telegraphy to contend with, and to a very limited extent. Today the world is radio conscious, and broadcasting has recognized value for influencing peoples. Yet much the same propaganda methods used before the days of radio have been adapted to broadcast in wartime. Though air technique is different, there is much reliance in the old devices of exaggeration, suppression, distortion, appeals to selfish prides and interests, and exploitation of prejudices and jealousies. Some types of broadcast propaganda are aimed at the masses, while others seek to cultivate groups and factions.

The Foreign Broadcast Monitoring Service is on continual watch for significant news not available in the regular press and radio dispatches, as well as news and comment directed against the United States. It closely examines this material for evidence of changes in foreign policies and military strategies, and shifts in propaganda treatment. The resultant reports identify the major themes and arguments, evaluate the flow of broadcasts, and estimate effects. Upon receiving these reports, respective Government officials can determine any necessary countermove or action. All reports by the Foreign Broadcast Monitoring Service are confidential and not of public issue.

#### 4. DEFENSE COMMUNICATIONS BOARD

##### Organization

The Defense Communications Board was created by Executive order on September 24, 1940, as a planning body for the coordination of defense communications activities. It has no operating or procurement functions, and reports to the President through the Office for Emergency Management.

Federal Communications Commission Chairman James Lawrence Fly is also chairman of the Defense Communications Board. Other Board members are Herbert E. Gaston, Assistant Secretary of the Treasury in Charge of the Coast Guard, who is secretary of the Board; Maj. Gen. Dawson Olmstead, Chief Signal Officer of the Army; Rear Adm. Leigh Noyes, Director of Naval Communications; and Breckinridge Long, Assistant Secretary of State in Charge of the Division of International Communications.

Assisting the Board are a coordinating committee and a law committee staffed by personnel from the agencies represented on the Board; the Board itself has no paid personnel. The coordinating committee supervises the work of various other committees representing the domestic and international broadcasting industries; telephone, telegraph, cable, and radiocommunications companies; aviation and amateur interests; and Federal, State, and municipal facilities. There are also an Interdepartment Radio Advisory Committee, a Communications Liaison Committee for Civilian Defense, and a Priorities Liaison Committee. Two special advisory groups representing industry and

labor report directly to the Board. Because many of its tasks are concerned with planning for potential military emergencies, some Board activities are not now matters of public record.

#### Activities

Each of the industry committees has been active in formulating plans for meeting foreseeable defense emergencies. For example, the international radiocommunications committee has surveyed alternative routing of international radio messages in the event that particular routes are interrupted by accident or belligerent action. The cable committee has made special studies of cable repair under wartime conditions. The telegraph committee has been concerned with formulation of plans for message priorities to defense communications, etc. The telephone committee has prepared special studies of maintenance of telephone service under emergency conditions and with particular reference to those telephone lines which now carry radiobroadcasts from networks to stations all over the country; plans for a super-network of telephone connections linking substantially every station in the country, and for regional telephonic networks have been prepared. The broadcasting committee has been concerned with such problems as the maintenance of continuous service during emergency interruption of program circuits or power lines, and with plans to prevent broadcasting stations from becoming beacons for enemy aircraft in areas of military combat. The State and municipal facilities committee is formulating plans for emergency use of fire and police communications systems, including the expansion of existing plant and equipment, the availability of auxiliary power supplies, the protection of communications centers from accident or sabotage and other steps designed to foster the efficiency and dependability of such communications systems. The Liaison Committee for Civilian Defense cooperates with the Office of Civilian Defense in preparing air-raid warning and other defense plans. These are a few of the Board's manifold planning activities.

Studies prepared by the various committees are submitted through the coordinating committee to the Board; frequently the Board takes action in the form of recommendations to the Federal Communications Commission, and the Commission customarily expedites action on such recommendations. Among the Board recommendations acted on by the Commission were the establishment of the Foreign Broadcast Monitoring Service; the setting aside of special frequencies for military pilot training schools; the adoption of various measures to safeguard communications services from possible activities of agents of foreign governments or interests; and the institution of procedures to facilitate the transfer of facilities needed for military purposes.

The Executive order establishing the Board specifically directed it to take no cognizance of matters pertaining to censorship.

## CHAPTER II

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### General

1. ADMINISTRATION
  2. COMMISSION MEMBERSHIP CHANGES
  3. STAFF ORGANIZATION
  4. PERSONNEL
  5. APPROPRIATIONS
  6. LEGISLATION
  7. LITIGATION
  8. DOCKETS
  9. INTERNATIONAL
  10. INTERDEPARTMENT RADIO ADVISORY COMMITTEE
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#### 1. ADMINISTRATION

The Federal Communications Commission continued to function as a unit, directly supervising all activities, with delegations of responsibility to committees of Commissioners, individual Commissioners, and the Administrative Board. The Commission itself made all policy determinations.

Authority of individual Commissioners and of the Administrative Board under Administrative Order No. 2 was extended in minor particulars. The Commission adopted Administrative Order No. 3, providing for the execution of functions of the Commission in the absence of a quorum to take care of emergency situations. The Commission, however, provided that the procedure under the latter order would not be followed after September 1941.

#### 2. COMMISSION MEMBERSHIP CHANGES

On March 22, 1941, Ray C. Wakefield of California was sworn in as Commissioner, to succeed the late Commissioner Thad H. Brown, whose term expired June 30, 1940; and on November 1, 1941, Clifford J. Durr of Alabama was sworn in to succeed Frederick I. Thompson, also of Alabama, whose term expired June 30, 1941.

### 3. STAFF ORGANIZATION

The Commission's staff organization consists of four units:

*Accounting, Statistical, and Tariff Department*, which supervises tariff and accounting regulation and analysis.

*Engineering Department*, which, in addition to domestic and foreign engineering phases, supervises the field staff and conducts technical research.

*Law Department*, which handles legal considerations in broadcast and common carrier regulation, legislation, and rule-making, and conducts investigations and litigation proceedings.

*Secretary's Office*, which has charge of internal administration, issues licenses and copies of Commission orders and decisions, and maintains records.

The heads of these departments constitute an *Administrative Board* and *Committee on Rules* which handle routine matters in accordance with established Commission policy, and consider and recommend new or revised rules and regulations.

### 4. PERSONNEL

At the close of the fiscal year, the Commission had 775 employees in Washington (including 257 national-defense employees) and 613 in the field (including 424 national-defense employees). With few exceptions, the Commission's personnel is under Civil Service.

### 5. APPROPRIATIONS

For the fiscal year, the Commission was appropriated \$4,126,340. Of this amount, \$1,750,000 was for national defense activities, and \$175,000 for relocation of monitoring stations.

### 6. LEGISLATION

#### Recommendations to Congress

The Commission made specific recommendations to Congress with respect to new legislation affecting communications, the subject matter of which is indicated hereafter. In addition, the Commission undertook a number of special studies on legislative matters which, upon completion, may necessitate additional proposals. The Commission has adopted the practice of making recommendations as the need arises rather than to present them in connection with its annual report.

#### Reports to Congress

The Commission continued to cooperate with the Interstate Commerce Committee of the Senate in the proceedings under S. Res. 95, 75th Congress, second session, approved June 19, 1939, which authorized an investigation of the telegraph industry. Extensive hearings were held on this matter during the year and representatives of the Commission furnished testimony. On October 28, 1941, this committee recommended that Congress amend the Communications Act to permit a merger of domestic and international telegraph carriers. This action was premised upon investigation and recommenda-

tions made by the Commission in 1940-1941 on the basis of defense and economic considerations.

Pursuant to Public, 97, 75th Congress, approved May 20, 1937, the Commission was directed to make a special study of the radio requirements necessary or desirable for safety purposes for ships navigating the Great Lakes and the inland waters of the United States, and to report its recommendations and the reasons therefor to Congress. This was done on December 16, 1940, as detailed in another section of this report.

The Commission cooperated with the Attorney General's Committee on Administrative Procedure in connection with the latter's report to Congress early in the fiscal year. Subsequently, the Commission furnished testimony and data for use of the subcommittee of the Senate Committee on the Judiciary in considering the "administrative procedure" bills S. 674, S. 675, and S. 918.

#### New Legislation

The basic law under which the Commission operates is the Communications Act of 1934, as amended. The following is a summary of legislation during the fiscal year affecting or proposing to affect this basic law:

On May 13, 1941, Senator White of Maine introduced S. Res. 113 proposing that the Senate Committee on Interstate Commerce study the chain broadcasting regulations promulgated by the Commission on May 2, 1941 [mentioned elsewhere in this report] to determine, among other things, the probable effects of those regulations, and to consider whether the Commission was authorized to promulgate and enforce the same. The resolution also requested the Commission to postpone the effective date of the regulations until 60 days after the Interstate Commerce Committee reported to the Senate. Hearings on the White resolution before the Senate Committee on Interstate Commerce were held from June 2 to June 20, 1941, and testimony was given by Chairman Fly, Commissioner Craven, and representatives of the three national network organizations, and of certain stations. The hearings were adjourned on June 20, 1941, subject to call of the committee chairman.

Section 4 (f) relating to the Commission's personnel was amended by Public, 20, Seventy-seventh Congress, first session (H. R. 533) approved March 23, 1941. This act provides compensation for overtime services of inspectors in charge and radio inspectors of the field division, paid by ship owners at whose request the overtime services are furnished.

The Commission supplied comments and assistance to congressional committees near the close of the year on a recommendation that section 353 (b) of the Communications Act be amended to provide that during the emergency proclaimed by the President on September 8, 1939, but not after June 30, 1943, the requirement of 6 months' previous service as a qualified radio operator on board United States vessel be suspended or modified for successive periods of not more than 6 months' duration. Public 155, enacting this provision, was approved July 8, 1941.

Altogether, the Commission commented upon 24 bills directly or indirectly relating to communications regulation.

## 7. LITIGATION

At the beginning of the fiscal year there were pending 12 cases to which the Commission was a party, 10<sup>1</sup> of which were in the United States Court of Appeals for the District of Columbia and 2<sup>1</sup> in the Supreme Court. During the fiscal year 5 additional appeals were taken to the Court of Appeals from decisions of the Commission, making a total of 15 cases pending in that court in the course of the fiscal year. One suit against the Commission was instituted in the United States District Court for the District of Columbia, 1 suit was brought in a 3-judge court in the United States District Court for the Northern District of Alabama, and 1 suit was brought in a 3-judge court in the United States District Court for the Southern District of New York.

Of the 15 cases in the Court of Appeals, 12 were dismissed and 3 were still pending at the close of the fiscal year. The 2 cases in the Supreme Court resulted in a reversal of the decision of the Court of Appeals which had denied the Commission's motion to dismiss the appeals. The suits in the District Court for the District of Columbia and in the District Court for the Northern District of Alabama were also dismissed; the suit in the District Court for the Southern District of New York was still pending.

The two cases in the Supreme Court involved the question whether the Court of Appeals for the District of Columbia has jurisdiction to entertain appeals from orders of the Commission refusing its consent to an assignment of a radio station license. One of the appeals was taken by the proposed transferor and the other by the proposed transferee. The Court of Appeals had held that it did have jurisdiction of both appeals. On certiorari the Supreme Court reversed the judgment of the Court of Appeals holding that the grant of jurisdiction conferred upon the Court of Appeals by section 402 of the Communications Act of 1934, as amended, does not include appeals from orders of the Commission refusing consent to the assignment of a license. (*Federal Communications Commission v. Columbia Broadcasting System of California, Inc.*, 311 U. S. 132.)

The most important problems raised by the litigation in the Court of Appeals during the current year involved (1) the power of the Court of Appeals under the Communications Act to stay the action of the Commission pending determination of an appeal; (2) the validity under the Communications Act of the Commission's procedure in granting applications without a hearing where electrical interference to an existing station is involved. Both of these problems were raised by the consolidated cases of *Scripps-Howard Radio, Inc. v. Federal Communications Commission* (Nos. 7657 and 7723). These cases were still pending and undecided at the close of the fiscal year.

<sup>1</sup> Included in the cases pending in the Court of Appeals are the 2 cases in the Supreme Court involving interlocutory matters. Since these two cases had not been decided on the merits by the Court of Appeals they are included in the Court of Appeals and the Supreme Court. These cases were finally disposed of by both courts during the fiscal year.



## Record of Court Cases

All of the cases adjudicated during the year were decided in favor of the Commission. The following tabulation shows the status of all cases:

Nature of the case	Number	Final decision for Commission	Final decision against Commission	Pending at end of fiscal year
Cases in Court of Appeals.....	15	12	0	3
Cases in Supreme Court.....	2	2	0	0
Cases in District Courts.....	3	2	0	1

<sup>1</sup> See note 1, p. 10.

## 8. DOCKETS

During the fiscal year the Commission designated 246 cases for hearing, of which number 204 were broadcast, 23 telegraph, 12 telephone, 6 television, and 1 amateur. During that period the Commission heard 49 broadcast, 14 telegraph, 10 telephone, and 3 television docket cases, and oral argument in 36 instances. In the same time 567 motions, petitions, and other pleadings were acted upon, 411 being granted, 91 denied, and 65 dismissed.

## 9. INTERNATIONAL

## General

In view of the world situation, the Commission's International Division has collaborated actively with the Department of State in matters involving international use of radio, wire, and cable services.

The Commission has engaged in a comprehensive survey of international communications facilities operated between the United States and foreign countries and has maintained complete day-to-day information of plant facilities, both cable and radio, and their capacities for handling such traffic.

This was in addition to the work of handling routine records and correspondence relating to international communications; adjusting many cases of international radio interference; compiling lists of international broadcast stations, both United States and foreign; preparing lists of broadcast stations in the North American countries; issuing semimonthly radio service bulletins and notifying the International Telecommunications Union at Berne, Switzerland, of all new radio stations authorized, and frequencies assigned. Also, the Inter-American Radio Office at Habana, Cuba, is kept advised of all changes in broadcast assignments. In addition, the Commission has forwarded to the Inter-American Radio Office copies of its engineering standards, technical information, rules and regulations, and information releases relative to developments in the radio art for distribution to countries of the Western Hemisphere.

**Interdepartmental Committee on Cooperation With American Republics**

The Commission has been active in the work of the Interdepartmental Committee on Cooperation with the American Republics which has met periodically under the chairmanship of the Under Secretary of State. The Commission has prepared and received committee approval of a proposal to provide six fellowships for citizens of other American Republics. The purpose of the fellowships is to promote better inter-American relations by providing a means of acquainting their qualified and representative communications engineers with the regulatory functions of the Commission and the operations of private commercial communications companies in the United States. The training will include working assignments in the various departments of the Commission and inspection trips to various communication companies' plants. The duration of the fellowships is not expected to exceed one year.

**10. INTERDEPARTMENT RADIO ADVISORY COMMITTEE**

Representatives of the Commission have devoted much time and effort to the work of the Interdepartment Radio Advisory Committee. This committee is a Government unit established for the purpose of advising the President with reference to the assignment of frequencies to Government radio stations. The Committee, which has met at least once a month, approved the assignment of 6,983 frequencies for Government radio stations during the past year. At the present time there are 21,133 active assignments to Federal radio stations, all of which have been recommended by the committee since its establishment. In addition, the Technical Subcommittee of the Interdepartment Radio Advisory Committee has considered problems involved in the allocation of such frequencies in order that the most efficient use of the radio spectrum may be attained.

## CHAPTER III

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# Telephone and Telegraph

1. TELEPHONE
  2. TELEGRAPH
  3. CABLE
  4. RADIO COMMON CARRIERS
  5. TARIFFS
  6. SUPERVISION OF ACCOUNTS
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### 1. TELEPHONE

#### General Regulation

The Commission is charged with the regulation of all telephone and telegraph companies doing business as common carriers in interstate or foreign communication. Such authority extends over wire and radio facilities. War conditions have brought about increased work in connection with international rates and services. In addition to regular supervision and reports on these matters, special studies have been made and particular data assembled.

#### Telephone Rate Section Established

As the Commission pointed out in its "Report on the Investigation of the Telephone Industry in the United States," made pursuant to Public Resolution No. 8, Seventy-fourth Congress, it is necessary for the Commission to be adequately informed on telephone rate matters in order to take such action as appears necessary in the public interest. To meet this need, a Rate Section has been established in the Law Department. Since its organization, this section has, in cooperation with the Accounting and Engineering Departments, directed its activities to a resolution of the fundamental telephone rate problems. In particular, the section prepared the legal framework for the Commission's proceeding involving interstate toll telephone rates.

#### Telephone Rate Reductions

By its order of April 1, 1941, the Commission instituted an inquiry into long distance telephone rates of the American Telephone & Telegraph Co. and the associated companies in the Bell System, and

ordered the company to show cause why its rates for interstate telephone service should not be reduced. Thereafter, the company agreed to a reduction in interstate long distance telephone rates which, it is estimated, will save telephone users \$14,000,000 a year, beginning July 10, 1941. Among benefits derived are the elimination of report charges hitherto applicable to uncompleted person-to-person and reversed charge calls; and reduction of overtime charges on person-to-person calls of longer duration than the initial period, so that the charge for overtime period will be the same as for a station-to-station call.

In dismissing the long lines rate case following this rate reduction, the Commission announced that it would continue studies of fact involved in the rate base, the cost of furnishing telephone service and related subjects. Studies of this type have been inaugurated in cooperation with the National Association of Railroad and Utility Commissioners.

Prior to institution of the above-mentioned rate inquiry, negotiations had been initiated with the New England Telephone & Telegraph Co., the Mountain States Telephone & Telegraph Co., and Northwestern Bell Telephone Co., for the purpose of obtaining greater uniformity in interstate message rates. The interstate rates of these companies had been maintained at a generally higher level than those of the American Telephone & Telegraph Co. and most of the other units in the Bell System. These companies agreed to file reduced rate schedules, effective July 10, 1941, resulting in estimated additional annual savings to the public of approximately \$250,000 with respect to the New England Co., \$316,500 for the Mountain States Co., and \$178,000 for the Northwestern Bell Co.

In previous annual reports, mention was made of an investigation into the interstate service furnished by the Pacific Telephone & Telegraph Co. and its two principal subsidiaries. A proposed report, adopted by the Commission on August 15, 1940, held certain rates "unjust and discriminatory." After consideration of exceptions and briefs, and following oral argument, a final report was adopted February 4, 1941. This report contained the same conclusion, and respondents were ordered to reduce certain interstate rates, effective March 15, 1941, to the level of those of the Long Lines Department of the American Telephone & Telegraph Co., resulting in an estimated saving to the public of approximately \$400,000 a year.

#### Other Rate Cases

At the request of the Southwestern Bell Telephone Co., the Commission instituted an investigation into the matter of filing certain message rates applicable to interstate traffic in the Kansas City area. The contention of the company was that these rates covered exchange service and, therefore, it was not required to file them with the Commission. After hearing and argument the Commission, on June 3, 1941, held that the rates in question did in fact cover interstate message toll service and should, therefore, be filed with the Commission. The company appealed to the courts.

Hearings were held with respect to the lawfulness of the rates charged for telephone-message traffic handled jointly by certain independent and Bell System telephone companies in Pennsylvania and New Jersey. Decision was pending.

**Telephone Facilities****APPLICATIONS**

There were 158 applications from telephone carriers during the fiscal year for extension and consolidation of lines or facilities. From July 1, 1934, to June 30, 1941, more than \$65,000,000 worth of new construction was approved.

**SUPPLEMENTING FACILITIES**

The second proviso of section 214 (a) empowers the Commission to authorize the supplementing of existing facilities without regard to other provisions of the section. During the year 156 applications were received requesting such authority. Of these, 137 were approved. Two applications were returned to the applicants. Action on 20 applications was pending.

Most of the applications were from the Bell Telephone System, only 13 being filed by other companies. Expenditures for construction in the individual projects approved ranged from a few thousand dollars to \$7,826,000, with a total of \$38,319,399. This is an increase over any previous year in number of applications, total expenditure, and miles of toll cable constructed.

**CONSOLIDATIONS**

Section 221 (a) provides that telephone carriers desiring to consolidate may file a petition requesting a certificate to the effect that the proposed consolidation, merger, acquisition, or control of the property of one or more telephone companies by another will be in the public interest. Such a certificate exempts carriers from provisions of the Antitrust Act.

There was pending the application of New Jersey Bell Telephone Co. to acquire the capital stock of the Imperial Securities Co., a holding company, which directly or indirectly holds stock control of the Keystone System composed of the Keystone Telephone Co. of Philadelphia, the Eastern Telephone & Telegraph Co. and the Camden and Atlantic Telephone Co. The Keystone System furnishes telephone service, both local exchange and toll, in Philadelphia and vicinity and in southern New Jersey in competition with the Bell Telephone Co. of Pennsylvania and the New Jersey Bell Telephone Co. Lengthy hearings were held and some users of Keystone service have intervened in opposition.

**2. TELEGRAPH****Applications**

The year was marked by a large increase in the number of applications for wire telegraph certificates under section 214. Sixty-six such applications were granted, 35 of which authorized extension of lines to military and naval establishments and involved the leasing of approximately 984 miles and the construction of 31 miles of telegraph circuit. One grant authorized the construction of 1,620 miles and the leasing of approximately 197 miles of telegraph circuit, permitting the establishment of a nation-wide weather-reporting system for the Civil Aeronautics Administration. Twenty-one of the applications requested authority for temporary use of approximately 696

miles of leased circuit. In its consideration of seven applications, preliminary investigation indicated that ample facilities were already available and in each instance the applicant was offered opportunity to present its case through hearing but did not request such hearing.

In March 1941 a hearing was held to determine the policy to be followed in the administration of section 214 as applied to applications for extensions of lines and supplementing of facilities by telegraph carriers which present the issue of direct competition between telegraph carriers through the entrance of one company into an area already served by another. Decision of the broad issues presented through these proceedings had not been reached at the end of the fiscal year.

#### Government Message Rates

As authorized by the Post Roads Act of 1866 and subsequent legislation, the Commission promulgated the annual order fixing rates for the fiscal year for the United States Government telegraph messages. The same ratio has been in effect since January 1, 1940, in most cases 60 percent of the rate applicable to private messages.

#### Investigations

*Trans-Pacific rates.*—Hearing was held for the purpose of inquiring into the lawfulness of the rates, classifications, and practices of the telegraph carriers engaged in handling messages between certain trans-Pacific points and the United States. Decision was pending.

*Pick-up and delivery practices.*—The investigation, mentioned in last year's annual report, of the pick-up and delivery practices of telegraph carriers was continued.

#### Prosecution

It was necessary for the Commission to turn over to the Department of Justice a case involving unauthorized departure from tariffs filed by a wire telegraph company. The carrier was convicted and fined.

### 3. CABLE

#### Effect of the War

The war continues to have a serious effect on the international communications services of American cable companies operating in the European area. No direct cable service is now available between the United States and any country on the continent of Europe although ample direct facilities are still available to the United Kingdom, Eire, and the Azores.

#### Developments

Several cable companies have been experimenting with a new method of signalling which separates the signalling current into two or more components and in this way transmits the signal in such a form that it arrives substantially less distorted than in the case of normal transmission. This method has given results on certain cables permitting at least 25 percent increase in transmission speed.

#### 4. RADIO COMMON CARRIERS

Licenseses in the fixed public radiotelephone and radiotelegraph services, in general, are engaged as common carriers in offering a world-wide radio communications service and a limited domestic radiotelegraph service. The Commission has the duty, in addition to its licensing function, of regulating their rates, practices, classifications of services and tariffs, plus supervision of accounts.

##### Radiotelegraph

Radiotelegraph service as operated in the United States is highly competitive, yet it is necessarily limited by its state of development and economic demands. The Commission must have full information and facts prior to determination upon any application. Many applications, other than those involving minor changes in equipment and renewal of licenses of existing stations, can be finally acted upon only after extensive hearings. Due to the current war situation and the inability to obtain all the information relative to competitive factors, contracts, etc., the Commission has adopted the policy of granting upon a temporary basis new or supplementary circuits for which it has determined that there is public need.

As a result of modifying licensing procedure for radio common carriers, much of the routine paper work has been materially reduced. However, due to the many temporary authorizations to maintain adequate communications channels to all parts of the world, resulting work in this particular phase has increased.

All radio common carriers have been required to submit records showing the flow of traffic to all parts of the world, the routing of traffic, extensions of existing radio circuits, and the actual use made of the frequencies which are licensed to them for public communications.

The war has curtailed radio communication to and from Europe. Many direct circuits formerly operated from this country have been disrupted, so that indirect rerouting has become necessary. Foreign censorship as well as actual discontinuance of circuits may necessitate rerouting. The Commission has continued to act promptly in granting special temporary authority for the establishment of circuits to new or temporary points in order that important government, diplomatic, as well as commercial messages may be efficiently and expeditiously handled.

Circuits to the following countries were at one time or another disrupted and direct service suspended: Poland, Czechoslovakia, Norway, Denmark, Belgium, Holland, Iceland, Syria, and France. With the exception of Denmark and France all these circuits were out as of June 30, 1941. Additional direct circuits during the past year were established to Finland, Egypt, Belgian Congo, and St. Pierre and Miquelon.

The Commission has authorized special controlled circuits to regulate the heavy flow of incoming press dispatches from various points.

On June 30, 1941, there were 16 domestic radiotelegraph common carriers operating transmitting equipment at 73 locations and approximately an equal number of receiving stations. The majority of companies operate principally in the international field although there is a limited domestic service between 16 major cities of the

United States, between certain points on the Great Lakes serving the maritime interests, between isolated cities and the southwest oil fields, and interisland service in Hawaii and Puerto Rico. Companies operating in the international field still offer service direct to 53 foreign points and indirect service to practically any country throughout the world.

The radiotelegraph companies transmit public correspondence pursuant to tariffs on file with the Commission and service messages incidental thereto which are necessary for the movement of traffic. In addition, these companies handle other types of traffic, such as addressed program material to and from overseas points for rebroadcast to the listening public, facsimile and radio photographs, and multiple addressed press service for reception principally by newspapers and broadcast stations. The latter service is widely used in the United States, thereby providing broadcast stations with news bulletins.

No hearings involving new points of radio communication have been conducted in view of the fact that the majority of requests were for special temporary authority.

New frequencies have been allocated to meet the needs for new circuits. Most of these assignments were the result of increased traffic activity. While no new companies were licensed to engage in telegraph communications for hire, the Commission has authorized many applications for the modernization of equipment.

During the early part of 1941 Press Wireless Inc. abandoned its station at Honolulu, due to the inadequacy of point to point traffic originating in Hawaii, and Globe Wireless closed its station at Guam. The latter station acted merely as a relay for traffic destined to and originating from the Philippine Islands, and as a result of the modernization of equipment at San Francisco, Calif., this station was no longer required.

#### Radiotelephone

As in the case of the radiotelegraph services, war conditions have affected transoceanic radiotelephone traffic. While the transoceanic messages destined to points in Europe have decreased, the traffic load to South American points has materially increased.

Additional radiotelephone circuits were inaugurated to Madrid, Spain, and Lisbon, Portugal. The direct circuits to Amsterdam and Paris, which were disrupted in the spring of 1940, have not been reestablished.

Since it has become necessary to maintain direct circuits to most countries on a 24-hour basis and to relieve the increase in traffic load to South American points, the Commission has granted additional frequencies for circuits to South America. At the present time nearly all circuits except the London circuit are operating at or near capacity. As in the case of South America, traffic destined for the Philippines and the Far East increased to such a point that additional circuits to Hawaii, the Philippines, and other Far Eastern points were made necessary. Advent of war between the United States and Japan complicated the Pacific service situation.

Radiotelephone service from the United States is rendered to practically all points through facilities of the American Telephone & Telegraph Company, located at three primary distribution centers,



namely, New York, Miami, and San Francisco. Telephone service to points in Europe, Africa, South America, and the Near East, is handled via New York, while that for Asia and Oceania is routed via San Francisco. Messages destined for Central America and northern South America are transmitted from Miami.

Puerto Rico service is furnished by the Radio Corporation of Puerto Rico, San Juan, and in Hawaii by the joint facilities of the Mutual Telephone Co. and R. C. A. Communications, Inc.

## 5. TARIFFS

At the close of the fiscal year 394 communication carriers of all types had tariffs and concurrences on file with the Commission, an increase of 34 over June 30, 1940. During the year these carriers filed 31,807 concurrences and tariff pages, containing changes in rates, regulations, practices, and classifications of service, or establishing new services. A total of 81 tariff pages were rejected for failure to conform to statutory requirements.

## 6. SUPERVISION OF ACCOUNTS

Among important activities of the Commission in the field of accounting regulation during the year were the following:

*Restatement of plant accounts on basis of original cost.*—Substantial progress was made in the review of the restatements of carriers' plant accounts on the basis of original cost and in the determination of the appropriate accounting disposition of the amounts included in plant-acquisition adjustment accounts. (State and Federal regulatory authorities are giving to this subject increasingly active attention in a concerted effort to formulate a cooperative procedure that will result in establishment of uniform practices.)

*Depreciation.*—The Commission participated in the preparation by the Special Committee on Depreciation of the National Association of Railroad and Utilities Commissioners of a comprehensive report on this subject.

*Cooperation with Federal and State regulatory bodies.*—The Commission cooperated with the Committee on Accounts and Statistics of the National Association of Railroad and Utilities Commissioners in many other matters considered during the year by that committee.

*Miscellaneous.*—Substantial progress was made in the following:

Preparation of an annual report form (Form R) for use by radiotelegraph carriers. (Completed.)

Preparation of an annual report form (Form S) for use by noncarrier affiliates of communication carriers.

Determination of suitable retirement units for use by wire-telegraph and ocean-cable carriers.

Revision of the uniform system of accounts for radiotelegraph carriers.

Revision of the uniform system of accounts for class A and class B telephone companies.

Development of a continuing property-record procedure for telephone and radiotelegraph carriers.

Reclassification of telephone companies to provide a separate group for the very large companies.

Preparation of tentative occupational classifications of employees of communication carriers.

Preliminary studies as to the feasibility of procedures that promise to be of service in the work of the Commission were made with respect to the adoption by States of uniform systems of accounts for telephone companies substantially similar to the systems prescribed by the Commission, and the consolidation of corporate financial statements.

#### Field Accounting Examinations

During the year the Commission's accounting field office made a number of examinations and investigations, the most important of which were: A general examination of the accounts of three radiotelegraph carriers; an investigation of the accounting performed by a large telephone carrier in connection with the restatement of its plant accounts on the basis of original cost; the preparation of historical accounting data for use in connection with the hearing held pursuant to S. Res. No. 95 (76th Congress) concerning the major telephone, wire-telegraph, ocean-cable, and radiotelegraph carriers; the examination of the accounting performed incident to the reorganization of one of the large telegraph carriers; an analysis of international communication by telegraph, radiotelegraph, and radiotelephone carriers covering the period from 1936 to 1939, inclusive; special studies and analyses relating to various asset, reserve, and income accounts of a large telephone carrier; and the preparation of special analytical studies of the operating results of all telephone carriers and systems for use in connection with negotiations for rate reductions.

## CHAPTER IV

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### Standard Broadcast

1. GENERAL
  2. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT
  3. CHAIN BROADCASTING REGULATIONS
  4. NEWSPAPER-RADIO INQUIRY
  5. MULTIPLE STATION OPERATION
  6. DIRECTIONAL ANTENNAS
  7. DIRECT MEASUREMENT
  8. STANDARDS OF GOOD ENGINEERING PRACTICE
  9. DISTRIBUTION OF BROADCAST FACILITIES
  10. LICENSE PERIOD EXTENDED
  11. COMPLAINTS AND INVESTIGATIONS
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#### 1. GENERAL

On November 1, 1941, there were 915 standard broadcast stations in operation or under construction—877 and 38, respectively. Sixty-eight new stations were authorized during the fiscal year. The number of receiving sets in use was estimated at more than 50,000,000. The largest number of single-time listeners was estimated to have heard President Roosevelt's address proclaiming an unlimited national emergency. The figure was set at 65,650,000, which eclipsed the previous year's high by more than 15,000,000. On 1941's record occasion, short wave and rebroadcast relayed the Chief Executive's talk to some 20,000,000 listeners in other countries. During this particular broadcast there was a noticeable decline in the number of telephone calls.

#### 2. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

Frequency assignments under the North American Regional Broadcasting Agreement became effective at 3 a. m. (eastern standard time) on March 29, 1941. This mutual pact, the first of its kind, has for its purpose the improvement of radio reception throughout North America. It was jointly entered into by Canada, Cuba, the Dominican Republic, Haiti, Mexico, and the United States.

Reallocations of frequencies of domestic stations were in accordance with those established at the January 14-30, 1941, conference between technical representatives of the countries concerned. These, with few

exceptions, conformed with those proposed in the lists submitted by the contracting nations on September 11, 1940. The change was accomplished smoothly due to the cooperation of station licensees, equipment manufacturers, and consulting engineers in making prior adjustments to transmitters and antenna systems.

Though 802 of the 893 standard broadcast stations then authorized in the United States changed frequencies, the shift was made in such manner that the relationship among stations on most channels was not disturbed. Improvement of service is noted primarily in cases of interference from foreign stations, and on certain clear channels where the reallocation involved directional antennas for the mutual protection of two or more high-powered stations.

In some instances, stations with directional antennas were not able to make readjustments by March 29 and were permitted to operate at night with reduced power pending readjustment. In cases where stations were assigned a channel requiring new or different directional antenna, they were enabled to operate with limited power until they could make the necessary installation.

### 3. CHAIN BROADCASTING REGULATIONS

In May 1940 the Commission completed its 3-year investigation into chain or network broadcasting, during which 96 witnesses were heard, 9,713 pages of testimony taken, and 707 exhibits introduced. The Commission's "Report on Chain Broadcasting," summarizing this 27-volume investigation record, was released May 2, 1941, and was accompanied by eight regulations designed to eliminate the abuses uncovered during the course of the investigation. Following a petition by Mutual Broadcasting System, oral arguments on amendments to the regulations were heard September 12; and on October 11, the Commission issued a "Supplemental Report on Chain Broadcasting," accompanied by modifications of some of the May 2d regulations.

The report found that at the end of 1940, some 465 stations were affiliated with National Broadcasting Company, Columbia Broadcasting System, or Mutual Broadcasting System. As of the end of 1938, less than 3 percent of the nation's total nighttime broadcasting power was utilized by stations not affiliated with one or another of these three network companies.

Most NBC and CBS affiliates had contracts binding them to their networks for 5 years, but binding on the networks for only 1 year. The May 2d regulations limited such contracts to 1 year. The October 11th regulations increased the term to 2 years, and also increased the license period of all stations from 1 year to 2.

The report found that affiliation contracts bound network affiliates, especially those of NBC and CBS, exclusively to one network so that many stations were barred by their network contracts from broadcasting any other network program even though they had time available and the other network was willing. The May 2d regulations prevent such exclusive restraints. The report also noted that some stations had a contractual right to keep neighboring stations from broadcasting those network programs which they rejected, thus depriving listeners in that community of particular network programs. Such practices were banned.

The report found that CBS kept under option substantially all the more desirable broadcasting hours of most of its outlets, so that it could oust any non-CBS program from a particular period on affiliated stations after 28 days' notice. NBC optioned the choice hours of most of its stations, thus similarly handicapping non-NBC programs. The time under option vastly exceeded the time actually used by the networks. Under the May 2d regulations, such time options were not permitted. The October 11th regulations modified this ban to permit nonexclusive options during certain hours. Under the regulation as modified, the station may option a certain portion of its available hours to one or more networks and the time so optioned will be available to the first taker among the networks holding option upon 56 days' prior notice. The option contract with any network may not restrict the granting of a similar option to other networks. Thus the efficacy of the option as a business convenience is retained while the nonexclusive feature prevents its use to restrict competition. Under both the May 2d and the October 11th regulations, networks remain free to purchase as much time outright as they care to use.

The report noted that, in addition to the various stations affiliated with the networks by contract, NBC was itself the licensee of 10 stations, including two each in New York, Chicago, Washington, and San Francisco, while CBS was the licensee of eight stations. Mutual did not own any stations, but rather was owned and operated by certain of its station outlets. Under the May 2d regulations the Commission will not license to a network more than one station in a single service area, nor will it license one station in communities where the stations are so few or of such unequal desirability that competition would be substantially restrained by the licensing of a station to a network.

The report found that the ownership of two networks, the Red and the Blue, by NBC concentrated excessive power in the hands of one network management, and constituted restraint of competition. It noted that the Blue network was in fact used as a buffer against competition for the Red. The May 2d regulations in effect required NBC to divest itself of one of its networks, so that the Blue could become a full-fledged, independent and competing entity rather than a mere adjunct of the Red. The October 11th regulations suspended the effective date of this provision, in order to make possible the disposition of the Blue as a unit, without impairment.

Various other restraints on stations were also uncovered during the investigation and appropriately dealt with in the May 2d regulations. One cumulative effect of the restraints uncovered was artificially to close the door to new networks. The regulations were designed to make possible the establishment of additional networks and enhanced network service.

The May 2d regulations became effective immediately with respect to new contracts between stations and networks, and were to have become effective after 90 days with respect to existing practices, except that the effective date of the regulation requiring the networks to dispose of certain network managed and operated stations could be postponed in particular instances from time to time to permit orderly disposition of properties. The effective date of the regula-

tions was later stayed, and the Commission's October 11th order made November 15 the effective date of the regulations as amended.

The report concluded:

We have exercised our jurisdiction upon the premise, generally accepted by the public and the industry, that the network method of program distribution is in the public interest. We subscribe to the view that network broadcasting is an integral and necessary part of radio. The regulations which we are promulgating are designed to preserve without loss the contribution of network broadcasting to the public and to the affiliated stations, while ensuring that licensees will exercise their responsibilities under the law. We believe that these regulations will foster and strengthen network broadcasting by opening up the field to competition. \* \* \*

Radio broadcasting is a competitive industry. The Congress has so declared it in the Communications Act of 1934, and has required the fullest measure of competition possible within physical limitations. If the industry cannot go forward on a competitive basis, if the substantial restraints upon competition which we seek to eliminate are indispensable to the industry, then we must frankly concede that broadcasting is not properly a competitive industry. \* \* \* We believe, however, that competition, given a fair test, will best protect the public interest. That is the American system.

Commissioners Case and Craven dissented from the report and from the supplemental report. In a minority opinion they held that the Commission is, in the main, "without jurisdiction to promulgate regulations which undertake to control indirectly the business arrangements of broadcasting licensees" and expressed fear that "the revolutionary change proposed by the majority will result in the destruction of the present excellent national program distribution system and the substitution therefor of some new kind of system, the effects of which the majority does not adequately visualize." Further declaring that the Commission, through its licensing powers, is enabled to deal with any abuses, the minority saw no reason why the Commission should not extend the license period to the full statutory limit of 3 years so as to "create an atmosphere of greater stability in the industry" and, at the same time, "in no way detract from the Commission's power to proceed by revocation against licensees who contravene the standard of public interest." With respect to the dual NBC network, the minority recommended negotiations looking to their voluntary segregation but found no record to support new regulation to control the relations between networks and affiliates. Asserting that broadcasting "must be kept free from unnecessary Government restraints," the minority report concluded that "this is no time to embark upon a new and untried course."

The "Report on Chain Broadcasting," containing the full text of the majority and minority opinions, and of the May 2d regulations, is for sale by the Superintendent of Documents, at 30 cents a copy. Copies of the supplemental report and of the October 11th regulations may be procured from the Commission.

In October 1941, NBC and CBS brought suit before a three-judge court in the District Court for the Southern District of New York, to enjoin and set aside the chain broadcasting regulations. Mutual entered the case in opposition to the NBC and CBS suit. On November 12, the Commission, under stipulations entered into with NBC and CBS, postponed the regulations pending court decision on plaintiffs' request for a preliminary injunction.

## 4. NEWSPAPER-RADIO INQUIRY

In view of the increasing number of applications by newspapers to operate FM (frequency modulation) broadcast stations, the Commission on March 20, 1941, ordered an investigation to determine what policy or rules, if any, should be promulgated in this connection, and also with respect to future acquisition of standard broadcast stations.

The general question of joint control of newspapers and broadcast stations has long been a topic of interest in Congress and has arisen from time to time in connection with particular decisions of the Commission. Thus the Commission has been called upon to decide whether in a community with only one daily newspaper and no radio station the public interest will be better served by licensing a proposed station to the newspaper with existing facilities for gathering news and procuring advertising revenues, or to a nonnewspaper applicant who will introduce an independent and competing medium for community service and for the dissemination of information and opinion.

In deciding whether or not to license a station to a newspaper, a variety of considerations may be relevant in determining the public interest, convenience, and necessity. For example, newspaper ownership of a station may make available to the listening public a wider supply of news due to the licensee's superior news-gathering facilities, or, on the other hand, the newspaper's desire to protect its newspaper investment may cause it to limit the broadcasting of news in the interest of wider newspaper circulation. While the unified operation of newspaper and station might bring financial stability to the joint enterprise, it might also result in unfair competitive advantages and eventual monopoly.

Such questions are inescapable so long as applications from newspapers for radio stations continue to be submitted to the Commission. They may be settled, as in the past, in the consideration of particular cases as they arise, or they may be the subject of a general determination of Commission policy or of new legislation.

The need for a thorough consideration of such questions was prompted by the fact that out of 99 applicants for FM licenses prior to June 30, 1941, 43 were from newspapers or persons associated with newspapers.

In order to obviate separate hearings on so many cases and to obtain relevant facts upon which to base future general guidance, the Commission, pursuant to its order No. 79 of March 20, postponed consideration of current applications by newspaper interests for FM stations and new standard broadcast facilities pending institution of the general inquiry.

Hearings were originally scheduled to begin on June 25, but actually commenced on July 23, to which date they had been postponed on petition by a committee representing certain newspaper publishers. Hearings were held before the Commission en banc between July 24 and October 25, and were subsequently recessed to December 4. On August 14, the United States District Court for the District of Columbia ordered a witness to testify under a subpoena which the respondent had previously ignored. Appeal was taken.

Preliminary exhibits submitted by the Commission staff, subject to revision, indicated that out of 880 standard broadcast stations, the

licensees of 66 were newspapers, 177 were owned to the extent of 50 percent or more by newspaper interests, and 55 others were in a greater or lesser degree associated with newspapers. In more than 90 communities, it was indicated, the only radio station was licensed to or associated with the only newspaper enterprise. Some 150 stations were associated with newspaper-radio chains, each such chain consisting of more than one newspaper and more than one radio station.

Three possible courses of action for the Commission are indicated as a result of its inquiry: (1) Use of the expert knowledge thus acquired as an aid to subsequent determinations in particular cases, (2) formulation of rules or statements of policy for the guidance of the Commission, or (3) recommendations to Congress for appropriate legislation.

#### 5. MULTIPLE STATION OPERATION

A ban on the operation of more than one standard broadcast station in any service area by a single interest or group of interests was set forth in a proposed rule announced August 5, 1941. The contemplated rule would apply to such multiple operation whether the stations were operated by one person or corporation, or by persons or corporations under common control, and "control" would be defined as "actual working control in whatever manner exercised," whether or not majority stock ownership is involved. Unlike multiple-ownership rules governing FM and television, the proposed standard broadcast rule would not limit multiple operation where the service areas of the stations under common management are distinct.

Oral arguments on the proposed rule were held October 6, 1941. If adopted, the rule would become effective immediately with respect to new grants and 6 months from the date of adoption with respect to existing stations, with provision for further extension in particular cases if necessary for the orderly disposition of properties.

#### 6. DIRECTIONAL ANTENNAS

Nearly 25 percent of all standard broadcast stations last year used directional antennas as compared with 14 percent the year previous.

The directional antenna has proven beneficial in simultaneously providing maximum service in certain directions and causing a minimum extent of interference in other directions to services on the same or adjacent frequencies. (It is not considered feasible from an economic or allocation viewpoint for stations operating on local channels to use directional antennas.) In addition to new directional antenna installations, the major portion of those in use were readjusted or rebuilt because of the North American Regional Broadcasting Agreement frequency shifts.

#### 7. DIRECT MEASUREMENT

Under section 3.51 of the Rules and Regulations, effective June 1, 1941, each standard broadcast station is required to determine operating power by direct measurement of its antenna power. With few exceptions covered by this rule, stations are now determining power by this so-called "direct method," which provides that the power supplied to the antenna be the same as that power for which the station is licensed.



When the operating power is determined by the power supplied to the last radio frequency amplifier tube or tubes of the transmitter ("indirect method"), the power supplied to the antenna may vary over wide limits, depending upon the adjustment of the transmitter. For example, of two stations authorized to operate with 100 watts power, one may supply only 75 watts to the antenna while the second may supply 150 watts or twice the actual power even though the input power to the vacuum tubes is the same in each case. Operation by the "direct method" tends to improve the quality of transmission since it eliminates adjusting the transmitter so as to sacrifice quality for power.

#### 8. STANDARDS OF GOOD ENGINEERING PRACTICE

There have been no major changes in the Standards of Good Engineering Practice, which became effective August 1, 1939. Several minor changes have been made in keeping with technical developments.

#### 9. DISTRIBUTION OF BROADCAST FACILITIES

The Rules and Standards operative since August 1, 1939, together with reallocations due to the North American Regional Broadcasting Agreement and the cooperative efforts of stations on the various regional channels mutually to reduce interference by means of directional antennas, have resulted in considerable change in the distribution of broadcast facilities. Since these changes are still being made at a rapid rate, a detailed study of population and areas served has not been considered warranted, particularly in view of the large number of new applications with resultant complications.

#### 10. LICENSE PERIOD EXTENDED

On October 11, 1941, in connection with its "Supplemental Report on Chain Broadcasting" (previously referred to), the Commission extended the normal license period of standard and relay broadcast stations from 1 to 2 years.

#### 11. COMPLAINTS AND INVESTIGATIONS

##### "No censorship"

The Commission has emphasized frequently that it exercises no power of censorship over radio communications. Thus it neither requires the broadcasting of particular programs nor bans them; program selection is in the first instance the function of the broadcasters licensed to operate stations.

However, the Commission is concerned to see that licensees use their power of program selection in the public interest. It is especially concerned with the maintenance of free speech on the air, and with the maintenance of well-rounded rather than one-sided presentations of controversial public issues. It welcomes complaints wherever they are verified and factually supported.

Of the thousands of complaints received annually, the bulk do not meet these requirements, or are clearly beyond the cognizance of the Commission. Complaints alleging unfair trade practices are customarily referred to the Federal Trade Commission.

Refusal of time on the air was the source of an especially large number of complaints during the year, largely by reason of issues arising out of the war. At the request of members of the Senate Committee on Interstate Commerce, the Commission undertook to analyze more than 40,000 programs dealing with controversial foreign policy issues broadcast during the period January through June 1941. The results of this analysis were not yet completed when this report went to press.

"The public interest—not the private—is paramount" in radio broadcasting declared the Commission in reprimanding a certain station for past partisanship practices. In its decision and order covering this case it added: "Under the American system of broadcasting it is clear that responsibilities for the conduct of a broadcast station must rest initially with the broadcaster. It is equally clear that with the limitations in frequencies inherent in the nature of radio, the public interest can never be served by a dedication of any broadcast facility to the support of \* \* \* partisan ends. Radio can serve as an instrument of democracy only when devoted to the communication of information and the exchange of ideas fairly and objectively presented \* \* \* Freedom of speech on the radio must be broad enough to provide full and equal opportunity for the presentation to the public of all sides of public issues."

#### Radio Facilities for Candidates for Public Office

The Communications Act provides that if a broadcast station shall provide use of its facilities to one candidate for a particular public office, it shall afford equal opportunity to all other candidates for the same office. The nature of the complaints received by the Commission falling within this provision of the law and the disposition made of them, in connection with the 1940 political campaign, is reflected in the Sixth Annual Report. On November 15, 1941, the Commission clarified its rules so as to define a "legally qualified candidate" within the meaning of section 315 of the Communications Act.

## CHAPTER V

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# Nonstandard Broadcast

1. GENERAL
  2. HIGH FREQUENCY (FM) BROADCAST SERVICE
  3. TELEVISION BROADCAST SERVICE
  4. INTERNATIONAL BROADCAST SERVICE
  5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE
  6. STUDIO-TRANSMITTER SERVICE
  7. RELAY BROADCAST SERVICE
  8. FACSIMILE BROADCAST SERVICE
  9. DEVELOPMENTAL BROADCAST SERVICE
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### 1. GENERAL

There have been important developments in the nonstandard broadcast field, notably in the high frequency, television, international, and noncommercial educational broadcast services.

The past year saw the inauguration of a commercial broadcast service using frequency modulation (FM) on the high frequencies between 42,000 and 50,000 kilocycles. In the New York City area applications for FM stations have exceeded the number of channels available.

Television development permitted the adoption of transmission standards which, besides permitting current commercial operation, provide sufficient flexibility to take care of improvements now in the laboratory stage. Accordingly, the Commission adopted rules and standards for commercial television effective July 1, 1941. Color television has also been successfully demonstrated.

United States international broadcast stations have improved their service to foreign countries. This makes possible the presentation of the cause of democracy, particularly in South America, on a level comparable with the transmissions from government-owned stations of other nations.

Progress in FM broadcasting was reflected in new applications and grants for educational broadcast facilities to operate on a non-commercial basis. Five of the 35 FM channels have been set aside for such educational use.

The Commission established the ST (studio-transmitter) service by which licensees of high frequency and international broadcast stations can employ radio for high quality program transmission from the studio to the transmitter. This is the first service established exclusively for frequencies above 300,000 kilocycles.

## 2. HIGH FREQUENCY [FM] BROADCAST SERVICE

A review of the steps leading to the authorization, in the spring of 1940, of frequency modulation (FM) on a commercial basis was included in the Sixth Annual Report of the Commission. Further refinements have been made in receivers, transmitting equipment, and antenna systems. At the close of the fiscal year approximately 14 manufacturers were active in the production of FM receivers. Available information indicates that as of November 1941 there are some 120,000 FM receivers in public use, with production estimated at about 1,500 sets a day. The majority of the FM receivers now sold receive standard band as well as FM broadcast.

### Authorizations

The first construction permits for commercial high frequency (FM) broadcast stations were issued by the Commission on October 31, 1940. As of December 1, 1941, there were 67 commercial FM authorizations and 43 applications pending. Eleven construction permits had been granted for stations for the New York City area, and pending applications far exceeded remaining facilities there.

Of interest are two particular authorizations. The first is for a station to be located on Mount Washington, N. H., antenna elevation 6,300 feet, which will serve an area of 31,000 square miles. Approximately three-fourths of a million people are within satisfactory service range of this station who do not have satisfactory reception of standard broadcast stations. The second permit is for construction of a station on Clingman's Peak, N. C., antenna elevation 6,875 feet, to cover 69,400 square miles. In this area, particularly in the summer months, standard band coverage is not adequate during the daytime. High frequency broadcast stations have distinct possibilities for rural coverage, particularly where high natural transmitter sites are available and the standard band coverage is relatively poor because of static and low ground conductivity.

### Changes in Rules

For the purpose of obtaining more effective use of the limited number of channels available for high frequency broadcast stations, the Commission on October 3, 1940, amended the rules so as to clarify requirements as to the areas to be served. The rules previously contemplated that the service area should be commensurate with the common cultural, economic, social, or other characteristics which would justify service to the area as a unit. This principle, while fundamentally sound, did not permit for administrative purposes any quantitative definition of such area in any specific case.

A measure of the area of social and economic influence of the city is the retail trade area, the extent of which has been the subject of

study by various market research organizations. A number of trade area delineations have been recognized by the Commission for determining, by the Commission and applicants, the areas which should be served. There are approximately 625 "basic trade areas" in the United States, each of which is entitled to one or more stations serving the area in its entirety. The requirement that stations of the same city should serve substantially the same area has been retained.

However, the Commission has established "limited trade areas" for the purpose of permitting stations in cities which are not considered principal cities of "basic trade areas" to serve the sphere of economic and social influence of such cities. These areas are in general much smaller than "basic trade areas."

Twenty-two channels were made available for stations serving basic and limited trade areas centering about cities which have a population of over 25,000. In addition, 6 channels have been reserved for basic and limited trade areas in which the city of the station has a population of less than 25,000.

Seven channels have been assigned for stations to serve primarily large rural areas which cannot be served satisfactorily otherwise, due to technical or economic limitations. These stations may serve principal cities in "basic trade areas" and other cities provided they do not sacrifice their rural service in so doing.

A "special service area" classification has been established for unusual cases not falling within the foregoing categories, where a definite need therefor is shown and where unfair competition will not arise.

On March 20, 1941, the Commission amended the rules to permit stations to be authorized on a temporary basis to serve less than the "basic trade areas" but at least the metropolitan district of the city upon showing that there is a need for relaxing the basic requirements. This made possible the inauguration of FM service to cities having very large basic trade area in parts of the country where trading centers are widely separated. The Commission also made available 3 frequencies, principally reserved for cities of less than 25,000 population, for use in cities of greater population which are adjacent to metropolitan districts of more than 1 million.

On December 9, 1940, the Commission conducted an informal engineering conference to consider rating high frequency broadcast transmitters. It resulted in an agreement between equipment manufacturers and the Commission. Consideration was also given to the practical problems related to the technical performance of stations.

The Commission also announced a policy of permitting new high frequency broadcast stations to operate with temporary installations. In many cases the complete equipment has not been immediately available, partly due to material shortages and to national defense obligations assumed by transmitter manufacturers. In this way stations may begin rendering service without waiting for delivery and installation of the final equipment. Provision was made for commercial operation of experimental stations at which frequency modulation was initially field tested, the licensees of which had been issued commercial construction permits.

Beginning October 1, 1941, FM was authorized for use by ship, coastal and emergency services using the ultra-high frequencies.

### 3. TELEVISION BROADCAST SERVICE

Television transmission is accomplished by systematically breaking down the image of the scene to be transmitted into very small picture elements and transmitting signals proportional to the light and shade in rapid succession. The converse process takes place at the receiver where the image is reconstructed. This is done so rapidly that the eye perceives the result as a complete picture. It is fundamental that the receiver follow the breaking down or "scanning" process. To accomplish this it is necessary for the transmitter to send keying or "synchronizing" signals to maintain the original relationship of the transmitted picture units. The receiver is more intimately related to the transmitter than in any other kind of broadcasting.

There are a number of ways in which the picture can be broken down for transmission. Likewise, there are a number of ways in which synchronization is attained. All of these factors go to what is generally called "transmission standards."

Obviously, it is essential that all receivers be capable of receiving all transmissions, and that the best possible uniform system of standards be agreed upon. It is also important that these standards incorporate sufficient flexibility to accommodate future technical developments.

#### 1940 Situation

At hearings held in January and in April of 1940, the Commission found the industry divided upon the basic question whether television was ready for commercial broadcasting, and also found the industry at odds as to transmission standards. Some believed that television had not reached the point where it could offer sufficient entertainment value to justify commercial operation and that standardization would result in the freezing of the science at the then level of efficiency. Others were determined to proceed at all costs with the launching of television on a large scale.

In its report of May 28, 1940, on the April hearing, the Commission declared:

As soon as the engineering opinion of the industry is prepared to approve any one of the competing systems of (television) broadcasting as the standard system the Commission will consider the authorization of full commercialization. That a single uniform system of television broadcasting is essential—so far as the basic standards are concerned—must also be amply clear. The public should not be inflicted with a hodgepodge of different television broadcasting and receiving sets.

Television entered the past fiscal year with a wide divergence in the industry on the matter of adopting standards. Because the situation was one which threatened to hold up coordinated television development indefinitely and to delay public service on a widespread basis, the Commission offered its cooperation to the industry along lines in furtherance of the achievement of higher standards by research and development.

#### National Television System Committee

First, it provided for new experimental television stations in various sections of the country to engage in practical demonstration of competing systems. Later it cooperated with the Radio Manufacturers Association (RMA) in creating the National Television

System Committee (NTSC). The RMA felt that "because of the inadequacy of the various suggested standards for television" all existing systems should be explored and developed, and new standards formulated. The NTSC was given this task for which it was well adapted, being organized from representatives of national technical organizations and companies broadly interested and experienced in the television field. The NTSC reconsidered all questions relating to television standardization and made report to the Commission on January 27, 1941. This report was the result of 5,000 man-hours of work and represented 60 meetings of the NTSC and its committees. Distribution of the proceedings of the committee involved 500,000 sheets of material.

#### 1941 Hearing

The following day the Commission announced that a public hearing would be held beginning March 20, 1941, to consider the various engineering standards suggested, and also to determine when television broadcast stations should be permitted to broadcast commercial programs as a public service.

At this hearing the Commission found the industry had reached agreement that television broadcasting was ready for standardization. The standards as finally proposed by the NTSC at the hearing represent, with but few exceptions, the undivided engineering opinion of the industry. Some difference of opinion existed among broadcasters as to the date when commercial operation should begin. However, the Commission was of the opinion that the reasons advanced by some for the delay were not controlling. Other leading figures in the industry expressed the view that developments warranted prompt standardization and commercialization.

The standards proposed by the NTSC provided for most of the improvements held out as readily possible a year ago for monochrome transmissions (black and white pictures). These standards fix the line and frame frequencies at 525 and 30, respectively. The 525 lines provide for greater detail in the pictures transmitted than the 441 lines advocated a year ago. They give substantially equal resolution and more fully exploit the possibilities of the frequency bands allocated for television. Different line and frame frequencies will probably be required for color transmissions. This, however, is a matter for future consideration after color transmissions have had adequate field tests.

Previously one of the weakest phases of the proposed television standards was the synchronizing pulse which frequently caused the loss of the picture under interference conditions. A few weeks before the March hearing, developments were brought forth for greatly intensifying the synchronizing signals transmitted.

#### Rules and Standards

On April 30, 1941, the Commission promulgated rules incorporating television transmission standards recommended by the National Television System Committee. Provision was made for the use of frequency modulation on the sound carrier; previously amplitude modulation had been considered. Incorporated were alternative standards for the synchronizing waveform and the manner of trans-

mission—namely, by amplitude modulation or frequency modulation. These alternatives permit universal reception by present receivers. Rules were adopted for commercial operation effective July 1, 1941.

Stations licensed for commercial operation are required to operate a minimum of 15 hours per week. Provision has also been retained for licensing television stations on an experimental basis, as well as experimental color transmissions.

As in the case of FM broadcast stations, no person or group may operate more than one television station in a given area. However, whereas a maximum of six scattered FM stations may be under the same control, the more limited television channels make three such stations the limit for the main television band.

The Commission's order accompanying the rules and standards provided that experimental television stations previously authorized would be issued construction permits for commercial operation upon a showing that the station construction would meet the new requirements. At the close of the fiscal year, two such stations received authorizations to begin 15 hours per week commercial operation. Five other stations, located in Los Angeles, Chicago, Philadelphia, New York City, and Schenectady, were converting their experimental stations into commercial stations. Seventeen others holding construction permits for experimental stations in various parts of the country indicated their intention to start commercial service as soon as possible. By November 1 there were 8 commercial authorizations.

The Commission also announced that on or before January 1, 1942, the Commission would consider further restricting the standards with respect to the alternatives in regard to synchronizing signals. Consideration will also be given at this time to test data with respect to color transmissions and to recommendations as to standards which may be adopted for color television.

#### Developments

On January 6 and 7, 1941, the Commission witnessed television demonstrations in Philadelphia and New York City. In Philadelphia there was demonstrated a new method of transmitting synchronizing signals. It indicated a considerable advance in holding received pictures in place under adverse interference conditions. In New York City the Commission witnessed a home television receiver employing a projection cathode ray tube giving pictures 13½ by 18 inches and also viewed large-screen telepictures 15 by 20 feet for theatres and other public places. Demonstration of three-color television was also witnessed.

#### 4. INTERNATIONAL BROADCAST SERVICE

International developments have spurred domestic interest in international broadcasting. Private organizations are now very active in presenting the United States viewpoint in the world radio forum which other nations have long used to advantage.

International broadcast stations in this country have made substantial advances in providing technical facilities and acceptable programs for promoting international goodwill and understanding.



Considerable emphasis has been placed upon the service to Central and South America. One organization which operates a national network has made arrangements for a number of stations in Latin America to rebroadcast the programs received from its international broadcast station. By way of reciprocity, the United States network will rebroadcast programs originating in South America.

The Commission has given particular cooperation to international broadcast licensing looking toward the improvement of service. It has striven to improve the technical operation of these stations, thus increasing the signal strength and bettering reception in foreign countries. Increases in power and installation of highly directive antennas have been encouraged. On September 1, 1941, there were 11 high-powered United States international broadcast stations, each capable of delivering international programs with at least 50 kilowatts of power. Two of these stations have increased their power to approximately 100 kilowatts and similar increases by other stations are contemplated. In addition, the Commission has aided the licensees in the design of new antennas directed to specific foreign countries in order that clearer and more intelligible signals may be received in all parts of the globe.

The Commission's rules requiring a minimum power of 50 kilowatts for international broadcast service became effective July 1, 1941. With a view to further improvement, the Commission in August 1941 modified its rules to permit greater flexibility in the use of frequencies available to this service. It is now possible to assign more than one frequency in the band to a single domestic licensee. This will enable the licensee, should interference be experienced on one frequency, to shift to another frequency not subject to the same degree of interference.

##### 5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

As of September 1, 1941, seven noncommercial educational broadcast stations were operating or authorized. They were affiliated with the Boards of Education of New York City, San Francisco, Cleveland, and Chicago; the San Diego Unified School District, and the Universities of Kentucky and Illinois.

As previously reported, the Commission in providing for a commercial broadcast service on the high frequencies allocated five adjacent channels for noncommercial educational broadcast stations. In this way, educational broadcasting may take advantage of FM transmission.

The Commission's rules for noncommercial educational broadcast stations require that the program service include units of an educational system. For example, a station owned and operated by a municipal school board should transmit classroom material to schools throughout the city. However, the rules permit transmissions to the general public, including entertainment as well as adult education programs. With the increasing distribution of FM receivers, boards of education and educational institutions will find FM transmitting facilities increasingly useful. It has been estimated that the cost of installing a school radio system is no more than the cost of adding an additional classroom.

To provide a further incentive for this kind of broadcasting, arrangements were made by the holder of the patent rights on the present system of frequency modulation to require payment of but nominal royalties on transmitters used by nonprofit educational stations.

#### 6. STUDIO-TRANSMITTER SERVICE

The Commission's rules require that the high frequency FM broadcast stations meet a substantially uniform response between 30 and 15,000 kilocycles. While it is generally agreed that this requirement can be met insofar as equipment itself is concerned, considerable difficulty is encountered in obtaining wire circuits between the studio and transmitter. In addition, many desirable FM transmitter sites are found on tops of hills and mountains removed from existing telephone circuits. Installation of wire lines would be costly.

The Commission eliminated this "bottleneck" in the achievement of high fidelity transmission by establishing a new service for this purpose. Rules adopted on March 12, 1941, provide for the licensing of an ST (studio-transmitter) station for the purpose of transmitting programs from the studio to the transmitter of the station. Twenty-three 600-kilocycle channels were provided between 330,000 and 346,000 kilocycles for such service.

ST stations are required to use FM and directional antennas meeting certain specifications. Some experimentation is required in order to finally arrive at a definite evaluation of the usefulness of this service. Accordingly, stations are licensed on an experimental basis.

The Commission later amended its rules so as to make ST service available to international broadcast stations. Inasmuch as there are but few international broadcast stations in the United States, additional ST stations operated by them impose no serious requirements upon available frequencies. By the same token, international broadcasts are subject to fewer mechanical and other interruptions.

#### 7. RELAY BROADCAST SERVICE

The relay broadcast service made possible many programs of standard broadcast stations which would not otherwise have been feasible because of lack of suitable wire facilities. A total of 498 authorizations for relay broadcast stations were outstanding at the close of the year. The license period of relay broadcast stations was, on October 11, 1941, extended for two years to conform with similar extension of the standard broadcast license.

Several relay broadcast licenses were issued to provide emergency studio-transmitter circuits when regular wire connections were disrupted.

Section 3.408 (d) of the Rules Governing Standard Broadcast Stations, which requires prior Commission authority before standard and high frequency stations may rebroadcast programs of stations of other classes, was suspended at the instance of the Secretary of War to permit such stations to rebroadcast transmissions from Government stations without first securing written authority of the Commission. In this connection, section 4.21 of the Rules Governing Relay Broad-

cast Stations was also suspended to permit use of relay broadcast stations from points under jurisdiction of military and naval establishments.

#### 8. FACSIMILE BROADCAST SERVICE

There were but four outstanding licenses for facsimile broadcast stations at the close of this year as compared with 16 stations a year ago. There were four special experimental authorizations to standard broadcast stations to transmit facsimile signals during the experimental period instead of seven a year ago. At these stations very few regular transmissions are being made.

The Commission provided for multiplex transmission of facsimile signals by high frequency (FM) broadcast stations. However, technical difficulties have been encountered in mutual interference of aural and facsimile reception.

#### 9. DEVELOPMENTAL BROADCAST SERVICE

The term "Developmental Broadcast Service" is used to define a station used to carry on development and research along lines other than those prescribed by other broadcast rules.

Of particular interest was the grant, on an experimental basis, of application by a certain firm in New York City for a developmental subscriber broadcast service on 117,650 kilocycles. This concern plans to furnish programs without advertising, but will restrict reception of the same by transmitting an accompanying "pig squeal" (discordant sound) which can only be eliminated by special receivers leased from the broadcaster. This proposal is unique in broadcasting annals. It will constitute a pioneer effort to exact charge for service directly rather than indirectly from the listener. The Commission deemed the idea worthy of investigation, and authorized the experiment.

## CHAPTER VI

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# Safety of Life and Property

1. MARINE SERVICES
  2. AVIATION SERVICE
  3. EMERGENCY SERVICE
  4. EXPERIMENTAL SERVICES
  5. ALASKAN SERVICES
  6. MISCELLANEOUS SERVICES
- 
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### 1. MARINE SERVICES

#### Great Lakes and Inland Waters Survey

Under date of December 16, 1940, the Commission reported to Congress on the special study of radio requirements for ships navigating the Great Lakes and inland waters. In that report, it is recommended that no legislation be enacted with respect to the Great Lakes pending treaty negotiations with the Canadian Government. In the same report, it is recommended also that appropriate legislation [similar to that contained in Title III, part II of the Communications Act] be enacted to require radio equipment on ships navigating exclusively on bays and sounds adjacent to the open sea.

#### Great Lakes Radiotelephone Service

Because of the large number of coastal-harbor and ship telephone stations of the United States and Canada which intercommunicate and operate within comparatively short distances of each other, and due to the necessity of sharing certain radio telephone frequencies, particularly the common calling and safety frequency 2182 kilocycles, there exists a definite need for joint regulatory measures. The basis of such regulation has been formed from time to time by informal conferences and exchanges of views between representatives of this Commission and the Canadian Government.

Such an informal conference was held at Toronto on March 12 and 13, 1941, which was attended by representatives of commercial radio communication companies of the United States and Canada, representatives of the Lake Carriers' Association, and Dominion Marine Association, and the United States and Canadian shipmasters' associations. Following this conference, some needed changes in operating practices were placed into effect by the Commission on April 1, 1941. These have considerably reduced interference on the calling and intership frequencies.

### Mississippi River Radiotelephone Service

Following analysis of the record of an informal hearing at Memphis on October 28, 1940, and upon completion of a detailed engineering study concerning related frequency allocation matters, the Commission allocated six frequencies between 2000 and 12000 kilocycles for assignment to ship and coastal-harbor telephone stations on the Mississippi River and connecting inland waters. These frequencies have transmission characteristics which will permit communication on the Mississippi River system and connecting Intra-coastal Waterway over distances up to several hundred miles.

Three coastal-harbor stations have been licensed for public telephone service with river vessels, and five applications are on file. In addition, the Inland Waterways Corporation, a governmental enterprise, has requested authority to use radiotelephony for communication with its 37 ship stations through the medium of the land station owned and operated by this organization at Memphis.

At the Memphis hearing it was shown that 60 vessels operating on the Mississippi River system had licensed radio stations on board. Seventeen of these vessels had telegraph equipment only, 21 had telephone equipment only, and 22 had both telephone and telegraph equipment. It was conservatively estimated, however, that the total number of towboats on the Mississippi River and its tributaries exceeds 500.

### Radiotelephony in Gulf Coast Area

During the latter part of 1940 the Commission received reports that severe interference was being caused to intership telephone communication by stations used on oil drilling rigs and moored vessels in connection with industrial oil operations in the coastal waters and marshes of Louisiana and Texas. This marshland bordering the Gulf of Mexico is an extensive area generally accessible only by boat and subject to severe storms. A large portion of the area is of such a swampy nature as to make construction and maintenance of wire lines impracticable. It was further reported that the ship-shore service through established coastal-harbor stations at New Orleans and Galveston did not fully meet the needs of some of the oil companies and barge lines.

Accordingly, an informal hearing was held at Houston on May 5 and 6, 1941. At the close of the fiscal year, the record of this hearing and other related information were being analyzed and studied by the Commission's staff preparatory to the submission of appropriate recommendations. In the meantime the Commission has temporarily authorized continued operation of the ship stations in question and has been advised that the licensees of the coastal-harbor stations at New Orleans and Galveston are attempting to overcome the alleged deficiencies of the ship-shore service rendered in this area.

### Coastal Radiotelegraph

As of June 30, 1941, there were 55 coastal telegraph stations, exclusive of those in Alaska. Fifty-two of these stations were licensed for public service and three for limited (governmental) service.

A public coastal service license was issued for a station at Mobile, thereby renewing the coastal service at that port, which, during the

previous year, had been discontinued by another licensee. The operation of the commercial coastal telegraph station at Agana, Guam, was discontinued voluntarily. Public coastal telegraph service is now rendered at Agana by the previously established naval radio station.

The aggregate volume of ship-shore paid message traffic handled through licensed coastal telegraph stations of the United States has diminished under present international conditions.

On March 1, 1941, regulations became effective which clarified the status of the relatively small number of coastal stations not licensed for public correspondence. The service of these stations is now classified as "limited (governmental) coastal" service. In addition to their normal service they are now required to acknowledge all safety calls and distress messages, and are permitted to transmit messages relating to the safety of navigation, life, and property, to any other station in the maritime mobile service.

#### Coastal Radiotelephone

There has been no change in the number of coastal telephone stations previously reported. These stations, four in number, are relatively inactive due to the withdrawal from commercial service or loss by disaster of many ocean-going passenger ships. For this reason the licensee of these stations is planning to use some of the frequencies normally employed for coastal service to supplement the regular fixed (point-to-point) public radiotelephone service to South America and other areas.

#### Coastal-Harbor Stations

The Commission licensed new public coastal-harbor stations at Portland and Astoria, Oreg.; Cape Girardeau, Mo.; Delaware City, Del.; Charleston, S. C.; and Kahuku, Hawaii. The license for the limited (governmental) coastal-harbor station at New Orleans was voluntarily surrendered. The coastal-harbor station at Mackinac Island was moved to Rogers City, Mich. As a result of extensive public hearings in May 1940, new coastal-harbor stations were authorized in the Great Lakes area at Detroit, Port Huron, and Houghton, Mich. and at Buffalo, N. Y. At the same time additional frequencies (above 3,000 kilocycles) were assigned to the existing stations at Lake Bluff, Ill.; Port Washington, Wis.; Duluth, Minn.; Rogers City, Mich., and Lorain, Ohio. The Commission, after formal hearings, denied applications for authority to construct coastal-harbor stations at Manistee and Marine City, Mich.; West Dover, Ohio; and Youngstown, N. Y.

During the year a permit was granted for a new coastal-harbor station near Eureka, Calif., for operation on the same frequency and to supplement the station near San Francisco, Calif. These two stations are to be interconnected by landwire as a means of avoiding mutual interference, in a manner similar to the Portland and Astoria stations on the Pacific coast and the two stations located at Ocean Gate and Delaware City, respectively, on the Atlantic coast.

As of June 30, 1941, there were 28 coastal-harbor stations in the United States, Hawaii, and Puerto Rico licensed to provide public

radiotelephone service, distributed geographically as follows: Atlantic coast, 8; Pacific coast, 6; Great Lakes, 5; Gulf coast, 3; Mississippi River, 2; and Hawaii and Puerto Rico, 1 each.

#### Ship Radiotelegraph and Radiotelephone

As of June 30, 1941, there were 5,214 ship radio stations of all classes, representing an increase of 19 percent over the 1940 figures. This reflects the increased use of radiotelephone equipment by many types of voluntarily equipped vessels, including cargo steamers, tow-boats, ferries, dredges, fishing boats, and yachts. The majority of telephone-equipped vessels are navigated on the Great Lakes and coastal and inland waters. On the other hand, most ocean-going merchant vessels and a few large passenger ships on the Great Lakes, under statutory requirement, are equipped with radiotelegraph installations.

The Inter-American Radio Communications Arrangement as revised at Santiago, Chile, 1940, provides for allocation in the Northern Zone of the frequency 2638 kilocycles for intership communication and the frequencies 2636 and 2640 kilocycles for aeronautical stations. Accordingly, the Commission, on September 4, 1940, modified its rules to permit the use of 2638 kilocycles frequency for radiotelephone communication between vessels except on the Great Lakes and inland waters. The limitation thus imposed is considered necessary to avoid interference to the service of inland aeronautical stations operating on 2636 and 2640 kilocycles. The action taken in allocating 2638 kilocycles for intership communication was intended to relieve to some extent the increasing interference on the intership telephone frequency 2738 kilocycles. Since the latter frequency is used by more than 3,000 ship stations operated generally within the territorial waters of this country, the Commission found it necessary to impose further limitation. This limitation consists of an amended rule approved on April 1, 1941, providing that use of the intership frequency 2738 kilocycles shall be confined solely to the exchange of distress and safety communications. Any communication on the intership frequencies 2638 and 2738 kilocycles is restricted to a period not exceeding five minutes except in actual distress.

The allocation of long-distance frequencies to ship telegraph stations was modified on July 24, 1940, to provide several series of harmonically related high frequencies between 3000 and 23000 kilocycles for the national defense services as well as for ship stations. The basic effect of this change was to provide for the construction of transmitters of simplified design and reduced cost. A secondary advantage was gained by the fact that 64 telegraph frequencies in the band 3000-23000 kilocycles are now assigned to commercial ship stations in comparison to 48 frequencies previously assigned.

On March 1, 1941, certain regulations became effective which require that licensed ship stations must render a service of public correspondence; either in conformity with established tariffs or without charge for the service of the particular ship station, at the option of the station licensee. This imposes an obligation on the part of every ship station to transmit messages for any person on board. Relay of messages by ship stations for the benefit of other stations in the mobile service is permissive but not obligatory.

### Emergency Marine Communication

Abnormal conditions prevailed in the use of radiotelegraphy at sea for distress purposes during the fiscal year. Certain areas designated as "combat areas" were not open to navigation by vessels of United States registry. Consequently, American ships were not in a position to render assistance to the large number of vessels which foundered in those waters. However, all incidents have not been confined to the designated combat areas, and American vessels responded to several radiotelegraph calls for assistance elsewhere. Radio silence is usually maintained by ships of belligerent nations upon receipt of a message indicating the shelling or torpedoing of a vessel in their vicinity in order not to betray their own position to an enemy raider or submarine. Consequently, it is impossible to evaluate properly the use of radiocommunication for distress purposes or to estimate the total number of lives or amount of property saved by its use during this period.

There were no major cases involving use of radio for distress communications within continental waters. There were, however, 24 distress cases within these waters in which the automatic-alarm signal figured. These signals actuated auto-alarms on 55 United States cargo vessels. Including disasters due to hostilities, there were 101 transmissions of auto-alarm signals by various ships and coastal telegraph stations, each of which actuated auto-alarms on at least one United States ship.

### Marine Radio Equipment

Increased demands upon manufacturers of radio and electrical equipment because of the national defense has caused delay in equipping some vessels. Unusually hazardous conditions at sea have stimulated production of emergency lifeboat radio equipment of small size and light weight which is now available for voluntary installation. Four new types of ship telegraph transmitters were approved by the Commission.

On January 2, 1941, the Commission promulgated requirements and type tests for the approval of any automatic-alarm signal keying device that may be developed for use on board certain classes of ocean-going vessels. Regulations provide that beginning January 1, 1943, each passenger ship, and beginning January 1, 1944, each ship subject to title III, part II of the Communications Act, shall be fitted with an approved "automatic-alarm-signal keying device." This is defined as a device capable of automatically keying the radiotelegraph transmitter on board a ship at sea so as to transmit the international auto-alarm signal to actuate alarms. Investigation has revealed that on numerous occasions the auto alarm signal has been improperly transmitted by hand and in those instances it failed to serve the purpose intended. An additional safeguard provided by this device is the possibility of its continued operation after a ship has been abandoned. In this way rescue ships would have additional time to obtain direction-finder bearings.

Inspection of ship stations has disclosed that seawater coming into contact with the nonconducting material supporting the antenna lead-in wire in some cases causes a serious loss of transmitting power. The Commission is receiving cooperation from several manufacturers



of insulating products who have submitted selected samples of antenna lead-in insulators for official tests.

A questionnaire survey was made to obtain information on the major technical details of available ship radiotelephone equipment. It was determined that there were at least 20 companies engaged in the manufacture and sale of a total of 80 types of equipment ranging from \$99.50 to \$2,450 in sale price.

Preparatory work on the Standards of Good Engineering Practice for Ship Stations was continued and the proposed Standards for Antennas and Transmitters were tentatively completed.

## 2. AVIATION SERVICE

### Domestic Aviation

Aviation communication service has changed since the days when airways were marked by bonfires maintained by farmers along the routes. Radio has today become almost as indispensable as fuel for large-scale aviation activities. The present world crisis has intensified the already complicated conditions in aviation communications operations. The number of civilian and military planes requiring communications service, and the extent to which radio is relied upon, have increased so much as to tax the capacity of available portions of the radio spectrum. Accordingly, constructive suggestions have been solicited by the Commission and many informal conferences with private fliers, transport operators, and representatives of the industry have been held.

At the beginning of the fiscal year, 18 transport companies using six domestic radio chain communication systems were in scheduled operation over routes more closely knitting the United States. All radio range stations and many marker stations, localizer stations, airport stations, and aeronautical stations are now under supervision of the Civil Aeronautics Administration.

The following table of radio stations in the domestic aviation service shows only nongovernment commercial stations licensed by the Federal Communications Commission:

Station type	June 30, 1940	June 30, 1941
Aircraft .....	1,294	2,140
Aeronautical .....	345	438
Aeronautical fixed .....	141	210
Airport control .....	82	75
Flying school .....	13	25

The increased number of stations licensed in the aviation service made it desirable to stagger the expiration date of station licenses. Increased use of radio by ship telephone stations and the establishments of coastal-harbor stations, together with growth in the use of aircraft for short-distance flights between the coast and outlying islands, made it desirable that ship telephone frequencies as well as ship telegraph frequencies be made available to aircraft.

The volume of domestic and international air travel required reassignment of certain frequencies allocated to chain aviation sys-

tems. An arrangement with Canada permitted six frequencies having Canadian priority being assigned for use on the international routes between Montreal, Canada, and New York, N. Y., and between Toronto, Canada, and New York, N. Y. The use of Canadian frequencies appeared to be the only solution, as channels now available for domestic communications are too greatly loaded to permit this additional service in connection with the Canadian routes.

#### Airport Traffic Control

At major terminal points, such as New York, Philadelphia, Chicago, Los Angeles, the problem of airport traffic control involves radio communication necessitating accuracy in relaying radio messages and still greater responsibility during periods of low ceilings that require instrument flights and blind landings.

Newly built airports are found inadequate almost immediately upon completion. In the case of LaGuardia Field, N. Y., there are approximately 300 landings and take-offs per day, the bulk of which occur between noon and dusk. The runways can be used only by one aircraft at a time. During such periods of congestion, the radio operator at the airport control station has had to require as many as 20 planes to circle at various altitudes at one time, each remaining aloft awaiting its turn to land.

There was a total of 2,655 airports, landing fields, and seaplane bases in the United States at the beginning of the fiscal year. Of this total approximately 25 percent were municipal airports, 20 percent were commercial landing fields, and the balance were military or miscellaneous Government and a few private fields. Airport radio control stations are being installed at major points, and many are being changed over to the ultra-high frequencies now available for airport control purposes. There were 75 airport control stations licensed at the close of the fiscal year which utilize instrument landing, marker beacons, and localizer equipment authorized by the Commission.

The ultra high frequencies available for airport control stations have been set up on a long-range assignment plan designed to meet the progressive use and future needs of aviation service, particularly the needs of nonscheduled fliers. It is desirable that as many points as possible use a single frequency and the number of additional frequencies necessary for point-to-point flying be limited to a minimum. In cooperation with the Civil Aeronautics Administration, the frequency assignment plan was developed so the majority of airports can be assigned a single frequency. With few exceptions, any one of the civil airways may be flown by the use of no more than four frequencies. Under such a system, the simplest type of fix-tuned receiver can be used in the aircraft installation. Airports not located on any of the civil airways or having no frequency designation under the assigned plan will be the subject of individual study.

#### Nonscheduled Aircraft

Under the provisions of the Communications Act, a license is required from the Commission for the operation of an aircraft radio station. Such operation can be carried on only by a citizen holding

a radio operator's license. These licenses are in addition to the certificate of registry of the aircraft and the pilot's license required and issued by the Civil Aeronautics Administration.

Though the private flyer has been relatively slow to realize the importance of 2-way radio, the number of aircraft stations licensed to nonscheduled flyers has increased from 837 to 1,653. With the installation of this equipment, the pilot has communication facilities with airport control stations and the benefit of the complete radio air navigational aids maintained by the Government. Indications are that the civil pilots training program will produce a large number of private owners of aircraft educated in the use of radio transmitters.

#### Flying School Stations

Flying school station licenses have been issued to applicants desiring radio communication facilities for the instruction of student pilots in flight. There were 25 stations of this class at the close of the fiscal year. This type of station has proved beneficial in the civil pilots training program. Of the four frequencies available for this service, one was set aside for soaring societies for use in connection with glider activities. During one meeting of glider enthusiasts, a special temporary airport station was necessary to enable a traffic control operator to warn away motor-driven aircraft. In this instance, radio communication was authorized both on the glider frequency of 39060 kilocycles and the airport control frequency of 278 kilocycles.

#### International Aviation Service

Notwithstanding the turbulence of world affairs and curtailment of scheduled commercial aviation service to the North European sector, progress has been made in new routes, extended routes, and better service to other parts of the world. The radio frequencies designated for intercontinental routes at the International Telecommunications Convention (Cairo revision), are now used in a coordinated system of communication essential for the safe operation of transport aircraft. There is a total of 284 terminals and 191 ground stations serving these international routes.

At the close of the fiscal year a study was being conducted of the communications necessary for all international routes in order to plan for their expansion and to assure that frequencies in adequate numbers would be available to carry the increasing communication requirements.

### 3. EMERGENCY SERVICE

The emergency service comprises stations operated by public and private organizations for the protection of life and property. This classification includes state, municipal, interzone, and zone police radio facilities and those engaged in marine fire, forestry, and special emergency protection. Increase in licenses for this service maintained the pace set the previous year.

The growth of this service in the past year is demonstrated below:

Class of station	Total, fiscal year 1940	Total, fiscal year 1941	Increase	
			Units	Percent
Municipal police.....	1,053	1,196	143	14
State police.....	246	513	267	108
Zone police.....	64	69	5	8
Interzone police.....	27	30	3	11
Special emergency.....	309	340	31	10
Forestry.....	617	807	190	31
Marine fire.....	12	6	-6	-50
Total, all classes.....	2,328	2,961	633	27

The emergency service has the second largest number of applications of any service, being exceeded only slightly by the ship services. A total of 7,263 applications were received last year as contrasted with 5,747 in the previous period.

**Police**

There are at this time 39 intermediate and 29 ultra high frequencies allocated to various police services. All of the police stations operating on the ultra high frequencies, with the exception of those using frequency modulation, are now assigned in the emergency service on a regular basis. These stations have added greatly to the efficient operation of the modern police department.

With the assignment of all 68 available frequencies, the very large number of stations has caused the problem of interference to remain of paramount importance. It should be pointed out that the term "municipal police station" does not mean one transmitter only. The group method of assignment generally includes the main station and any number of mobile units up to two hundred or more under one license.

Experience gained during the year further proved the value of the ultra high frequencies for land, mobile, and portable-mobile units. Improved design and construction has made possible an increase in the cruising range of the mobile units and thereby increased the effectiveness of police protection. This is especially gratifying to the smaller police departments with their limited budgets and lack of personnel. The increase in range has also made feasible the use of these frequencies by the state police organizations for necessary two-way communication, especially in remote rural areas where telephone service is not available.

In the past year the available zone and interzone frequencies have proved ample for point-to-point police communication by means of radiotelegraph. The most effective use of these frequencies is by the state police systems and the large municipalities. Those police departments which have installed zone and interzone facilities have been able to clear necessary and urgent traffic through a system as fast and reliable as any point-to-point service.

The use of mobile transmitters and car-to-car communication has been responsible for the apprehension of numerous law breakers who

otherwise might have escaped the "one-way" system of police radio. The cooperative use of several municipal police systems having their mobile units in well-planned and coordinated networks around the larger cities and closely built-up county areas provides large-scale protection.

#### Forestry

Radio has proved to be an important adjunct in forest conservation work. It is particularly valuable in preventing forest fires by its ability to dispatch men and equipment to the scene before fires reach a serious stage.

The United States Forest Service, the State departments of conservation, and private agencies owning and operating forest lands, are equipping additional hundreds of fire-lookout towers with radio. Portable and mobile equipment furnish reliable and instantaneous communication between bases and crews. The number of stations authorized in the forestry service has increased from 617 to 807, a gain of 31 percent in the past year. Present allocation to this service consists of 11 ultra high frequencies and 4 intermediate frequencies.

#### Marine Fire Stations

Marine fire stations are licensed primarily for intercommunication between fire headquarters and fire boats. Such a station justifies its existence by permitting rapid dispatching of marine fire-fighting apparatus to the scene of fires and explosions aboard ships or at docks.

The use of marine fire radio facilities has resulted in an appreciable saving to the public. It permits continuous communication to fire-fighting boats, enabling their direction and recall if the fire is brought under control by other means or if the alarm is false. The number of authorizations for this class of station has decreased, chiefly due to the coordination of various such units into single systems. This has resulted in greater efficiency. The protection is further aided by the use of patrol and report duty rather than by holding large fleets available at fixed locations awaiting call.

#### Special Emergency Stations

Special emergency stations are authorized for organizations established for relief purposes in emergencies and which have a disaster communication plan; for persons having establishments in remote locations which cannot be reached by other means of communication; and for public utilities for emergency dispatching of repair and relief crews to the scenes of failures and serious damage which may cause death or personal injury and destruction of public property. These stations may not be used for the handling of routine or non-emergency communications.

It has been demonstrated that through the use of special emergency radio stations the operation of utilities can be coordinated in a public emergency and, in addition to the prevention of damage, these stations make possible expeditious rehabilitation. Various telephone companies have provided special emergency stations located at strategic

points throughout the country. These are portable in nature and are completely self-contained, so that in the event of damage to any communication system they can rapidly be established at a break and communication reestablished.

The Commission has allocated four intermediate frequencies and 10 ultra high frequencies for this service, and has licensed 340 such stations in the past year. This is a gain of 10 percent over the number licensed in the previous year.

#### 4. EXPERIMENTAL SERVICES

One of the most important activities of the experimental radio services during the year was in connection with the production of radio equipment for the national defense. This included experimentation in all phases of the radio art, from the investigation of unsolved technical problems to the testing and calibrating of complete radio installations.

Considerable interest has been shown in the application of frequency modulation to services other than broadcast. At the close of the fiscal year 74 authorizations had been granted to municipal police, 45 to State police, and 60 to special emergency. These authorizations provide for the installation of approximately 1,126 radio transmitters together with the necessary auxiliary equipment. Valuable information has been obtained from the operation of these stations.

Another development being tested under actual service conditions is the use of relay or repeater circuits. These circuits furnish a practical method of materially extending the effective coverage of a communication network. In general, these relay stations are located at high elevations and are provided with directive antennas. The transmitters are automatically controlled by a sensitive receiver tuned to the frequency of the control stations. Messages originating at the control station automatically place the repeater stations in operation, which, in turn, retransmits the messages to the next repeater station or to the terminus.

An interesting application of the use of repeater stations is in connection with the new 160-mile Pennsylvania Turnpike. To link this highway for instantaneous communication, it is proposed to establish a radio network consisting of 52 radio stations, 7 of which will be unattended relay or repeater stations, 4 unattended frequency modulated land stations, 15 amplitude modulated fixed stations and 26 portable-mobile stations.

A message originating at one of the interchanges or at the main headquarters at Harrisburg will be transmitted by means of a fixed station in the usual manner. This message will be received at one of the repeater stations and will automatically place the repeater transmitter on the air. This, in turn, will actuate the next repeater station and thus relay the message over the entire length of the highway. Four frequency modulated transmitters will retransmit the message direct to the mobile units within the area covered by each of these stations. Messages originating in any of the patrol cars will likewise be relayed over the highway.

## 5. ALASKAN SERVICES

Following is a table indicating the number and type of stations in the various services in Alaska for the past three fiscal years:

Service	1939	1940	1941
Fixed public.....	300	342	321
Public coastal.....	150	167	159
Aviation.....	210	246	112
Special emergency.....	0	6	6
Experimental.....	0	0	2

A hearing held at Fairbanks and Juneau, beginning October 2, 1939, found that the generally unsatisfactory condition of aviation communication services in Alaska could best be remedied by the operators themselves. On this basis, coordinated use of radio communications has progressed with the organization of "Alaska Aeronautical Radio, Inc.," at Juneau, serving all of southeast Alaska, and "Fairbanks Aeronautical Radio," serving the airport at Fairbanks. These organizations are still in the process of taking over the independently licensed stations, rearranging the locations for the most effective use by aircraft flying the various routes, and modernizing the equipment with increased power where needed. It is expected that eventually a coordinated aviation communication service will be available anywhere in Alaska similar to that in successful operation in the United States.

## 6. MISCELLANEOUS SERVICES

In general, there has been little change in the miscellaneous services during the fiscal year. This is reflected in the following tabulation of the number of stations licensed in each of the various classes:

Service and station class	1940	1941
(1) Geophysical service:		
Geological stations.....	304	269
(2) Special press service:		
Relay press stations.....	7	7
Mobile press stations.....	3	4
(3) Intermittent service:		
Motion picture stations.....	12	12
Provisional stations.....	3	7

The destruction of the swinging bridge across the Narrows, Pierce County, Wash., during a wind storm was widely publicized. In connection with the original construction of this bridge, one fixed provisional station was located at Tacoma with five portable-mobile provisional stations in use at various locations on the project. These authorizations have been reinstated to assist in the reconstruction. Provisional stations were useful in the construction of petties at Gray's Harbor, Washington, being employed to dispatch and direct work boats and barges.

## CHAPTER VII

# Radio Operators

1. COMMERCIAL
2. AMATEUR

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### 1. COMMERCIAL

World events show that communication facilities, civil as well as military, must be maintained at full effectiveness and indicate how important to the national security are the thousands of individuals employed in their operation. Skilled radio operators must be available in adequate numbers. Several Federal agencies have contributed to this end in various ways, including the inauguration or expansion of practical training courses.

The Commission has encouraged operators to maintain their licenses. The required showing of service for renewals has been suspended by Order 77. Thousands of applicants are examined for radio licenses monthly. Increased work in this connection has been facilitated by the apparatus used for code tests, the use of multiple-choice forms in most of the written examination elements, cooperation of other Federal agencies in conducting examinations, particularly at remote points, and nonassembled examinations for the lowest class of license, supervised by chosen State or municipal officials for subsequent grading by the Commission's staff.

Six classes of license continued to be issued during the year. Three are radiotelegraph classes, of which the highest is open only to a person aged 21 or more having at least a year of experience as a manual radiotelegraph operator at ship or coastal stations. Three are radiotelephone classes, of which the highest is required for operators at broadcast stations while the lowest is acceptable for police, aircraft pilots, and others who are engaged in routine operation of radio equipment but do not adjust or service it.

This lowest class of license or restricted radiotelephone permit is now held by about 60,000 individuals, which reflects the greatly increased use of radio, particularly for police and other services concerned with the safety of life and property. The other 5 classes of license divide among 20,000 individuals, of whom about 9,000 hold a radiotelegraph class.

While this means that the latter number are qualified by license for the vital service of marine radio, it by no means indicates that all of these licensees are currently available for such assignment.



Many are engaged in other vital services, as suggested by the fact that more than 4,000 of them also hold radiotelephone licenses. During the year the Commission has engaged in the collection of more definite information regarding each license holder, including employment and citizenship.

#### Citizenship Inquiries

Congress authorizes issuance of radio licenses to citizens of the United States only. By its Order 75 the Commission called upon each licensed radio operator and each applicant for new or renewed license to file prescribed forms furnishing identification, including fingerprints and record of citizenship. Through cooperation of communications companies, similar information was obtained from employees in a position to intercept or handle international communications. Returns from both sources exceed 150,000.

In some instances prior citizenship claims were apparently fraudulent. In other cases it appears that the Commission's inquiry and resulting efforts to obtain records of birth, naturalization or other basis of citizenship, have revealed to numerous individuals that they are not technically citizens, although they may have long resided in the United States and exercised the rights and duties of citizens, including military service. Much more numerous are persons who are presumably citizens of the United States but who find it very difficult to furnish record of that fact. Considerable effort has been made to aid such persons by suggestions and independent inquiries. The Commission has been greatly aided by the very substantial cooperation of the Immigration and Naturalization Service, the Passport Division of the Department of State, the Tabulating Division of the Bureau of Accounts, the military departments, and numerous other offices.

The Commission's order in this connection did not itself void any outstanding license. On the contrary, the practice has been to maintain validity, to extend licenses or to issue temporary authorizations to those needing them, while allowing ample time to search for records, and to settle questions that arise in some cases involving several generations, foreign births, and application of the laws governing immigration, naturalization, and derivative citizenship.

#### 2. AMATEUR

Amateurs generally filed the requested showings and were encouraged to maintain their interest and licenses. To continue these while allowing time for citizenship inquiries and orderly consideration, the Commission by its Order 76 extended the expiring licenses of any amateur who filed showing and applied for license renewal. Its Order 77 suspended a rule requiring a showing of use or operation to qualify for renewed license, and its Order 81 further greatly simplified the required application for such purpose by amateurs who had been called to the colors.

The Commission received upwards of a hundred applications daily for new, renewed, or modified amateur licenses; the total during the year exceeded 40,000, counting as 1 a form that commonly comprises 2 applications—for license as an amateur operator and license of an

amateur station. About 10,000 of these were returned to applicants for various reasons or not honored because the related examinations failed to show passing grades. Counting operators and stations separately, there were issued upwards of 50,000 licenses, in nearly all instances for a 3-year term. Most of the issues were renewals or modifications; about a fourth were new licenses.

Amateur licenses are now held by about 60,000 persons distributed throughout the States, territories, and possessions, being several times the number authorized by all other countries combined.

Radio amateurs of the United States have not only greatly exceeded all others in numbers, but have generally enjoyed greater privileges. The war has necessarily brought temporary restraint to their activities. Communication by amateurs is now suspended generally for the duration of the war, pursuant to action by the Commission on December 7, 1941, the day that Japan declared war upon the United States. This ban applies to all amateurs except those who may be permitted by the Commission to function in special national defense categories upon specific recommendation of the Defense Communications Board.

Even before the war broke, only a relatively small number of amateurs, as discerned by the Commission's monitoring service, had violated preliminary restrictions. During the fiscal year the Commission found it necessary to revoke the licenses of four amateurs and suspend the licenses of 40 others.

The amateurs generally have cheerfully accepted emergency conditions, understanding the necessity for war's restrictions and appreciating the recognition of amateur accomplishments as indicated by the effort to sustain their privileges as far as practicable.

#### Developments in Amateur Service

Widespread interest was noted in connection with the development and testing of self-powered transmitting equipment for use in handling emergency communications. Attention was focused on establishing new emergency communication networks and expanding existing ones with a view of providing speedy communication facilities throughout the United States, its possessions and territories. Close cooperation was maintained with the military and civilian defense authorities, as well as with relief organizations, by a large number of amateurs interested in net operation, who offered their services and facilities to furnish emergency hook-ups in the event of armed attack, floods, hurricanes and other situations when normal communications are disrupted or impaired.

Many amateur stations are affiliated with the Army Amateur Reserve System, the Naval Communications Reserve and other organizations which devoted much time to handling communications through the medium of the International Morse Code. Amateurs interested in improving their skill in the reception and transmission of communications in code found membership in these organizations of immense value for training purposes.

Numerous improvements in amateur station equipment were evident, which in a measure accounted for the large increase in the number of amateur radiotelephone stations operating in the amateur service prior to the outbreak of war.

## CHAPTER VIII

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### Technical Studies

1. INTERFERENCE FROM ELECTROMEDICAL EQUIPMENT
  2. INTERFERENCE FROM LOW-POWER DEVICES
  3. "COLLEGE NETWORKS" AND OTHER WIRED RADIO
  4. MEASURING ELECTRICAL NOISE
  5. HIGH FREQUENCY BLANKETING
  6. GROUND WAVE PROPAGATION
  7. IONOSPHERIC WAVES
  8. TROPOSPHERIC WAVES
  9. VARIABLE FREQUENCY CIRCUIT THEORY
  10. ELECTRIC AND MAGNETIC UNITS
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#### 1. INTERFERENCE FROM ELECTROMEDICAL EQUIPMENT

Considerable progress was made during the year toward a solution to the problem of interference to radio reception caused by the operation of high-frequency electromedical equipment. A conference was held in Washington during the latter part of 1940, which was attended by representatives of the medical profession, manufacturers of diathermy machines, the radio industry, and the Government. At this meeting general agreement was reached as to the frequencies suitable for therapeutic treatments. There was agreement also on all other matters with one exception—the frequency stability or "tolerance" to be prescribed. As a result, a subcommittee was appointed to give further study and submit final recommendations.

Another committee was appointed to make further study of the possibilities of shielding and other physiological factors in connection with the problem. The major work of these committees has been concluded and their reports are expected soon.

While the above-mentioned committees were active, the consent of Government departments, through the Interdepartment Radio Advisory Committee, was obtained to the assignment of the frequencies 13.600, 27.320, and 40.980 megacycles for use by diathermy machines with a tolerance of 0.05 percent of the operating frequency.

There still remains the determination of the relative cost of diathermy machines in order to meet this latter specification. This is a design problem which can best be solved through the collaboration of the radio and diathermy machine manufacturers.

## 2. INTERFERENCE FROM LOW-POWER DEVICES

The rules and regulations governing devices of this type were tentatively adopted in November 1938. Such apparatus is used at very low power for remote control by radio over extremely short distances, such as opening and closing garage doors, turning radio sets on and off, etc. The rules, if strictly adhered to, preclude the possibility of interference to radio reception. At the time of the adoption of these rules it was stipulated that they were not to be considered as final but that the Commission would continue to study and assemble information regarding the character and effects of the radiation involved.

Improper design or use of equipment has resulted in a considerable number of complaints of interference during the year, particularly in the case of radio-controlled phonograph record-players and certain electric signs used for advertising. A committee composed of engineers representing the various divisions of the Engineering Department was therefore organized to give particular study to this problem.

## 3. "COLLEGE NETWORKS" AND OTHER WIRED RADIO

In this type of system communication is effected not by the transmission of radio waves through space but by the transmission of radio frequency currents via wire lines. Radiation of energy from the lines capable of causing interference is prevented by proper shielding of the lines in metal conduits.

An interesting adaptation of this system has recently been made by undergraduate students at some 30 colleges in the United States. Programs are transmitted from a central location to the dormitories, fraternity and sorority houses on the college campus. The various systems are joined in a single organization called "The Intercollegiate Broadcasting System." Preliminary investigation indicated that these "college networks" are well engineered and supervised. No interference has been reported as a result of their use.

Other adaptations have been the so-called "carrier call systems" and the "radio nurse" for interoffice communication or communication in institutions. When carefully designed, these systems may be operated with negligible interference-producing potentialities—no greater than that of the ordinary well-designed superheterodyne radio receiver.

No rules and regulations have been promulgated governing this type of wired communication. However, the systems, if used on open lines or if improperly designed, are capable of causing very serious interference. The committee at work upon the problem of low power radio-frequency electrical devices is therefore including carrier current systems in its study with a view to determining the need for regulation in the event of extension of the use of this principle of communication into other fields.

## 4. MEASURING ELECTRICAL NOISE

Much experimental work has been done in recent years by engineers in the United States, Canada, and Europe in efforts to bring about

uniformity in methods and standardization of equipment for measurements of electrical noise.

Electrical noise, i. e., that produced by electrical machinery, is a limiting factor to good reception in many radio services. The power required for satisfactory reception in these services depends upon the noise encountered in different localities which varies over wide limits. The problem is one in which Commission engineers have been active.

As a result of measurements and equipment tests made in the United States and Canada, tentative standards for noise measurements were proposed for adoption in each country during the year. These proposed standards differed in some detail in the electrical constants chosen for the equipment, which would have rendered the interpretation of data exchanged between the two countries very difficult if not impossible. It was therefore decided to repeat the tests, both in the United States and Canada, utilizing like equipment for the measurements. It is hoped that agreement can be reached within the present year.

### 5. HIGH FREQUENCY BLANKETING

The blanket area of a broadcast station may be defined as that area adjacent to the transmitter in which its signal is sufficiently strong to cause interference to the reception of signals of other stations designed to serve that area.

Investigation of such interference was made as a result of precautions taken in considering applications for new frequency modulation (FM) stations to insure good reception in residential areas. With the cooperation of two Washington stations, measurements were made of the "crosstalk." The latter is not typical of that usually encountered with amplitude modulation (standard broadcast) stations. This crosstalk is not likely to be anticipated or observed until after the location of stations on alternate adjacent channels serving the same area, and therefore should be considered prior to making any such assignments.

Radio operating companies and manufacturers are cooperating with the Commission in its study in order that blanketing in the FM service may be reduced to a minimum.

### 6. GROUND WAVE PROPAGATION

The ground wave is defined as that portion of a radio wave which is ordinarily affected by the presence of the ground. It does not include ionospheric (sky) waves or tropospheric waves hereafter mentioned. Ground waves are responsible for the primary service areas of standard broadcast stations operating on the lower frequencies and also of high frequency and television broadcast stations operating in the ultra high frequencies. The study of their behavior is therefore a continuing one.

The graphical methods of computing ground wave field intensities mentioned in the Sixth Annual Report have come into general use both in this country and abroad. Studies during the year have consisted mainly in clarification and illustration of their use, through computation of curves of field intensity versus distance for the typical conditions and various cases which arise in practice.

## 7. IONOSPHERIC WAVES

An extensive study of ionospheric (sky) wave propagation in the frequency range comprising the standard broadcast band has been in progress for 5 years.

Ionospheric waves are those responsible for reception at night at great distances in rural areas from clear channel stations. A knowledge of their behavior is essential in allocation problems because such waves are also responsible for the restricted primary service areas of regional and local broadcast stations at night.

It is known from previous studies that broadcast sky wave transmission varies substantially throughout the 11-year sunspot cycle. The experimental data necessary for the formulation of the theory are being received daily as a result of a sunspot cycle survey. Plans for this survey were made specifically to facilitate separate evaluation of those factors believed responsible for fading, the variation of field intensity with frequency, time, distance, the seasons, and the years, as well as the effects of latitude and the earth's magnetic field, in order to obtain a better understanding of the mechanism of propagation. It is expected, therefore, that this study will continue throughout a complete cycle of solar activity. If the study is successfully completed it will represent the most comprehensive investigation of sky wave propagation at broadcast frequencies ever made. The field intensity records on hand now number 15,419 and the noise records, 4,721.

## 8. TROPOSPHERIC WAVES

Knowledge of the behavior of tropospheric waves is of importance in the assignment of frequencies and the location of stations operating on the ultra high frequencies. These waves bear a similar relation in ultra high frequency wave propagation to the ionosphere (sky) waves which occur at night in the standard bands. In each case they are responsible at times for transmission from a station far beyond its normal ground wave range, causing interference at the longer distances as well as fading. For this reason the study of tropospheric waves mentioned in the Sixth Annual Report has been continued.

## 9. VARIABLE FREQUENCY CIRCUIT THEORY

Development of the high frequency broadcast service progressed during the year at a phenomenal rate. The fundamental principles in transmission and reception of frequency modulated signals are very different from those of amplitude modulated signals. As a result, many new conceptions and some misconceptions have grown up with the rapid advance of this new form of radio communication.

A knowledge of the behavior of electric circuits (i. e., the currents produced in them when under the influence of applied voltages produced by FM signals and particularly the effects when the desired signal is accompanied by various types of noise, or other undesired or interfering signals) is of fundamental importance to the Commission in the assignment of frequencies and the location of stations in order that interference may be minimized.

A comprehensive study of variable frequency electric circuit theory has been under way for some time and is now nearing completion.

#### 10. ELECTRIC AND MAGNETIC UNITS

The International Electrotechnical Commission (I. E. C.) meeting at Scheveningen, Brussels, in June 1935 adopted the meter, kilogram, and second as the basic units of length, mass, and time, this action becoming effective in January 1940. The question of the electrical unit to be adopted was left open, opinion being divided between the international ohm and coulomb. The question of rationalization of the units was also undecided.

While the United States has not officially adopted this system of units, called the MKS Georgi system, there is evidence that it will gradually come into use in this country. Textbooks and papers are appearing in increasing numbers in which the MKS system is used.

The Commission has been interested in this action because it represents a step toward a goal which engineers, physicists, and teachers have striven without avail for many years, namely, the adoption of a single system of units satisfactory alike to the mathematician and physicist and also to the engineer and laboratory experimenter.

## CHAPTER IX

### Statistics

1. BROADCAST FINANCIAL DATA
2. BROADCAST STATISTICS
3. OTHER RADIO SERVICE STATISTICS
4. COMMON CARRIER STATISTICS
5. FIELD-ACTIVITY STATISTICS
6. PUBLICATIONS

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#### 1. BROADCAST FINANCIAL DATA

The broadcast business in the United States reached a new high of \$154,823,787 in the calendar year 1940, which was an increase of \$24,855,761, or 19 percent, over the figures for 1939, according to financial data filed with the Commission. This amount was for sale of time only, as reported by three major networks, five regional networks, and 765 stations. In addition to time sales, the industry derived \$13,181,948 from the sale of talent and other services during 1940, which was \$1,862,696 better than the year previous.

In consequence, the broadcast service income (operating profit) of the entire industry increased in 1940 by more than \$9,000,000 over 1939, or about 39 percent.

The three major networks (National, Columbia, and Mutual) reported combined time sales of \$71,919,428 for the year, which is up about 15 percent over 1939. The National Broadcasting Co., through its dual networks, accounted for \$37,137,823, while the shares of Columbia and Mutual in the total business were \$31,181,444 and \$3,600,161, respectively. They paid to stations under contract and to regional networks \$22,123,760 compared to \$18,023,195 the year previous. The combined broadcast service income as reported by National, Columbia, and Mutual, including the operations of their networks and stations, was \$13,705,043 before Federal income tax. After provision for Federal income tax the net income was \$3,918,772 and \$5,006,634 for National and Columbia, respectively, and a loss of \$39,712 for Mutual.

The purely non-network business of the industry (i. e., time sold to local and national advertisers by the 765 stations) was \$81,897,236, bettering the previous year by \$14,109,409, or 20 percent. The broadcast income of 734 stations not operated by or for the networks amounted to \$19,123,609, being up \$6,345,817, or half again as much as for 1939.



A total of 187 stations lost money in 1940. These stations had total time sales of \$8,402,886, total expenses of \$9,778,019, and lost in the aggregate \$1,551,812. These figures include losses for 26 of 62 new stations, the remaining 36 having operated at a profit. However, the number of stations losing money was under the figure for 1939, when 227 stations lost \$2,220,471. Sixty-one stations have lost money every year since 1937.

As of December 31, 1940, the industry employed 26,824 persons. The year's payroll was \$58,616,059.

## 2. BROADCAST STATISTICS

The following tables and listing have to do with statistics for the broadcast industry for the fiscal year ended June 30, 1941:

*Number of broadcast stations*

Class of station	As of July 1, 1940	New	Deleted	As of July 1, 1941
Standard broadcast.....	847	68	18	1 897
High frequency broadcast.....	50	49	30	2 69
Low-frequency relay.....	225	19	15	229
High-frequency relay.....	278	19	28	269
Developmental.....	7	1	0	8
Television.....	26	26	5	3 47
International.....	13	1	2	12
Facsimile.....	16	0	12	4
Noncommercial educational.....	3	2	0	5
Class II—Experimental.....	0	1	0	1
S. T. (Studio-transmitter).....	0	4	0	4
<b>Total stations.....</b>	<b>1,465</b>	<b>190</b>	<b>110</b>	<b>1,545</b>

<sup>1</sup> Of the total number of standard broadcast stations, 750 operate unlimited time, 22 limited time, 56 daytime only, and the rest share time or operate specified time.

<sup>2</sup> Includes 49 commercial high frequency (FM) broadcast stations.

<sup>3</sup> Includes 2 commercial television broadcast stations.

*Broadcast applications*

Service	Applications received	Applications granted	Special authorizations
Standard.....	4,281	3,784	746
Relay.....	732	741	79
High frequency (FM).....	433	83	152
Television.....	128	103	35
International.....	88	79	40
Noncommercial educational.....	28	12	10
Developmental.....	24	18	2
Facsimile.....	6	7	0
S. T. (Studio-transmitter).....	4	4	0
<b>Totals.....</b>	<b>5,724</b>	<b>4,831</b>	<b>1,064</b>

NOTE.—Figures include formal and informal applications for new stations, construction permits, modification of construction permits, assignment of construction permits, licenses, renewal of licenses, assignment of licenses, transfer of control, installation of equipment, determination of operating power by direct method, special experimental authorizations, etc. Standard broadcast application figures include 590 Form 335's (chain broadcasting); grants include 875 extensions of licenses. Developmental grants include one class II experimental broadcast station.

## 3. OTHER RADIO SERVICE STATISTICS

Statistics for fiscal year ended June 30, 1941

	Applica- tions received	Author- izations issued	New sta- tions au- thorized	Total sta- tions June 30, 1941
Ship service.....	7,462	5,125	1,442	5,214
Aviation:				
Aeronautical.....	1,106	1,133	41	438
Aeronautical fixed.....	431	457	12	210
Aeronautical and aeronautical fixed.....	74	0	0	0
Public aeronautical.....	0	0	0	0
Public aircraft.....	0	0	0	0
Aircraft.....	4,446	4,484	1,080	2,140
Airport.....	163	188	18	75
Flying school.....	106	38	20	25
Instrument landing.....	0	0	0	0
Marker beacon.....	0	0	0	0
Subtotal.....	6,326	6,300	1,171	2,888
Emergency service:				
Municipal police.....	3,963	2,926	250	1,196
State police.....	966	858	215	513
Zone police.....	156	174	5	69
Interzone police.....	85	89	3	30
Special emergency.....	1,414	1,355	103	340
Forestry.....	646	638	246	807
Marine fire.....	33	17	0	6
Subtotal.....	7,263	6,057	822	2,961
Experimental:				
Class 1.....	513	386	53	216
Class 2.....	822	578	165	231
Class 3.....	4	1	1	1
Subtotal.....	1,339	965	219	448
Point-to-point telegraph:				
Public.....	367	331	0	69
Press.....	70	52	0	3
Private.....	0	0	0	0
Agriculture.....	10	7	0	7
Subtotal.....	447	390	0	79
Point-to-point telephone:				
Public.....	56	59	0	15
Alaskan service:				
Fixed public.....	543	490	60	321
Experimental.....	2	2	0	2
Special emergency.....	6	6	0	6
Aviation.....	222	292	8	112
Coastal.....	279	275	28	159
Subtotal.....	1,052	1,065	96	600
Coastal service:				
Coastal telegraph.....	115	86	0	52
Marine relay.....	65	71	0	37
Coastal telegraph and marine relay.....	5	0	0	0
Coastal harbor.....	67	161	8	32
Coastal telephone.....	13	7	0	4
Limited governmental service (coastal telegraph).....	7	6	13	13
Subtotal.....	272	331	11	128
Miscellaneous service:				
Geological.....	354	319	23	269
Motion picture.....	15	14	2	12
Provisional.....	25	19	4	7
Mobile press.....	7	4	1	4
Relay press.....	9	11	0	7
Subtotal.....	410	367	30	299
Total.....	24,627	20,659	3,791	12,632

1 Class of service changed from private coastal telegraph.

## 4. COMMON CARRIER STATISTICS

## Annual and Monthly Reports

Annual reports for the calendar year 1940 (containing comprehensive information of a financial and statistical nature) were filed by 216 companies, an increase of 49 over the number for the previous year. Of these companies, 137 were telephone carriers, 16 were wire-telegraph or ocean-cable carriers, 20 were radiotelegraph carriers, and 43 were holding companies. Monthly reports also were filed during the calendar year by 115 companies, of which 98 were telephone carriers, 8 were wire-telegraph or ocean-cable carriers, and 9 were radiotelegraph carriers. There were filed during the fiscal year for the first time certain data requested in 2 new annual report forms that had been prepared by the Commission for use by miscellaneous classes of small communication carriers and by class C telephone carriers. In certain instances, telephone carriers that are not subject to the complete jurisdiction of the Commission voluntarily filed annual and monthly reports for use by the Commission in preparing statistical compilations.

## Statistical Compilations

Statistical data of communication carriers and holding companies for 1940 are published in a separate volume, "Statistics of the Communications Industry in the United States," which may be purchased from the Superintendent of Documents.

The following statistical summaries were issued by the Commission during the year:

Statistics of the communications industry in the United States, 1939.

Summary of monthly reports of large telephone carriers in the United States. Summary of monthly reports of wire-telegraph, ocean-cable, and radiotelegraph carriers.

Salary report of telephone and telegraph carriers and holding companies, 1939.

Telephone hand-set charges and changes since January 1, 1940.

Various other statistical studies were made during the year relative to domestic and international telegraph traffic and to employees of telegraph carriers, and progress was made in the preparation of classifications of telephone, telegraph, cable, and radiotelegraph employees.

*Wire certificates—Fiscal year ended June 30, 1941*

	Received	Granted
Telephone.....	146	122
Telegraph.....	105	110
Total.....	251	232

## 5. FIELD-ACTIVITY STATISTICS

Outstanding in the work of the Field Division during the year was its contribution to the formation of the National Defense Operations Section. (See Chap. 1.) Engineers and investigators from the field staff provided the nucleus of the new section. In addition, the

entire division participated in the training of new personnel, as well as the engineering problem of providing specialized equipment required in this national defense activity.

Although the regular field personnel for a time was cut almost in half as a result, the Routine Operations Section continued to make regular and special investigations, conduct operator license examinations, and perform other routine functions.

In its routine functioning the Field Division made more than 18,500 inspections during the fiscal year. Of this number, 11,097 were ship stations (7,256 on vessels of United States and 3,841 on vessels of foreign registry); 5,054 radiotelegraph stations, 343 radiotelephone stations, and 2,159 broadcast stations. In the ship inspections 4,310 violation and advisory notices were served, and 3,631 violations were cleared during inspection. As a result of the land-station inspections, 1,455 violation notices were served.

More than 35,000 frequency measurements were made—20,065 radiotelegraph, 634 radiotelephone, and 14,778 broadcast. Monitoring resulted in 1,434 violation notices and 113 harmonic notices being served.

Nearly 47,000 applicants for radio operator licenses were examined (exclusive of class C amateurs). Of this number 35,671 were applicants for commercial licenses, 30,269 being in the radiotelephone classifications. Applicants for classes A and B amateur radio licenses totaled 11,203. As a result of examinations, 35,360 operators received commercial licenses—32,439 telephone and 2,921 telegraph.

Routine investigations numbered 3,864—comprising 2,386 telegraph, 226 broadcast, 201 unlicensed operation, 630 interference, and 421 miscellaneous cases. Only 86 of these cases had not been closed at the end of the fiscal year.

## 6. PUBLICATIONS

With few exceptions, all printed publications of the Commission are sold by the Superintendent of Documents, Government Printing Office, Washington.

Exceptions are several general information or special handbooks, which are obtainable from the Commission upon request. These include "Radio—A Public Primer," which was issued in February 1941 as a companion pamphlet to "An ABC of the FCC," which appeared the year previous.

In June 1941 the Commission issued its first booklet for operators and licensees of radiotelephone stations on board ships. Titled "Information Regarding Ship and Coastal-Harbor Radiotelephone Service," and likewise available without cost, it gives essential facts about this safety service. Another gratis publication is the "Study Guide and Reference Material for Amateur Radio Operator License Examination," issued in 1940.

## Printed Matter for Sale By Superintendent of Documents

Following is a list of Commission publications available from the Superintendent of Documents at Washington, with price indicated:

	Price
Communications Act of 1934 with amendments.....	\$0. 15
Federal Communications Commission Reports, Decisions, and Orders, exclusive of annual reports:	
Volume 1—July 1934, July 1935.....	1. 00
Volume 2—July 1935, June 1936.....	2. 00
Volume 3—July 1936, February 1937.....	2. 00
Volume 4—March 1937, November 15, 1937.....	1. 50
Volume 5—November 16, 1937, June 30, 1938.....	1. 50
Volume 6—July 1, 1938, February 28, 1939.....	1. 50
Volume 7—March 1, 1939, February 29, 1940.....	(*)
Annual Reports:	
First Annual Report—Fiscal year 1935.....	. 15
Third Annual Report—Fiscal year 1937.....	. 30
Fifth Annual Report—Fiscal year 1939.....	. 30
Sixth Annual Report—Fiscal year 1940.....	. 20
Seventh Annual Report—Fiscal year 1941.....	. 10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	. 15
Standards of Good Engineering Practice Concerning Standard Broadcast Stations.....	. 30
Statistics of the Communications Industry in the United States.....	. 30
Report on Chain Broadcasting.....	. 30
Commission Rules and Regulations:	
Part 1—Practice and Procedure.....	. 10
Part 2—General Rules and Regulations.....	. 10
Part 3—Rules Governing Standard and High Frequency Broadcast Stations.....	. 10
Part 4—Rules Governing Broadcast Services (Other Than Standard Broadcast).....	. 10
Part 5—Experimental Rules.....	. 05
Part 6—Rules Governing Fixed Public Radio Services.....	. 05
Part 7—Rules Governing Coastal and Marine Relay Services.....	. 05
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\*Price not set at time this listing was compiled.

EIGHTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION

FISCAL YEAR ENDED JUNE 30, 1942

(With Notation of Subsequent War  
and Other Important Activities)

COMMISSIONERS

MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

(As of January 1, 1943)

CHAIRMAN

JAMES LAWRENCE FLY

(Term expires June 30, 1949)

PAUL A. WALKER

(Term expires June 30, 1946)

GEORGE HENRY PAYNE

(Term expires June 30, 1943)

NORMAN S. CASE

(Term expires June 30, 1945)

RAY C. WAKEFIELD

(Term expires June 30, 1947)

T.A.M. CRAVEN

(Term expires June 30, 1944)

CLIFFORD J. DURR

(Term expires June 30, 1948)

LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
Washington, D. C., March 3, 1943.

To the Congress of the United States:

The Eighth Annual Report of the Federal Communications Commission, for the fiscal year ending June 30, 1942, is submitted herewith. Certain matters occurring since June 30, 1942, in particular developments in the Commission's war activities, are included to provide as nearly as possible a current picture.

Pursuant to regulations of the Bureau of the Budget, this year's report is submitted in mimeographed form rather than printed.

Respectfully,

JAMES LAWRENCE FLY,  
Chairman.



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## CHAPTER 1

### WAR ACTIVITIES

1. General
  2. Radio Intelligence Division
  3. Foreign Broadcast Intelligence Service
  4. Board of War Communications
  5. Other Commission War Activities
- 

#### 1. General

Since July 1, 1941, and even more intensively since Pearl Harbor, the conversion of Commission activities to a war footing has been its chief task.

The Commission's concern is with electrical communications by wire and radio. Just as land, sea, and air transport is the life blood of a nation at war, so telephone, telegraph, and radio communication is its nerve system. The United States needs international communications routes, maintained at peak efficiency, to carry messages promptly to and from our forces overseas, our allies, and friendly neutrals; to weld this hemisphere into a single neighborly unit; to assemble news and information from all quarters of the world; and to carry American news and information to friends abroad. On the home front we need prompt, safe, and efficient telephone and telegraph systems to carry on the work of war production and the essential business of the country. Communications routes must be expanded to meet new war needs, while wastage of critical materials and equipment on unessential expansion must be avoided. Communications plants must be protected against sabotage and accident, and misuse of communications techniques by the enemy must be prevented. To such goals as these the full attention of the Commission is now directed.

#### 2. Radio Intelligence Division

The largest single activity of the whole Commission is the monitoring of the ether throughout the United States, its Territories and possessions, by the Radio Intelligence Division (formerly the National Defense Operations) of the Engineering Department. R.I.D. stations, strategically placed to cover enemy, illegal, and unlicensed radio transmissions, keep constant watch

over the whole radio spectrum. They are a first line of defense against radiocommunication with the enemy abroad, and against illegal use of radio at home. In addition, their continuous watch for lost planes and for marine distress signals, and the aid they render in locating lost planes, and in helping them to return to their bases, are a regular part of their duties.

Primary monitoring stations. The key points in the R.I.D. monitoring system are the 12 primary monitoring stations. Their function in general is to range through the radiofrequency spectrum in search of all unidentified, clandestine, or illegal radio transmissions, to establish the general location of transmitters from which such signals emanate, and to intercept and record such signals for use by the War and Navy Departments, the Federal Bureau of Investigation, and other intelligence services of the United States.

Secondary monitoring stations. The Commission maintains 90 secondary stations, one or more of which are located in each of the 48 states and in the territories and possessions. The functions of the secondary stations are to investigate each report of alleged unidentified, clandestine, or illegal radio operation reported within its territory, and to locate precisely the origin of such transmissions after they have been generally located by the primary monitoring stations. The secondary station personnel, like the primary, maintains so far as possible a 24-hour monitoring watch for unidentified or unauthorized radio signals, thus supplementing the work of the primary stations.

Radio Intelligence Centers. The three radio intelligence centers are located at Honolulu, T.H., San Francisco, California, and Washington, D.C. All three were instituted at the specific request of the armed forces, and the bulk of their duties are performed in cooperation with the Army, Navy, Coast Guard, and Federal Bureau of Investigation. They act as coordinating centers for all reports concerning radio surveillance and direction-finding activities, enemy and illegal radio operations in their respective areas, etc.

Mobile coastal units. The Commanding Generals of the Western, Eastern, and Southern Defense Commands have requested the Commission to supply a comprehensive mobile radio surveillance extending throughout the coastal areas of these three defense commands. Mobile units now patrol the entire 5000 mile coast line of the continental United States. These coastal patrol units are particularly on the watch for any radio transmitters on shore which might attempt to communicate with an enemy ship at sea relative to the departure, location, or cargoes of departing vessels.

Washington activities. The work of the primary and secondary monitoring stations, of the radio intelligence centers, and of the coastal patrols is coordinated in Washington by a small staff. This staff is composed of the Chief of the Division; an Administrative Section; an Intercept Section, which receives, classifies, and distributes intercepted radio traffic to the Chief Naval Censor, the Chief Signal Officer, the Weather Bureau, and the Coast Guard; a Cartographic Unit which plots on maps the location of unidentified, clandestine, and illegal stations; a Translation Unit which translates foreign-language intercepts into English; an Investigative Section; and a Communications Section. The entire Division is so organized that a clandestine signal received anywhere in American territory can be thoroughly investigated. This includes spotting the location of the transmitter, analyzing the signals intercepted, and investigating the circumstances. The information is turned over with a minimum of delay to the Army, Navy, Department of Justice, or other appropriate agency.

Broadcast Recording Unit. This unit gives engineering assistance to the FBIS at five listening posts in the U.S. territories and possessions; organizes and operates the technical facilities for reception of programs under the general supervision of the R.I.D.

### 3. Foreign Broadcast Intelligence Service

The Foreign Broadcast Intelligence Service (formerly the Foreign Broadcast Monitoring Service) was created in March, 1941, as the result of a suggestion from the State Department to the Board of War Communications that means be found to keep the government informed about the content of foreign broadcasts. The Board designated the Federal Communications Commission as the agency best equipped technically to carry out this task, and the Commission thereupon organized the Foreign Broadcast Intelligence Service. (FBIS).

The FBIS is a war agency. It operates exclusively as a service to the Federal (and United Nations) agencies, and to officials shaping foreign and military policy, carrying on military operations and economic warfare, aiding in the dissemination of accurate news and information to the American and other peoples, countering enemy propaganda, and promoting understanding and unity in the war effort.

Its specific functions are: (1) listening to broadcasts emanating from foreign countries throughout the world; (2) summarizing and digesting their contents; (3) recording the more important broadcasts verbatim and translating them from the thirty-five or more languages and dialects used in foreign broadcasts; and (4) selecting, editing, and reporting in the forms most useful to the various Federal agencies served, the news and propaganda intelligence received. Operating on a 24-hour day, seven-days-a-week schedule, the FBIS provides a service and center for minute-by-minute reporting of foreign broadcast news intelligence and answers to requests for special information, as well as for continuous, detailed analysis of foreign radio propaganda. The FBIS also conducts analyses to determine possible propaganda content of domestic foreign language broadcasts.

Because the enemy and enemy-conquered countries have cut off the regular channels of rapid news communication (diplomatic staffs, press representatives and cable news service--even travelers), enemy and neutral radio broadcasts for domestic and foreign consumption are our chief source of foreign news and intelligence. The FBIS performs this emergency task.

So also, because of its direct and full access to the raw material of incoming broadcast propaganda, the FBIS prepares cumulative, intensive analysis of enemy programs. Regular and special reports on incoming propaganda are transmitted by FBIS to those Federal agencies which are concerned with combatting or neutralizing such enemy activity.

The listening posts and monitoring-recording stations maintained by FBIS are designed to cover three main geographical areas.

First is the Pacific and Asiatic area where Japanese and Japanese-controlled stations in Japan, Manchukuo, occupied China, French Indo-China, and the Philippines carry on extensive broadcast operations in many languages aimed at these countries themselves, at Latin America, Free China, Europe and the United States. Two FBIS stations, one in Portland and one recently taken over in San Francisco from the Office of War Information, divide the labor of monitoring these broadcasts. They listen also to shortwave broadcasts from Free China and from Russia. The news, intelligence, and propaganda thus selected and processed is teletyped to FBIS headquarters in Washington.

Second is the Latin American area where each of 20 republics maintains one or more stations for making domestic broadcasts, many of which are audible in the United States, and for broadcasting programs direct to this country. The promotion of closer relations between the United States and the other American nations has led to the development of an extensive U.S. program of shortwave broadcasting to Latin America. To provide a basis for these broadcasts and to collect war information from these countries, FBIS maintains at Kingsville, Texas, a listening post designed to monitor, record, and edit the programs from Latin American stations to their sister states and to the U. S. The material thus procured is teletyped from Kingsville to FBIS headquarters in Washington for relay to the Coordinator of Inter-American Affairs, Office of Strategic Services and other agencies with a special interest in Latin America.

Third is the large and important volume of broadcasts emanating from Germany, Italy, German-and-Italian-controlled territory in Europe, a few neutral stations in this area (Switzerland, Sweden, Spain, Portugal and Turkey) and from Great Britain itself. These include shortwave broadcasts designed for foreign and American audiences. To keep in touch with this elaborate set of programs in a variety of languages, FBIS maintains a major listening post near Washington, D. C., from which selected programs as received are transmitted directly and fully to the Washington headquarters office where they are recorded, monitored, translated, and edited. Essential to the Washington listening post is the London FBIS bureau maintained in cooperation with the British Broadcasting Corporation. By arrangement with the BBC, the large volume of programs from the Continent of Europe for home consumption, including summaries of programs received at British Ministry of Information listening posts in Egypt and India, are available to FBIS editors who select important material not audible in Washington and forward it, by trans-Atlantic radio to Washington headquarters. Broadcasts from Africa and Europe to the Antilles and to South America, and from the Antilles to South America, are handled by an FBIS listening post in Puerto Rico. Here programs which are not heard in Washington are intercepted and the results sent by wire to the Washington office.

In all, about 1,650,000 words are intercepted daily.

#### 4. Board of War Communications

##### Organization

The Board of War Communications (formerly the Defense Communications Board) was created by Executive Order on September 24, 1940. The Board reports to the President through the Office of Emergency Management.

F.C.C. Chairman James Lawrence Fly is also Chairman of the Board of War Communications. Other Board members are Major General Dawson Olmstead, Chief Signal Officer of the Army; Captain Carl F. Holden, Director of Naval Communications; Hon. Breckenridge Long, Assistant Secretary of State in Charge of the Division of International Communications; Hon. Herbert E. Gastor, Assistant Secretary of the Treasury in Charge of Treasury Enforcement Activities, who is Secretary of the Board; and Captain R. J. Mauerman, U. S. Coast Guard, who is Assistant Secretary of the Board.

The Board itself has no paid personnel, appropriation, or funds. It operates through a Coordinating Committee and a Law Committee staffed by personnel from the agencies represented on the



Board; through Labor and Industry Advisory Committees and an International Broadcasting Coordinating Committee; and through 13 "numbered committees" for radio amateurs, aviation communications, cable, domestic broadcasting, the Interdepartmental Radio Advisory Committee, international broadcasting, radiocommunications, state and municipal facilities, telephone, telegraph, U.S. Government facilities, the Communications Liaison Committee for Civilian Defense, and the Priorities Liaison Committee.

### Activities

As of December 31, 1942, the Board had issued 25 orders, plus modifications and extensions thereof. Orders 1, 2, 3, 14, and 23 delegated certain communications powers to the Army and Navy; Order 4 provided for registration by the Federal Communications Commission of all radio-frequency generating apparatus not otherwise licensed; Orders 5, 6, 7, 8, 11, 16, and 21 provided for the closure of certain facilities, services, and circuits, together with exceptions to such closure orders; Order 9 delegated to the Federal Communications Commission certain authority with respect to the War Emergency Radio Service; Order 10 provided for notice to the Federal Communications Commission prior to abandonment or suspension of wire communications facilities; Order 12 dealt with the removing and impounding of radio equipment in Puerto Rico and the Virgin Islands; Order 13 instituted a questionnaire concerning transmitting tubes; Orders 15, 17, 18, and 19 dealt with international radiotelephone restrictions; Order 20 provided priority for urgent telephone toll calls essential to the war effort or public safety; Order 22 concerns the leasing of cable circuits; Order 24 concerns operation of certain international radiobroadcasting stations; and Orders 25, 25-A, 25-B, and 25-C concern telegraph service.

The Board has also issued memoranda requesting other government agencies to eliminate insofar as feasible, the use of long-distance circuits, to spread the filing time of telegrams throughout the day in order to avoid peak loads, and to take other steps designed to improve the efficiency of communication services.

#### 5. Other Commission War Activities.

In addition to the new functions described above, the following war activities of the Commission, most of which are carried on by the regular staff, should be mentioned:

(a) Studies of the speed and adequacy of wartime telegraph services, undertaken at the request of the Board of War Communications to ensure swift and uninterrupted despatch of military and civilian war messages;

(b) The inauguration, in cooperation with the Office of Civilian Defense, of a new "War Emergency Radio Service" in lieu of former amateur activities, and designed to provide radiocommunications facilities for State and local civilian defense officials;

(c) Comprehensive surveys resulting in detailed plans and recommendations to insure adequate protection against sabotage of important communications facilities, both wire and radio, or other service interruptions.

(d) The recapture for military use of frequencies assigned to less essential civilian uses and needed by the armed forces;

(e) The issuance and enforcement of uniform instructions to insure radio silence during air-raid alarms;

(f) Studies of the optimum frequencies, power, antenna design, and hours for international broadcasting stations beaming programs abroad, all of which are now programmed by the Office of War Information and the Office of the Coordinator of Inter-American Affairs;

(g) Preparation of maps and data concerning all broadcast stations for the Fighter Command of the Army Air Forces;

(h) Studies of methods of confusing enemy planes endeavoring to use American broadcast stations as homing beacons;

(i) Studies of the propagation characteristics of ultra-high frequencies, to facilitate their use in American war activities and to prevent misuse within the United States by the enemy;

(j) Authorization of new communications routes to foreign points not previously served;

(k) Establishment of standards and inspection of non-radiating receivers for use on board ship, to prevent receiver radiations from revealing the ship's location to enemy raiders;

(l) Preparation of technical requirements for life-boat radio equipment;

(m) The maintenance of a continuous marine watch for the reception of distress signals;

(n) Analyses of radio distress signals at sea;

(o) Studies of the use of automatic marine radio alarms under war conditions;

(p) Wartime expansion of police radio and other emergency radio services;

(q) Detail of FCC radio operators to Army Information Centers for enforcement of radio silence during air-raid alarms and other radio air-raid defense duties;

- (r) Registry of all diathermy equipment and unlicensed transmitters.
- (s) Studies of foreign-language broadcasting by domestic stations;
- (t) Expansion of Latin American communications facilities and related hemispheric radio and wire communications problems;
- (u) Studies of skilled labor shortage, deferment procedures, and related manpower problems in the communications industries;
- (v) Studies of rates charged by communications carriers, as part of the anti-inflation program;
- (w) Studies in connection with telegraph merger legislation and the proposed merger of telegraph carriers.

Many of these and other war activities of the Commission are treated in greater detail elsewhere in this report.

Of especial importance was the Commission's Memorandum Opinion of April 27, 1942, instituted at the suggestion of the Board of War Communications and designed to save materials needed elsewhere in the war effort. The Memorandum Opinion states:

"\* \* \*The Commission has adopted a policy to grant no application for an authorization involving the use of any materials to construct or to change the transmitting facilities of any standard, television, facsimile, relay, or high frequency (FM) broadcast stations."

Coupled with this conservation policy governing radiobroadcasting grants, is a policy of granting only those applications for extension of wire-line facilities which are needed for military or civilian war use.

## CHAPTER II

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GENERAL

1. Administration
  2. Commission Membership Changes
  3. Staff Organization
  4. Personnel
  5. Appropriations
  6. Legislation
  7. Litigation
  8. Dockets
  9. International
  10. Interdepartment Radio Advisory Committee
- 
- 

1. Administration

There were no significant changes in the Commission's administrative procedures.

2. Commission Membership Changes

On November 1, 1941, Clifford J. Durr of Alabama was sworn in to succeed Frederick I. Thompson, also of Alabama, whose term expired June 30, 1941.

3. Staff Organization

The Commission's staff organization consists of five units: the Accounting, Statistical, and Tariff Department, the Engineering Department, the Foreign Broadcast Intelligence Service, the Law Department, and the Secretary's Office. The Chief Accountant, Chief Engineer, The General Counsel, and Secretary constitute an Administrative Board, which handles routine actions in accordance with established Commission policy, and a Committee on Rules, which considers and recommends revisions of the rules and regulations.

4. Personnel

At the end of the fiscal year 1942, the Commission had 2,108 employees; of these 511 were regular employees in Washington, 531 were

national defense employees in Washington, 222 were regular employees in the field, and 844 were national defense employees in the field.

### 5. Appropriations

For the fiscal year 1942, the Commission was appropriated \$2,315,229 for its regular activities, \$3,316,195 for its national defense activities, and \$24,500 for printing and binding—a total of \$5,655,924.

### 6. Legislation

The basic law under which the Commission operates is the Communications Act of 1934 as amended. During the fiscal year two amendments were made to that Act.

Section 353(b) was amended by Public No. 155, 77th Cong., 1st sess. (H.R. 2074), approved July 8, 1941. This amendment provides that during the emergency proclaimed by the President on September 8, 1939, but not after June 30, 1943, the requirement of six months' previous service as a qualified operator in a station on board a ship of the United States may be suspended or modified by regulation or order of the Commission for successive periods of not more than six months' duration.

Section 606 of the Communications Act, relating to the war emergency powers of the President, was amended by Public No. 413, 77th Cong., 1st sess. (H.R. 6263), approved January 26, 1942. This Act added paragraphs (d), (f), and (g) to Section 606. This amendment authorizes the President, during a state of war or threat of war involving the United States, (1) to suspend or amend the rules and regulations of the Commission applicable to any or all facilities or stations for wire communications within the jurisdiction of the United States; (2) to cause the closing of any facility or station for wire communications and the removal therefrom of its apparatus and equipment; or (3) to authorize the use or control of any such facility or station by any department of the Government. Similar power with respect to stations for radio communication is already possessed by the President.

S. 2445, a bill to amend the Communications Act of 1934 so as to permit consolidation or merger of telegraph companies, was introduced on April 9, 1942 by Senators White and McFarland. Hearings were held before the Senate Committee on Interstate Commerce during April and May 1942, and the bill was reported out in amended form as S. 2598, in which form it passed the Senate on June 22, 1942.

Thereafter, hearings were held before a subcommittee of the House Committee on Interstate and Foreign Commerce on July 21-23, 1942, and the House Committee reported the bill with amendments; but no action was taken by the House.

H. R. 5497, a bill to alter the structure of the Commission and to amend many important procedural provisions of the Communications Act of 1934, was introduced on August 5, 1941, by Representative Sanders. Hearings were held before the House Committee on Interstate and Foreign Commerce between April 14 and July 2, 1942. The bill was not reported out. No hearings were held on a similar bill, S. 1806, introduced on July 31, 1941, by Senator White.

During the fiscal year the Commission also answered requests from Congress for its views on six other bills.

### 7. Litigation

At the beginning of the fiscal year there were pending four cases to which the Commission was a party, three of which were in the United States Court of Appeals for the District of Columbia and one in the United States District Court for the Southern District of New York.

During the year nine new cases were filed. Four of them were appeals to the Court of Appeals for the District of Columbia from orders of the Commission. Three were suits filed in three-judge district courts pursuant to the Urgent Deficiencies Act to enjoin Commission action. One was a suit filed by the Commission in the United States District Court for the District of Columbia to enforce a subpoena. This case was subsequently appealed to the Court of Appeals. The remaining case was one reopened by leave of the Court of Appeals for the District of Columbia.

Seven cases were finally disposed of during the year. The Commission won six of these cases and lost one.

Thus, six cases were pending at the end of the year, four in the Court of Appeals for the District of Columbia and two in the United States District Court for the Southern District of New York.

Three of the cases pending at the end of the year went to the Supreme Court of the United States on interlocutory matters. In one of them, Scripps-Howard Radio, Inc. v. Federal Communications Commission, No. 508, decided April 6, 1942, the Court of Appeals certified to the Supreme Court the question whether, in a case appealed under Section 402(b) of the Communications Act, the Court of Appeals has the power to issue a stay order preserving the status quo pending determination of the appeal. The question certified was answered in the affirmative and the case is now pending in the Court of Appeals on the merits.

The other two cases which went to the Supreme Court, National Broadcasting Company, et al. v. United States, No. 1025, and Columbia Broadcasting System v. United States, No. 1026, both decided June 1, 1942, are suits to enjoin the enforcement of the Commission's chain broadcasting regulations. The three-judge district court in which the suits were brought dismissed the complaints on motions of the Commission which urged that the regulations are mere declarations of policy to be applied in subsequent administrative proceedings and hence are not reviewable at this time. The Supreme Court reversed, holding that the regulations are reviewable under the Urgent Deficiencies Act. The cases were remanded to the lower court for disposition on the merits. On November 16, 1942, the three-judge court held for the Commission on the merits. The cases are now on appeal to the Supreme Court.

Of the cases finally disposed of during the year, two are worthy of specific mention. Stahlman v. Federal Communications Commission, 126 F. (2d) 124, involved an action by the Commission to enforce obedience to a subpoena requiring a witness to appear and testify before the Commission in connection with its newspaper hearing. The witness refused to appear on the ground that the Commission had no authority to enact regulations directed against ownership of radio stations by newspapers, and therefore was without authority to conduct the investigation. Suit was brought by the Commission in the United States District Court for the District of Columbia to enforce the subpoena. The District Court ordered the witness to appear. An appeal was filed and the Court of Appeals affirmed the holding that the Commission did have authority to hold the hearings, and directed the witness to obey the subpoena.

R.C.A. Communications, Inc. v. United States, 43 F. Supp. 851, was a suit brought by R.C.A. Communications Inc. in a three-judge court for the Southern District of New York to set aside an order of the Commission lowering the rates charged on international and in transit "Urgent" telegraph messages, from double the rate for regular messages to 1 1/2 times that rate. The court sustained the Commission's action, holding that the Commission had jurisdiction over international inbound messages and messages in transit within the United States as well as outbound messages. The court also held that the ratio established by the Commission was warranted, saying: "We think that Section 201(b) of the Act gave the Commission sole authority to classify communications by wire or radio as 'Urgent' and to fix reasonable charges therefor."

### 8. Dockets

During the fiscal year, 127 docket cases were heard by the Commission. The Commission also acted on 636 motions, petitions, and other pleadings; of which 452 were granted, 149 were denied, and 35 were dismissed.

### 9. International

The International Division of the Engineering Department prepares the basic data on all phases of international communications - radiotelephone, radiotelegraph, and cable. It advises the War and Navy Departments with respect to the best frequencies available for special military communications services. The Division's major report, the International Telecommunications Survey, is supplied to all government agencies concerned with international communications problems. The Division maintains the "master-frequency records" for both transmission and reception of all radio frequency assignments in the United States and in foreign countries. It furnishes technical information and advice to the Interdepartment Radio Advisory Committee and the Interdepartmental Committee for International Radiobroadcasting Facilities and supplies the secretariat for these two committees. It serves as liaison between the Commission and the Committee on Cooperation with American Republics, the State, War and Navy Departments, and other government agencies concerned with international telecommunications problems.

### 10. Interdepartment Radio Advisory Committee

The Interdepartment Radio Advisory Committee, upon which 12 Federal agencies are represented, was established for the purpose of advising the President with reference to the assignment of frequencies to Government radio stations. During the fiscal year it approved the assignment of 6,942 frequencies for Government radio stations, bringing to 27,635 the number of such assignments recommended by the Committee since its establishment. IRAC is now a committee of the Board of War Communications and advises the Board of its assignments.

The administrative duties in connection with IRAC are performed by the International Division of the Commission's Engineering Department.



## CHAPTER III

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 TELEPHONE AND TELEGRAPH
 

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1. Telephone
2. Telegraph
3. Cable
4. Radio Common Carriers
5. Tariffs
6. Supervision of Accounts

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 1. Telephone

The Commission is charged with the regulation of all wire and radio telephone and telegraph companies doing business as common carriers in interstate or foreign communication. War conditions, by the creation of new problems, have resulted in greatly increased work relating to both domestic and international circuits, rates, and services.

## Rate Investigations

American Telephone and Telegraph Company Long-Lines Rates. On November 21, 1942, the Commission ordered the American Telephone and Telegraph Company to show cause why its toll rates and other charges should not be substantially reduced. Hearings were held on December 16 and 17, 1942; and on January 20, 1943, after a series of conferences, the Commission announced that the company had agreed to reductions totaling an estimated \$34,700,000, in its rates to the public; and in addition to reduction of its share of rates and an increase in the share allotted to associated and independent companies amounting to \$16,000,000 -- a total reduction in the American Company's Long Lines revenues of \$50,700,000. A part of the reduction was in rates charged for leased private-line telephone, telegraph, and radio-program transmission services, and the remainder was in the decrease in overtime charges on toll messages. The United States Government, as the largest user of telephone service, will benefit materially from an estimated reduction of \$11,900,000 in charges for such services, and will further benefit substantially from the reduction in rates for calls in excess of three minutes. To prevent an increase in ordinary long-distance calls over already burdened circuits, no reduction was made in the rates charged for the first three minutes. Toll rates including the reductions in overtime rates were made applicable on the "station-to-station" basis (as distinguished from the "board-to-board" basis of making toll rates. In addition, the adoption of the "station-to-station" method of quoting toll rates was one of the factors resulting in increased compensation to connection carriers.

In announcing the settlement, the Commission stated: "The reductions are in conformity (1) with the Government policy against inflation and (2) with the policy of avoiding an increase of civilian traffic and the consequent impeding of war messages."

Representatives of state public utility commissions participated with the Commission in the proceedings. The Office of Price Administration was an intervenor, stating the an order reducing the excess earnings of the company would contribute materially to its program of controlling costs.

Special Telephone Charges of Hotels, Apartment Houses, and Clubs in Interstate and Foreign communications. -- The principal issue involved is to determine whether surcharges imposed by hotels, apartment houses, and clubs in the District of Columbia, on telephone calls to and from telephone stations located on their premises, are subject to any regulation either by this Commission or by the Public Utilities Commission of the District of Columbia. A hearing was held jointly with the District Public Utilities Commission and a decision on this matter is pending. The precedent which may be established in this case will, of course, be an important one for similar conditions existing in other cities.

Northwestern Bell Telephone Company Increased Charges for Interstate Telephone Exchange Service in Iowa.--The Commission suspended certain increases in charges for interstate telephone exchange service in Iowa which were not subject to review by any state or local regulatory agency,<sup>1/</sup> and ordered an investigation to determine the justness and reasonableness of these rates. The Company was granted an extension of time to prepare its case and has agreed to continue suspension of the increased charges accordingly.

Illinois Bell Telephone Company and American Telephone and Telegraph Company Increased Rates for Radiotelephone service through Coastal Harbor Radio Station WAY.--This proceeding was instituted after the companies had increased their rates for radiotelephone service through coastal harbor radio station WAY. The Commission suspended the increased rates and ordered an investigation to determine the justness and reasonableness thereof. Hearings have been held and the matter is pending decision.

Separation of Telephone Property, Revenues, and Expense as an Aid in the Regulation of Telephone Companies.--With the collaboration of the National Association of Railroad and Utilities Commissioners, the Commission has undertaken a study of the methods of separating telephone property, revenues, and expenses as between interstate and foreign communication on the one hand, and intrastate communication on the other. Such a study also includes consideration of whether telephone toll rates should be fixed on a "station-to-station" or "board-to-board" basis. The board-to-board basis means that toll

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<sup>1/</sup> Iowa is one of the three states having no statewide regulation of telephone rates, and the communications in question are not regulated locally.

rates and charges are stated to cover all services, facilities and operations required in the transmission and reception of telephone toll communications between one toll board and another toll board, and that compensation to the telephone company for facilities and services required to establish connection between the actual telephone stations and the toll boards is provided for in the exchange rate. The station-to-station basis means that telephone toll rates and charges are stated to cover all the services, facilities, and operations required in the transmission and reception of telephone toll communications between one telephone station and another telephone station. The Commission directed that a hearing be held in order to receive evidence and the views of interested parties with respect to these questions.

New York Telephone Company Accounting. - The Commission instituted an investigation to determine the propriety of accounting entries of the New York Telephone Company relating to certain acquisitions of telephone property by the company from its parent company, the American Telephone and Telegraph Company. The Commission suspended, pending decision herein, all charges to operating expenses made by the New York Telephone Company after January 1, 1942, for the purpose of amortizing the questioned amounts in its acquisition adjustment account.

Bell System Pension Accounting. - This proceeding involves the manner of accounting for certain charges made in connection with pensions. The propriety of the Bell System Pension Plan is not in question. The Commission issued a proposed report, in which it concluded that the companies involved had not justified accounting entries which charged to operating expense accounts certain amounts necessary to arrest the growth of an "unfunded actuarial liability". Exceptions and briefs were filed and oral argument was heard. On December 2, 1942, the Commission issued its final report and order directing that the items in question be eliminated from operating expense accounts.

Increased Service Charges of Associated Telephone Company, Ltd., for Private Line Teletypewriter Station Equipment. The Commission suspended certain increases in charges for station equipment furnished for and in connection with interstate and foreign private line teletypewriter service, and ordered an investigation to determine the justness and reasonableness of these rates. The Company requested permission to withdraw the suspended tariff changes, and when the withdrawal became effective, the matter was dismissed.

#### Telephonic Facilities

Applications. During the fiscal year the Commission approved 174 applications for telephone facilities involving an aggregate expenditure of about \$78,000,000. Of these, 165 were to supplement existing facilities by new construction costing approximately \$45,000,000; 7 were for acquisition of properties valued at more than \$33,000,000; and 2 involved consolidations of properties aggregating \$39,500.

Type K Carrier Systems. On January 8, 1942, the Commission instituted an investigation into the facts and circumstances surrounding the construction and operation of Type K Carrier Systems between New York City and Boston, Mass., by the American Telephone and Telegraph Company and the New York Telephone Company. Type K carrier systems, superimposed upon wires, provide the means of transmitting twelve simultaneous conversations, and in the New York-Boston case, eight Type K Carrier Systems, providing 96 additional telephone channels, were installed in lieu of the additional wires

necessary to carry a comparable number of simultaneous conversations. The Commission ordered the two companies to show cause why authorizations covering such facilities are not required under Section 214 of the Communications Act of 1934 as amended. A hearing was held before an individual commissioner and the matter was awaiting formal decision of the Commission at the close of the fiscal year.

Acquisitions and Consolidations. During the fiscal year the Commission approved 5 applications of the American Telephone and Telegraph Company to acquire the assets of its subsidiaries, the American Telephone and Telegraph Company of Georgia, the American Telephone and Telegraph Company of Kentucky, Inc., the American Telephone and Telegraph Company of Mississippi, the American Telephone and Telegraph Company of South Carolina, and the American Telephone and Telegraph Company of Tennessee. The purpose was corporate simplification. These applications involved aggregate assets of about \$25,000,000.

There were also granted the application of the Tri-State Telephone and Telegraph Company to acquire and operate the interstate toll lines of the Nicollet County Telephone and Telegraph Company, involving assets of about \$1,06,000, and the application of the Northwestern Bell Telephone Company to acquire and operate the interstate toll lines of the Dakota Central Telephone Company, valued at approximately \$7,740,000. Both the Nicollet and the Dakota Central companies were already part of the system of the Northwestern Bell Telephone Company through stock affiliation.

At the end of the fiscal year there were pending three applications for authority to acquire and operate interstate toll lines.

Hearings on the application of the New Jersey Bell Telephone Company to acquire the capital stock of Imperial Securities Company, a holding company which directly or indirectly holds stock control of the Keystone System, composed of the Keystone Telephone Company of Philadelphia, the Eastern Telephone and Telegraph Company, and the Camden and Atlantic Telephone and Telegraph Company, have been concluded and the matter is now awaiting formal decision.

Applications of the Carolina Telephone and Telegraph Company to acquire the Colerain Telephone Company, and of the Southern Bell Telephone and Telegraph Company to acquire the Collierville Telephone Company, were granted.

## 2. Telegraph

### Applications

There were 150 applications for wire-telegraph certificates under Section 214 received by the Commission during the year. Of

these, 143 were granted. Of the latter, 86 authorized extensions of lines to military and naval establishments, and involved the leasing of approximately 4,097 miles and the construction of 1,807 miles of telegraph circuit.

Applications filed by Postal Telegraph Cable Co. for extensions of telegraph lines from Beaumont to Orange, Texas; from Ogdensburg to Massena, New York; from Bellows Falls to Springfield, Vermont; and from Miami to Florida City, Florida, received during the fiscal year 1941 were heard during the fiscal year 1942 and are awaiting decision.

#### Government Message Rates

The Navy and War Departments presented to the Commission the question whether cost-plus-a-fixed-fee contractors with those departments were entitled to the rates for telegraph service fixed by the Commission for government messages, as authorized by the Post Roads Act of 1866 and subsequent legislation. In the annual order of the Commission fixing rates for United States Government telegraph messages, the Commission prescribed a ratio which in most cases is 60% of the rate applicable to private messages. A formal proceeding was held by the Commission upon the question presented by the Navy and War Departments, following which the Commission revised its annual government message order to provide that government rates are applicable to telegraph messages sent by cost-plus-a-fixed-fee contractors with the United States Government departments when such messages are certified by authorized officers or employees of such departments as messages on official business for which payment will be made from United States funds.

#### Investigations

Investigation of Telegraph Service. On July 3, 1942, the Board of War Communications requested the Commission to undertake promptly an investigation into the service rendered in the telegraph field. Pursuant to this request, the Commission, by Order No. 103 dated July 7, 1942, instituted an investigation of the speed, accuracy, and general adequacy of wartime telegraph service; the manner and method of conducting operations and the extent to which such operating methods are suitable and adequate to wartime needs; matters pertaining to technical developments and improvements in such service; and the cause or causes for any inadequacies in service which may be found to exist.

The investigation was carried on, as requested by the Board, with the cooperation of the telegraph companies and the labor unions at 12 key Western Union and Postal Telegraph offices—New York, Chicago, Atlanta, New Orleans, Dallas, Cleveland, Detroit, St. Louis, Los Angeles, San Francisco, Portland, and Seattle. Thereafter, in October 1942, the Commission reported its findings to the Board.

Following this report the Board on November 5, 1942, issued its Order No. 25 (superseded on December 10, 1942 by Order No. 25-C). This order establishes speed-of-service goals for telegraph messages; orders the discontinuance of all non-telegraphic services including errand, distribution, remittance, installment payments, shopping, and other services; and bans the acceptance of domestic felicitation and congratulation telegrams, including Christmas, New Year, Easter, Father's Day, Jewish New Year, Mother's Day, Thanksgiving, and Valentine's Day greetings, congratulations on the birth of a child, graduations, weddings, anniversaries, and birthdays. Order No. 25-C also requests, and where necessary authorizes, the Commission to develop a plan of priorities for the handling of urgent essential traffic, both governmental and non-governmental; to prepare standards of minimum use to control installations of teleprinter equipment for telegraph users, including exemptions for equipment which serves a military necessity or a vital public need which cannot otherwise be met; to formulate basic principles for regulation of the leasing of telegraph circuits, to the end that no needed facilities shall be used for non-essential purposes; to study possibilities for the elimination of unnecessary circuits, facilities, and offices; and to develop a plan for the curtailment of the use of franks and deadhead messages and the elimination of "free service" messages.

Tariff Schedules for Land Line Charges for Foreign Telegraph Services. -In its decision on this case the Commission found that the charges for service rendered by Postal Telegraph-Cable Company to customers filing international messages at its office by long distance telephone (the sender paying the telephone toll cost), were discriminatory when the zone rates at the point at which the telephone message originated were applied rather than the zone rates at the recording point. The Commission decided that the schedule in issue had the effect of discriminating unjustly and unreasonably between customers using long distance telephone in filing messages and local customers, at both the point of origin and the receiving or recording point.

Pick-up and Delivery Practices. -The investigation described in the last Annual Report relating to the pick-up and delivery practices of telegraph carriers has been continued.

Investigation of Commercial News Bulletins, Quotation Service Tariffs and CND Baseball-Sports-Ticker Services. - The Commission has instituted an inquiry to determine a proper separation of the charges applicable to transmission from the charges applicable to the contents of the messages transmitted in these services by the Western Union and Postal Telegraph Companies. Hearings have been held and the matter is now pending.

Investigation of Private Line Teletypewriter Service. - Transradio Press Service, Inc., filed a complaint against the American Tele-

phone and Telegraph Company with respect to its charges, classifications, regulations, and practices for press private line teletypewriter service. The Commission consolidated this complaint with an order of investigation into these matters. On January 20, 1943, the F.C.C. announced that the American company had agreed to substantial reduction in private-line charges. Hearings in the matter went forward, however, and the matter is still pending.

Tariff Schedules for Private Printer Service by Telegraph Carriers.—

The carriers furnishing this service have been required to file certain information relating to charges, terms and conditions upon which each carrier undertake to install private printers and furnish this service to the public, and the carriers have been further required to show cause why they should not file tariff schedules accordingly.

Merger

During the fiscal year, studies were prepared for use by Government witnesses in their testimony before a subcommittee of the Senate Interstate Commerce Committee on S. 2445, 77th Congress, 2nd Session to amend the Communications Act of 1934, as amended, to permit consolidations or mergers of telegraph operations and for other purposes.

3. Ocean Cable

The war has interrupted cable communication services of American companies to continental Europe and to Far Eastern points. Direct facilities are available to the United Kingdom, Eire and the Azores. The Pacific cable is operating to Hawaii and Midway only.

4. Radio Common Carriers

The Commission has continued its practice of granting authorizations for radiotelegraph circuits upon a temporary basis only, in order to permit the establishment of circuits for which there is an existing public need under wartime conditions without the delays incident to extensive hearings which might be necessary to determine questions relevant to authorizations on a permanent basis. The extension of the war and the consequent dispersal of

United Nations troops throughout the world has required that emphasis be placed upon the need for adequate communication facilities between the United States and all foreign points of strategic importance.

Since the commencement of the war, direct radiotelegraph circuits have been established to Egypt, Australia, Iceland, Paraguay, Bolivia, New Caledonia, Greenland, New Zealand, Iran, French Equatorial Africa, Asiatic U.S.S.R. and several additional points in unoccupied China. During the fiscal year, the Commission received 471 applications for authority to establish additional radiotelegraph circuits and issued 448 authorizations. During this period, 8 new stations were authorized, and on June 30, 1942 the total number of radiotelegraph stations authorized by the Commission was 87.

As a result of the entry of the United States into the war, direct radiotelegraph circuits with Axis countries have been discontinued, and circuits to countries occupied by the Japanese have also been discontinued.

By Order of the Board of War Communications, all domestic point to point radiotelegraph circuits in the United States were designated for closure, effective June 30, 1942. By subsequent order of the Board of War Communications, issued on the recommendation of the Commission, R.C.A. Communications, Inc., Mackay Radio and Telegraph Companies (California and Delaware), and Tropical Radio Telegraph Company were permitted to continue the operation of certain designated radiotelegraph circuits within the United States for the transmission of precensored international messages relayed within the United States, and Press Wireless, Inc., was permitted to operate certain radiotelegraph circuits within the United States for the handling of international government, press, and service messages, and for the transmission of domestic multiple address press and service messages.

Where an applicant for authority to establish a direct radiotelegraph circuit, proposes to apply to service over such direct circuit existing rates which are predicated upon indirect service involving several relays and handlings, the question of the justness and reasonableness of the application of such rates arises. In order to avoid delay in the establishment of circuits which may be vital in the war effort, the Commission, in authorizing certain direct circuits, has noted the existence of such rate questions and has expressly reserved consideration thereof for an appropriate proceeding at some later date. Under other circumstances, the Commission, in granting authorizations for additional direct circuits, has imposed conditions designed to prevent the application of unreasonable rates to the direct service authorized.

After study of the quarterly reports submitted by the companies during the past several years and the closing of the domestic



operations, the Commission was of the opinion that the radio communication companies could efficiently carry on all of their important international communications on a fewer number of frequencies than presently licensed to them by making more effective use of each frequency. After conferences with the carriers, it was decided that the companies could relinquish approximately 87 frequencies from 2 to 23 megacycles which would be made available to the armed forces for the duration of the war. These frequency studies are to be continued and will form a basis for the determination of future frequency requirements of all companies both during war and peacetime conditions.

Effective April 2, 1942, Section 6.29 was amended so that, normally, licenses for stations in the Fixed Public Radio Services will be issued for a period of two years instead of one year, the date of expiration being the first day of December.

On June 1, 1942, Globe Wireless, Ltd., ceased operations as a commercial common carrier for the duration of the war and leased its facilities to the United States Government. The cessation of operation in the commercial field was brought about through the loss of its Far Eastern circuits which decreased its traffic and revenues so far as to impair its ability to remain in commercial service.

#### Investigations

Ordinary Press Rates Between United States and China. - Press Wireless, Inc., established rates for ordinary press radiotelegraph services between the United States and China. The rates so established were higher than those charged by Press Wireless, Inc., for ordinary press radiotelegraph service to England, France and Russia. The Commission instituted an investigation to determine the justness and reasonableness of the rates to China. Hearings have been held and the matter is pending.

Government Direct Radiotelegraph Transmission Service. - R.C.A. Communications, Inc., filed tariffs for such service. The Commission instituted an investigation into the reasonableness of the rates and charges, and the justness of the classifications, regulations, and practices in connection with the service. The carrier thereupon withdrew such tariffs and the Commission dismissed the proceeding.

Rates to South America, Central America and the West Indies. -- The Commission has broadened its inquiry into the justness and reasonableness of charges for international telegraph communications between the United States on the one hand, and South America and Central America on the other, to include consideration of the rates between the United States and the West Indies and the desirability of establishing additional through routes. Hearings have been held, and the matter is now pending before the Commission for decision.

Through Routes Between Transpacific Points and Points in the United States. - This proceeding arose upon a complaint by Globe Wireless, Ltd., against the Western Union and Postal Telegraph Companies, requesting the establishment of through routes between the latter companies and Globe for the handling in the United States of Globe's transpacific telegraph traffic. The Commission, finding such action necessary and desirable in the public interest, ordered the establishment of such through routes.

Transpacific Rates. - This proceeding involved an investigation into the justness and reasonableness of the "radiomail" classification offered by Globe Wireless, Ltd., applicable in its transpacific service from the Philippine Islands to the United States, Guam, and the Hawaiian Islands. Consolidated with this proceeding was an investigation into the reasonableness of a differential in charge made by Globe and various other telegraph carriers for services between the Philippine Islands on the one hand, and the United States, Guam, and the Hawaiian Islands on the other. The Commission found that the "radiomail" classification was not a distinctive classification of service authorized by Section 201(b) and found the same unlawful.

Rates to Colombia. - Upon application by Globe Wireless, Ltd., a radiotelegraph carrier, the Commission modified Globe's station licenses to permit it to institute direct service to Colombia. Globe proposed to furnish such service at rates lower than those prevailing for service over the routes of other carriers. Competing carriers petitioned the Commission for reconsideration. In its decision denying these petitions, the Commission pointed out that it is reasonable to assume that a substantial portion of the traffic to be handled by Globe will arise from increased use of telegraph services stimulated by such lower rates and will not necessarily be traffic diverted from competing carriers. The Commission also gave recognition to the fact that establishment of additional communications circuits between the United States and South America is conducive to better international relations and hemispheric solidarity.

Increased Rates for Telegraph Messages from Bolivia to the United States. - The Commission suspended certain increases in charges of Mackay Radio and Telegraph Company (Delaware) for telegraph messages from La Paz, Bolivia to the United States, and ordered an investigation to determine the justness and reasonableness of these rates. A hearing was held, and the matter is pending before the Commission for decision.

#### Radiotelephone

As in the case of the radiotelegraph service, war conditions have seriously affected transeceanic telephone traffic.

Shortly after the entrance of the United States into the war, service to Berlin, Rome, and Tokyo was suspended. Subsequently, radiotelephone service to Java and the Philippine Islands was discontinued when these countries were occupied by Japanese military authorities.

International radiotelephone communications are now restricted by Order No. 19, issued September 30, 1942, which provides as follows:

- "(1) Non-governmental business radiotelephone calls between the United States and Great Britain shall be permitted subject to the prior approval thereof from the Office of Censorship. No personal radiotelephone calls shall be permitted between the United States and Great Britain.
- "(2) No non-governmental business or personal radiotelephone call shall be made to or from any foreign point outside of the Western Hemisphere other than Great Britain unless such call is made in the interest of the United States or the United Nations and unless an agency of the United States Government sponsors such call and obtains prior approval therefor from the Office of Censorship; PROVIDED, HOWEVER, That this provision shall not apply to American press calls or radio broadcast programs, or to such other press calls and radio programs as may be specifically approved by the Office of Censorship.
- "(3) No calls of any nature, over the radiotelephone circuits under the jurisdiction of the United States, no matter where such calls may originate, unless sponsored and approved as provided in paragraph (2), shall be permitted to, from, or on behalf of, the following thirteen countries: Egypt, Finland, France, Iceland, Iran, Ireland, Latvia, Lithuania, Portugal, Spain, Sweden, Switzerland, and Turkey.
- "(4) Personal calls other than those prohibited in the foregoing paragraphs may be completed between two points in the Western Hemisphere."

The only new point of communication to which radiotelephone service has been extended during the year was to Surinam (Dutch Guiana), although transmission tests to the U.S.S.R. have been under way for some time.

Due to the tremendous increase in radiotelephone traffic to South America, Hawaii, Puerto Rico, and Panama, additional circuits have been established to accommodate this traffic. All of the new circuits are of the twin-channel single sideband type thus providing for future growth with the minimum requirements for frequency space.

Radiotelephone service from the United States is rendered from three primary distribution centers located at New York, New York; San Francisco, California, and Miami, Florida. Telephone service to points in Europe, Panama and South America is routed via New York; while that to Australia and Hawaii is handled via San Francisco. Telephone calls destined to Central America, the West Indies and Northern South America are transmitted from Miami.

### 5. Tariffs.

At the close of the fiscal year 192 communication carriers of all types had tariffs and concurrences on file with the Commission. During the year these carriers filed 30,420 concurrences and tariff pages, containing changes in rates, regulations, practices and classification of services. A total of 35 tariff pages were rejected for failure to conform to statutory requirements.

During the year, upon application, special permission was granted telephone carriers to make changes in, or file tariffs on less than statutory notice in 43 instances. During the same period 286 applications for similar authority were received from telegraph carriers. Of this number 283 were granted, 7 were denied and 6 were withdrawn.

#### Expeditionary Force Message Service

A special wartime EFM service was established during June 1942 for the benefit of members of the Armed Forces and their families. Selection from one of 104 fixed texts, designed to cover nearly all occasions, offers the sender an exceptionally low message rate equivalent to 60 cents in American currency. The texts were sponsored and approved by the Armed Forces and the carrier companies.

### 6. Supervision of Accounts

Among the more important activities of the Commission in the field of accounting regulation were the following:

Restatement of plant accounts on basis of original cost.—The first of a series of formal cooperative proceedings with State commissions

was instituted for the purpose of disposing of questions and other important related matters with respect to write-ups accomplished through transfers or exchanges of property between affiliated companies. This proceeding involved the American Telephone and Telegraph Company and its largest operating subsidiary, The New York Telephone Company. It is anticipated that as a result of these proceedings it will be possible to formulate practicable and conclusive procedures for the solution of the many intricate problems inherent in the application of the original cost requirements.

Depreciation. - Participation in the activities of the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners has continued.

In order that the Commission might be informed as to the annual depreciation rates of common carriers by wire or radio, an order was issued in June requiring such carriers to furnish certain information with respect to all changes made since December 31, 1941, in depreciation rates applied and to continue furnishing information regarding similar future changes.

Inquiry was instituted into the depreciation practices of The Western Union Telegraph Company as a result of which accounting adjustments totaling more than \$15,000,000 have been made with further adjustments pending the completion of additional stages of the continuing investigation.

Miscellaneous. - In connection with other projects of a continuing character there were issued a number of amendments of the uniform system of accounts for telephone companies and of the regulations relating to the destruction of records by communication carriers. These latter were principally changes made necessary by war-created circumstances such as the prevention of the seizure of informative documents by the enemy. Other projects included:

Determination of suitable retirement units for use by wire-telegraph and ocean-cable carriers.

Revision of the uniform system of accounts for Class A and class B telephone companies.

Development of a continuing property-record procedure for telephone and radiotelegraph carriers.

Revision of a proposed annual report form (Form S) for use by noncarrier affiliates of communication carriers to conform to the requirements of defense agencies and to avoid duplicative requirements.

Compilation of a revised summarization relating to the promulgation by State commissions of uniform systems of accounts for telephone companies that were patterned after the systems prescribed by this Commission. (The summary indicated marked progress toward uniformity of requirements).

Compilation of an annual report form (Form O) for wire-telegraph and ocean-cable carriers to conform to the new uniform system of accounts for such carriers effective January 1, 1943.

Examination and report on the financial condition of a radiotelegraph carrier taken over by the War Department.

Analysis of current international telegraph and radiotelephone traffic.

Investigations of the accounting performed by telegraph and telephone carriers in connection with the restatement of plant accounts on the basis of original cost and the establishment of continuing property records.

Studies of the accounting organizations of three large telephone carriers and analyses of their methods of segregation of depreciation reserves.

Continuing studies of the long lines department of the American Telephone and Telegraph Company with respect to plant additions, working capital requirements, depreciation reserves, receipts and payments for lease and joint use of plant, and division of revenues from joint interstate business with other participating carriers.

While the war has operated to retard progress upon, or to postpone the completion of, several projects, it has also created a most urgent need of information upon a variety of subjects. An important series of questions, for example, had to do with various accounting problems presented in connection with the construction by, or for, communication carriers of emergency facilities required by the Government itself or by industries engaged in the war effort. Rental of complete plants or portions thereof by the Government occasioned special studies. Emphasis upon the matter of ownership of stock of communication carriers by aliens provided another task.

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STANDARD BROADCAST

1. General
  2. Memorandum Opinion of April 27, 1942
  3. North American Regional Broadcasting Agreement
  4. Chain Broadcasting Regulations
  5. Newspaper-Radio Inquiry
  6. Modifications of Rules and Regulations
  7. Foreign-Language Programs
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1. General

A total of 897 standard broadcast stations were in operation or under construction on June 30, 1941. During the fiscal year thirty-four stations were authorized and six deleted, making a net increase of twenty-eight stations during the fiscal year.

The use of more complex directional antenna systems to minimize interference has made it possible for numerous stations to increase nighttime power to the maximum allowable and the submission of applications for new or increased facilities involving the use of these complex directional antenna systems has increased the time and care which the Commission has been required to devote to the study of such proposals. Approximately 25% of the stations in existence on June 30, 1941 employed directional antennae. Approximately 27.6% of the stations operating as authorized on June 30, 1942 employ directional antennae.

2. Memorandum Opinion of April 27, 1942

The Commission on April 27, 1942 published a memorandum opinion as follows:

"Since the adoption of the Commission's Memorandum Opinion of February 23, 1942, concerning policy and procedure for the handling of standard broadcast applications, it has become increasingly apparent that further restrictions upon the use of materials and skilled personnel for the construction and operation of radio-broadcast stations are necessary. Public interest demands that the

requirements of the armed services be met before materials and skilled personnel can be used for the expansion of existing or the construction of new broadcast services.

"On April 16, 1942, the Defense Communications Board recommended to the War Production Board and this Commission that there be immediately placed in effect the following policy:

No future authorizations involving the use of any materials shall be issued by the Federal Communications Commission nor shall further materials be allocated by the War Production Board, to construct or to change the transmitting facilities of any Standard, Television, Facsimile, Relay or High Frequency (FM, Non-Commercial, Experimental) broadcast station.

"Upon consideration of this recommendation, the Commission has adopted a policy to grant no application for an authorization involving the use of any materials to construct or change the transmitting facilities of any standard, television, facsimile, relay, or high frequency (FM) broadcast station. The Commission, however, has deferred action on the recommendation of the Defense Communications Board with respect to experimental high frequency and non-commercial educational broadcast stations.

"Applications filed to meet the requirements of authorizations heretofore made in the form of conditional grants, and applications requesting an extension of time within which to complete construction under authorizations heretofore made, will not be granted, unless it appears that the applicant (1) has made substantial expenditures in connection therewith or actually commenced construction prior to the date hereof, and (2) has on hand or available substantially all materials and equipment necessary to complete construction.

"This policy shall not preclude the issuance of authorizations involving essential repairs or replacements for the purpose of maintaining existing services; nor shall it preclude the issuance of authorizations by the Commission for construction of, or changes in, facilities required by the Commission or recommended by the head of a war agency of the Federal Government.

"For the purpose of carrying this policy into effect, the following procedure will govern applications now pending: Every applicant who desires to prosecute a pending application involving the use of materials to construct or change the transmitting facilities of any standard, television, facsimile, relay or high



frequency (FM) broadcast station 1/, shall, on or before June 1, 1942, file with the Commission a formal petition embodying a statement of such facts and circumstances as he believes would warrant the granting of his application in the public interest. The filing of such petition will be construed as an indication of the desire of the applicant to prosecute his application, and, in the event the petition is denied, the application will be designated for hearing. Failure of any such applicant to file such formal petition on or before June 1, 1942, or such further time as the Commission may, upon satisfactory showing allow, will be deemed an abandonment of the application, and such application will be retired to the closed files of the Commission and dismissed without prejudice."

This memorandum superseded a somewhat similar statement of policy dated February 23, 1942 and has a more far reaching effect on the work of the Commission in regard to applications for new or increased broadcast facilities as well as for other services.

There is definitely a shortage of much of the material and equipment necessary to the maintenance of broadcast stations, particularly large transmitting tubes. The Commission's Engineering Department has been active in cooperation with the broadcasters and with the various war agencies in an effort to work out a plan to make use of all surplus material and equipment and to afford the industry as a whole every possible means of maintaining stations in operation. Considerable study has been devoted to a means of prolonging the life expectancy of consumable materials employed in communication.

### 3. North American Regional Broadcasting Agreement

The plan for cooperation among North American countries in the allocation of broadcast facilities as provided for in the North American Regional Broadcasting Agreement became effective March 29, 1941. The Dominican Republic and Newfoundland ratified the Agreement during the fiscal year.

Interference between United States stations and stations of other countries signatory to the North American Regional Broadcasting Agreement has occurred in several instances during the past

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1/ Includes all such applications filed prior to the date hereof irrespective of present status.

year as have several conflicting notifications of proposed new assignments. In most cases these interference problems and conflicts have been adjusted in a manner satisfactory to all parties. The North American Regional Broadcasting Agreement is serving its purpose in preventing the total confusion that would speedily ensue in the absence of a planned system of allocation adhered to by all of the North American countries.

#### 4. Chain Broadcasting Regulations

The Chain Broadcasting Regulations are now suspended pending the outcome of litigation between the network companies and the Commission. A three-judge court in New York has found for the Commission, and the matter is now on appeal to the Supreme Court.

#### 5. Newspaper-Radio Inquiry

During the fiscal year the Commission held hearings on the joint control of newspapers and broadcasting stations, pursuant to Order No. 79. The record has not been closed and no action has been taken.

#### 6. Modifications of Rules and Regulations

In view of the scarcity of skilled operators holding the proper grade of license to operate standard broadcast stations, the Commission, pursuant to Orders 91, 91-A and 91-B, relaxed the requirements in regard to operators where it is impossible for stations to secure a full complement of operators holding first-class radiotelephone licenses. To lengthen the life of transmitting tubes and equipment, and to conserve personnel, the Commission by Orders 94 and 94-A reduced the requirements for minimum hours of broadcast service; and by Order No. 107 it required a reduction of power by one decibel.

#### 7. Foreign Language Programs

Much attention has been given to domestic foreign language radio stations and programs. Assistance has been given to representatives of the Foreign Language Division of the Office of War Information, the Office of Censorship, the Special War Policies Unit of the Department of Justice, other government agencies, the foreign language broadcasters, and interested private organizations in order to determine policies with respect to such stations. Surveys are being made of program service, personnel, community background, and general operations of foreign-language stations.

## CHAPTER V

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NONSTANDARD BROADCAST

1. General
  2. High Frequency (FM) Broadcast Service
  3. Television Broadcast Service
  4. International Broadcast Service
  5. Noncommercial Educational Broadcast Service
  6. Studio-Transmitter Service
  7. Relay Broadcast Service
  8. Facsimile Broadcast Service
  9. Developmental Broadcast Service
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1. General

The Commission's war policy of limiting grants and authorizations pursuant to the Memorandum Opinion of April 27, 1942 (described in a previous chapter), also includes the following classes of non-standard broadcast stations: television, facsimile, relay and high frequency or frequency modulation (FM). This policy was asserted for applications filed to meet terms of conditional grants, and applications requesting additional time in which to complete construction under previous authorizations. Such applications are not granted unless substantial expenditures have been made or construction actually has been started and, further, unless substantially all materials and equipment necessary to complete construction are on hand or available. Applications for experimental high frequency and non-commercial educational broadcast stations were not made subject to this policy.

2. High Frequency (FM) Broadcast Service

With the curtailment of new authorizations for FM stations, together with the stoppage of production of broadcast receivers after April 22, 1942, further expansion of FM service is unlikely until after the war.

Authorizations. As of July 1, 1942, 55 construction permits for commercial FM broadcast stations were outstanding and five licenses had been granted. During the year 20 construction permits were granted prior to the adoption of the Memorandum Opinion, and eight authorizations were deleted, the latter generally resulting from the inability of permittees to obtain equipment. Due to this difficulty, a considerable number of stations were operating under special temporary authorizations.

using temporary transmitters or antennas and serving areas smaller than specified by the terms of the construction permits. At the close of the year, ten experimental high frequency broadcast stations were continuing to operate in the FM band under special authorizations, and seven of these stations had applications for commercial FM station authorizations either pending or granted.

Rules. No changes in the rules governing this service were made during the year; however, due to the shortage of materials, equipment, and skilled personnel necessary to broadcasting, the Commission on August 4, 1942, announced that holders of construction permits for FM stations may obtain licenses during the war to operate presently existing facilities, provided construction has reached a point where a substantial public service can be rendered. License applications submitted under this policy must include a showing of diligence in proceeding with construction and the applicant's willingness to proceed to final construction when equipment and personnel become available.

Although the rules permit the use of simultaneous facsimile transmission by high frequency broadcast stations, only limited interest has been shown in such operation and some technical difficulties have arisen in its application.

### 3. Television Broadcast Service

July 1, 1941 marked the beginning of television broadcast service to the public on a commercial basis. Under the rules and regulations adopted by the Commission in April of the same year for this type of service, each broadcast station was required to render a minimum of 15 hours program service per week.

Two television broadcast stations, both located in New York City, initiated program service to the public on a 15 hour-a-week basis, beginning July 1, 1941. In September, 1941, a station in Philadelphia was authorized to operate on a commercial basis, and in February, 1942, a station in Schenectady, New York, was likewise authorized. Thus, over the present fiscal year, four television broadcast stations have commenced and are continuing with program service to the public.

During June, 1942, the Commission authorized the completion with materials on hand of a fifth commercial station, located in Chicago, Illinois. The broadcast service that will be rendered by these five stations in various locations of the United States, augmented by the several experimental stations that continue to make limited broadcasts, should keep alive this new art during the war.

Station Construction. In addition to the five commercial stations authorized, as of July 1, 1941, 16 other permittees had authorizations for experimental television stations. Each permittee had indicated his intention to proceed promptly with the construction of the proposed station and to seek authorization for commercial operation at an early date. As of January 1, 1942, five of these permittees had obtained commercial authorization, with completion dates for station construction varying from one to six months. The eleven remaining permittees were unable to proceed with construction because of lack of equipment and each had obtained an extension for completing its proposed stations.

During the first months of 1942, it became evident that because of the war emergency equipment would not be available for constructing the unfinished stations authorized. On April 9, 1942, the Commission held an informal conference with television station permittees and licensees for the purpose of determining upon policies that might be followed during the war emergency. Representatives of the National Television System Committee also attended this conference. Following the conference the Commission called upon the permittees of television broadcast stations to submit progress reports on station construction and equipment on hand or needed for completion of the stations authorized.

As previously indicated, the Commission on April 27, 1942, adopted the policy that no further authorizations involving the use of any materials would be issued by the Commission to construct or to change the transmitting facilities of any commercial television broadcast station. This action of the Commission did not, however, prevent further authorizations for experimental television station construction, and the Commission has since April 27, 1942, continued to issue authorizations for such stations upon a showing that the construction was necessary to carry forward worth-while television research work.

Regulations. The operating rules and regulations for television broadcast stations adopted by the Commission in April, 1941, have not been changed except as to the minimum program service required of commercial stations. As a result of the Commission's conference with the television industry on April 9, 1942, the rule (Section 4.261(a)) governing the minimum program service required was changed to require but four hours per week instead of 15 hours per week.

Standards. At the time the Commission adopted regulations and standards for commercial television broadcast stations, it also announced that on or before January 1, 1942, it would consider further restrictions in standards with regard to the alternatives permitted in synchronizing wave forms. The same announcement

further stated that test data with respect to color transmissions and recommendations as to standards therefor would also be considered.

At the April 9, 1942, conference the National Television System Committee submitted a report recommending that the Commission's present standards be continued in effect for the duration of the war. This committee also stated that the present knowledge of the art does not justify the setting of standards for color transmissions. Its recommendations were adopted by the Commission.

#### 4. International Broadcast Service

At the close of the fiscal year there were fourteen international broadcast stations in operation within the United States. One, a 100 kilowatt station located in San Francisco, was licensed during the year.

All international broadcast stations are now programmed by the Office of War Information and the Office of the Coordinator of Inter-American Affairs. The Commission cooperates closely in determining optimum frequency, power, antenna structure, and hours of service for broadcasts from these stations to foreign areas. Commission engineers have cooperated in designing new stations and antennas in this international service.

#### 5. Noncommercial Educational Broadcast Service

As previously reported, five channels have been allocated for noncommercial educational FM broadcast stations. Since these frequencies are adjacent to those assigned commercial FM broadcast stations, educational programs can be received by the public.

As of July 1, 1942, eight FM educational stations were operating or under construction, a gain of three during the year.

#### 6. Studio-Transmitter Service

The location of many high frequency (FM) broadcast transmitters on the remote tops of hills and mountains for increased service areas often makes it difficult to provide economical, dependable and satisfactory telephone lines for the programming of such stations. This difficulty is overcome by a provision in the Commission's rules for ST (studio-transmitter) stations for transmitting programs from the studio to the transmitter of such stations. ST stations are required to employ FM and to use directional antennas.

The rules also provide for the use of ST stations by international broadcast stations, providing program circuits less subject to mechanical interruption.

Only a limited increase in this type of radio has been observed during the past year; about half those in service were authorized during the last fiscal period. Although ST is not included in the wartime "freeze" order of the Commission, the policy of no additional grants in the FM service has become a determining factor to a very large degree.

#### 7. Relay Broadcast Service

Relay broadcast stations are employed for the transmission of broadcast programs from sources where wire facilities are not available. Such stations may also be used as an emergency program link between the studio and the transmitter of a standard broadcast station when the regular wire circuits are interrupted. Considerable interest has been shown in the use of FM for relay broadcast work and several such stations have been licensed. At the close of the fiscal year a total of 523 authorizations for relay broadcast stations were outstanding.

#### 8. Facsimile Broadcast Service

Interest in facsimile broadcasting has continued to lag and at the close of the fiscal year only four stations were licensed, the same as the previous year. This service provided a means of transmitting still-pictures and text to a particular type of receiver in the homes and offices of the public. It was believed that a future for it might be found during the nighttime silence period of the standard broadcast stations, and some experimentation has been made in simultaneous transmissions over FM stations. Those standard broadcast stations owned or affiliated with newspapers showed particular interest in its development. While formerly a number of special authorizations for transmission of facsimile signals by standard broadcast stations were issued, all of such authorizations have expired without request for renewal.

As previously indicated, high frequency broadcast stations may multiplex transmission of facsimile signals with the regular aural programs; however, technical difficulties in such operation have been experienced and interest in this particular development has been limited.

### 9. Developmental Broadcast Service

Stations authorized under these rules are provided to permit manufacturers of broadcast equipment and experimenters in this field to carry on development and research looking toward new or improved broadcast apparatus and service. Due to the concentrated effort of manufacturers and others in developing and producing radio equipment for military purposes, the operation of developmental broadcast stations has been voluntarily restricted considerably, and there has been no change during the year of the number of stations (eight) authorized.



## CHAPTER VI

## SAFETY OF LIFE AND PROPERTY

1. Marine Services
2. Aviation Service
3. Emergency Service
4. Experimental Service
5. Miscellaneous Services
6. War Emergency Radio Service

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1. Marine Services

## Control by Navy Department

Immediately following the entry of the United States into the war, the Board of War Communications issued its Order No. 1, which had the effect of making radio stations and facilities on board certain ships subject to use, control, supervision, inspection, or closure by the Navy Department.

Ship radio stations, accordingly, are subject to the regulations and instructions of the Navy Department in addition to applicable treaties and statutes and the Commission's Rules and Regulations. Close cooperation between the Commission and the Naval authorities has been necessary in the enforcement of radio requirements and in the promulgation of new regulations concerning ship radio installations. The Commission has adopted a practice of withdrawing or withholding deficiency notices when requested by local Naval Authorities where corrective action required by such notices would cause a delay in the movement of the vessel in connection with the war effort.

Board of War Communications Order No. 2, dated February 26, 1942, similarly authorizes the Navy Department to use, control, supervise, inspect, or close all coastal and marine relay stations.

## Field Inspections

A total of 10,260 ship inspections were made by the Field Division of the Engineering Department during the fiscal year—

6,863 on U. S. vessels and 3,397 on vessels of foreign registry. As a result of these inspections, 4,279 violations notices were served, and 2,791 violations were cleared in the course of the inspections.

#### Exemptions

As in the past, the Commission granted exemptions from ship radio requirements to vessels under 100 tons gross tonnage, providing in most cases that such vessels not navigate more than 20 miles from land; and it similarly exempted certain other vessels, as authorized by Sec. 352 (b) of the Communications Act.

#### Great Lakes Engineering Study

During the past year the Commission made further study of necessary requirements for a safety radiocommunication service on the Great Lakes. An engineering survey was conducted for the purpose of obtaining additional technical data, under actual operating conditions, relative to the amount of radio transmitter power necessary to provide a selected degree of reliability in radiocommunication for a given distance on the Great Lakes. The survey involved a determination of the signal-to-noise ratios necessary to provide a given degree of intelligibility of radiotelephone transmission, a determination of the intensity of atmospheric noise which might be expected in an average navigation season, and numerous other required observations.

#### Approval of Equipment

Type approval of radio equipment designed for use on oceangoing vessels of the United States has been extended during the past year to shipboard radio receivers with respect to the radiation of energy. This extension was necessitated by a new rule, one purpose of which is to prevent enemy naval units from locating United States ships at sea through the use of sensitive radio direction finders or other radio receiving equipment capable of detecting radiated energy from the receivers on board. The Commission's engineers and inspectors tested or observed tests on a total of approximately 100 types of ship radio receivers which were submitted by commercial manufacturers or operating agencies for type approval, and action was taken to approve or disapprove each of these types under the requirements for equipment of this nature.

The Commission on June 6, 1942, approved the first automatic-alarm-signal keying device for use on oceangoing vessels of the United States. The automatic-alarm-signal keying device was designed and tested for compliance with the requirements promulgated by the Commission in 1941 for this type of equipment. The use of an automatic-alarm-signal keying device greatly reduces the possibility of error in transmitting the international automatic alarm signal and provides a means of transmitting the alarm signal after the ship has been abandoned. This procedure allows additional time for stations interested in the distress to take direction finder bearings.

Three additional types of ship station radiotelegraph transmitters have been approved, one as a main transmitter, one as an emergency transmitter, and one as both a main and an emergency transmitter. In accordance with pertinent regulations, the Commission also has approved certain emergency transmitting equipment for use in lifeboats of oceangoing merchant vessels, and is giving expeditious treatment to all matters concerning lifeboat radio apparatus.

#### New Rules

Because of the increased hazards to the safety of life and property at sea resulting from the war, it was found necessary to modify the Commission's rules governing ship service to provide added protection of the shipboard radio installations and a higher degree of reliability. New rules promulgated as a result of the war include the Commission's rule prohibiting the use of radio receivers which radiate radio frequency energy to an excessive degree on board oceangoing vessels of the United States; emergency transmitting antenna requirements; requirements pertaining to the protection of the ship's main antenna; and, other wartime provisions relative to the use and operating procedure of ship radio stations.

#### Emergency Marine Communications

During the past year and especially in the period following the entry of the United States into the war, increased use was made of the international and wartime distress signals by both ship and coastal radio stations. As in the past, the coastal radiotelegraph facilities contributed effectively to the safety of life and property at sea by intercepting distress signals from ships and rebroadcasting the signals using higher power than that available on board ship. Since our entry into the war, coastal stations have been used for the transmission of war warning messages to ships at sea. When sent on the international distress wave, these messages are frequently preceded by the automatic-alarm-signal in order to attract the attention of ships using approved automatic alarm receivers.

Because of the restrictions which have been applied to the use of receiving apparatus under certain conditions on board ship, and because of the lack of information concerning ship movements, it has not been possible to compile the usual statistical data regarding the number of responses to automatic alarm signal transmissions or to make conclusive studies of individual distress cases.

#### Radiotelephony in Gulf Coast Area

As a result of an investigation hearing held at Houston, Texas, the previous year, the Commission on May 26, 1942, published its conclusions concerning certain radiocommunication problems of the petroleum industry in the Gulf coastal area. It was decided that radio stations installed on stranded and indefinitely moored vessels and on fixed structures throughout inland waters of the coastal areas of Louisiana and Texas should not be classed and licensed as ship stations but should be authorized as provisional stations in the intermittent service. It was also decided that such provisional stations should be authorized, under certain conditions, to communicate with nearby public coastal harbor stations provided interference would not be caused to maritime mobile stations.

#### Coastal Stations

As of June 30, 1942, there were forty-eight coastal telegraph stations licensed by the Commission, exclusive of those in the Territory of Alaska. Because of the decrease in the ship-shore message traffic handled through coastal telegraph stations, brought about by the war, a total of 17 stations of this class in the United States and Hawaii were closed during the past year. The majority of the closed stations are maintained in readiness for immediate operation if their reactivation should be found necessary. No new coastal telegraph stations were established, and there has been no change in the number of coastal telephone stations previously reported. The four stations of this class licensed by the Commission are inactive insofar as communication with ships is concerned, and their facilities are being temporarily utilized for overseas fixed public telephone service.

#### Coastal Harbor Stations

For communication with vessels on the Mississippi River and the connecting inland waters, using frequencies specifically allocated by the Commission, the Commission licensed a new public

coastal harbor station at St. Louis, Missouri, and authorized the construction of a public coastal harbor station at Louisville, Kentucky. Public hearings were held on applications for construction permits for similar new coastal harbor stations at Pittsburgh, Pennsylvania, and Hoquiam, Washington. As of June 30, 1942, there were 36 coastal harbor stations, exclusive of stations in Alaska, authorized by the Commission.

### Stations in Alaska

Most vessels whose operations are concentrated in Alaskan waters are equipped with low-power radiotelephone ship stations for communication with low-power coastal harbor telephone stations open to public correspondence. Because of limited public land-line service in Alaska, there are many more coastal harbor stations in that Territory than in the continental United States. For the same reason there are many point-to-point stations operating in the fixed public service for intra-Alaska communication, often using the same equipment which comprises a coastal station. Since there are no public service radio communication companies in Alaska, most of these stations are maintained by isolated communities or commercial companies whose chief activity involves one or more of the principal industries of the Territory.

All point-to-point radio communication is coordinated with radio stations operated by the U. S. Signal Corps in Alaska and all stations licensed by the Commission in the fixed public service are subject to such use, control, supervision, and inspection by the Department of War as may be deemed necessary for the national security and defense, and the successful conduct of the war. All licensed ship and coastal stations in the Territory are subject to similar control by the Navy Department.

## 2. Aviation Service

### Domestic Aviation

A total of 8013 authorizations for the use of radio transmitting equipment in the aviation service, including aircraft, aeronautical, aeronautical-fixed, airport control, flying schools, and flight test radio stations were issued by the Commission during the year ending June 30, 1942. Many of the commercial aeronautical facilities are now operating in conjunction with the military forces, and the facilities remaining for commercial use are being operated to the limit of their capacity. The resultant burden upon the aviation radio communication facilities serving the combined military and

commercial operations has necessitated several changes in the related administrative procedure and regulatory action of the Commission. These changes have been consummated after numerous conferences and close cooperation with the War Department, the Navy Department, the Civil Aeronautics Administration and certain war agencies of the Government, as well as the representatives of the aviation industry.

The several hundred licensed aeronautical stations are required to serve all radio equipped aircraft. Being largely owned and operated by commercial airlines, however, they are primarily engaged in communicating with scheduled commercial aircraft. Various changes in commercial air traffic such as shortening of routes to save vital materials, temporary closure of radio stations during construction work on airports and landing fields, diversion of commercial operations to military service and similar factors, have resulted in the closure of some of these stations but in most cases, this does not signify actual abandonment. Aeronautical-fixed stations are supplementary to the aeronautical stations and provide a point-to-point radio communication service, between the various ground stations, relating solely to actual aviation needs.

There are many scheduled aircraft radio stations authorized by the Commission for use aboard commercial transport aircraft in behalf of 21 station licensees. A number of commercial aircraft have been taken over by the military forces with the result of a sustained increase in activity.

Practically all of the non-government aircraft and aeronautical stations operating in the continental United States use double side-band telephony, which requires at least 6 kilocycles of the radio frequency spectrum for each communication channel. Serious problems of radio frequency allocation which arise from time to time because of the demand for additional communication channels require and receive expeditious engineering treatment. Problems of this nature had developed at the close of the fiscal year 1942, and their ultimate solution will require much engineering study and collaboration with the Interdepartment Radio Advisory Committee, War Department, Navy Department, and Civil Aeronautics Administration.

#### Non-Scheduled Aircraft

Authorization for the use of radio transmitting equipment aboard non-scheduled aircraft more than doubled over the previous year. Among other reasons, this increase may be attributed to a stimulated interest in flying, fostered by the

operation of the Civil Air Patrol, by large scale pilot training activities, and by other governmental regulations which tend more and more toward the requirement that all aircraft flying cross-country be equipped to transmit and receive radio communications. The associated increase in demand for aircraft radio transmitting equipment is reflected in the increased number of applications filed for aircraft station licenses. The consideration of these applications necessitates close cooperation with the War Production Board from the viewpoint of procurement and priorities. Many of the privately owned and operated aircraft in the Civil Air Patrol are contributing directly to the war effort by assuming various patrol and ferrying duties assigned by the Army. In this respect, plane-to-plane communication and plane-to-ground communication by means of radio has proved desirable and essential.

#### Airport Control Stations

The function of an airport control radio station is to provide communication, usually by means of telephony, between airport control tower and aircraft radio stations in the immediate vicinity of the airport, for purpose of controlling air traffic. The increased number of aircraft engaged in flying within the continental limits of the United States has necessarily increased the number of individual contacts made with the control towers and has made it necessary for radio communication facilities at airports to be operated consistently at the limit of their capacity. Many airports have attempted to convert the operation of their radio transmitters to the ultra-high frequencies allocated by the Commission under a plan designed to meet the future needs of these stations, thereby relieving interference on the less effective low frequencies. They have not been successful in effecting this change in frequencies in many cases because of the shortage of radio equipment brought about by the war.

The number of airport control stations authorized by the Commission during the year represents an increase of approximately 23 per cent over the preceding year. Included among these airport stations are 5 stations equipped for instrument landings. The advantage offered by the latter is the fact that landings may be made more safely during adverse weather conditions, provided the aircraft concerned have radio instrument landing facilities. The use of radio controlled instruments in aircraft navigation is constantly increasing in all branches of aviation, particularly in commercial air transport.

#### Flying School Stations

Commercial Flying School radio stations usually operate on one of the four ultra-high frequencies allocated by the Commission

for use by stations of this class. Transmission characteristics of the ultra-high frequencies are especially well adapted to the type of local communication needed for flight training activities. Communication between the student flier and the instructor on the ground or in another aircraft, by use of radio telephony, has been of great assistance in the training program. In some instances such communications have actually been the means by which serious accidents have been averted. It is apparent that operation of flying school stations contributes directly to the safety of life and property in the air, and aids the war effort through increased efficiency in the instruction of student pilots.

#### Flight Test Stations

A flight test radio station affords a means of transmitting essential communications in connection with test flights of aircraft. Since inception of this class of station in the year 1941, four flight test stations have been authorized to communicate on the ultra-high frequency allocated for this purpose.

#### International and Alaskan Aviation Service

Because of the war there has been a marked increase in the extent of routes and volume of traffic in international and Alaskan air operations. In general, non-military aviation service in Alaska has shown an increase of more than 100 per cent based upon authorizations on record at the close of the fiscal year as compared with the previous year. This trend in Alaskan service may be taken as an indication of a similar trend in the international service.

At the close of the fiscal year, all non-government radio communication facilities of the Alaskan aviation service were under control of the War Department through complete military activation of the Territory and the authority conferred upon the War Department by Order No. 14 of the Board of War Communications.

### 3. Emergency Service

Emergency Radio Service is the communication provided by numerous stations of public and private organizations devoted to the protection of life, public safety, and property. This classification includes state and municipal police, zone and inter-zone police, special emergency, forestry, and marine fire stations.



With respect to the number of applications received, the emergency radio service is exceeded only by the broadcast and ship services. The following tabulation shows the changes in the number of stations during recent years, including the fiscal year 1942:

Class of Station	Total 1940	Total 1941	Total 1942	Increase during 1942.	
				Number	Per Cent
Municipal Police	1053	1196	1672	476	39.8
State Police	246	513	378	-135	-23.0
Zone Police	64	69	85	16	23.2
Interzone Police	27	30	33	3	10.0
Special Emergency	309	340	435	95	27.9
Forestry	617	807	844	37	4.5
Marine Fire	12	6	8	2	33.0
Totals	2328	2961	3455	494	16.7

A definite trend towards use of frequency modulation (FM) for radiotelephony in the emergency service was observed during the year. An ultra short wave communication system using frequency modulation has certain advantages over the conventional amplitude modulation system, such as freedom from local noise and a reduction of interference from other stations particularly when the other stations operate on the same carrier frequency. The characteristic of frequency modulation, whereby the strongest of a group of simultaneously received signals is clearly discernible over the weaker signals, permits rapid clearance of communications without requiring repetition because of interference. This characteristic of frequency modulation will enable the Commission to assign the same carrier frequency to stations located in adjacent municipalities, with the knowledge that serious interference which would result from such assignments if the stations were using amplitude modulation will not occur.

Recognizing the practical advantages of radiotelephone transmission by means of FM the Commission made appropriate changes in its rules, effective October 1, 1941, to permit its use by police, forestry, and other stations in the emergency service. These existing "experimental" stations were transferred to regular classifications in the emergency service.

The rules governing stations in the emergency service now provide for licensing a radiocommunication system composed of a land station (fixed location) and mobile radio units under one instrument of authorization. This procedure has simplified the Commission's records pertaining to the emergency service and has permitted a

considerable reduction in the number of applications filed for necessary instruments of authorization. Moreover, this principle of licensing groups of stations as a system offers advantageous latitude of operation, including the unrestricted transfer of mobile radio units within communication systems operated by public utilities and large departments of state or municipal governments. In situations of this kind, the use of more than one land station is often necessary; however, all radiocommunications transmitted within the system are under the operating jurisdiction of one controlling land station. Due to the foregoing reasons, the percentage increase in station licensees as expressed in the foregoing tabulation does not indicate the increased activity in emergency service during the year.

### Police Radio

Police radio is essential for civilian defense and protection, and for the maintenance of law and order. Municipal and state police systems are being chosen as the nerve centers of many systems of protection and civilian defense. However, the loss of experienced personnel to military service and the restrictions on use of materials has handicapped these developments to some extent. Augmented by volunteers and specially trained workers, police radio systems are being extended throughout many vital manufacturing areas, and are being coordinated with plant guards and special fire fighting squads. Continued operation of established zone and interzone police radio stations using long distance frequencies for radiotelegraph communication between separate police systems is a valuable supplementary service in time of war, especially in the event existing wire lines were interrupted.

For the preservation of law and order in large encampment areas, the military and civil police operate their communications in a unified system. These systems enable the necessary expansion to be properly made, and in addition provide for other essential communications of military importance, such as the rapid clearance of large convoys of military units and trucks through municipal areas.

The increase during the past fiscal year for municipal police stations was 39.8 per cent in comparison to a 14 per cent increase for the previous fiscal year. The number of state police stations decreased 23 per cent because many mobile station licenses were automatically cancelled, in changing to the system method of licensing mobile units. Ninety-one new state police station licenses were granted during the year, and if this increase were figured on the basis of the actual stations placed in service, the increase in state police radio stations

for the past fiscal year would be approximately 20 percent. It is necessary to maintain close liaison with the War Production Board during consideration of applications for additional police radio equipment, in order that procurement and priority matters will be properly coordinated.

Simultaneous use of frequency modulation and amplitude modulation on the same carrier frequency apparently has not increased interference between police communication systems. The practical development of frequency modulation has somewhat alleviated the interference problem and has substantially increased the utility of the 29 ultra-high frequencies allocated for police radio communication.

The use of high frequency unattended repeater stations has grown rapidly during the past year. Such authorizations have been granted as Class 2 experimental police stations. The principal use of these repeater stations in the Police Service is to increase the talk-back range of radio-equipped police cars. It is generally known that fixed police radio stations can transmit successfully to mobile units over longer distances than the cars can in reply. Comparatively compact and unattended repeater stations located at isolated points of high elevation intercept messages from the mobile police cars and automatically relay these messages over high frequency circuits to the headquarters or land station at a fixed location. In geographical areas favorable to this method of operation, such as the State of California, where many high mountains exist, the talk-back range of police cars has been greatly increased by such operation.

The outstanding example of automatic repeater installation is represented by the Pennsylvania Turnpike Radio System which utilizes seven unattended radio repeater stations. While this system has been operating on an experimental basis for only eighteen months, the operation of these unattended repeater stations on ultra high frequencies has served a useful purpose and gives promise of extensive practical application in the future.

#### Forestry

The United States Forest Service, the State Departments of Conservation, and private agencies owning and operating timber land have equipped hundreds of fire lookout towers with radio equipment, mostly for communication by telephony. Men and vehicles also are provided with radio units in order to establish a reliable communication network. This permits the rapid exchange of messages between the bases of forest fire control and the operating crews. Because of the state of war, this communication service which is established throughout sparsely settled and remote areas appears to have a valuable supplementary use in connection with the military forces; however, its full possibilities in this respect have not yet been demonstrated.

### Marine Fire Stations

Under the marine fire classification, a relatively small number of radiotelephone stations are operated by municipal fire departments as an aid in reporting and combating fires originating on or near docks, wharves, moored vessels, and warehouses along city waterfronts. This service is useful for dispatching fire boats and coordinating their operation with the activities of land fire fighting units. Continuous communication is provided between fire headquarters and fire boats and between the boats and fire trucks, thereby permitting the immediate dispatch or recall of the mobile fire units.

Because of the important relationship between shipping and the war effort and the consequent need for increased protection against fire in harbors and ports, the value of marine fire service has increased during the year. Radiotelephony has increased the effectiveness of available fire boats in coping with expanded harbor patrols and other duties which are necessary.

### Special Emergency Stations

Special Emergency Stations, as their classification implies, are intended for use only in emergencies concerning the safety of life or important property, provided no other means of communication is available. These stations, most of which are equipped for radiotelephony, are prohibited by the Commission's regulations from handling routine or non-emergency communications. During the past fiscal year the number of special emergency installations increased more than 27 per cent over the previous fiscal year.

Since the outbreak of the war, special efforts have been made by the gas, water, and electric power utilities to furnish improved protection for their pipe lines, aqueducts, and transmission lines in remote areas. These facilities are patrolled by special repairmen who often are deputized police officers with the authority to arrest. Special emergency radio stations permit utilities to be coordinated in a public emergency.

Special emergency stations are used also by public service wire telephone and telegraph companies to restore communication as quickly as possible after failure of the regular wire system has resulted from a flood, strong wind, or other cause. Portable radio transmitter and receiver units are placed at each end of the land-wire gap, and are used temporarily to bridge damaged lines. As soon as the wire lines are repaired or replaced the radio units are removed and stored at strategic locations for use in the next emergency.

#### 4. Experimental Service

Stimulated by the urgent war-time need for new equipment and revolutionary methods in the field of radio communication, activity in the Experimental Service has increased during the year. Experimentation and development have occurred in almost every field of radio including television, facsimile, frequency modulation, direction-finding, and selective calling devices. A total of 493 experimental authorizations were in effect at the close of the fiscal year, which is an increase of ten percent over the previous year. The closure of all amateur stations probably was a factor contributing to the increased activity in the experimental field.

Many authorizations for the operation of experimental radio stations were issued to industrial organizations engaged in radio research and development under contracts issued by various agencies of the government, particularly the War and Navy Departments. For military reasons the scope and far-reaching effects of this research work cannot be revealed at this time; however, it may be reported that new methods and new techniques have been developed which, in all probability, will greatly enhance the value of radio in commercial fields of application after the war.

#### 5. Miscellaneous Services

The entry of this country into the war created a new interest in prospecting for crude oil deposits and strategic minerals, and at the close of the fiscal year, the number of geological stations which are licensed for such purposes had increased 25 per cent in comparison to the previous year. On the other hand, the use of the relatively few relay press stations and mobile press stations has been reduced by certain restrictions necessitated by the war. Motion picture stations continue as a valuable adjunct in the filming of motion pictures since they are used for the protection of life and safety of the personnel and for the coordination of related activities.

The following tabulation shows the number of licensed stations by classes in each of the recognized miscellaneous services:

Service and station class	Number 1941	Number 1942
(1) Geophysical service:		
Geological stations.....	269	302
(2) Special press service:		
Relay press stations.....	7	7
Mobile press stations.....	4	3
(3) Intermittent service:		
Motion picture stations.....	12	15
Provisional stations.....	7	22

Under the revised rules, it is appropriate for the Commission to authorize provisional stations to be operated by miscellaneous organizations whose activities are directly related to the war effort. For example, radio stations operated by lumber companies can prevent accidents and can be employed to dispatch logging trucks over long and hazardous one-way forest roads, thus expediting production of wood products used in the construction of aircraft and for other projects of value to the war effort. Radiotelephone stations operated by large plants manufacturing war products afford communication for the plant police system where a municipal police radio system is not readily available for the plant police or where the use of municipal police radiocommunication would not be feasible.

#### 6. War Emergency Radio Service

As recommended by the Board of War Communications, a new "War Emergency Radio Service" was authorized as a temporary wartime measure, and regulations governing this service were adopted by the Commission, effective June 12, 1942. The new service is intended to provide rapid emergency communication considered necessary for the national security and defense. The Board of War Communications, the Office of Civilian Defense, and the War Department collaborated with the Commission in the formulation of this plan. It makes available on a voluntary basis the services and equipment of amateur radio operators and other qualified citizens under conditions which would assure responsible control, and at the same time permits sufficient flexibility of operation to provide communications essential for civilian defense and state guard organizations. The Board of War Communications by means of its order No. 9 of May 28, 1942, delegated to the Commission the necessary authority to control, supervise, inspect, or close stations in this service in accordance with the terms of Executive Order No. 8964, and without regard to the requirements of notice and hearing contained in the Communications Act.

The rules and regulations governing stations in the War Emergency Radio Service provide for establishment of communication facilities for civilian defense organizations and for separate facilities for state guard organizations. Civilian defense stations may be used by instrumentalities of local government such as cities, towns, and counties to furnish essential emergency communication relating to civilian defense during or immediately following air raids, impending air raids, or other enemy operations or acts of sabotage. State guard stations may be used by state guard organizations during emergencies endangering life, public safety, or important property, or for essential communications directly relating to state guard activities under circumstances in which other communication facilities do not exist or are inadequate.

The Commission requires that each licensee of civilian defense stations appoint a responsible citizen to direct and supervise the operation of all civilian defense radio units authorized in the license. Each official so appointed is termed by regulation "Radio Aide" and must meet certain standard qualifications, among which, is the holding of a valid radio operator license of any class except a Restricted Radiotelephone Operator Permit. His duties include supervision of all of the radio stations and operators in a civilian defense communication system. He is responsible under the station licensee for the monitoring of all transmissions and must generally guard against the improper use of the station, such as any unintentional or inadvertent transmissions which might be of value to the enemy.

## CHAPTER VII

## RADIO OPERATORS

1. General
  2. Commercial
  3. Amateur
- 
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1. General

There has developed a serious shortage of qualified operators in practically all radio services licensed by the Commission. Thousands of radio operators entered the military services of the nation during the year, thus creating vacancies at their former stations; and this has only in part been counterbalanced by the fact that the number of radio operators licensed during the year has greatly exceeded the average yearly increase over previous years.

During the fiscal year 1942, 69,804 applicants were examined (exclusive of Class C Amateurs). This is 22,930 more than were examined for operator licenses during the fiscal year 1941. Of the 69,804 applicants examined, 61,903 were applicants for commercial licenses, 58,277 being in the radiotelephone classifications. Applicants for Classes A and B amateur radio operator licenses totalled 7,901. As a result of examinations 61,399 commercial operators licenses were issued - 56,830 telephone and 4569 telegraph.

The Communications Act authorizes issuance of radio licenses to citizens of the United States only. <sup>1/</sup> By its Order 75 of 1940 the Commission required each licensed radio operator and each applicant for new or renewed license to file a certain questionnaire under oath, fingerprint card and documentary evidence to prove United States citizenship. Approximately 182,000 such responses have been received and analyzed since the adoption of the Order. Receipts exceed 5,000 monthly.

Similar information has been obtained from communications company employees; more than 45,000 have been received to date and receipts approximate 860 monthly.

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1/ Communications Act. Sec. 303



## 2. Commercial Radio Operators

Six classes of commercial radio operator licenses are issued by the Commission. Three are for radiotelegraph and three are radiotelephone.

About 94,000 commercial operator licenses were outstanding at the close of the fiscal year, of which about 72,000 were restricted radiotelephone permits. The large increase reflects greatly increased use of radio, particularly for police and other services concerned with the safety of life and property. About 12,000 were Class I and Class II radiotelephone licenses, and the remaining 10,000 were radiotelegraph licenses.

The Commission, in recognition of the growing shortage of first class radiotelephone operators and upon recommendation of the Board of War Communications, relaxed its operator requirements (Order 91, 91(a) and 91(b)) to permit the operation of broadcast stations of any class by qualified holders of any class commercial operator license. However, station licensees must have at least one first class radiotelephone operator at hand to make all adjustments of the transmitter except those of a minor nature. The Orders also make it necessary for holders of restricted radiotelephone permits to have such permits endorsed to show their proficiency in radiotelephone theory as ascertained through examination.

The Commission adopted Order 97, establishing a new class of operator license entitled "Temporary Limited Radiotelegraph Second Class Operator License." This license is valid for the operation of licensed radiotelegraph equipment installed aboard ships only.

The Commission having also found that conditions arising from the war emergency necessitated an increased number of radiotelegraph operators qualified to operate aeronautical and aeronautical fixed stations using type A-1 and A-2 emissions, further relaxed its rules governing radio operators by Commission Order 102; that for a period of five years or until further Order of the Commission the holder of a valid first or second class radiotelephone operator license or the holder of a valid restricted radiotelephone operator permit be authorized to act as operator of this type station provided that the face of the permit or license has been endorsed attesting to the holder's ability to transmit and receive International Morse Code at the rate of at least sixteen code groups per minute.

Commission Order 93 permits the operation of radio-transmitting apparatus by certain qualified Latin-American students during their period of specialized aeronautical training with the C.A.A., only.

### 3. Amateur

On December 8, 1941 the Commission, at the request of the Board of War Communications, issued Order 87 closing all amateur stations throughout the United States, its territories, and possessions. This action was taken in the interest of the security of the United States.

The closing of amateur stations did not diminish the interest of amateurs in radio and allied subjects. Many amateur operators have obtained commercial licenses and are employed in the operation of broadcast, aircraft ship and other classes of stations. Thousands of amateurs have entered the military services of the Nation, while others are engaged in various types of radio work in manufacturing organizations.

Since February 26, 1942, the Commission has continued to grant renewed amateur station licenses and amateur operator licenses to qualified applicants. This policy is supported by the War and Navy Departments in consideration of the fact that holders of amateur operator licenses entering the military and naval services are given higher ratings in recognition of their specialized technical knowledge.

On June 19 the Commission ordered the registration of all amateur radio transmitters requiring a complete description, ownership, location, etc., to be followed with information regarding any removal from the possession of the registrant.

Many amateurs, whose peacetime interests were devoted to the organization and establishment of emergency communication networks to be utilized by the American Red Cross and other disaster relief organizations in the event of floods, hurricanes, earthquakes and similar catastrophes when normal communication facilities had been disrupted, have retained possession of their equipment, which may become useful to State Guard and Civilian Defense organizations desiring to operate radio stations in the War Emergency Radio Service. Many amateurs became associated with these organizations during the past year and their experience gained as amateur station operators should prove very helpful in solving Civilian Defense and State Guard communication problems.

## CHAPTER VIII

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TECHNICAL STUDIES

1. The Eleven-Year Sunspot Cycle Survey
  2. Tropospheric Waves
  3. Ground Waves
  4. Standardization of Methods of Measuring Electrical Noise
  5. Registration of Radiofrequency Generators
- 
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The Commission as a result of war conditions now serves as a consultant to other defense agencies such as the Board of War Communications, the Office of Civilian Defense, and the National Defense Research Committee. It collaborates with the Army, the Navy, the National Bureau of Standards, the National Inventors Council, the National Research Council and the radio divisions of other government departments. It is called upon for advice from time to time by state, county and municipal defense organizations. The character and the scope of the technical studies of the Technical Information Division during the year were necessarily affected by these changed conditions. In general, all work considered as routine was curtailed in order that full time might be given to problems bearing directly on the war.

1. The Eleven-Year Sunspot Cycle Survey

This study of wave propagation, mentioned in many of the Commission's previous reports to Congress, has been in progress since the year 1938. Successful completion of the project requires continuous 24-hour automatic recordings of field intensity and noise over one complete sunspot cycle, or eleven years. Statistical analysis of the data so far obtained has yielded information which has been of great value to the Commission in connection with normal communication problems. It has now been found of even greater value in connection with wartime communication problems.

2. Tropospheric Waves

The study of tropospheric waves, a knowledge of which is important in connection with the assignment of frequencies for the rapidly growing commercial and government radio services operating

in the ultra-high-frequency regions of the spectrum, has also been a continuing one. Tropospheric waves are dependent on the weather, rather than on the vagaries of the ionosphere, as is the case with sky waves on the lower frequencies. For this reason experimental investigation of their behavior requires field intensity recordings of relatively few stations and over a shorter period of time -- only one year or two -- as compared to the eleven-year period required for ionospheric waves. Although changed conditions in the field caused by the war had previously interrupted this study, some recordings of tropospheric waves were begun from a location in Washington during the early part of the year. The arrangements at this location proved unsatisfactory because of interference to reception caused by diathermy machines. Equipment is now being installed at the Commission's monitoring station at Laurel, Maryland, for continuous recordings on four ultra-high-frequency broadcast stations. The lack of reliable data regarding propagation characteristics of ultra-high frequencies, extensively used by the armed forces made the inauguration and continuation of this program essential.

### 3. Ground Waves

Progress has continued during the year in the study of ground waves responsible for the primary service areas of both standard broadcast stations operating on the lower frequencies and of high-frequency broadcast and television broadcast stations operating on the ultra-high frequencies. Ground wave propagation curves were prepared for the entire band of frequencies from 10 kilocycles to 10,000 megacycles for average land conditions, and for transmission over sea water. Nomograms based on these curves are in process of preparation which will make possible rapid calculation of radio wave propagation over distance ranges of 200 miles for frequencies between 20 - 500 megacycles and antenna heights ranging from 30 to 1000 feet.

### 4. Standardization of the Methods of Measuring Electrical Noise

The importance of accepted standard methods of measuring electrical noise, i.e., man-made noise produced by electrical machinery of various kinds in connection with studies of radio wave propagation, was emphasized in the annual report of last year. Commission engineers participated in tests held in Montreal in April to determine the reliability of telegraph and telephone signals through varying amounts of electrical noise and in concurrent tests and comparisons of noise meters. In conformity with previous experience, wide variations were found to exist among the various meters tested. The listening tests disclosed that even with consistent methods of measuring noise, its effect upon communication

circuits cannot be predicted with accuracy unless the characteristics of the radio receivers to be used are also known.

#### 5. Registration of Radiofrequency Generators

Pursuant to authority delegated to the Board of War Communications by the President, Order 8964 of December 10, 1941, the Board determined that the national security and defense and the successful conduct of the war demanded that the government (F.C.C.) have knowledge of all persons having apparatus equipped for the transmission of radiofrequency energy. Under terms of its Order the Federal Communications Commission was authorized not to require registry of particular apparatus or classes of apparatus whenever it determined that registry was not necessary.

The radiofrequency generators referred to may be separated into general classes, namely: (1) Carrier Current Communication Systems; (2) Wired Radio Broadcasting Systems; (3) Inter-office Wired Radio Communication Systems; (4) Wired Radio Systems in Private Use; (5) Radiofrequency Remote Control Devices; (6) Radiofrequency Phonograph Oscillators; (7) Test Oscillators or Signal Generators; (8) Diathermy Apparatus; and, (9) Industrial Oscillators.

The Commission has during the year, through its Orders Nos. 96, 99 and 101, provided for the registration of all diathermy machines, unlicensed or unused radio transmitters designed for communication purposes, and all amateur transmitters. The other classes of generating equipment are currently under consideration.

## CHAPTER IX

## STATISTICS

1. Common Carrier Statistics
2. Broadcast Financial Data
3. Broadcast Statistics
4. Other Radio Service Statistics
5. Engineering Field Statistics
6. Publications

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1. Common Carrier Statistics
Reports of Carriers

For the calendar year 1941 annual reports were filed by 218 companies including 135 telephone carriers, 33 wire-telegraph, ocean-cable and radiotelegraph carriers, and 45 holding companies. These reports contain considerable financial and operating data relating to the communications industry. In addition, 40 carriers filed reports concerning traffic damage claims paid during the year 1941 by telegraph, cable and radiotelegraph carriers. Certain statistical data for the calendar year 1941 relative to large common carriers reporting to the Commission are shown in the following table:

Item	Telephone carriers	Wire-telegraph & ocean-cable carriers	Radio-telegraph carriers
Investment in plant and equipment	\$5,393,579,802	\$486,844,552	\$30,314,488
Depreciation and Amortization Reserves	<u>1,526,632,183</u>	<u>180,056,404</u>	<u>16,682,606</u>
Net investment in plant and equipment	\$3,866,897,619	\$306,788,158	\$13,631,882
Operating revenues <u>1/</u>	1,407,761,066	149,315,654	15,725,900
Operating expenses <u>1/</u>	918,194,439	125,927,627	9,936,473
Net operating income	489,566,627	23,388,027	5,789,427
Net income	210,019,491	6,111,860	1,645,940
Number of employees at end of year	345,439	74,298	3,852
Total payroll for the year	\$603,410,323	90,942,052	\$7,133,569

1/ Approximately \$32,000,000 of intercompany general service and license fees and rents of the Bell System have not been eliminated from these accounts.

## 2. Broadcast Financial Data

The standard broadcast networks and stations in the United States received from the sale of time \$178,091,043 in the calendar year 1941, an increase of \$23,267,256, or 15%, over the amount for 1940, according to financial data filed with the Commission by the three nationwide network companies, the seven regional networks, and 817 standard stations. In addition to time sales, these networks and stations reported revenues of \$15,190,335 from the sale of talent and other services during 1941, an increase of \$2,008,387 over the amount reported for the previous year. Broadcast service income (operating profit) of the standard broadcast industry for 1941 exceeded the amount reported for 1940 by more than \$11,500,000, or about 35%.

The three major network companies (NBC, CBS, and Mutual) reported combined standard broadcast time sales of \$79,621,534 for the year, up about 11% over 1940. The National Broadcasting Co., through its dual networks, accounted for \$40,378,764, while the figures for CBS and Mutual were \$34,386,040 and \$4,856,730, respectively. They paid to standard stations under contract and to regional networks \$25,651,249 compared to \$22,123,760 in the year previous. The combined standard broadcast service income as reported by NBC, CBS and Mutual, including the operations of their networks and standard stations, was \$16,897,944 before Federal income and excess profits taxes. After provision for Federal income and excess profits taxes, and including profits or losses from the operation of other than standard broadcast stations, the combined net income of the three nation-wide network companies amounted to \$8,642,279 in 1941 as compared with \$8,879,694 for the preceding calendar year.

The purely non-network business (time sold to local and national advertisers by the 817 standard broadcast stations) of the industry was \$97,379,610, bettering the previous year by \$15,482,374, or approximately 19%. The broadcast service income of 784 standard stations not operated by or for the networks amounted to \$27,056,162, an increase of \$7,932,553, or approximately 41%.

A total of 177 standard stations reported broadcast service deficits in 1941. These stations had total time sales of \$7,629,969, total expenses of \$8,706,066, and lost in the aggregate \$1,209,795. These figures include losses for 10 of 54 new standard stations, the remaining 44 having operated at a profit. However, the number of standard stations showing broadcast service deficits was under the figure for 1940, when 187 stations lost \$1,551,812.

As of December 31, 1941, these standard broadcast networks and stations employed 24,728 persons, and the pay roll for the year 1941 was \$50,668,977.

## 3. Broadcast Statistics

NUMBER OF STATIONS IN BROADCAST SERVICE  
FOR FISCAL YEAR ENDING JUNE 30, 1941 and 1942

Class of Station	As of June 30, 1941	New	Deleted	As of June 30, 1942
Standard Broadcast .....	897	34	6	925
High Frequency Broadcast (Experimental) 20	20	0	7	13
High Frequency Broadcast (FM).....	49	20	8	61
Low Frequency Relay.....	229	36	17	248
High Frequency Relay.....	269	30	24	275
Television (Experimental).....	45	7	16	36
Television (Commercial).....	2	9	1	10
International.....	12	3	1	14
Developmental.....	8	0	0	8
ST.....	4	8	2	10
Facsimile.....	4	0	0	4
Non-Commercial Educational.....	5	4	1	8
Class II (Experimental).....	1	1	0	2
	<u>1545</u>	<u>152</u>	<u>83</u>	<u>1614</u>

## BROADCAST APPLICATIONS

Service	Applica- tions received	Applica- tions granted	Special authori- zations
Standard Broadcast.....	4,087	3,252	442
Relay Broadcast .....	802	634	76
International Broadcast.....	128	74	63
Television Broadcast (Commercial)..	74	38	16
Television Broadcast (Experimental)	109	89	27
Facsimile Broadcast.....	5	14	1
High Frequency Broadcast(Experimental)	117	35	122
High Frequency Broadcast (FM).....	371	158	150
Non-Commercial Educational Broadcast	15	18	0
Developmental Broadcast.....	15	24	10
ST (Studio-Transmitter) Broadcast..	36	20	11
Class II Broadcast (Experimental)..	6	1	1
Totals.....	<u>5,765</u>	<u>4,357</u>	<u>919</u>

NOTE. - Figures include formal and informal applications for new stations, construction permits, modification of construction permits, assignment of construction permits, licenses, renewal of licenses, assignment of licenses, transfer of control, installation of equipment, determination of operating power by direct method, special experimental authorizations, etc. Standard broadcast application figures include 590 Form 335's (chain broadcasting); grants include 875 extensions of licenses. Developmental grants include one class II experimental broadcast station.



#### 4. Other Radio Service Statistics

Statistics for fiscal year ending June 30, 1942

SERVICE	Appli- cations Received	Authori- zations Issued	New Stations Authorized	Total Stations June 30 1942
<u>AVIATION:</u>				
Aeronautical	572	1019	53	424
Aeronautical Fixed	225	328	7	165
Aero. & Aero. Fixed	92	86	0	0
Aircraft	6627	6365	2012*	3759
Airport Control	177	162	15	53
Flying School	49	49	10	21
Flight Test	6	4	2	4
Sub-Total	7748	8013	2099	4426
<u>EMERGENCY:</u>				
Municipal Police	4995	3593	419	1672
State Police	1164	638	91	378
Zone Police	128	115	2	85
Interzone Police	48	43	2	33
Forestry	1197	1142	165	844
Special Emergency	770	549	124	435
Marine Fire	25	15	2	8
Sub-Total	8327	6095	805	3455
<u>EXPERIMENTAL:</u>				
Class 1	462	446	65	297
Class 2	669	657	188	195
Class 3	2	2	0	0
Sub-Total	1133	1105	253	493
<u>PT. TO PT. TELEGRAPH:</u>				
Public	471	448	4	73
Press	70	39	4	7
Agriculture	14	7	0	7
Sub-Total	555	494	8	87
<u>PT. TO PT. TELEPHONE:</u>				
Public	69	70	20	18
<u>MISCELLANEOUS SERVICE:</u>				
Geological	328	673	36	302
Motion Picture	15	15	4	15
Provisional	43	58	18	22
Mobile Press	4	4	0	3
Relay Press	7	4	0	7
Sub-Total	397	754	58	349

SERVICE	Year Ending June 30, 1942			Total Stations June 30 1942
	Appli- cations Received	Authori- zations Issued	New Station Authorizes	
<u>COASTAL (U.S.):</u>				
Coastal Telegraph	81	43	0	48
Coastal Harbor	100	57	9	36
Coastal & Pt. to Pt.	3	1	0	0
Marine Relay	57	20	0	0
M.R. & C. Telegraph	10	2	0	0
Coastal Telephone	11	4	0	8
Sub-Total	262	127	9	92
<u>ALASKAN SERVICES:</u>				
Fixed Public	479	471	39	321
Experimental	5	4	0	4
Aviation	341	307	14*	287
Coastal	277	514	21	176
Sub-Total	1102	1296	74	788
TOTAL	19,933	18,282	3,326	9,708
<u>WIRE CERTIFICATES:</u>				
Telephone	167	131		
Telegraph	173	197		
Total	340	328		

\* The count for new stations authorized for Alaskan Aircraft is included in figure for U.S. The Number 14 under Alaska represents Aeronautical and Aeronautical Fixed stations.

### 5. Engineering Field Statistics

During the fiscal year the Field Division of the Engineering Department made 34,534 frequency measurements-- 4,157 radiotelegraph, 10,911 broadcast, and 1,292 radiotelephone. Such frequency monitoring resulted in the serving of 1,062 violation notices and 53 harmonic notices.

The number of inspections completed during the fiscal year totaled 16,548. Of these, 4,157 were radiotelegraph stations, 1714 were broadcast stations, and 417 were radiotelephone stations. A total of 1,386 violation notices were served following such inspections.

As noted in Chapter VI (1) (b), the Division also made 10,260 ship inspections, as a result of which 4,879 violations notices were served.

Routine investigations numbered 1,992. Of these, 679 were amateur, 224 broadcast, and 1,089 miscellaneous cases. At the close of the fiscal year only 24 cases remained unclosed.

During the fiscal year 1942, 69,804 applicants for radio operator permits were given examinations, an increase of 22,930 over the fiscal year 1941.

## 6. Publications

Following is a list of Federal Communications Commission publications of general interest available at the Government Printing Office, Superintendent of Documents, Washington, D. C.:

Title	Price
Communications Act of 1934 with Amendments and Index Thereto.....	.15
Federal Communications Commission Reports (Bound volumes of decisions and orders, exclusive of annual reports):	
Volume 1 - July 1934, July 1935.....	1.00
Volume 2 - July 1935, June 1936.....	2.00
Volume 3 - July 1936, February 1937.....	2.00
Volume 4 - March 1937, November 15, 1937.....	1.50
Volume 5 - November 16, 1937, June 30, 1938.....	1.50
Volume 6 - July 1, 1938, February 28, 1939.....	1.50
Volume 7 - March 1, 1939, February 29, 1940.....	1.50
Annual Reports of the Commission:	
First Annual Report - Fiscal year 1935.....	.15
Third Annual Report - Fiscal year 1937.....	.30
Fifth Annual Report - Fiscal year 1939.....	.30
Sixth Annual Report - Fiscal year 1940.....	.20
Seventh Annual Report - Fiscal year 1941.....	.10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	.15

Title	Price
Standards of Good Engineering Practice Concerning Standard Broadcast Stations. (550-1600 kc).....	.30
Statistics of the Communications Industry in the United States (1939).....	.25
Statistics of the Communications Industry in the United States (1940).....	.20
Report on Chain Broadcasting.....	.30
Rules and Regulations of the Federal Communications Commission:	
Part 1, Practice and Procedure.....	.10
Part 2, General Rules and Regulations.....	.10
Part 3, Rules Governing Standard Broadcast Stations....	.05
Part 4, Rules Governing Broadcast Services (Other Than Standard Broadcast).....	.10
Part 5, Experimental Rules.....	.05
Part 6, Rules Governing Fixed Public Radio Services.....	.05
Part 7, Rules Governing Coastal and Marine Relay Services.....	.05
Part 8, Ship Rules.....	.10
Part 9, Aviation Radio Services.....	.05
Part 10, Rules Governing Emergency Radio Services.....	.05
Part 11, Rules Governing Miscellaneous Radio Services.....	.05
Part 12, Rules Governing Amateur Radio: Stations and Operators.....	.10
Part 13, Rules Governing Commercial Radio Operators.....	.05

Title	Price
Part 14, Rules Governing Radio Stations in Alaska (Other than Amateur and Broadcast).....	.09
Part 31 and 32, Uniform System of Accounts Class A and Class B Telephone Companies, Units of Property Class A and Class B Telephone Companies (1 pamphlet).....	.15
Part 33, Accounting by Class C Telephone Companies.....	.15
Part 34, Uniform System of Accounts, Radio Telegraph Carriers.....	.25
Part 35, Uniform System of Accounts for Telegraph and Cable Companies.....	.35
Part 41, Rules Governing Telegraph and Telephone Franks.....	.05
Part 42, Rules Governing the Destruction of Records.....	.10
Part 43, Rules Governing the Filing of Information, Contracts, etc., of Telecommunication Carriers.....	.05
Part 61, Tariffs, - Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communication Service.....	.10
Part 62, Rules Governing Application under Sec. 212 of the Act to Hold Interlocking Directorates.....	.05
Federal Communications Commission Report on Social and Economic Data, Pursuant to Informal Hearing etc., July 1, 1937.....	.60
Federal Communications Commission - Proposed Report Telephone Investigation (Pursuant to Public Resolution No. 8, 74th Congress).....	1.00

In addition, the following are available without charge from the Federal Communications Commission:

An ABC of the F.C.C. (1940)  
 Radio — A Public Primer (1941)  
 Information Regarding Ship and Coastal Harbor Radiotelephone Service (1941)

NINTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION

FISCAL YEAR ENDED JUNE 30, 1943

(With Notations of Subsequent Important Activities)

COMMISSIONERS  
MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION  
(As of January 1, 1944)

CHAIRMAN  
JAMES LAWRENCE FLY  
(Term expires June 30, 1949)

PAUL A. WALKER  
(Term expires June 30, 1946)

RAY C. WAKEFIELD  
(Term expires June 30, 1947)

NORMAN S. CASE  
(Term expires June 30, 1945)

CLIFFORD J. DURR  
(Term expires June 30, 1948)

T.A.M. CRAVEN  
(Term expires June 30, 1944)

(One Vacancy)

LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION  
Washington, D. C., February 8, 1944

To the Congress of the United States:

The Ninth Annual Report of the Federal Communications Commission for the fiscal year ending June 30, 1943, is submitted herewith. Certain major developments since June 30 are also included to enhance the current usefulness of the Report.

Respectfully,

JAMES LAWRENCE FLY  
Chairman



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## INTRODUCTION

The Federal Communications Commission during the past year intensified its efforts to strengthen our own communications as a weapon of war and to thwart the use of enemy communications against us.

The demands upon our communications systems are increasingly urgent. The telephone, telegraph, radio and cable systems are used for vital war purposes: to direct troop movements, to speed the shipment of war materials, to issue orders to war plants, to shift manpower, to combat sabotage. Our fighting men in bivouacs around the globe tune in the radio for up-to-the-minute news and entertainment from the homeland. The radio flashes us our first news and photographs of the battlefield and rallies the homefront for such measures as rationing; bond sales, civilian defense, plasma collection, salvage drives, manpower recruitment. In the international field, broadcasting is aiding the citizens of the United Nations to understand each other better and is enabling us to oppose the Axis strategy of lies with the United Nations strategy of truth.

To facilitate the performance of these war tasks, the FCC: Conducted continuing investigations of compliance by the telegraph companies with Board of War Communications orders prohibiting domestic congratulatory messages and non-telegraphic services and curtailing dead-head and service messages, and made other studies to speed the handling of essential traffic; approved the merger of Western Union and Postal Telegraph; inspected communications plants and made recommendations for anti-sabotage precautions; aided in planning and authorized numerous lines of communications with foreign lands; called a meeting of government and industry authorities to discuss preliminary steps toward coordinating their planning for the postwar technical future of radio; enforced radio silence during air raid tests and alerts; provided engineering advice and other assistance to develop psychological warfare over international shortwave stations; moved to alleviate the materials and equipment shortages by curtailing non-essential radio construction, by making surveys of surplus and salvageable equipment and by saving wear and tear on valuable equipment through certain changes in operating rules; examined 76,210 applicants for commercial radio operator licenses; made available the results of several manpower surveys; continued the recording of sky waves and tropospheric waves in connection with frequency allocation studies; prepared statistics on various aspects of communications operations for use by the industry and allied fields; and took various other steps to assist the communications systems to meet wartime problems.

The Radio Intelligence Division, the largest unit of the FCC, safeguarded the radio channels from subversive operations by maintaining

an around-the-clock patrol of the ether, checked 3960 cases of suspected illegal transmissions, furnished direction-finding service for more than 300 aircraft including military planes and located sources of interference to commercial and military services. The Foreign Broadcast Intelligence Service, the second largest unit of the FCC, recorded, translated, digested and analyzed foreign broadcasts from around the globe in 35 languages and dialects for the information of the State, War and Navy Departments, Foreign Economic Administration, Office of War Information, Coordinator of Inter-American Affairs, Office of Strategic Services and many other agencies of this government and the United Nations.

As the nation continued to produce an unprecedented number of ships, all requiring radio, the inspection activities of the Commission to enforce regulations for the safety of life and property at sea had to be greatly expanded. Additional work was created by the increasing use of radio in the emergency services including police departments which were employing radio to offset their loss of personnel.

A reduction agreed to on January 20, 1943, by the Bell System, in the rates for interstate toll calls and private-line services will result in a saving to the public of upwards of \$34,700,000 annually. Annual savings of \$300,000 resulted from reductions made by the A. T. & T. in certain telephone and telephoto rates between this country and Canada. Western Union and Postal teletype rates were reduced by \$1,300,000 annually, telegraph rates between United States and Latin America by at least \$2,000,000.

The network rules adopted by the Commission to end practices by which the chains restricted competition, limited the rights of stations to make their own selection of programs and curtailed the opportunities of listeners were upheld by the Supreme Court on May 10, 1943.

To meet the problem raised by concentration of control over standard broadcast stations serving substantially the same area, the Commission adopted a rule against multiple ownership. Another change in its rules extended the license period of standard broadcast stations from two to three years.

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## CHAPTER I

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GENERAL

1. Administration
  2. Commission Membership Changes
  3. Staff Organization
  4. Personnel
  5. Appropriations
  6. Legislation
  7. Litigation
  8. Dockets
  9. International
  10. Interdepartment Radio Advisory Committee
- 

1. Administration

On March 25, 1943, the Commission adopted an Administrative Order establishing a Personnel Division and a Budget and Planning Division.

2. Commission Membership Changes

The term of George Henry Payne expired June 30, 1943. As of December 1943, this vacancy had not been filled.

3. Staff Organization

The Commission's organization consists of eight units: the Accounting, Statistical and Tariff Department, the Engineering Department, the Foreign Broadcast Intelligence Service, the Law Department, the Office of the Secretary, the Office of Information, the Personnel Division, and the Budget and Planning Division. The latter two units were not organized until July. The Chief Accountant, the Chief Engineer, the General Counsel and the Secretary constitute an Administrative Board, which handles routine actions in accordance with established Commission policy, and a Committee on Rules, which considers and recommends revisions of the rules and regulations.

4. Personnel

Employees of the Commission on June 30, 1943, numbered 2153. Of these, 382 were regular employees in Washington, 617 were national defense employees in Washington; 206 were regular employees in the field, 948 were national defense employees in the field.

## 5. Appropriations

For the fiscal year, the Commission was appropriated \$2,085,000 for its regular activities, \$5,668,535 for its war activities and \$23,600 for printing and binding - a total of \$7,777,135.

## 6. Legislation

The basic law under which the Commission operates is the Communications Act of 1934, as amended. During the fiscal year three amendments were made to that Act.

Two amendments were effected by Public No. 4, 78th Cong., 1st Sess., approved March 6, 1943. This Act added a new Section 222 and amended Section 214 of the Act. Section 222 authorizes the Commission to approve an application for consolidation or merger of domestic telegraph companies if the requirements imposed by that section are met. Paragraph (a) of Section 222 sets out definitions; paragraph (b) declares it lawful for domestic telegraph companies to merge upon receiving the approval of the Commission; paragraph (c) specifies the criteria and standards to be applied by the Commission in acting upon an application for merger; paragraph (d) prohibits Commission approval of a merger if as a result of such merger there is more than a specified percentage of alien participation in the new company; paragraph (e) provides for the establishment of an equitable formula for the distribution of traffic to the international telegraph carriers, and the division of charges between those carriers and the merged carrier; paragraph (f) makes provision for the protection of employes involved in the merger, and endows the National Labor Relations Board with jurisdiction to enforce and protect the rights, privileges, and immunities granted or guaranteed to employes under paragraph (f).

Section 214 was amended to require a certificate of public convenience and necessity for the discontinuance, reduction, or impairment of service to a community. Paragraph (d) thereof was also amended to empower the Commission to authorize or require any carrier to establish a public office.

Section 606 of the Communications Act, relating to war emergency powers, was amended by Public No. 850, 77th Cong., 2nd Sess., approved December 29, 1942, which added paragraph (h) to Section 606. In general the amendments suspend or limit, or authorize the Secretary of the Navy to suspend or limit, for the duration of the war certain provisions of the Communications Act relating to the Safety of Life at Sea.

Two important bills were introduced, one each in the Senate and House of Representatives, which would amend the Communications Act in

many important respects. S. 814, a bill to alter the structure of the Commission and to amend many important procedural provisions of the Communications Act of 1934, was introduced on March 2, 1943, by Senators White and Wheeler. This bill contains features derived from H. R. 5497 and S. 1806, both introduced in the 77th Congress. Hearings on this bill were commenced on November 3, 1943, and concluded on December 16, 1943.

H. R. 1490, a bill also designed to alter the structure of the Commission and amend important procedural provisions of the Communications Act of 1934, was introduced on January 25, 1943, by Representative Holmes. This bill is substantially identical with H. R. 5497, 77th Congress, upon which extensive hearings were held. No hearings have yet been held on this bill.

During the fiscal year the Commission also answered requests from Congress for its views on seven other bills. The Commission has also furnished information to State officials with respect to the bearing of the Communications Act on proposed State legislation.

### 7. Litigation

At the beginning of the fiscal year there were pending six cases to which the Commission was a party, four of which were in the United States Court of Appeals for the District of Columbia, and two in the United States District Court for the Southern District of New York.

During the year three new cases were filed. Two of them were appeals to the Court of Appeals for the District of Columbia from orders of the Commission, and one was a suit filed in the United States District Court for the District of Massachusetts pursuant to the Urgent Deficiencies Act, to enjoin Commission action. In addition, two appeals to the Supreme Court of the United States were filed from decisions of the United States District Court for the Southern District of New York, and a petition for certiorari to review a decision of the United States Court of Appeals for the District of Columbia was granted.

Six cases were finally disposed of during the year. The Commission won five of these cases and lost one. Thus, three cases were pending at the end of the year, two in the Court of Appeals for the District of Columbia, and one in the United States District Court for the District of Massachusetts.

Of the cases finally disposed of, those decided by the Supreme Court are worthy of further comment. The cases of National Broadcasting Company v. United States; No. 554, decided May 10, 1943, and Columbia Broadcasting



System v. United States; No. 555, decided May 10, 1943, represented the final phase of the litigation in which the validity of the chain broadcasting regulations was challenged. Extensive investigation and hearings, conducted by the Commission, disclosed the existence of certain contractual restraints and practices, imposed by networks upon their affiliated stations, which had the effect of curtailing competition and limiting the rights of licensees to make their own selection of programs. The eight network regulations promulgated by the Commission were designed to eliminate these restraints upon licensees and limitations upon the opportunities of listeners.

Regulation 3.101 provides that network affiliation contracts may not be so drawn as to prevent a station, if it so desires, from carrying programs from another network. Regulation 3.102 provides that the regular affiliate may not prevent some other station from carrying a network program in the event that the regular affiliate rejects it. Regulation 3.103 provides that an affiliation contract shall not be entered into for a period longer than two years. Regulation 3.104 provides that time subject to a network option shall not be subject to call on less than 56 days notice; that not more than three hours in each of four specified segments of the broadcast day shall be subject to option; and that the options shall not be exclusive as against other network organizations. Regulation 3.105 provides that the licensee may not contract away his right to reject unsuitable or improper programs. Regulation 3.106 provides that no network shall own more than one station in any locality, nor be the licensee of a station in any locality where the existing stations are so few, or of such unequal desirability, that competition would be substantially restrained. Regulation 3.107 forbids the ownership of two networks by a single network organization. Regulation 3.108 provides that networks may not hinder or prevent affiliates from fixing or altering their own non-network rates.

These regulations were attacked by CBS and NBC on the grounds that the Commission was without statutory authority to promulgate them; that they were arbitrary and capricious and without support in the evidence; that they constituted a deprivation of due process; and that they abridged freedom of speech in violation of the First Amendment.

The three-judge District Court, to which the cases had been remanded by the Supreme Court for a decision on the merits, upheld the validity of the regulations and granted the Commission's motion for summary judgment. On appeal from these decisions the Supreme Court affirmed, holding that the regulations were within the statutory authority of the Commission, were reasonable exercise of the Commission's power, and entailed no deprivation of any constitutional rights. Upon the expiration of a stay granted by the Supreme Court during the course of the litigation, the regulations became effective and are now operative.

In the case of Federal Communications Commission v. National Broadcasting Company, Inc. (KOA), No. 585, decided May 17, 1943, the Supreme Court affirmed the decision of the Court of Appeals for the District of Columbia, holding that the licensee of a station classified as a Class I station under Section 3.25(a) of the Commission's Rules and Regulations, was entitled as a matter of right to intervene in proceedings on an application, the granting of which would permit nighttime operation of another station on the channel occupied by the Class I station.

#### 8. Dockets

The Commission heard 108 docket cases, and six oral arguments en banc; acted on 476 motions, petitions and other pleadings, of which it granted 323, denied 136 and dismissed 17.

#### 9. International

A revised table showing the latest frequency allocations from 10 kc to 401000 kc and above was prepared by the International Division of the Engineering Department during the year. In addition, it prepared a Master Frequency List showing the allocated, assigned and received frequencies in the United States and possessions. A frequency plan for the allocation and assignment of frequencies in the aviation service for the Alaskan, Arctic and Inter-American International Routes was developed and coordinated.

Courses in telecommunications techniques were given to eight South and Central American holders of scholarships which were sponsored by the Inter-American Training Administration.

The International Division prepares basic information on all phases of international communications, and advises the War and Navy Departments on the best frequencies available for special military communications. The Division's major report, the International Telecommunications Survey, is supplied to all interested government agencies. Master frequency records are maintained for both transmission and reception of all radio frequency assignments in the United States and foreign countries.

The Division furnishes technical information and advice to the Interdepartment Radio Advisory Committee and the Interdepartmental Committee for International Radiobroadcasting Facilities of the Board of War Communications and supplies the secretariat for these two committees.

It serves as liaison between the Commission and the State Department Committee on Cooperation with the American Republics, the State, War and Navy Departments, the Office of the Coordinator of Inter-American Affairs, and other government agencies.

#### 10. Interdepartment Radio Advisory Committee

The Commission is one of the 12 Federal agencies comprising the Interdepartment Radio Advisory Committee which advises the President on the assignment of frequencies to government agencies or classes of stations. During the year, IRAC approved 3374 new assignments, 1546 deletions, and numerous modifications in existing assignments, bringing the total number of outstanding assignments made by IRAC since its inception to 29,463.

IRAC is now a committee of the Board of War Communications and advises the Board of assignments involving new frequencies or changes in method or type of employment of existing frequencies.

## CHAPTER II

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WAR ACTIVITIES

1. Radio Intelligence Division
2. Foreign Broadcast Intelligence Service
3. Board of War Communications
4. Enforcement of Radio Silence
5. Protection of Facilities Against Sabotage
6. Manpower Problems
7. Post War Planning
8. Other Commission Activities

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1. Radio Intelligence Division

Following the pattern developed during previous years, the Radio Intelligence Division of the Engineering Department continued during the past year to guard against secret enemy radio transmission and to protect vital war communications by acting as traffic officer on the overcrowded ether highways, by tracing and identifying sources of interference to military and commercial radio services and by locating stations which were unlicensed, had pirated call letters or were unidentified.

A total of 3960 cases of suspected illegal operation were investigated. Most of these were based on information received from law enforcement agencies.

Maintaining an around-the-clock watch for distress signals from ships and military and civilian planes, the RID performed some of its most spectacular activities of the year. SOS calls and reports of submarine attacks picked up by RID monitors were promptly relayed to naval stations. More than 300 aircraft including military planes were aided by the RID direction-finding services. Some of these planes were headed

for disaster because they were lost, some had already been forced down, others needed to check their positions. As soon as an RID station tuned in one of these calls, it arranged to have other RID units tune in so that they could secure bearings to be used in plotting a fix on a chart. The location or fix thus obtained was flashed to the appropriate officials for transmission to the lost planes or for use in rescue operations.

More than 55,000 words of valuable information intercepted by RID monitors from messages radiotelegraphed by the enemy were provided daily to agencies of this government and the United Nations. This intelligence, covering economic conditions, war production, materials, supplies, morale and other pertinent data, furnished a guidance not otherwise obtainable. (These messages are sent in radiotelegraph code to specific points, whereas the enemy broadcasts recorded and studied by the FBIS are in speech and designed mainly for propaganda purposes.)

All this patrolling of the ether to detect Fifth Column stations, to enforce regulations insuring safe, speedy communications, to assist ships and planes in distress and to intercept enemy messages, was performed by a far-flung monitoring system. At the close of the fiscal year, the RID was operating 12 primary monitoring stations, 79 secondary stations scattered over the Continental United States, its Territories and Possessions, 121 mobile units, of which 30 were cruising up and down the 5000-mile shoreline of the Atlantic, Pacific and Gulf Coasts maintaining special vigilance for illegal shore-to-ship or ship-to-shore communication, and three intelligence centers located in Honolulu, San Francisco, and Washington, D. C. This network makes it possible to investigate immediately any radio signal heard anywhere in America. The RID was supervising the engineering facilities of five broadcast recording units of the Foreign Broadcast Intelligence Service of the FCC. During the year, a new monitoring station was established for the FBIS at Hayward, Calif. Additional high-frequency direction finders were installed in Alaska at the request of the Alaska Defense Command.

The security of the Western Hemisphere was considerably strengthened during the year by the construction of RID-type monitoring stations in certain Latin-American republics under the supervision of RID engineers. The engineers also assisted in training the operators. This service was rendered in accordance with the plans for hemispheric defense formulated at the Rio Conference.

The specialized training and experience of the RID staff were made available to two other groups. Army Air Forces commissioned officers were assigned to the Division for training in direction-finding and evaluation of fixes. RID procedures in locating planes were furnished to the School of Applied Tactics, Orlando, Fla. Personnel of the Office of Strategic Services were trained in direction-finding, detection and monitoring.

The full story of scope of RID activities during this period cannot be told until after the war.

## 2. Foreign Broadcast Intelligence Service

The content of available foreign broadcasts which FBIS surveys to discover clues for war agencies on the activities and plans of the enemy and to foster closer relations with friendly nations is now over 2,500,000 words a day and comprises 35 languages and dialects.

The reports on foreign broadcasts prepared by the FBIS are studied by some 1000 officials of this government and United Nations governments as an aid in planning foreign policy, military strategy, economic warfare, counter-propaganda and the promotion of understanding and unity among the Allies.

This service was set up when the ordinary sources of intelligence such as cable service, diplomatic staffs, press representatives and travelers were cut off.

Propaganda drives originated by the enemy almost invariably follow lines emphasized previously in shortwave broadcasts. These propaganda shifts usually presage new political, diplomatic or military moves.

FBIS cruises the ether at five listening posts, assembles and compares the information collected by other United Nations listening posts, samples new programs.

The FBIS listening posts are located at Portland, Oregon; Kingsville, Texas; Santurce, Puerto Rico; Silver Hill, Maryland, and San Francisco, California. Each post has a battery of receiving and recording sets.

Because of the great volume of material now being broadcast, not all of it can be monitored. A selection is made daily based on (1) requests from war agencies for special programs, (2) changing atmospheric conditions and air raids, and (3) the monitored material readily available from other United Nations listening posts.

All the programs thus selected are recorded. As a program is recorded, a monitor listens and types up the main points in English. From these brief summaries, the editors eliminate duplications, identify the significant and especially requested items, order the full texts translated from the recordings and put on the wire to Washington the most valuable texts and excerpts thus selected.

There is a third selection in Washington where the incoming material from all sources is surveyed, duplications eliminated and the material prepared for distribution.

Distribution is also a selective process. To the major governmental units which demand minute-by-minute service, an omnibus teletype wire carries the bulk of the broadcast summaries and texts as they are received. To the OWI Overseas Branch in New York and San Francisco go separate teletype wires with propaganda summaries and texts. Similarly, broadcast material from and to Latin America goes by a third wire service to the Coordinator of Inter-American Affairs. The day's grist from Far Eastern broadcasts is similarly selected for a special cable file to the London FBIS office for the use of British Ministry of Information and the American Intelligence units in the British Capital. So, also, prisoners' messages are earmarked for immediate dispatch to the War Department.

The whole incoming volume of monitored material is, for other users; classified by geographic areas, with emphasis on excerpts and full verbatim texts, and organized each day into a general mimeographed report sent by messenger service to 300 or more government desks where, for the most part, it is used by regional intelligence specialists. A small number of agencies, by assigning personnel to FBIS offices or by standing order for copies of text transcripts, themselves have access to large portions of the unselected raw material.

Copies of the mass of recorded broadcasts are channelled also to the small group of FBIS analysts organized into geographical sections. Here a careful quantitative review is made and a general picture of propaganda trends, emphases and continuity is constructed. Cumulated week by week and month by month this serves as a background and perspective for evaluating new broadcast items as they appear. The Analysis Division issues weekly and fortnightly reviews of broadcasts, region by region, which are distributed to the 350 governmental officials who have requested them.

Finally, in addition to the FBIS regular output, there is a steady stream of requests from individual agencies for items of information about current broadcasts which in some cases can be answered by telephone immediately, in other cases require an hour's intensive search, and in still others call for several days' work ending in a special report. In all, the estimated daily output of FBIS is over 150,000 words, or six per cent of the available broadcasts.

Started nine months before Pearl Harbor, and expanded rapidly after that date for the succeeding nine months, FBIS had by July, 1942, developed its essential structural character and organization. Briefly this consists of a central editorial and distribution headquarters in Washington, serving also as a major listening post for broadcasts from Europe; two listening posts on the Pacific Coast, one at Portland, the other at San Francisco, to cover broadcasts from across the Pacific;

a post in Kingsville, Texas, to cover broadcasts from Latin America; a small post in Puerto Rico to listen to programs from South Europe and the Antilles; and a London editorial outpost attached to the BBC central monitoring unit and serving as a selection agency for broadcast material to be cabled to the U. S. - also serving as distribution center to the American war agency and diplomatic units in London. All these posts are connected by two-way telecommunication with the Washington headquarters.

During the past year, the principal developments have been as follows:

1. Enlargement of the San Francisco station as authorized by Congressional supplemental appropriation and construction of a first class broadcast reception station at Hayward, Calif., to replace the inadequate post turned over by CBS on August 1, 1942. Establishment of an auxiliary translation center for Far Eastern broadcasts at Denver.
2. Installation of a regular cable file of Far Eastern monitored material to the Ministry of Information in London.
3. Installation of an editorial staff at the new BBC country listening post with full direct access to the whole volume of a million words or more monitored there.
4. Provision of teletype service to the Foreign Service Division, OWI, to form a part of an auxiliary news service furnished by that agency to press and news associations.
5. Dispatch of FBIS editors and monitors from London to North Africa at the time of the landing last November, at the request of the Army field headquarters, to organize monitoring units there, and later in advancing Army units, functioning as a part of the Army Psychological Warfare Branch.
6. Completion of cooperative arrangements with OWI, MOI, and BBC, for coverage of broadcasts not available or well-heard in the United States or Great Britain. Under these arrangements FBIS does not undertake the construction or maintenance of monitoring posts overseas but assigns editors to overseas posts maintained by BBC, MOI, OWI or other United Nations governments, to select material valuable for transmission to Washington. In effect, the arrangements imply a joint planning of world broadcast coverage with complete interchange of monitored material. Under this agreement FBIS has an editor assigned to Stockholm, an editor in Algiers, and plans are being completed for assignments to six other strategic points overseas.
7. Physical integration of the FBIS Analysis Division with the Overseas Intelligence Division of OWI, making FBIS analysts directly



available to the OWI Overseas Branch for special reports and queries and making available for FBIS analysts the foreign press and other intelligence collected by OWI. This unusual cooperative arrangement relates FBIS organically to one of its principal users, at the same time retaining its independent character as a radio analysis service for other government agencies.

8. Cooperative arrangement with the Coordinator of Inter-American Affairs by which CIAA takes over Latin American analysis as a general service to other federal agencies and edits the Latin American section of the FBIS weekly review-of broadcasts.

9. Setting up of expedited delivery to the War Department of all messages concerning American prisoners broadcast from enemy countries.

10. Increased service to United Nations missions in Washington, including teletype service for Canada, China and the Philippines. In the case of Canada, the wire service ties in the Dominion with the British-American network without any necessity of setting up a duplicate monitoring service.

### 3. Board of War Communications

(As the Board of War Communications is an independent agency, the emphasis in this report is on those actions which involved the cooperation of the FCC.)

#### Organization

The Board of War Communications (formerly the Defense Communications Board) was created by Executive Order No. 8546 on September 24, 1940, for the purpose of determining, preparing, and coordinating plans for the most efficient control and use of the country's radio, wire and cable communications facilities during the national emergency. Thereafter, by Executive Order No. 8964, dated December 10, 1941, and by Executive Order No. 9089, dated March 6, 1942, there was delegated to the Board the President's wartime authority under Section 606(a) of the Communications Act to direct that communications essential to the national defense and security shall have preference or priority and, under Sections 606(c) and (d), to direct the use, control or closure of radio and wire communication stations and facilities.

FCC Chairman James Lawrence Fly is also Chairman of the Board of War Communications. The other members of the Board are Major General Harry C. Ingles, Chief Signal Officer of the Army; Rear Admiral Joseph R. Redman, Director of Naval Communications; Hon. Breckinridge Long, Assistant Secretary of State in Charge of the Division of International Communications; and Hon. Herbert E. Gaston, Assistant Secretary of the

Treasury in Charge of Treasury Enforcement Activities, who is Secretary of the Board. Captain E. M. Webster, Chief of Communications, U. S. Coast Guard, is Assistant Secretary of the Board.

The Board reports to the President through the Office for Emergency Management. It has no paid personnel, appropriation or funds. It operates through a Coordinating Committee and a Law Committee staffed by personnel from the agencies represented on the Board; through Labor and Industry Advisory Committees and an international Broadcasting Coordinating Committee; and through 13 "numbered committees" for radio amateurs, aviation communications, cable, domestic broadcasting, the Interdepartment Radio Advisory Committee, international broadcasting, radiocommunications, state and municipal facilities, telegraph, telephone, U. S. Government facilities, the Communications Liaison Committee for Civilian Defense, and the Priorities Liaison Committee.

#### Activities

As of December, 1943, the Board had issued a total of 29 orders, with various amendments. Order 12 dealt with the removal and impounding of radio equipment in Puerto Rico and the Virgin Islands; Order 13 instituted a questionnaire concerning transmitting tubes; Orders 14 and 23 delegated certain communications powers to the Army; Orders 15, 17, 18, 19 and 19-A dealt with international radiotelephone restrictions; Orders 16 and 21 created an exemption to the provisions of Order 11 requiring the closure of point-to-point radiotelegraph circuits in the Agriculture Service; Order 20 provided priority for urgent telephone toll calls essential to the war effort or public safety; Order 22 dealt with the leasing of communications circuits in submarine cables; Order 24 concerns operation of certain international radiobroadcast stations; Orders 25, 25-A, 25-B, 25-C, and 28 prohibited certain non-telegraphic services and certain types of messages; Orders 26, 27 and 27-A provided priority for urgent TWX calls and for telegraph messages essential to the war effort or public safety; and Order 29 dealt with the institution of negotiations regarding the establishment of new foreign points of communication.

Perhaps the most important of all the Orders issued by the Board during the year covered by this report, and certainly from the viewpoint of their widespread public application, were Orders 20, 25-C, 26, and 27-A. Order 25-C prohibited substantially all non-telegraphic services by telegraph carriers and the acceptance of domestic messages of congratulation and felicitation. The reasons for the issuance of this Order, and the investigation conducted by the Commission which led to the issuance of the Order, are discussed in Chapter III, page 32 of this report. Orders 20, 26 and 27-A set up new wartime systems of precedences

for telephone and TWX calls and for telegraph messages essential to the war effort or public safety and provided for the expedited handling of these calls and messages.

Under Order No. 20, persons and organizations engaged in essential activities were designated "preferred callers" and entitled to request preferred service for toll calls of particular importance and urgency. Priority 1 service was reserved for those calls requiring immediate completion for war purposes or to safeguard life or property and relating to one or more of the following matters:

- (1) Arrangements for moving armed forces during combat operations.
- (2) Extremely urgent orders to armed forces.
- (3) Immediate dangers due to the presence of the enemy.
- (4) Hurricane, flood, earthquake or other disaster materially affecting the war effort or public security.

For other toll calls related to the national defense and security or the successful conduct of the war, preferred callers may use Priority 2 if immediate completion is necessary, or Priority 3 if prompt completion is necessary and if the calls relate to one or more of the following matters:

- (1) Important Governmental functions.
- (2) Machinery, tools or raw materials for war plants.
- (3) Production of essential supplies.
- (4) Maintenance of essential public services.
- (5) Supply or movement of food.
- (6) Civilian defense or public health and safety.

Order 26 contained similar provisions for preferred service for TWX calls.

The priorities system established for telegraph messages was substantially similar. Under Order No. 27-A, four categories of essential telegraph messages were set up to be accorded preference in transmission and delivery. In order of decreasing importance these categories are "US URGENT", "OP PRIORITY", "PRIORITY" and "RAPID". The "US URGENT" category is limited to domestic and international messages filed by the War and Navy Departments and to international messages filed by the State Department and the Federal Bureau of Investigation and the "OP PRIORITY" classification to domestic and international messages of the War and Navy Departments. The "PRIORITY" classification in addition to being available to the State, War and Navy Departments and the Federal Bureau of Investigation is also available for any full rate domestic message which requires

immediate transmission for war purposes or to safeguard life or property and which relates to one or more of the following matters:

- (1) Immediate dangers due to the presence of the enemy.
- (2) Emergency communications in connection with actual military or naval requirements.
- (3) Hurricane, flood, earthquake, or other disaster.

The "RAPID" classification is comparable to the Priority 3 classification for telephone messages and is available for full rate domestic messages which require prompt transmission and delivery for the national defense and security, the successful conduct of the war, or to safeguard life or property, and which relate to one or more of the following matters:

- (1) Important governmental functions.
- (2) Machinery, tools, or raw materials for war plants
- (3) Production, movement, and diversion of essential supplies.
- (4) Maintenance of essential public services.
- (5) Supply, movement and diversion of food.
- (6) Civilian defense or public health and safety.

The Board has circulated a number of memoranda addressed to the heads of all government departments and agencies designed to aid in the improvement of telegraph service. These have included a request to eliminate superfluous words in the address or signature of government telegrams; a request to file telegrams as early in the day as possible avoiding any tendency to accumulate telegrams for filing in the late afternoon when the peak load of the carriers is reached; and a request that certain prescribed procedures be followed in the filing of multiple address, or book, telegraph messages. All these memoranda and the procedures suggested for the guidance of the government departments and agencies were designed to reduce the peak loads of the carriers and the amount of work required of clerical and operating personnel in the handling of government messages.

#### 4. Enforcement of Radio Silence

At the close of the fiscal year, 19 four-man Units of the Interceptor Section of the Field Division of the Engineering Department were in operation with the primary function of maintaining liaison between the Army and the Commission for the silencing of radio stations in the event of an air raid. The Section was established on June 20, 1942.

The Section carries out this function as follows: (1) Assists in the preparation of instructions to radio stations participating in radio

silence. (2) Supervises the required tests necessary to maintain the efficiency of the system. (3) Enforces radio silence when ordered by the War Department and monitors during such periods of silence to insure compliance with orders.

The Interceptor Units are located in Army Air Forces Information Centers along the East, West and Gulf Coasts.

A number of projects were completed during the year. Restricted Order No. 2, Wartime Operation of Radio Stations in the Continental United States, a thirteen page brochure with map, was distributed to 6000 radio stations and hundreds of Army and Navy posts. A Tactical Call Book, containing over 5000 calls, calculated to reduce the danger of radio transmissions being used for homing purposes, was prepared and distributed to authorities concerned, and tactical call forms were mailed to licensees for making application to the local Intercept Officer for assignment. A Composite Bi-weekly Report, summarizing the Weekly Progress Reports received from Intercept Officers assigned to constituent Regional Headquarters within the respective Commands, was inaugurated and supplied to Commanding Generals at their request, thus making available to the Headquarters Command a day by day working summary of air raid warning activities.

In addition to the above, the Section handled numerous special assignments at the request of Regional Controllers such as the preparation of Area Radio Silence Control Manuals, interference monitoring, investigation and development of the alert receiver for automatic silencing, and other developmental work leading to the expansion and perfection of the system.

#### 5. Protection of Facilities Against Sabotage

The Security Section of the Field Division of the Engineering Department began functioning with the opening of the Washington office in October, 1942.

The Section was organized in accordance with Executive Order 9165 of May 19, 1942, which directed the Commission to conduct surveys to ascertain the security status of communications facilities, to make recommendations to the owners and government officials, and to "take all other necessary steps within the scope of its authority for the protection of essential facilities against sabotage and other destructive acts or omissions."

The Washington office was staffed with three engineers and one traveling investigator. The field staff consists of six traveling supervisors who have received special training at plant protection and

security schools. Part-time assistance is given by members of the Enforcement Section of the Field Division.

To date, the Section has completed surveys of all international radiotelegraph and radiotelephone stations, key broadcast stations, cable properties and the more important offices of the Bell Telephone System. Surveys of the more important offices of Western Union and Postal Telegraph Companies are now under way.

As a result of whole-hearted cooperation from companies the protective measures for the communications facilities of the nation have been extensively improved.

#### 6. Manpower Problem

A survey conducted by the Economics Division of the Accounting, Statistical and Tariff Department to assist the broadcast industry to obtain radiotelephone license holders, had covered 2000 such holders as of October 1943, of whom 10 per cent signified their availability for full-time or part-time jobs.

The Division is also maintaining a monthly index of the manpower situation in the communications industry. A report on current employment and on future labor requirements, together with analyses of occupational deferment policies, training facilities and turnover problems in the communications industries has been furnished to the Board of War Communications. The Division cooperated with the Board in drawing up a list of essential occupations in the industry. This was accepted by the War Manpower Commission and transmitted by Selective Service to its local boards. A survey conducted by the Division in cooperation with the War Manpower Commission and the U. S. Office of Education disclosed the inadequacy of employee training facilities in the industry.

#### 7. Post War Planning

The Federal Communications Commission invited the Board of War Communications, the Interdepartment Radio Advisory Committee and the Radio Technical Planning Board to meet informally with the Commission on November 17, 1943, to discuss preliminary steps toward coordinating their planning for the technical future of radio. It was the consensus of the meeting that, subject to priorities of work related to the war, the studios should start as quickly as possible so that manufacturers can be ready with plans to produce equipment when materials are again available. An exchange of information between the government departments and the RTPB so that all concerned in the field could coordinate their work was agreed upon. The various panels of the RTPB and the government groups will study such problems as (a) Major changes which may be required by each service, i.e., standard broadcasting, FM broadcasting, television, aviation (domestic and international), police and

emergency services, international point-to-point, maritime and government; (b) Changes to be made in the Federal Communications Commission's present standards of good engineering practice and other technical rules, and (c) The possibilities of utilizing frequencies above 300 megacycles.

#### 8. Other Commission War Activities

In addition to the major war activities described above, the various units of the Commission carried on the following projects to promote the war-effort during the past year:

1. With special funds granted by Congress, it expanded its examination of domestic foreign language programs.
2. Cataloged surplus and salvageable broadcast equipment for use by Army, Navy, WPB and other war agencies, as well as for use by the industry to minimize the need for new parts.
3. Ordered a new class of stations for Civil Air patrol activities and for use during emergencies involving the public safety.
4. Prepared an analysis of idle standard broadcast transmitters as an aid in relieving the equipment shortage.
5. In cooperation with the Board of War Communications issued an order decreasing power of broadcast transmitters one decibel to conserve life of vacuum tubes without causing noticeable change to the listener.
6. Relaxed requirements for commercial radio operators in an effort to relieve manpower shortage.
7. Instituted an investigation of the speed, accuracy and general adequacy of wartime telegraph service. Reported findings to Board of War Communications which adopted orders designed to improve the service by prohibiting substantially all non-telegraphic services and messages of congratulation and felicitation.
8. Issued many experimental authorizations to scientific laboratories and industrial organizations engaged in radio research in connection with government war contracts.
9. Prepared a table showing the latest international frequency allocations from 10 kc to 401,000 kc and above.
10. Studied use made of frequencies assigned to international and domestic carriers to obtain for the War and Navy Departments any frequencies not absolutely needed by the carriers.

11. Continued world-wide telecommunications survey in the interest of the State, War and Navy Departments.

12. In line with the policies of the Office of Price Administration, scrutinized all changes in telegraph and telephone tariffs to forestall any unwarranted increases.

13. Continued studies of the earnings and results of operation of telephone and telegraph companies for the purpose of developing the trends and their probable effect on wartime service.

14. Reviewed applications under Section 214 of the Communications Act for the extension of telephone and telegraph facilities, coordinating such applications with the wartime policies of the Army and Navy and the War Production Board.

15. Examined financial condition of numerous small broadcast stations and their ability to remain on the air in the light of operating losses, with particular emphasis on the possibility of curtailment of radio service in communities having only one station.

16. Prepared confidential maps for use by several war agencies.



## CHAPTER III

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TELEPHONE AND TELEGRAPH

1. Telephone
2. Telegraph
3. Ocean Cable
4. Radio Common Carriers
5. Tariffs
6. Supervision of Accounts

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1. Telephone

## Rate Investigations

American Telephone and Telegraph Company Long Lines Rates - Part of the agreement between the Commission and the American Telephone and Telegraph Company which resulted in telephone rate reductions totalling an estimated \$34,700,000, provided for an increase of \$19,000,000 in the compensation to the associated Bell and connecting companies with respect to their share of the revenues from long distance telephone business. The Commission has made available to the various State Commissions personnel and data to assist them in determining the effect of the increased compensation on the ability of the local telephone companies to reduce intrastate telephone rates.

Special Telephone Charges of Hotels, Apartment Houses and Clubs on Interstate and Foreign Communications - The principal issue involved was whether surcharges collected by hotels, apartment houses and clubs in the District of Columbia on interstate and foreign telephone toll calls to and from telephone stations located on their premises were subject to regulation by this Commission. A hearing was held jointly with the District Public Utilities Commission. The Commission in a final report and order issued on December 10, 1943, held that such surcharges on interstate and foreign toll calls are subject to its jurisdiction finding that in the collection of such surcharges, the hotels, apartment houses and clubs were agents of the telephone companies involved. The telephone companies were ordered to file proper tariffs with the Commission covering such surcharges. The District Commission reached a similar conclusion as to its jurisdiction over surcharges on local calls.

Northwestern Bell Telephone Company Increased Rates for Interstate Telephone Exchange Service in Iowa - The increased charges for interstate telephone exchange service in Iowa which were suspended and ordered investigated by the Commission were cancelled by the Company, and the investigation was, therefore, postponed.

Illinois Bell Telephone Company and American Telephone and Telegraph Company Increased Rates for Radiotelephone Service Through Coastal Harbor Radio Station WAY - In this proceeding proposed increased rates for radiotelephone service through coastal harbor radio station WAY, located at Lake Bluff, Ill., which had been suspended and investigated by the Commission were found by the Commission to be unjustified, and unjust and unreasonable and were ordered rescinded. Lower rates were prescribed. The Commission also found that the zoning arrangement for the determination of rates had not been justified and was unjust and unreasonable, and that the payment to or retention by vessels involved of one-third of the radio-link charges was an unjust and unreasonable practice. Revised tariffs have been filed pursuant to the Commission's order and are now in effect.

Michigan Bell Telephone Company Rates for Radiotelephone Service Through Stations WFR, WFS and WFV - This was a proceeding of investigation into rates for radiotelephone service through coastal harbor radio stations WFR, WFS, and WFV located in and near Detroit and Port Huron, Mich. This proceeding involved considerations like those presented in the above case involving the rates of the Illinois Bell Telephone Company through station WAY, except that the rates here under investigation were initial rates for the service. The Commission's decision in this proceeding was generally similar to that reached in the above Illinois Bell case, and resulted in a similar reduction in rates.

#### Other Investigations

Separation of Telephone Property Revenues and Expense - In accordance with an order adopted June 9, 1942 the Commission held hearings to determine what property of carriers of telephone communications should be considered as used in interstate and foreign services, and what revenues and expenses should be associated with such services, as distinguished from the property, revenues and expenses related to intrastate services. Representatives of the Bell System, numerous independent telephone companies and various state regulatory commissions appeared at the hearings. The proceeding has been conducted cooperatively with the State Public Service Commissions, and representatives of the State Commission presided at the hearings with the members of this Commission designated to sit therein. The matter is now pending before the Commission for decision.

New York Telephone Company Accounting - Hearings were held in this matter, cooperatively with the New York Public Service Commission, to investigate the accounting performed by the New York Telephone Company with respect to certain property acquisitions. In its final report of December 14, 1943, issued concurrently with that of the New York Commission, this Commission required the carrier to make certain accounting adjustments relating chiefly to the "Original Cost" of certain acquired properties.

Bell System License Service Contracts - As part of a long range program for the study of certain fundamental problems of telephone rate regulation, the Commission, acting in close cooperation with the State Commissioners' Committee designated for the purpose, is conducting an investigation into the Bell System license service contracts. This investigation should result in the compilation of data and the enunciation of guiding principles which should be of material assistance to this Commission and the state regulatory commissions concerned with the regulation of telephone rates.

#### Telephone Facilities

Fifty applications for construction certificates were received during the fiscal year. Fifty-seven applications were approved, including nine filed during the 1941 fiscal year. These projects involved construction ranging from a few thousand dollars to \$2,557,000. The total construction cost was \$8,683,627.

Wire Telephone Applications for Construction  
Approved by the Commission from July 1, 1934  
to June 30, 1943

Period	Number of Appli- cations	Estimated Construction Cost	Miles of Cable Placed	Miles of Open Wire Placed
7/1/34 to 6/30/35	7	\$1,145,851	234.3	1/ -
7/1/35 to 6/30/36	15	275,625	24	475
7/1/36 to 6/30/37	50	5,551,702	206	17,045
7/1/37 to 6/30/38	45	3,921,000	499	1,212
7/1/38 to 6/30/39	45	6,960,123	646	2/ 1,967
7/1/39 to 6/30/40	72	9,070,952	1,209.2	3/ 3,501
7/1/40 to 6/30/41	137	38,319,399	5,203	15,521
7/1/41 to 6/30/42	169	45,046,250	5,099.7	4/ 34,583
7/1/42 to 6/30/43	48	8,683,627	418	4,501
Total	588	\$118,974,529	13,599.2	78,805

1/ Of which 94.5 miles is coaxial cable containing 2 coaxial units.

2/ Of which 195 miles is coaxial cable containing 4 coaxial units.

3/ Of which 42 miles is coaxial cable containing 4 coaxial units.

4/ Of which 296 miles is coaxial cable containing 4 coaxial units and 101 miles is coaxial cable containing 6 coaxial units.

It will be noted that the estimated construction cost covered by the applications approved during the fiscal year represents a drastic reduction from the preceding fiscal year despite the increased demands for telephone toll service. The reason for this reduction lies in the restricted use of critical materials made necessary by the war and the greatly increased use of multichannel carrier current systems.

The use of the "EB" type of carrier equipment, hereinafter referred to, has provided on an emergency basis some 400,000 miles of additional telephone channels during the fiscal year.

The following paragraphs discuss the applications falling into the various specific provisions of the Communications Act relating to granting of the authority required.

Supplementing of Existing Facilities Under Section 214 - During the fiscal year, 28 applications for authority to supplement existing facilities were received only one of which was filed by a company not a part of the Bell System. Twenty-five of these were approved and three are pending.

In connection with these projects, it is the policy of the Commission to require periodic construction and progress reports and a full report on their completion. The reports are received and analyzed by the Engineering and Accounting Departments.

On July 14, 1942, the Commission requested full and complete information with respect to certain wire, carrier and phantom line facilities the Bell System had constructed, are constructing, or propose to construct since January 1, 1939 without prior authorization from this Commission. <sup>1/</sup> In response to said order the Bell System Companies filed 4535 items totaling \$99,401,342 in cost, 1386 of which totaling \$20,242,957 were for open wire construction and 1176, totaling \$20,764,110, were for cable construction. These facilities are used for interstate communication in the normal operation of toll telephone service but are not continuously an integral part of lines crossing state boundaries, being connected during the duration of successive interstate telephone calls. An investigation is in progress to determine whether authorization for such construction should have been obtained from the Commission.

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<sup>1/</sup> The proceeding involving the question as to whether Commission authorization is required for construction of carrier projects, i.e., In the matter of A.T. & T. and New York Telephone Co., for construction and operation of carrier systems between New York, N.Y. and Boston, Mass. (Docket No. 6256) is still pending.

Telephone Service - Telephone toll calls have increased tremendously under wartime demands. The total number of calls handled through the Bell System's toll boards will reach 750,000,000 in 1943 with an additional 500,000,000 short-haul toll calls handled through other than toll boards. Within the past four years the traffic of the Long Lines Department of the American Telephone and Telegraph Company has doubled and is now running at the unprecedented rate of 150 million messages annually. This increase is equivalent to the total business reached after steady and almost uninterrupted growth of some 65 years. Such growth has resulted in an overloading of telephone facilities and in a deterioration of service. In October of 1943, the average connection speed of toll board calls was 3.7 minutes, as compared with a speed of 1.7 minutes two years ago. In 1916, the average speed was 16 minutes. The companies have had the collaboration of the Commission, the Board of War Communications and the War Production Board in their efforts to meet service demands under the difficult conditions caused by the war.

Abandonment of Telephone Service Pursuant to the requirement of Board of War Communications Order No. 10, the Commission has been notified of the closing of 8 small rural exchanges, 8 telephone toll stations, 220 telephone toll stations with telegraph tariff listings and the removal of 15 miles of steel wire, 587 miles of iron wire, 62,612 miles of copper wire, 157 miles of cable and 419 miles of poles. Excepting in the case of the small rural exchanges serving a very few subscribers, these abandonments have not affected service and result from the substitution of cable for aerial wire routes and the involuntary removals of telephone stations. The materials salvaged, particularly copper, as a result of these operations are available for future construction, thus supplementing the Nation's stockpile of critical materials.

Telephone Developments - The Bell System completed and placed in operation twin transcontinental toll cables connecting the toll cable networks of the East and of the Pacific Coast which permits telephone conversations to be transmitted from coast to coast by "K" carrier systems in cable for the first time. For example, it is now possible to talk through cable for the entire distance between Bangor, Maine and San Diego, Calif.

The Bell System has installed a system of crossbar switching at Philadelphia for handling toll telephone connections. Toll operators in 32 cities within a radius of about 250 miles now will be able to dial directly subscribers in Philadelphia and in many other cities reached through Philadelphia.

In order to obtain a greater utilization of existing plant, the Bell System Companies have developed carrier equipment known as the "EB" type which permits the splitting of a regular telephone carrier

channel into two lower grade channels thus meeting in part and on an emergency basis the need for additional telephone channel requirements in certain areas, and assisting in the conservation of critical materials.

Acquisitions and Consolidations - During the fiscal year, the Commission approved the application of the American Telephone and Telegraph Company to acquire the assets of its subsidiary, the American Telephone and Telegraph Company of Missouri. The assets involved amounted to approximately \$12,000,000. The Commission also approved an application by the Southern Bell Telephone and Telegraph Company for authority to acquire and operate the Christian-Todd Telephone Company with assets of approximately \$1,200,000 and of the Ohio Bell Telephone Company to acquire and operate the Highland County Telephone Company, with assets of about \$156,000.

While the matter of the application of the New Jersey Telephone Company to acquire the capital stock of Imperial Securities Company was pending before the Commission for decision, the New Jersey Bell Telephone Company and The Bell Telephone Company of Pennsylvania filed an amended application which included a request by the applicants for authorization to consolidate with the properties of the applicants the physical properties of the Keystone Telephone Company of Philadelphia, and the physical properties of the other subsidiaries of Imperial Securities Company. The Commission thereafter authorized the acquisition and consolidation for which approval was sought.

Through Routes and Interconnections - The Commission heard oral argument and considered exceptions and briefs to its Proposed Report of October 12, 1943, on the latest rehearing of the matter of the petition of the Oklahoma-Arkansas Telephone Company for physical connection with the facilities of the Southwestern Bell Telephone Company. By its order of December 8, 1943, the Commission denied the relief sought by the petitioner, and dismissed the proceeding, adopting its Proposed Report as the final Report of the Commission.

## 2. Telegraph

### Merger

On March 6, 1943, the Communications Act of 1934, as amended, was amended to provide for permissive consolidations or mergers of domestic telegraph carriers. On May 25, 1943, the Western Union Telegraph Company and Postal Telegraph, Inc., filed with the Commission an application for approval and authorization of the proposed merger of Western Union and the Postal Telegraph System. Extensive hearings

before the Commission en banc were held on this application, as subsequently amended. The hearing was conducted cooperatively with the various state regulatory authorities, the National Association of Railroad and Utilities Commissioners appointing, at the invitation of this Commission, a committee of State Commissioners to preside with this Commission at the hearings. The principal participants at these hearings, in addition to the applicants and the state commissions, were the Commercial Telegraphers Union (American Federation of Labor), the American Communications Association (Congress of Industrial Organizations), and the various United States carriers engaged in international telegraph operations. On September 27, 1943, the Commission issued its final report and order authorizing and approving the proposed merger.

#### Government Message Rates

The Commission met for public hearing the question of the rates to be prescribed by it for the year ended June 30, 1944, for United States Government telegrams under the Post Roads Act of 1866, as amended. After public hearing and argument, in which various interested government agencies participated, including the War, Navy and Justice Departments and the Office of Price Administration, the Commission ordered that the rates for United States Government telegrams should be 80% of the rates applicable to commercial telegrams in the corresponding classifications. This ratio represented an increase for government telegrams in certain classifications for which the rate had previously been 60% of the rate for commercial messages.

#### Rate Investigations

Rates Between the United States and South America, Central America and the West Indies - In the proceeding of general investigation of the rates for telegraph communications between the United States on the one hand, and South America, Central America and the West Indies on the other, the Commission ordered All America Cables and Radio, Inc., the principal United States carrier operating in this field of communications service; to reduce its rates in the estimated amount of \$1,320,000 on an annual basis. The Commission also enunciated certain general principles which were to be followed by All America in establishing the new reduced rates. These principles included the equalization of rates for messages northbound to the United States with those for messages southbound from the United States; the unification of the rates for ordinary plain language and code messages; and uniformity of rates on a regional basis, for messages between the United States and each of the three regions of South America, Central America and the West Indies. The Commission indicated in its Report that the principles set forth

for revision of All America's rates should also be followed by the other telegraph carriers engaged in communication service between the United States and Latin America. The Commission also ordered adjustment of inter-American telegraph rates to reflect the existence of operating "gateways" based on direct radio circuits between San Francisco, New Orleans, Miami and Boston on the one hand, and points in the other American republics on the other, and to equalize such rates with the rates for service over cable and radio circuits between New York City and such other points. The Commission's order also established a basic four cent factor applicable to the landline handling within the United States of inter-American messages originating in or destined to points in the United States outside of the gateway cities, which factor is - the same regardless of the point of origin or destination of the messages. Reductions, in accordance with the Commission's order, by all carriers furnishing inter-American telegraph service are expected to result in annual savings to the public in an amount between two and two and one-half million dollars.

International Press and Government Rates - Following issuance of a proposed report and the filing of exceptions thereon, the Commission has reopened the hearings with respect to the rates of Press Wireless, Inc. for ordinary press radiotelegraph service between the United States and China in order to take further evidence on this matter, and, at the same time, ordered a general investigation into all of the rates of Press Wireless, Inc. This general investigation, which was instituted in view of the extremely high rate of earnings of Press Wireless, Inc., includes rates for government service which the carrier has been authorized to furnish for the duration of the war, as well as its rates for press service. Hearings on these matters are now pending.

Photo Service Rates - Since it appeared that increasing use is being made of photo service, and that the charges for such service may not be established on a proper basis, the Commission instituted an investigation into the lawfulness of the charges for interstate and foreign photo service, by wire or by radio. Hearing on this matter is now pending.

Marine News Service - The Western Union Telegraph Company proposed an increase in its rates for marine news service. This service consists of furnishing to subscribers, by means of tickers placed on subscribers' premises, reports of the movements of ships in New York harbor. The proposed increased rates were suspended by the Commission and a hearing was held. In a proposed decision issued by the Commission, it was found that although some increase in Western Union's rates for the service may be justified, the proposed increase had not been justified and was unjust and unreasonable. The matter is now pending for final decision.



Timed Wire Service - Finding that the practices and regulations of The Western Union Telegraph Company and the Postal Telegraph-Cable Company with respect to the timed wire service classification of communications were unjust and unreasonable because of the discriminations and undue and unreasonable preferences and advantages given to particular persons, the Commission ordered the classification terminated. The carriers substituted the so-called "Day Letter/ Longram" classification, which represented a modification of the Day Letter classification and provided lower charges for longer messages.

West Coast Telephone Company Teletypewriter Exchange Service - The Commission suspended the operation of a proposed \$30 minimum monthly charge and a one year initial contract period proposed by the West Coast Telephone Company for its teletypewriter exchange service. After a hearing, the Commission issued a proposed decision concluding that the proposed minimum charge and initial contract period had not been justified. After oral argument, the Commission adopted its Proposed Report as a final report and required the carrier respondent to cancel its tariff provisions which established a \$30 minimum monthly charge and which required an initial contract period of one year. There was then established a \$10 minimum monthly charge and a one-month contract period.

Charges for Channels for Teletypewriter Service - The Commission instituted an investigation with respect to new charges filed -- by the Public Utilities California Corporation for channels for teletypewriter service to agencies of the United States Government. After investigation, the Company placed into effect a substantial reduction in these charges, and the proceeding was thereupon dismissed.

"X" and "RX" Messages - The Commission issued a proposed report in which it found unjustified and unjust and unreasonably discriminatory the practices and regulations of telegraph carriers in according to messages marked "X" and "RX" priority over regular messages for the same charge. Oral argument was held at the request of certain of the users of "X" and "RX" service. After oral argument, the Commission deferred further consideration of the matter until January 1, 1944.

Increased Charges for Stock Exchange Quotation Bond and Stock Ticker Services - The Western Union Telegraph Company proposed an increase in its rates for New York Stock Exchange bond and stock ticker services. These proposed rates were suspended by the Commission and an investigation was instituted. After investigation, Western Union withdrew the proposed increases in charges, and the proceeding was dismissed insofar as it related to the increased charges. The proceeding with respect to the investigation of the existing charges for these services is still pending.

Increased Charges for Telegraph Communications from the United States to New Hebrides - The Western Union Telegraph Company proposed increased rates for telegraph communication service from the United States to New Hebrides via the Vancouver Cable which were in excess of its rates via another route. The Commission suspended the proposed increase in rates and ordered an investigation of these rates and similar rates of the Postal Telegraph-Cable Company. After investigation, the carriers withdrew the higher rates and established the same lower rates for service over the Vancouver Cable route as were in effect for service over the other route, and the proceeding was dismissed.

Changes in Directory Listings Resulting in Rate Adjustments - The Western Union Telegraph Company and the Postal Telegraph-Cable Company (New York) filed amendments to their directory of station listings relative to several specified points in the United States and Canada which were not directly served by the carrier, termed "other line" points. The changes had the effect of increasing the charges for telegraph service to and from certain points and lowering the charges with respect to other points. The proposed increased charges were suspended by the Commission. After investigation certain of the proposed charges were modified, and it was determined that the remaining rate adjustments occasioned by such changes in the carriers' directory of station listings should be considered on a system-wide basis, and the proceeding was dismissed without prejudice.

Limitation of Liability for Leased-Wire Service - The Western Union Telegraph Company proposed a tariff provision limiting its liability for its own negligence for interruptions of leased-wire facilities. The Commission suspended the proposed tariff provision and also ordered an investigation of the liability provision of the leased-wire service tariff of Postal Telegraph-Cable Company which contained similar provisions. After investigation, the carriers deleted the questioned provisions from their tariffs, and the proceeding was dismissed.

Charges for Delivering Telegrams to Closed Office Points - The Commission suspended and designated for hearing certain proposed revisions in the tariffs of The Western Union Telegraph Company relating to charges for delivering telegrams after the Company's office had closed. The proposed tariffs would have had the effect of providing for an indeterminate charge for delivery and might have resulted in increased charges. Prior to the hearing, the Company filed revised tariffs which eliminated the objectionable features of the suspended provisions, and the proceeding was dismissed.

Tourate Messages - The Commission suspended and ordered an investigation of a tariff filing of Western Union and Postal proposing to accord priority handling to messages in the Tourate classification. Thereupon, the carriers proposed that the Commission permit them to abolish the Tourate classification on the ground that it was a non-essential service. After informal investigation of the matter, the Commission advised the carriers of its desire to continue this classification of service, but without according it priority handling. Accordingly, the carriers withdrew the suspended tariff filing, and the matter was dismissed.

#### Other Investigations

##### Discontinuance, Reduction, or Impairment of Telegraph Service

Upon formal complaint of the American Communications Association, and on its own motion, the Commission ordered an investigation of any discontinuance, reduction or impairment of telegraph service to any community or part of community by The Western Union Telegraph Company or the Postal Telegraph System, which might be a violation of Section 214 of the Communications Act of 1934, as amended. This investigation was occasioned by numerous telegraph office closings which had been effected without prior application to or authorization by the Commission.

##### Interception of Radiotelegraph Communications Between the United States and Colombia

- The Commission conducted an investigation based on an informal complaint that one of the United States carriers engaged in communication services with South America had followed the practice of intercepting radio communications from Colombia intended for reception by competing United States carriers, and had used the intercepted material for soliciting patronage and for other business purposes. As a result of the investigation steps were taken to prevent recurrence of the practice concerning which complaint had been made.

Investigation of Telegraph Service - A number of orders designed to improve the speed and quality of telegraph service were issued by the Commission as the result of an investigation carried on during the year.

On July 2, 1942, the Board of War Communications requested the Commission to undertake promptly an investigation into the service rendered in the telegraph field. Pursuant to this request, the Commission, by Order No. 103 dated July 7, 1942, instituted an investigation of the speed, accuracy, and general adequacy of wartime telegraph service; the manner and method of conducting operations and the extent to which such operating

methods are suitable and adequate to wartime needs; matters pertaining to technical developments and improvements in such service; and the cause or causes for any inadequacies in service which may be found to exist.

The investigation was carried on, as requested by the Board, with the cooperation of the telegraph companies and the labor unions at 12 key Western Union and Postal Telegraph offices - New York, Chicago, Atlanta, New Orleans, Dallas, Cleveland, Detroit, St. Louis, Los Angeles, San Francisco, Portland, and Seattle. Thereafter, in October 1942, the Commission reported its findings to the Board.

On the basis of the material contained in the Commission's October 1942 Report the Board adopted a number of orders (25-C, 27-A and 28) calculated to improve service. The principal effects of Order 25-C were the prohibition of substantially all non-telegraphic services, effecting a complete concentration of the industry's available manpower and resources on the movement of telegraph traffic, and the prohibition of domestic messages of congratulation and felicitation in an effort to reduce the peak wartime load of the carriers and to improve the service rendered on essential messages. Order 27-A, previously described, established a system of wartime telegraph precedences designed to insure the expedited handling and delivery of important telegrams. Order 28 placed various restrictions on the use of deadhead and service messages appreciably curtailing their volume and the load of the carriers.

Under the terms of Order 25-C the Commission was also requested to make periodic reports to the Board concerning the state of telegraph service. In order to obtain the necessary data for the submission of these periodic reports, the Commission on April 27, 1943, issued its Order No. 113 requiring daily speed-of-service tests to be conducted by The Western Union Telegraph Company and the Postal Telegraph-Cable Company. These studies were required to be made in the 25 cities handling the largest volume of telegraph traffic and in accordance with detailed instructions which accompanied the order.

The first speed-of-service reports made pursuant to Order No. 113 were filed with the Commission on July 20 covering the service rendered during the month of June 1943. These initial reports, with other material, were discussed in the September 1943 Commission report to the Board on telegraph service, the first of the periodic reports on telegraph service made pursuant to the request contained in Board Order 25-C. Various investigations were also conducted from time to time by the Commission to

determine the extent of compliance by the public and the telegraph carriers with the provisions of the Board's Orders Nos. 25-C, 27-A and 28 as well as other aspects of telegraph service. The results of these investigations made during the year ending June 1943 were also described in the Commission's September 1943 report to the Board.

On September 22, 1943, the Commission also began an investigation regarding the telegraph and telephone facilities leased for non-essential purposes such as the speedy dissemination of racing information by other than press associations, newspapers and radio stations in the regular course of their business of supplying information for the general public. This investigation was undertaken pursuant to the Commission's Order 117, in the light of the testimony presented in the merger proceeding of Western Union and Postal, which indicated that critical materials and skilled telegraph personnel were being employed in connection with the leasing of telegraph facilities for the rapid dissemination of horse racing information for gambling purposes.

Illegal Construction and Operation of Radio Stations by the State of Michigan - The Commission conducted an investigation of the construction and operation by the Michigan State Police organization of police and forestry radio stations without first obtaining authorization from the Commission. A hearing was held on the matter to develop the facts, ascertain the reasons for such action, the persons responsible, and the steps taken to prevent recurrences of such actions. The respondent admitted the impropriety of its acts and gave certain assurances as to future behavior. The matter is pending Commission decision.

#### Wire Telegraph Facilities

Applications - During the fiscal year 125 applications for wire telegraph certificates were filed with the Commission. One hundred and seventeen applications were granted, 91 of which authorized extension of lines to military and naval establishments and involved the leasing of approximately 3291 circuit miles and the construction of 142 wire miles. Thirteen applications were withdrawn as a result of the proposed telegraph merger. One application was returned for failure to show a military or vital public need.

After public hearings the Commission issued reports denying the applications of Postal Telegraph-Cable Company for extension of its lines to Springfield, Vermont; Messena, New York; Orange,

Bermuda, Ecuador, French West Africa (Dakar), Gold Coast (Africa), and Madagascar. Direct circuits to French Morocco and Tunisia were authorized and it is expected that these circuits will be open for service in the near future.

In January, 1943, the Board of War Communications cancelled its policy with respect to the establishment of parallel and forked radiotelegraph circuits between the United States and a foreign country under which the Commission had previously authorized competitive circuits to the same foreign country, and requested that in the future the Commission authorize no new international and transoceanic commercial radio circuits without the Board's express approval. The Commission adopted this policy on February 2, 1943, and since this date each application for a new circuit has been referred to the Board for its recommendation. With respect to all such applications, the Board has recommended that only one company be authorized to communicate with the point in question and that the company be required to handle all classes of official, press, personal and commercial traffic. The Commission, therefore, has authorized one company only to operate with each new point of communication. Further, on May 13, 1943, the Board adopted Order No. 29, which reads in part, that "no carrier engaging in international wire or radio communication, except as to circuits on the North American continent, shall institute any negotiations or arrangements with any foreign administration or organization regarding the establishment of a new foreign point of communication unless such carrier shall have given prior written notice to the Board of the proposed institution of such negotiations or arrangements and shall have received the Board's advice thereupon."

In this connection, a procedure set up by the Board provided that upon receipt of notification from a carrier of its proposal to establish a new circuit, the Board will determine whether such a circuit is necessary. If it is determined that a circuit is desirable, the Board will then invite other interested carriers to make application to the Commission for authority to communicate with this point. The Commission will authorize one company to communicate with the point in question and will notify the Department of State of its action. After the selected company receives the written approval of the Department of State, it may begin negotiations with the foreign administration for the establishment of the circuit.

All inactive points of communication, including points in enemy and enemy-controlled countries were deleted from, and active points of communication under special temporary authority were incorporated in, the renewed licenses which became effective December 1, 1942. Pursuant to the Board's recommendations made to the

Commission in April 1943, all new points of communication are authorized under temporary authorizations for periods not exceeding one year.

One regular point-to-point telegraph station has been authorized during the fiscal year 1943. This station is licensed to a cable company in Puerto Rico for the purpose of insuring adequate communication service between this strategic island and the United States. Operation of the station is authorized only during such times as all of the company's cable circuits between the United States and Puerto Rico are interrupted. In addition, four very high frequency keying control stations were authorized. These latter stations are used for short distance communication in conjunction with established regular stations.

A total of 462 applications, covering various related matters, were received and of these, 417 authorizations were granted. As of June 30, 1943, there were 50 point-to-point radiotelegraph stations licensed by this Commission whereas on June 30, 1942 there were 87 such stations. This decrease was brought about by Board of War Communications Order No. 8 which closed all domestic radiotelegraph circuits, except those used to relay international traffic, resulting in the subsequent closure by the licensee of stations which were used for domestic service. The Commission did not renew these station licenses when they expired on November 30, 1942.

Work was continued on the study to determine whether efficient use was being made of frequencies authorized to the carriers. This was necessitated primarily by the military need for more frequencies to be used in connection with important war operations.

#### Investigations

Exclusive Foreign Radiotelegraph Traffic Contracts - In connection with the authorization of new radiotelegraph circuits to foreign points, it developed that certain of the radiotelegraph carriers had entered into traffic contracts with foreign carriers or administrations which hampered the institution of additional circuits by competing United States carriers. The Commission instituted an investigation into the matter by designating for hearing the applications of R.C.A. Communications, Inc., for renewal of its station licenses. Before hearing on the matter was held, the company consented to the inclusion in its licenses of a condition prohibiting it from entering into or operating under contracts

with foreign correspondents which might prevent or hamper the establishment and unrestricted operation of circuits with any other United States carrier. The Commission included an identical condition in the licenses of all other radio carriers engaged in the fixed public and fixed public press services. In accordance with such license condition, the radio carriers waived the restrictive provisions in their foreign traffic contracts.

Divisions of Charges Between United States Radio Carriers and Their Foreign Correspondents - The Commission instituted formal proceeding for modification of radio licenses in the fixed public and fixed public press services with the view to incorporating in such licenses a condition requiring the licensee to divide charges with its foreign correspondents on a fifty-fifty basis. This proceeding was instituted to provide a uniform and equitable basis of division of charges for foreign radio communications for the protection of the United States carriers in their dealings with foreign correspondents. Hearing on this matter is now pending.

New Direct Radiotelegraph Circuits Between the United States and North and West Africa - Applications were filed by R.C.A. Communications, Inc., Mackay Radio and Telegraph Company and Press Wireless, Inc., for authority to establish direct radiotelegraph circuits between the United States and various points in North and West Africa. The Commission, after receiving a recommendation from the Board of War Communications that only one carrier be authorized to establish such a circuit with each of the points involved, authorized Mackay to communicate with Algiers, and authorized RCA Communications, Inc., to communicate with Dakar and Rabat, and denied the remaining applications. Thereafter, the three carriers requested reconsideration of such of their applications as were denied, public hearings have been held thereon, and the matters are now pending before the Commission for decision.

Application of Press Wireless, Inc., for Modification of Its Licenses so as to render "fixed public service" - On July 28, 1943, Press Wireless, Inc., a carrier licensed to handle only press and government service, filed applications to modify its licenses so that it might render "fixed public service," i.e., handle all classes of traffic. By subsequent amendment, the applicant asked that the modification sought be granted only for the duration of the war, and only as to those foreign points where, because of the policy of the Joint Chiefs of Staff, only one American carrier rendering fixed public service would be permitted to serve. The matter was designated for hearing, and other competing carriers were permitted to intervene. The hearing has been concluded, proposed findings have been filed by the parties, and the matter awaits issuance of a Proposed Report by the Commission.



## Ship Radio Stations

License Renewal Proceedings - Because of alleged violations of the Commission's Rules and Regulations relative to ship radio service, the Commission set down for hearing the license renewal applications of Parker Bros., Inc., for Station WDUG, and of W. A. Wansley for Station WOAF, both at Houston, Texas. Hearings were held and the matters are pending before the Commission for decision. The applicants were licensed on a temporary basis pending a decision on the renewal applications.

License Revocations - One ship radio station license was surrendered when the Commission instituted revocation proceeding against the licensee based on evidence that the station was being operated in violation of the Commission's Rules.

## Radiotelephone

War conditions have seriously affected transoceanic radiotelephone traffic and the Board of War Communications Orders Nos. 19 and 19-A have imposed restrictions on public telephone calls between the United States and many foreign countries.

It is expected that the pre-war circuits to enemy and enemy occupied countries will be restored as soon as they are freed from the Axis. The only new point of communication to which direct radiotelephone service has been extended during the year was Santiago, Chile. However, tests with U.S.S.R. (European) and Curacao (Dutch West Indies) have indicated that satisfactory service can be provided, and it is expected that service to these countries will be opened in the very near future. Tests are also being conducted with China and Afghanistan with a view of establishing service to these countries when such tests indicate that satisfactory service can be provided.

No new point-to-point radiotelephone stations were licensed during the past year. A total of 91 applications, covering various related matters, were received, and of these, 89 authorizations were granted.

## 5. Tariffs

Rate Schedules - At the close of the fiscal year, 396 communication carriers had tariffs and concurrences on file with the Commission. They filed 23,558 tariff publications, containing changes in rates, regulations, practices, and classifications of service, or establishing new communication services and new or revised instruments of concurrence. A total of 203 tariff publications were rejected for failure to conform to statutory requirements.

Numerous irregularities in the rate schedules were corrected or eliminated through correspondence with the carriers.

Special Permission.- During the year upon application special permission was granted telephone carriers to make changes in, or file tariffs on less than statutory notice in 15 instances. During the same period 288 applications for similar authority were received from telegraph carriers. Of this number 259 were granted and 18 were denied. Eleven applications were withdrawn. Three applications relating to both telephone and telegraph service were received and granted.

Tariff Changes - In the Commission's Eighth Annual Report certain data were submitted regarding the reductions in rates for interstate services negotiated with the American Telephone and Telegraph Company and its associated companies aggregating approximately \$34,700,000, based on the volume of business handled during the months of September, October and November, 1942, on an annual basis. The changes in rates filed by the respective carriers, giving effect to these reductions, were as follows:

Effective February 15 and March 1, 1943, respectively, the American Telephone and Telegraph Company and its associated Bell Telephone Companies filed revised tariff schedules reducing the overtime rates for two-point and conference interstate toll telephone service within the United States, with an estimated annual saving to the users of approximately \$22,900,000.

The American Company and its associated Bell Companies also filed revised tariffs effective February 1 and March 1, 1943, respectively, which reduced interstate private line telephone and telegraph, and program transmission service rates, with an estimated annual reduction to the users of approximately \$11,800,000.

Other significant changes in rates filed by the carriers since June 30, 1942, were as follows:

The American Telephone and Telegraph Company filed reduced overtime rates for two-point message toll telephone service between points in the United States and certain points in Canada, effective March 15, 1943, and also reduced rates for interstate channels for telephotograph transmission effective June 1, 1943. These reductions were estimated to produce annual savings of approximately \$300,000 to the users of the service.

Effective March 1, 1943, the Western Union Telegraph Company and Postal Telegraph-Cable Company revised their tariff schedules which reduced the maximum charges for telemeter service and lowered charges for leased facilities. It was estimated that these reductions would save users approximately \$1,300,000 annually.

As the result of its inquiry into the justness and reasonableness of charges for telegraph communications between the United States and South America, Central America and the West Indies, the Commission ordered reductions in rates which are expected to save users at least \$2,000,000 annually. The carriers handling this traffic have filed revised tariff schedules covering reductions in rates on the southbound traffic, but most of the filings to cover revisions of the charges for northbound traffic are being held in abeyance, pending completion of negotiations of the carriers with the foreign connecting carriers in those localities as to the appropriate rates and the bases for the division of revenues.

#### 6. Supervision of Accounts

Outstanding activities of the Commission in the field of accounting regulation were:

Uniform System of Accounts - The new classification of accounts, part 35 (Uniform System of Accounts for Wire-telegraph and Ocean-Cable Carriers) of the Commission's Rules and Regulations were made effective January 1, 1943. In addition to substantial changes in the previously effective system of accounts, the new classification of accounts provides for the restatement of property accounts on the basis of original cost, the determination of appropriate amounts to be provided as allowances for depreciation which will have the effect of restating the net book cost of plant on the basis of its remaining service life, and requires the installation and maintenance of continuing property records.

Restatement of Plant Accounts on Basis of Original Cost - Studies of the restatements filed by communications carriers were continued, but were primarily limited to the instances where the matter was under consideration by State Commissions with respect to certain carriers and to the domestic telegraph carriers in connection with the merger proceedings.

New York Telephone Company Accounting - REFER TO CHAPTER III,  
PAGE 23.

Western Union Telegraph Company Original Cost and Restatement of Plant Accounts - Investigation by the Commission's staff disclosed that Western Union's recorded investment in outside plant for the period June 30, 1910 to December 31, 1931 was overstated in the amount of \$26,475,876. Negotiations with the company resulted in an agreement to reduce the plant and equipment accounts by that amount by charges of \$9,236,349 to surplus, in respect of right of way, and \$17,239,528 to the reserve for accrued depreciation. The company further agreed to transfer, concurrently, \$17,500,000 from surplus to the reserve for accrued depreciation.

Pacific Coast Restatements - Examinations were made in connection with proposed restatements of plant accounts by three telephone carriers on the Pacific Coast in cooperation with representatives of the local State regulatory commissions.

The assignment of most of the personnel to more urgent matters in connection with the war has necessitated the deferment of most of these studies to the post-war period. On the basis of the studies undertaken thus far, it is apparent that the pursuit of this work in the future will result in showing that there should be substantial reductions in the recorded investments of the carriers in communication plant. State Commissions have requested, through the Committee on Accounts and Statistics of the National Association of Railroad and Utilities Commissioners, that this Commission participate in a survey and an appropriate ensuing enforcement program directed toward full compliance with the uniform accounting regulations requiring reclassification of accounts on the basis of original cost and the correction of various other misstatements in related accounts of the carriers.

Continuing Property Records - The presently effective Uniform System of Accounts for Communications Carriers provides for the establishment and maintenance of continuing property records. The value of these records from the viewpoint of the Commission and the industry is unquestioned, and while the present manpower shortages may delay somewhat the establishment of these records, arrangements have been made for the preparation and filing by the carriers of plans for such records which is considered a valuable forward step.

Depreciation - Participation in the activities of the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners has continued and a comprehensive report covering all phases of depreciation was submitted by the Committee at the National Convention held in September 1943, and publication of the report was authorized by the Association. In the meantime studies of the changes in depreciation rates of common carriers by wire and radio

is being continued in view of the vital importance of this work in connection with the control of prices for communication services by the Commission in line with the Federal anti-inflation program.

Relief and Pensions - Certain studies in connection with data submitted by communications carriers with respect to relief and pension plans were also continued during the year. Announcement of decisions by the Commission with respect to compliance or non-compliance of the carriers with the applicable regulations were being held in abeyance, pending decision by the United States District Court of the District of Massachusetts upon the complaint of the New England Telephone and Telegraph Company against the Commission's Order of December 2, 1942, in Docket No. 5188, which decision will have a material bearing upon a number of controversial points involved in this matter.

Miscellaneous - Communication carriers that operate separate departments of a holding, servicing, manufacturing, or other non-carrier company nature and of an operating company nature, were required by Commission order to furnish the Commission with supplemental supporting statements indicating the effect of such other activities upon the affairs of the company. Other projects included:

Prepared an assigned portion of a symposium on income and excess profits taxes for use by the Committee on Accounts and Statistics of the National Association of Railroad and Utilities Commissioners.

Reduced the period of retention of domestic telegraph messages from one year to three months, after extensive studies, which included correspondence and conferences with representatives of other agencies such as the War Department, the Navy Department, the Federal Bureau of Investigation, and the Bureau of the Budget.

Amended the Rules of the Commission to permit filing copies of Securities and Exchange Commission Forms, instead of similar FCC forms, by certain holding companies.

Made a complete revision of Annual Report Form O (for wire-telegraph and ocean-cable carriers) which was necessary as a result of the adoption of the aforementioned new uniform system of accounts for those carriers.

Condensed somewhat Annual Report Form M (for telephone companies) to lighten the burden upon the carriers because of the present manpower situation.

Maintained continuing studies of the Long Lines Department of the American Telephone and Telegraph Company with

respect to plant additions, working capital requirements, depreciation reserves, receipts and payments for leased and jointly used plant, and division of revenues from joint interstate business with other participating carriers.

Continued analysis of current international cable, radiotelegraph and radiotelephone traffic.

Completed a comprehensive study of the capital structure and operations of a large international communications carrier and its many subsidiaries.

Made an extensive analysis of license contract costs of American Telephone and Telegraph Company, including cost of development and research work performed, and fees collected from associated companies and their subsidiaries.

Investigated compliance of wire and radiotelegraph carriers with the new uniform system of accounts.

Examined records of international carriers to verify refunds to customers for excess amounts collected for urgent traffic, as directed by a Federal Court.

Investigated practices of telegraph carriers in handling messages filed directly with carriers.

Made examination of methods of telegraph carriers in accounting for transactions involving foreign exchange.

## CHAPTER IV

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STANDARD BROADCAST

1. General
  2. Material and Manpower
  3. Policy on Use of Critical Materials
  4. North American Regional Broadcasting Agreement
  5. Chain Broadcasting Regulations
  6. Multiple Ownership
  7. License Period Extended
  8. Foreign Language Programs
- 

1. General

A total of 912 standard broadcast stations were in operation or under construction on June 30, 1943.

During the fiscal year the Commission received 35 applications for the assignment of broadcast station licenses and 21 for the transfer of control of corporations holding broadcast station licenses. Forty-two of these applications were granted without a hearing, six after a hearing. Three were dismissed at the request of the applicants, five were pending before the Commission at the close of the fiscal year.

As the use of the standard broadcast facilities increased, the readily available and simple engineering assignments decreased. Directional antenna design has become so complex that various factors and effects which could be safely ignored in simple arrays must be given consideration in any future allocation of facilities. Difficulties in actually obtaining in practice many of the theoretically possible proposals presented to the Commission, and later difficulties in maintaining inherently critical arrays, have occurred from time to time. The Commission has, therefore, engaged in a study of some of these problems preliminary to revision of existing rules and standards. It appears desirable, however, to delay actual revision until it is possible for engineering consultants and others now engaged in war activities to provide the benefit of their experience in this regard.

## 2. Material and Manpower

The necessity for maintaining existing standard broadcast facilities in spite of shortages in vital replacement equipment and equipment requirements of other government agencies, without undue recourse to production facilities now geared to war production, resulted in several extensive studies by the Commission.

During the fiscal year, the Commission conducted and prepared for the Board of War Communications an analysis of vacuum tubes in the hands of broadcast licensees. The purpose of this analysis was to determine the general condition and reserve of transmitting vacuum tubes in the standard broadcast industry.

The Commission upon the recommendation of the Board of War Communications prepared a 1075-page catalog of surplus and salvageable equipment and published and distributed this catalog to key points in the United States on January 12, 1945. Current information is maintained by supplements which are issued from time to time. Two such supplements have been issued and a third is being prepared.

An analysis was made of idle standard broadcast transmitters available throughout the United States to determine their age, general condition and serviceability.

The above studies have been utilized by the Army, War Production Board and other war agencies as well as the radio industry to obtain transmitters and other items of equipment not otherwise available.

The Commission, in addition to supplying data with regard to available technical equipment, has continued to provide technical information whenever required by the armed services or the various war agencies. These data include several studies of a confidential nature for the Army, Navy and Board of War Communications.

On November 7, 1942, in further recognition of the scarcity of materials and manufacturing facilities, the Commission, in cooperation with the Board of War Communications, adopted Order No. 107 requiring the readjustment of broadcast transmitters in the interest of conservation of equipment. As a result of these readjustments radiated power was decreased by approximately 21% (one decibel) and the life of broadcast equipment (vacuum tubes in particular) has been materially prolonged without a noticeable change to the broadcast listener. The licensed power of stations remains unchanged.

Radio engineers both in the government and in industry have long agreed that the change in power by one decibel could not be detected by



the listener. In order to substantiate this opinion, tests were made by the Commission in cooperation with certain stations. Listeners, aware of the tests, were unable to determine when the power was reduced and when it was not.

In conjunction with the above Order, there was issued a "Manual on the Adjustment of Standard Broadcast Transmitters" prepared and approved by the Board of War Communications setting forth the procedure to be followed in readjusting the equipment and in making regular checks of such adjustments.

The Commission at the same time adopted Order No. 94-A superseding its previous Order No. 94 and suspending Section 3.71 of the Rules and Regulations with respect to requiring each standard broadcast station to operate at least two-thirds of the authorized time during the broadcast day, i.e., 6 A.M. to midnight, and in lieu thereof only required operation for one-third of the broadcast day. This permitted a voluntary reduction in time of operation from 12 hours daily, in the case of an unlimited time station, to 6 hours daily. There is no restriction on the maximum hours of operation except as provided by individual licenses and the Rules and Regulations of the Commission.

On January 19, 1943, the Commission, in recognition of the shortage of radiotelephone operators because of the additional demands of military services, adopted Order 91-C. This Order superseded Orders 91, 91-A, and 91-B and provided for an even greater relaxation of requirements for commercial radio operators.

### 3. Policy on Use of Critical Materials

In view of the equipment studies, an analysis was made of pending applications and those dismissed because of equipment requirements to determine, if possible, whether needed service could be obtained by utilizing idle equipment not involved in established programs or possible future requirements.

On September 22, 1942, the Commission published the following modification of the so-called "Freeze Order":

"The Commission today relaxed slightly its interpretation of the Memorandum Opinion of April 27, 1942, in order that applications involving shifts in frequency in which no materials will be utilized other than quartz crystals, may be granted, provided:

- (a) Such applications involve no inconsistencies with Order No. M-146 of the War Production Board relating to quartz crystals;

- (b) Such applications involve no engineering conflict with any other application pending at any time since February 22, 1942;
- (c) Such applications involve no inconsistencies with the Commission's Rules and Regulations;
- (d) Such applications tend toward a fair, efficient, and equitable distribution of radio service, are consistent with sound allocation principles and offer substantial improvement in standard broadcast service; and
- (e) Such applications are otherwise in the public interest.

The Committee studying this matter advises that it will make further recommendations relative to the Memorandum Opinion."

On August 11, 1943, Commission policy with regard to standard broadcast applications was further modified by the following statement:

"Upon consideration of a report and recommendations of its Committee on Critical Radio Materials, the Commission on August 10, 1943 determined that under certain stated conditions it would be in the public interest to grant applications for permits involving the use of idle equipment to increase power of 100-watt local channel standard broadcast stations to 250-watts and for construction of new 100-watt or 250-watt local channel stations.

"Applications for permits to construct new 100-watt and 250-watt local channel standard broadcast stations in cities or towns where no station is located at present and not located in metropolitan districts already served by a radio station; and applications to increase power of local channel stations to 250 watts may be granted upon a satisfactory showing that:

1. All required materials, except vacuum tubes, may be obtained without priority assistance. 1/

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1/ The Commission is informed by the War Production Board that building construction requires a clearance which may be obtained only when that agency is satisfied that a direct contribution toward winning the war is clearly indicated."

2. Such applications involve no inconsistencies with the Commission's Rules and Regulations.
3. Such applications tend toward a fair, efficient and equitable distribution of radio service, are consistent with sound allocation principles, offer substantial improvement in standard broadcast service, and
4. Such applications are otherwise in the public interest.

"Applications for local channel stations or changes in such stations which have been dismissed without prejudice pursuant to the policy announced April 27, 1942, may be reinstated for consideration in the light of the new circumstances upon submission of a petition within thirty days of this date showing (1) that such application is in conformity with the foregoing enumerated conditions; and (2) any and all changes with respect to facts and circumstances as represented in the original applications."

Based upon the vacuum tube survey in August, 1942, it appeared that approximately 67.5% of the 872 broadcast stations considered would be forced to remain silent prior to July 1, 1943 by reason of vacuum tube failure alone. In addition, it appeared that the lack of skilled manpower and shortages in replacement equipment of various types would cause the closing of additional stations. It will be noted, however, that as the result of the Commission's policy with regard to applications involving the use of materials; the reduction in operating power of broadcast stations; the recommendations made as the result of equipment surveys; the collection and distribution of information regarding surplus and salvageable equipment in the United States; the temporary relaxation of the commercial radio operator requirements under Orders 91, 91-A, 91-B and 91-C; the allocation of some new vacuum tubes and other equipment by the War Production Board; and the cooperation and efforts of the broadcast industry in general, only fourteen stations, or slightly more than one percent, were forced to cease operation or surrender construction permits from all causes during the fiscal year ending June 30, 1943.

#### 4. North American Regional Broadcasting Agreement

It is apparent, after more than 2 years of operation, that the North American Regional Broadcasting Agreement is functioning successfully. Conflicting notifications and interference problems, normally expected in a plan of this magnitude, have been settled without friction and with a minimum of negotiation.

There are several assignments, specifically allocated to the United States under the terms of the Agreement, that have not yet been completely utilized because of shortages in equipment and trained personnel. The Agreement provides a period of five years from March 29, 1941 for this country to accomplish full utilization.

The Commission continues to prepare technical data and lists of assignments for transmittal to other signators in accordance with the Agreement.

#### 5. Chain Broadcasting Regulations

On May 10, 1943, the Supreme Court upheld the validity of the chain broadcasting regulations and upon the expiration of a stay granted by the Court, the regulations went into effect in June 1943 (see Chapter I, page 3). One of the most important of the chain broadcasting regulations was Regulation 3.107 which was directed against the ownership of more than one network by a single network organization. This regulation had been suspended indefinitely in order to afford adequate time for the disposition of the properties involved. On August 11, 1943, an application was filed with the Commission for the transfer of control of the Blue Network from RCA to the American Broadcasting System, a company entirely owned by Mr. Edward J. Noble. A hearing was held on this application on September 10 and 20, 1943. On October 12, 1943, the Commission issued its Decision and Order approving the application and authorizing the transfer.

#### 6. Multiple Ownership

Order No. 84-A promulgating Regulation 3.35 which sets forth the Commission's policy regarding multiple ownership of standard broadcast stations was adopted by the Commission on November 23, 1943. This regulation provides that no license shall be granted for a standard broadcast station, directly or indirectly owned, operated or controlled by any person where such station renders or will render primary service to a substantial portion of the primary service area of another broadcast station, directly or indirectly owned, operated or controlled by such person, except upon a showing

that public interest, convenience and necessity will be served through such multiple ownership situation. This policy was adopted after extensive consideration of the problem raised by concentration of control over standard broadcast stations serving substantially the same area.

#### 7. License Period Extended

On December 14, 1943, the Commission adopted an amendment of Section 3.34 of the Rules and Regulations, to become effective with respect to licenses granted on and after December 15, 1943, extending the normal license period of standard broadcast stations from two to three years. A transition period was ordered during which initial renewals will be for staggered periods, ranging from one year to two years and nine months. Thereafter, all regular licenses will be for the full three-year period.

#### 8. Foreign Language Programs

Because of the increasing importance of examining domestic foreign language broadcasting, Congress granted funds to the FCC in October 1942, to expand the work it was already doing in this field.

Foreign language broadcasts had assumed increased significance after the outbreak of the war in Europe in 1939. Certain groups affiliated with foreign organizations were attempting to use broadcasting as a medium of propaganda to create Axis sympathies in this country. Many of the prominent performers on these programs had been interned as dangerous enemy aliens, some had been arrested for failure to register as agents of foreign governments, some had been barred from certain areas of the United States. Many complaints came to the Commission.

In the fall of 1940, the Commission made a comprehensive survey of programs and personnel. At the same time it expanded its work of recording and analyzing the broadcasts. After Pearl Harbor there was a decided change in the tenor of many programs, but many questionable ones still remained and the Commission continued its vigilance. The granting of special funds by Congress in 1942 enabled the Commission to intensify its surveillance.

The information obtained by the Commission was used in determining whether the stations were operating in the public interest. It was also made available to the Office of War Information, Office of Censorship, Department of Justice, Federal Bureau of Investigation, Treasury Department, Coordinator of Inter-American Affairs and other agencies interested in some aspect of foreign language broadcasting.

Foreign language broadcasting as a whole has been invaluable in mobilizing the homefront for total war. The last survey, made in February 1943, showed 169 stations presenting programs in 27 languages and having a potential audience of 15,000,000 listeners. The broadcasts have been utilized by the Treasury Department in the sale of bonds, by Selective Service to register men for military service, by the Office of Price Administration to explain rationing regulations, by the U. S. Employment Service to obtain labor for war industries, by the Office of War Information to counteract Axis propaganda beamed to American foreign-speaking groups by the short-wave radio, by the Office of Civilian Defense and many other government agencies.

## CHAPTER V

## NONSTANDARD BROADCAST

1. General
2. High Frequency (FM) Broadcast Service
3. Television Broadcast Service
4. International Broadcast Service
5. Noncommercial Educational Broadcast Stations
6. ST (Studio-Transmitter) Broadcast Service
7. Relay Broadcast Service
8. Facsimile Broadcast Service
9. Developmental Broadcast Service

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1. General

The limitation during wartime of authorizations for station construction, indicated by the Memorandum Opinion of April 27, 1942, includes nonstandard broadcast stations of the following classes: high frequency (FM), television (commercial), facsimile and relay broadcast. Few applications have been granted during the year for construction permits or for extension of time in which to complete construction of stations in these services. However, on February 23, 1943, the Commission announced that in order to sustain interest in high frequency (FM) and television broadcasting, it would not dismiss those applications which could not qualify under the provisions of the Memorandum Opinion, but instead would retain the applications in the pending files without present action. In addition, a relaxation of the "freeze order" regarding relay broadcast stations was announced on August 28, 1943, providing for additional relay broadcast facilities where needed and where equipment is readily available.

To conserve materials and yet make use of authorized and existing station construction, licenses have been issued for FM and television stations to cover construction in part where a satisfactory broadcast service could be rendered. Other means have also been taken to maintain existing broadcast services as much as possible without conflicting with the war effort. To assist in the maintenance of service in the face of the shortage of transmitting tubes and replacement equipment, the Commission on July 6, 1943 adopted a simplified procedure

for authorizing changes in technical operation of FM, television, and noncommercial educational broadcast stations. During the fiscal year 111 authorizations were issued in accordance with the procedure established by the Commission's Administrative Order No. 2 for temporary changes in operation of equipment and for similar matters in the nonstandard broadcast services.

## 2. High Frequency (FM) Broadcast Service

It is noteworthy that while several stations have had to operate with reduced power and hours of operation, no station in this new field has ceased broadcasting activity during the war, although hampered by loss of personnel, difficulty in obtaining replacement tubes and equipment, general financial loss from operation, and limited distribution of FM receiving sets. The construction of high frequency (FM) broadcast stations continues to be restricted, in accordance with the Memorandum Opinion of April 27, 1942. Three new stations were authorized in this service during the year, where existing experimental or other previously authorized equipment was employed. The total number of FM stations authorized decreased from 61 to 48, due to the expiration of a number of construction permits for which equipment was not available. At the close of the fiscal year 41 stations were in operation, in addition to six experimental high frequency broadcast stations also furnishing FM programs.

On August 4, 1942, the Commission announced that it would issue wartime licenses for FM stations for the operation of existing facilities, provided construction had reached a point where a substantial public service could be rendered. Applications for licenses under this policy require a showing of diligence in proceeding with construction and willingness to complete construction when equipment and personnel become available. By the close of the fiscal year, 26 of the FM stations authorized had been licensed under this policy and several others either had applied or were preparing to file applications for such wartime licenses, with their stations in operation under program tests or other authorization. Ten FM stations have received regular licenses following completion of construction and testing.

On February 23, 1943, the Commission announced that because of the shortage of material, equipment, and skilled personnel and in order to sustain interest in high frequency (FM) broadcasting (and television, as later described), it would not dismiss applications for such facilities that are contrary to the provisions of the Memorandum Opinion of April 27, 1942, but instead would retain such applications in the pending files of the Commission without present action. This policy also provided for the reinstatement of FM applications which had been dismissed under the Memorandum Opinion. New FM



applications, as well as applications refiled for authorizations which had previously been granted but which had been permitted to expire due to wartime difficulties, are retained in the pending files instead of being dismissed pursuant to the Memorandum Opinion.

Several FM rules were waived during the year. On March 30, 1943, the Commission adopted Order No. 111, permitting FM stations to furnish the required minimum six hours daily of programs during any part of the broadcast day. Previously it was necessary to operate at least three hours before 6:00 p.m. and three hours after 6:00 p.m. each day (Sundays excepted) in accordance with Section 3.261 of the rules. To insure that at least a partially independent program service is furnished to FM listeners, the Commission has heretofore required that a minimum of two hours daily of the broadcast schedule consist of programs not duplicated in the area by a standard or other FM broadcast station. However, because of the increasing shortage of manpower, the Commission on July 6, 1943, adopted Order No. 111-A, relaxing this requirement and permitting FM broadcast station licensees (who generally also have a standard broadcast station) to use duplicated program material for all FM programs if necessary. One method of alleviating the manpower shortage has been adopted in Philadelphia where the five FM stations each broadcast one day out of five in accordance with a cooperative arrangement approved by the Commission.

On March 30, 1943 Order No. 112 was adopted, suspending until further notice the rule (Sec. 3.229) requiring FM stations to make field intensity measurements of station coverage. Such coverage surveys, which indicate the correlation of a station's service area with the area authorized, require skilled personnel and mobile measuring equipment.

On August 24, 1943 the Commission adopted letter calls for FM stations, effective November 1, 1943, replacing the letter-numeral combinations (like K37LA) previously used. Under the old system the two figures indicated assigned frequency and the final letter or letters indicated the city in which the station is located. Thus, the call K37LA denotes a station operating on 43,700 kc at Los Angeles and W45D a station on 44,500 kc at Detroit. Licensees of FM stations found, however, that the letter-numeral system was somewhat cumbersome and did not meet with general public acceptance. In addition, a change in frequency would require a change in call, causing some confusion.

The new system provides four-letter calls for FM stations like those used in standard broadcasting, television and most other

services. Licensees may request particular call letter combinations from those available for assignment. An FM broadcaster who also has a standard broadcast station in the same city may, if he so desires, be assigned the call letters of the standard broadcast station plus the suffix "FM". For example, a standard broadcast station with the call KQO may thus use "KQO-FM" as identification for the FM broadcast station. Call letters of stations in the United States begin with the letter "W" or "K", depending, with some exceptions, upon whether the station is located east or west of the Mississippi River.

### 3. Television Broadcast Service

Throughout the fiscal year commercial television has been subject to the Commission's policy adopted April 27, 1942, namely, that no authorizations would be issued which involved the use of any materials to construct or change the transmitting facilities of a television broadcast station. Although this policy did not preclude authorization of experimental television station construction, no applications concerning new experimental stations were received.

As of June 30, 1943, four television broadcast stations were licensed for commercial operation. Three of these stations have maintained a minimum program schedule of four hours per week, presently required of such stations by the Commission's rules and regulations, during the entire fiscal year. Two of these stations are located in New York City and have arranged their broadcasts so that only one station is on the air at a time, providing at least eight hours program service per week to the area. The other two commercial stations are located in Schenectady and Philadelphia, the latter station having been licensed to begin commercial operation on April 20, 1943. This station had previously rendered experimental program service. Each of the licensed commercial stations has devoted a part of its program service to civilian defense subjects.

Five experimental television stations have also provided scheduled program service of two or three hours per week throughout the greater part of the year. One of these stations is located in New York City, two are in Chicago, and two in Los Angeles. These experimental stations likewise included civilian defense subjects in their program service. Of the total of 28 experimental television stations authorized, about one-half are television relay broadcast stations used for transmitting from places where suitable wire facilities are not available or for relaying programs from one television station to another for rebroadcast purposes. Both the Schenectady and Philadelphia

stations rebroadcast television material being broadcast in New York City. The use of similar relay stations in connection with possible future network television broadcasting has been proposed, and present operation should furnish substantive data regarding the feasibility of such a project.

On October 27, 1942 the Commission deferred action on pending applications pertaining to commercial television broadcast stations which must be denied under its wartime policies regarding station construction. Thereafter, on February 23, 1943 the Commission announced that it would not dismiss television applications that may not be granted under the Memorandum Opinion of April 27, 1942 but would retain these applications in the pending files without present action. It was further provided that television applications which had been dismissed under the "freeze order" could be reinstated.

It was also announced on February 23, 1943 that holders of construction permits for television stations might obtain licenses to operate existing facilities during the war on either an experimental or commercial basis, provided construction had reached a point where the station was capable of rendering a substantial service. Two television stations have such wartime licenses and another application is pending.

#### 4. International Broadcast Service

At the close of the fiscal year there were 13 international broadcast stations in operation within the United States, one less than the number operated during the previous fiscal year. This reduction was occasioned by the discontinuance of a low-power station to facilitate the construction, at the same site, of additional high-power equipment. In accordance with the plan proposed by the Interdepartmental Committee for International Radiobroadcasting Facilities a number of 50 and 100 kw stations were under construction. During the month of August 1943 three new 50 kw stations were licensed, two at Scituate, Mass., and one at Cincinnati, Ohio, while one new 50 kw station began testing at San Francisco, Calif.

All international broadcast stations are programmed by the Office of War Information and the Office of the Coordinator of Inter-American Affairs. These two offices have proposed a total of 36 international broadcast transmitters to provide adequately for the needs of psychological warfare. The Commission has cooperated closely with these agencies in providing engineering advice.

Although international broadcast stations are not included in the restrictions on the construction or change of the facilities

of other broadcast stations, the scarcity of materials due to the war has delayed the construction of new stations. In order to meet immediate needs, available equipment of point-to-point stations not required for their regular service is being used under special authorization for international broadcast service. During the fiscal year, seven such authorizations were issued, bringing the total number of stations authorized to engage in the international broadcast service to twenty.

#### 5. Noncommercial Educational Broadcast Stations

Five channels are allocated for noncommercial educational broadcast stations adjacent to the commercial FM broadcast band. Since these stations may be tuned in on the usual FM broadcast receiver, the programs may be received by the public.

At the end of the fiscal year seven stations were authorized, as compared to eight the previous year. While these stations have not been subject to the wartime restrictions on construction contained in the Memorandum Opinion of April 27, 1942, equipment shortages and lack of skilled personnel have served to limit present development. However, considerable interest is shown by educators in the establishment of these stations and this may bring faster development in the postwar period.

#### 6. ST (Studio-Transmitter) Broadcast Service

ST broadcast stations are used for providing program circuits between the studio and transmitter of high frequency (FM) broadcast stations and international broadcast stations. Particularly where the transmitter is located at a remote point (such as mountain-top FM stations), the use of an ST station provides a more satisfactory and dependable program circuit. Principally due to the restricted construction of FM broadcast stations, no significant development in the ST broadcast service has occurred during the year.

#### 7. Relay Broadcast Service

Relay broadcast stations are employed for the transmission of broadcast programs from places of origination where wire facilities are not available. These stations may also be used for emergency circuits between studio and transmitter of standard broadcast stations when the regular wire facilities are interrupted. While new relay broadcast construction has been restricted, the number of stations increased during the year from 523 to 549. This resulted from the duplicate licensing of some relay broadcast transmitters, with leasing arrangements between licensees.

Upon consideration of a report of its Committee on Critical Radio Materials, the Commission on August 28, 1943, announced that under certain conditions it would authorize the use of equipment for additional or improved relay broadcast facilities. The shortage of telephone line facilities has increased the need for relay broadcast transmitters in many instances, and the use of these small radio stations permits the origination of programs from camps and other places where telephone lines may not be available for this purpose. Applications for relay broadcast facilities under this relaxation of the "freeze order" must show that the required materials may be obtained without priority assistance, and it is believed that use will be made of idle equipment found unnecessary or unsuited for other services.

#### 8. Facsimile Broadcast Service

Stations in this service are used to transmit still pictures and text to facsimile receivers in homes and other places equipped with proper receiving apparatus. Interest in facsimile broadcasting continues to be limited and only three stations are authorized, a decrease of one from the previous year.

Although the rules provide for the multiplex transmission of facsimile by high frequency (FM) broadcast stations, no regular FM stations provide this service and little interest in this development has been indicated.

#### 9. Developmental Broadcast Service

Developmental broadcast stations provide a facility for use by equipment manufacturers and experimenters when needed for development or research in connection with broadcast equipment. The operation of such stations during the past year has been slight because of the concentration by manufacturers on military radio development and production, with a reduction in the number of stations authorized from eight to four. Activity in this field will likely increase as the postwar period approaches.



## CHAPTER VI

## SAFETY OF LIFE AND PROPERTY

1. War Emergency Policies on Use of Materials
2. Marine Services
3. Aviation Radio Service
4. Emergency and Miscellaneous Radio Services
5. Experimental Radio Service

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1. War Emergency Policies on Use of Materials

Since it became increasingly apparent that the public interest required a curtailment of the use of critical materials for the construction or change of the transmitting facilities of certain classes of non-government radio stations, including those operating in the various safety radio services, the Board of War Communications, in June, 1942, made the following recommendation to the War Production Board and to the Federal Communications Commission:

No future authorizations involving the use of any materials shall be issued by the Federal Communications Commission nor shall further materials be allocated by the War Production Board, to construct or to change the transmitting facilities of any station operating in the Emergency, Miscellaneous, Coastal, Marine Relay, or Fixed Public Services; or of any Aeronautical Fixed (domestic) Station; Itinerant Aircraft Station; or Flying School Station; provided, however that upon a proper showing that any such station serves an essential military need or a vital public need, which cannot otherwise be met, the Commission and the War Production Board will take action commensurate with the importance of the particular facility in question.

The Commission announced adoption of this recommendation in its Memorandum Opinions made public under dates of July 7 and July 21, 1942. The Commission now requires that all applications submitted which involve the use of any material to construct or to change the transmitting facilities of any radio station operating in these services must be accompanied by a verified statement showing all the facts and circumstances which the applicant believes to

demonstrate that the facilities to be constructed or changed will serve either an essential military need or a vital public need, which cannot otherwise be met. At the close of the fiscal year, however, it had been determined through experience in the administration of this policy that applications pertaining to certain classes of stations, such as itinerant aircraft stations in Alaska, did not require an individual showing of vital public need or essential military need in view of such need having been established with respect to all stations of these classes.

## 2. Marine Services

### Exemptions

The Commission is authorized, pursuant to the International Convention for the Safety of Life at Sea, London, 1929, and Section 352(b) of the Communications Act of 1934, as amended, to grant exemption from the ship radio requirements prescribed by the Convention and the Act to certain vessels or classes of vessels when navigated under specified conditions when the Commission is satisfied that the route or conditions of the voyage involved or other circumstances are such as to render compliance with those requirements unnecessary or unreasonable. It has been the continued policy of the Commission to grant exemption on an annual basis for certain classes of vessels and to exempt individual vessels for limited periods of time sufficient to cover specified voyages.

The exemption previously granted to small passenger vessels of less than 100 gross tons operating in the coastal waters between Naples, Florida and New Orleans, La., was renewed for another year.

The Commission renewed the general exemption previously granted to small passenger vessels of United States registry, as a class, up to and including 15 gross tons. Many of the vessels to which these exemptions apply are engaged in sportfishing, sightseeing and the water taxi business.

The exemption previously granted to certain U. S. passenger ferry boats over 100 gross tons which operate on international voyages on Puget Sound was renewed.



### Coastal Radiotelegraph Stations

As of June 30, 1943, there were 26 coastal telegraph stations licensed by the Commission, exclusive of those in Alaska. Three such stations were licensed for limited (governmental) coastal service, the remainder being licensed for public service. This is a decrease of 22 outstanding licenses for coastal stations during the year. The reduction is attributed indirectly to the sharp curtailment in ship to shore message traffic as a result of the war, and to the policy adopted by the Commission on January 12, 1943, of not renewing licenses for stations of this class which had been closed and were not in active commercial operation. No new coastal telegraph stations were authorized during the year; however, 74 applications were received, resulting in the issuance of 57 authorizations pertaining to the existing coastal telegraph stations.

### Ship Station Inspections

A total of 8110 ship radio station inspections were made by the Field Division of the Engineering Department, 6069 on U. S. vessels and 2041 on vessels of foreign registry. The inspections resulted in the serving of 5924 violation notices and the clearing of 2773 violations.

### Coastal Radiotelephone Stations

As of June 30, 1943, four stations were licensed by the Commission for public coastal telephone service. As a result of the war these stations are inactive insofar as communication with ships is concerned but are being utilized nevertheless, on a temporary basis in the Fixed Public service. During the year six applications were received, resulting in the issuance of four authorizations. No new stations were established during the year.

### Marine Relay Radiotelegraph Stations

During the year 55 applications were received, 35 authorizations were issued to stations in this service. Fifteen marine relay stations were licensed as of June 30, 1943. No new stations were established in this service and since the service rendered by stations of this class is closely allied to the coastal service, activities of marine relay stations have also been curtailed as a result of the war. A petition was received and is under consideration concerning changes in the Commission's rules to permit the use of Marine Relay radiotelegraph stations in connection with the coastal harbor telephone service on the Great Lakes.

### Coastal Harbor Radiotelephone Stations

As of June 30, 1943, 35 coastal harbor stations were licensed by the Commission (exclusive of those in Alaska), of which two were licensed for limited (governmental) coastal service and 33 for public coastal service. During the year 81 applications were received, 80 authorizations issued. As a result of the war, all communication between ships and coastal harbor stations is subject to control and supervision by the naval authorities under Section 606 of the Communications Act. The volume of commercial communication accordingly has been drastically curtailed. Nevertheless, considerable activity is permitted ship and coastal stations on the Great Lakes and inland waters where the service rendered is of substantial benefit to the efficient operation of bulk cargo carriers and other classes of ships engaged in activities essential to the war.

### Authorizations for Transmission of Weather And Hydrographic Information

For reasons of security certain restrictions were placed by naval authorities on the dissemination of weather and hydrographic information by radio stations; whereupon it developed that vessels on the Great Lakes and connecting inland waters required more extensive information of this nature. The U. S. Weather Bureau, with the cooperation of interested naval authorities, this Commission and the Canadian radio administration, and after consultation with licensees of coastal harbor radio stations in the Great Lakes area, developed a schedule for the encoded transmission of weather and hydrographic information. The Commission authorized the following coastal harbor stations serving vessels in the Great Lakes area to transmit the encoded information on daily schedules: WAY, Lake Bluff, Ill.; WLF, Rogers City, Mich.; WAD, Port Washington, Wisc.; WAS, Duluth, Minn. and WMI, Lorain, Ohio. In addition, the Commission authorized certain coastal harbor stations serving vessels on the Mississippi River and connecting inland waters to transmit river level stages and flood warnings.

## Hearings on Applications

Two public hearings were held involving the public coastal service. One was on an application for a construction permit to use additional frequencies at coastal harbor station KMP, Cape Girardeau, Mo. to extend the communication range of this station substantially. The other was on the proposed establishment of a new coastal harbor station at Joliet, Ill. and on an application for authority for Great Lakes coastal harbor station WAY, at Lake Bluff, Ill. to communicate with ships navigated on the Mississippi River and connecting inland waters.

A public hearing was held at Houston, Texas, on applications for renewal of the licenses of two radio stations located on board barges and licensed as ship stations, for the purpose of determining, among other things, the nature of the service rendered by these stations and whether or not such service is within the purview of the Commission's rules governing ship radio service.

## Services in Alaska

The Board of War Communications, by Order No. 14, delegated to the War Department broad powers with respect to radio stations in Alaska. All stations in Alaska licensed by the Commission are subject to this Order, except ship, coastal and marine relay stations, which are subject to control by the Navy Department under Orders No. 1 and 2 of the Board which were issued during the previous year.

Because conditions in Alaska are unfavorable to the construction of public land wire communication facilities, there are numerous small point-to-point radio stations which are used for communication wholly within the Territory. Since many of these stations communicate with the stations of the Alaskan Communications System, applications for licenses and construction permits normally are reviewed by the latter before they are presented to the Commission. Because the Western Defense area includes Alaska and because of the War Department's responsibility concerning Alaskan radio stations as evidenced by Order No. 14 of the Board of War Communications, many of the applications concerning these stations are reviewed by the Alaska Defense Command and the Western Defense Command before they reach the Commission for action.

At the close of the last fiscal year 153 public coastal stations and 275 point-to-point stations in the fixed public service in Alaska were licensed by the Commission. Several of these stations are cooperating with the armed forces.

## Marine Watch on 500 KC

The Commission maintains, in connection with its other monitoring and intercept activities, a continuous listening watch on 500 kilocycles, the international marine distress frequency. These stations, which are operated by the Field Division of the Engineering Department, are so placed as to make almost certain the interception of any distress message originating on board merchant ships anywhere within several hundred miles of our coast line. Provision is made for immediate liaison with the U. S. Coast Guard and the headquarters of all coastal defense areas where remedial action is taken. A continuing analysis of intercepts of distress communication is furnished the U. S. Coast Guard to assist the latter in evaluating the effectiveness of its coastal radio facilities.

## Approval of Equipment

Numerous new types of marine radio equipment for oceangoing vessels to meet the changing wartime requirements for more suitable equipment and to conserve materials and manpower have been approved by the Commission. Certain tests were conducted at the Commission's laboratory near Laurel, Md., and on board a boat - the latter tests with the cooperation of the U. S. Coast Guard - relative to the communication range of lifeboat transmitters, both with the conventional lifeboat antennas and with recently developed balloon and kite-supported antennas. Fifteen additional types of receivers were approved during the past year as capable of being used on board ship without attracting the attention of the enemy. Four types were disapproved.

Several new types of lifeboat radio transmitters were approved, bringing the number of approved types to ten. To take advantage of the increased communicating range which may be obtained by using a relatively high antenna, acceptable topmasts were devised by the lifeboat manufacturers and others for attachment to the sailing masts of the lifeboats, which will support the antennas at a height of 26 feet above the water. The simpler topmasts are constructed of appropriate lengths of bamboo which are lashed to the sailing masts; the more elaborate ones are of sectionalized wood and metal construction and are provided with halyards for raising and lowering them

The Commission on August 18, 1942, amended its rules to require a reliable artificial antenna for use in testing, in port, a ship's emergency radiotelegraph transmitter, with a minimum of

radiation, for effective operation on the distress frequency 500 kc. Such tests are considered necessary to insure proper operation of the transmitting equipment when it is needed during an emergency at sea and to allow inexperienced operators an opportunity to familiarize themselves with the operation of the equipment.

The Commission approved the use of steel instead of aluminum for fabricating the enclosed case and front panel of an auto alarm, the second device of this kind in which steel has supplanted more critical materials.

The Commission suspended until further order its rule which requires the installation of automatic alarm-signal keying-devices in connection with radio transmitters installed on certain vessels. This action was taken because critical material and manpower is necessary to manufacture and install such equipment and because the need for such equipment has been greatly minimized due to the exigencies of wartime ship operation.

Because antenna entrance-insulators were observed during inspection on board ship to cause undue transmitting power losses and to lack uniformity in insulating qualities, tests were conducted by the Commission's laboratory on certain antenna entrance insulators of the kind used on board merchant ships. The insulators were subjected to tests over a period of ten months during which time the insulators were exposed to the elements and were occasionally subjected to salt water spray. The power losses caused by all insulators tested appear to depend largely on the ability of the insulator's surface to hold a continuous water film after wetting.

Due to the more stringent frequency stability which would normally be required of radio transmitters effective January 1, 1944, under the Commission's Rules and the International General Radio Regulations, a survey was initiated to determine the number of radio transmitters which would not meet the new frequency tolerances. The new tolerances, if enforced, would make necessary the replacement of some transmitters and the modification of others, thus requiring the use of critical material and manpower.

### 3. Aviation Radio Service

#### General

Radio stations in the Aviation Service include aircraft stations aboard itinerant and scheduled aircraft, airport control stations, aeronautical stations, aeronautical-fixed stations, instrument-landing stations, radio marker stations, flight-test stations and flying-school stations. All such stations transmit only communications necessary for safe aircraft operation and the protection of life and property in the air.

A majority of the commercial aeronautical and aeronautical-fixed radio station facilities are providing communication service in conjunction with operations of the military forces. Much of this activity revolves about the operation of air-cargo aircraft by the various commercial airlines for the U. S. Army Air Forces. Due to the increased activities of the airlines in connection with air-cargo operations, several aeronautical and aeronautical-fixed stations previously closed down have been reopened by the airlines and several entirely new stations have been built.

Because of the lack of governmental air navigation radio facilities at certain locations, Aeronautical Radio Inc., radio licensee agency for the majority of U. S. domestic commercial airlines, has been authorized to construct and operate several radio marker stations as aids to air navigation. It is anticipated that the Civil Aeronautics Administration will take over the operation of these stations as soon as possible or will provide adequate substitute facilities.

There was only a slight increase during the fiscal year in the number of scheduled aircraft radio stations licensed to the commercial airlines. The apparent reason for this was the continued inability of the airlines to obtain additional or replacement aircraft.

During the year a frequency assignment plan for aeronautical, aircraft, and aeronautical-fixed stations operating in the Hawaiian area was approved and was incorporated in the Commission's Rules and Regulations. This plan makes available to airline operators in the Hawaiian area additional frequencies for aeronautical service and a completely new set of frequencies for aeronautical-fixed service. This action was taken as a result of the continued growth of commercial airline operations in the Hawaiian area and the consequent need for additional radio facilities on the same basis as equivalent facilities in the continental United States.

### Non-Scheduled Aircraft Radio Stations

There has been a substantial decrease in the number of aircraft stations authorized during the past fiscal year as compared with the preceding year. This may be attributed to the transfer of aircraft from the commercial airlines to the War Department, to the sharp reduction of non-essential civilian flying, and to the requirements of the Commission's Memorandum Opinion of July 7, 1942, relative to the use of materials. In some cases, new aircraft station licenses for itinerant aircraft have not been granted because of inability of the applicants to meet the Commission's wartime requirement that the proposed station would serve an essential military or vital public need.

Applications for aircraft radio stations which have been found to meet the requirements of the aforementioned Memorandum Opinion fall into several groups. These groups include applications for licenses for radio stations installed aboard aircraft used for civil pilot training pursuant to contracts with the Civil Aeronautics Administration, for aircraft radio stations aboard aircraft used in carrying out the terms of contracts with some branch of the armed forces, such as the making of aerial maps for the Army or Navy, for stations installed aboard aircraft used for personnel and small consignment transportation by manufacturers and individuals in connection with the production of war materials, for aircraft stations in Alaska, and for stations aboard aircraft used by persons engaged in pilot training activities. It has been determined that these activities meet a vital public or essential military need and that applications for licenses for aircraft radio stations involving materials to be used in conjunction with such activities should be granted.

### Airport-Control Radiotelephone Stations

An airport-control station provides communication limited to actual aviation need for the control of airport traffic between an airport control tower and aircraft operating in the immediate vicinity of an airport.

Although the construction of five new airport-control stations was authorized by the Commission during the fiscal year, the total number of such stations licensed by the Commission continued to decrease. This is attributed to the cancellation and expiration of the licenses of some stations located at airports where flying activities have substantially decreased because of the war and because the Civil Aeronautics Administration has taken over

operation of a large number of airport-control stations. The latter stations are located at airports where greatly increased flying activities, both civil and military at the same airport, has necessitated government operation of the tower radio facilities to insure uniformity of operating procedure in the interest of safety.

The majority of the airport-control station licenses indicated during the fiscal year that attempts had been made to obtain very-high-frequency equipment in conformity with the Commission's Rules and Regulations as previously reported. However, because of the scarcity of critical materials to construct such radio equipment, none of the licensees were able to secure the necessary equipment to inaugurate the desired operation on very-high-frequencies. Three of the airport-control stations are operated in conjunction with radio-localizer transmissions for use in connection with aircraft instrument landings. Radio-localizer facilities at an airport make it possible to use the airport under weather conditions which otherwise would not permit safe landings and take-offs.

#### Flight-Test Radio Stations

Flight-test stations aboard aircraft undergoing test, and flight-test stations on the ground, are used for the transmission of essential communications in connection with the tests of aircraft and components thereof. Such stations are licensed only to manufacturers of aircraft and major aircraft components. During the year seven new flight-test stations were licensed, making a total of twelve such stations licensed by the Commission at the end of the fiscal year. The majority of these stations are operated on a specially assigned frequency made available to flight-test stations through the cooperation and interest of the War and Navy Departments. A number of these stations are operated also on the one very-high frequency allocated by the Commission for this purpose.

#### Flying-School Radio Stations

Flying-school radio stations are used for communicating with students and pilots during flight training. Such stations are licensed only to bona fide flying-schools and soaring societies. The use of flying-school stations for communications other than for instructional purposes and the promotion of safety of life and property is strictly prohibited. Two new stations of this classification were authorized during the year making a total of twelve such stations licensed at the close of the fiscal year.



A number of these stations are authorized through special arrangements with the War Department to operate on frequencies other than the flying-school frequencies normally allocated by the Commission. Such stations are licensed on behalf of schools which are engaged in the instruction of air cadets for the United States and for other countries of the United Nations.

There has been a decrease in the total number of flying-school stations authorized. This is attributed primarily to the consolidation of air cadet training schools and the consequent reduction in the number of flying schools. The operation of flying-school radio stations contributes directly to the safety of life and property in the air and aids the war effort through increased efficiency in the instruction of student pilots.

#### International and Alaskan Aviation Radio Service.

International air traffic continues to increase as a result of the war. The number of United States aircraft flying international routes has increased rapidly during the year. This has resulted in the international route frequencies becoming overloaded with communications and has increased the need for additional frequencies to provide necessary communication on these routes. Not only has traffic increased on the existing international routes, but many new international routes have been established and thus an immediate and critical need for additional frequencies to serve these routes is evident. Because of the many routes covered most of the aircraft on international routes have been equipped to operate on many more transmitting frequencies than in former years.

Non-military air traffic in Alaska has continued to increase. On March 22, 1943, the Alaska Aeronautics and Communications Commission adopted regulations requiring that all aircraft operating within the Territory of Alaska must be equipped with two-way radio communication facilities. This regulation became effective July 1, 1943. On April 6, 1943, the Commission received a telegram from the Governor of Alaska, and Chairman of the Alaska Aeronautics and Communications Commission, requesting that all itinerant aircraft in Alaska be deemed to be serving a vital public need and therefore that the use of radio apparatus installed therein be considered as meeting the requirements of the Commission's Memorandum Opinion of July 7, 1942. Aircraft frequently afford the only means of transportation to isolated points in Alaska. In view also of the fact that all aircraft in Alaska are required to be radio equipped, the Commission adopted the policy that all radio stations aboard itinerant aircraft operating in the Territory of Alaska are considered to meet the requirements of the Memorandum Opinion of July 7, 1942, on the basis that such stations are fulfilling a vital public need which cannot otherwise be met.

#### 4. Emergency and Miscellaneous Radio Services

##### Emergency Radio Service

Emergency Radio Service includes all types of radio communication, except marine and aviation, which is carried on for emergency purposes. The various classes of stations in this service are state and municipal police, zone and interzone police, special emergency, forestry and marine (harbor) fire. With the exception of special emergency and forestry, authorizations for radio stations in this service are issued only to instrumentalities of state or municipal government. In addition to authorizations issued to governmental bodies, special emergency stations and forestry stations may, under certain conditions, be authorized for use by public utilities and private organizations.

Fewer applications for authorizations in the emergency radio service were received this year than last. This is attributed to the fact that the license term for all stations in the emergency service was changed, effective April 2, 1942, to two years instead of one year. As a result, the only applications for renewal of license which were necessary during the fiscal year were those of Special Emergency stations. The number of authorized stations in the emergency service as compared with the previous fiscal year has increased about three per cent. The number of stations licensed in the last three fiscal years, together with the increase or decrease over the number in the previous fiscal year is shown in the following table:

Class of Station	Number of Stations			Change during	
	1941	1942	1943	1942	1943
Municipal Police	1196	1672	1708	+ 476	+ 36
State Police	513	378	- 135	- 135	+ 53
Zone Police	69	85	94	+ 16	+ 9
Interzone Police	30	33	30	+ 3	- 3
Special Emergency	340	435	448	+ 95	+ 13
Forestry	807	844	837	+ 37	- 5
Marine Fire	6	8	10	+ 2	+ 2
Totals	2961	3455	3558	+ 494	+ 95

The trend toward the use of frequency modulation in the emergency service continues. Nearly all applications for new radiotelephone stations specify the use of frequency modulated equipment on the very-high-frequency communication channels. Relatively few applications for the use of amplitude-modulated equipment are received. In most cases such applications are filed by licensees who are making

additions to their existing radio facilities. Undoubtedly the change-over of existing radiotelephone facilities from amplitude-modulated systems to frequency-modulated systems would have been greatly accelerated during the year except for the critical shortage of material.

### Police Radio Stations

War conditions have greatly increased the need of police departments for radio communication. Boomtown evils have been created in many communities by new or expanded war production plants. Large increases in population, inadequate housing, lack of recreation facilities and other civic needs have promoted lawlessness and increased the work of the police. Police forces have lost men to the services and to war industry.

A number of police departments have tried to meet these problems by increasing their radio communication facilities. It has been the Commission's policy to grant applications for increased facilities only where an essential military or vital public need has been demonstrated.

In some of the metropolitan areas the number of police radio stations and police messages has increased to such an extent that mutual interference between stations operating on the same or adjacent frequencies is becoming a serious problem. The expected increase in the use of frequency-modulated systems will alleviate this condition to a certain extent.

The establishment of a statewide police communication system presents an entirely different problem from the establishment of a municipal police radio system because of the larger service area to be covered for states and because of the effect on radio waves of the variation in terrain over which communication must be established. For this reason, the first installed police communication systems usually consisted of a number of strategically located land stations at fixed locations operating with comparatively high power on medium frequencies. During the last few years, however, it has been found that a very successful statewide radio communication system could be effected by the use of a somewhat greater number of land stations of lower power operating on the very-high-frequencies and making use of frequency-modulated transmitters and associated receivers.

The necessary coverage of fairly large state areas has been attained by placing the transmitting antenna as high as possible above the average elevation of the particular area, even though in some instances the radio station is located at some distance from the state

police substation. In such cases the equipment is usually unattended by operators and is electrically controlled by means of land-wire lines between the transmitter location and the state police substation. The trend toward the latter type of statewide system has continued during the past fiscal year although, like the same trend in municipal police systems, it has been retarded by the lack of equipment.

#### Forestry Radio Stations

Forestry radio stations are operated usually by state forestry and conservation departments although in a few cases such stations are operated by private organizations which are legally responsible for the protection of wooded areas. There are two major uses of radio in forestry protection. The first is to provide rapid communication between fire towers to expedite the exact location of smoke observed from the towers; the second is to coordinate the movement of personnel and equipment to the fire and to direct activities at the fire.

In using radio it is the practice to equip forest fire towers with low power, very-high-frequency, radiotelephone equipment. By the use of such stations, it is possible for two or three towers which may observe a "smoke" to locate it quickly by triangulation. Mobile units are then dispatched to the location of the smoke either by the tower man or by the district fire warden's office, which is also equipped with radio facilities. If the fire develops to the point where it is necessary to mobilize large numbers of fire fighters and pieces of fire-fighting equipment, the battle against the fire is facilitated through the use of radio. At times the person in charge of the fire fighting facilities may even direct operations from a radio-equipped airplane over the scene of the fire.

Like the police, the forestry services have suffered a substantial loss of personnel and have attempted to compensate for this by increasing the efficiency of the communication facilities. In addition, the forestry services have been given additional duties in connection with the protection of war-vital areas from the damage caused by fires originating in the nearby forests and the smoke resulting from such fires.

### Marine Fire Radio Stations

Marine fire radio stations are operated by a few of the larger cities for the purpose of directing water-borne equipment to fight fires along waterfronts. During the past fiscal year there has been only a small increase in the number of such stations; however, a number of previously licensed stations in this classification have expanded their radio communication facilities. At the close of the fiscal year the Commission had under consideration the advisability of expanding the scope of service for this class of station in order to permit the use of radio communication in connection with large fires in sections of the cities located some distance from the waterfront. Most municipal fire departments maintain elaborate wire communication facilities for receipt of alarms and the direction of equipment. There are occasions, however, when the senior fire department official present at a large fire, needs to communicate with other officials or with the fire department headquarters from a point where no wire communication facilities are available.

### Special Emergency Radio Stations

Special emergency stations are for use in emergencies jeopardizing life, public safety, or important property. The licensees of these stations are usually public utilities although organizations established for relief purposes and persons having establishments in remote locations are, under certain conditions, eligible licensees. The importance of continuous maintenance of electricity, gas, water and other public services to plants engaged in manufacture of war equipment is unquestioned. Maintenance of transportation is also essential. The use of radio facilities for communicating with repair trucks and maintenance crews in emergencies has assisted public utilities handicapped by personnel loss and greatly expanded demand for service.

During the past fiscal year wire telephone and telegraph companies have made increased use of their special emergency radio stations for the purpose of restoring communication when wire lines were disrupted by storms, floods and other disasters. Such stations are in readiness at strategic points and are rushed to the scene of such disasters for the purpose of closing gaps in wire communication circuits during the period that is required to repair such breaks. The number of these stations has increased during the past fiscal year although the increase was not as large as in previous years because of the difficulty in obtaining equipment.

## Miscellaneous Radio Services

The number of geological and provisional radio stations has increased somewhat during the fiscal year. All other classes of stations in the Miscellaneous Services have decreased or remained the same. The following table shows the number of stations and the changes therein during the past two years:

Service and Class Station	Number of Stations		Changes	
	Fiscal Year		Fiscal Year	
	1942	1943	1942	1943
(1) Geophysical Service				
Geological Stations	302	325	+ 33	+ 23
(2) Special Press Service				
Relay Press Stations	7	5	+ 0	- 2
Mobile Press Stations	3	3	1	+ 0
(3) Intermittent Service				
Motion Picture Stations	15	10	+ 3	- 5
Provisional Stations	22	36	+ 15	+ 14
Totals	349	397	+ 50	+ 30

Geological stations are those in the Intermittent Service authorized primarily for geological studies. Some of the stations are used by field parties in connection with seismograph explorations for oil.

Statements made by licensees of Geological stations indicate the use of the small, low power portable stations results in a considerable saving of critical materials and man hours. Generally, the portable stations are used to provide communication between the different sections of the exploring parties and to furnish a means for recording the output of the various geophones at the centrally-located recording truck. Insulated copper wires temporarily laid on the ground formerly were used for connecting the pickup devices with the recording instrument. The importance of petroleum products to the armed forces and to the war industries is generally understood and the continued exploration for oil reserves by the petroleum industry is necessary to assure an ample supply.

The use of provisional radio stations as an aid to the protection of large war plants has increased considerably. These localized systems function like a small municipal police system, affording a means of instantaneous communication between the plant guard headquarters, isolated guard houses and cruising guard vehicles.

## War Emergency Radio Service

The War Emergency Radio Service is a temporary wartime service to meet the need for rapid emergency communication in connection with national security. This service initially was composed of two classes of stations, namely, civilian defense and state guard stations, which are intended to provide distinct and separate short-distance communication facilities on frequencies above 112,000 kilocycles for use by Citizens' Defense Corps and State Guards, or equivalent officially-recognized organizations.

Pursuant to the recommendation of the Board of War Communications and following several conferences with representatives of the National Headquarters of the Civil Air Patrol, a new class of station designated "Civil Air Patrol" was included in this service, effective January 19, 1943. This class of station is defined as a station to be used exclusively for essential communications relative to the activities of the Civil Air Patrol except when such activities are under direct military control. These stations may be used only during emergencies when life, public safety, or important property are endangered; or for essential communication relative to Civil Air Patrol activities, when other communication facilities do not exist or are inadequate.

On August 22, 1942, a civilian defense station license was issued to the City of Lawrence, Massachusetts, which was the first authorization issued for any class of station in this new service. The initial state guard and civil air patrol authorizations were issued on August 26, 1942 and May 24, 1943, respectively. The following tabulation indicates the number of stations in the War Emergency Radio Service which were licensed during the fiscal year:

<u>Class of Station</u>	<u>Number - 1943</u>
Civilian Defense	199
State Guard	8
Civil Air Patrol	<u>4</u>
Total	211

Under the rules for this service, the term "station" does not necessarily mean one transmitter but may, and usually does, include several fixed, portable and portable-mobile units which are operated as a coordinated emergency-communications system. In a few instances civilian defense station licenses issued to municipalities include over 100 units.

Because of reports received from numerous licensees and the Office of Civilian Defense, indicating that insufficient time was

available to civilian defense licensees for making adjustments to equipment, training personnel, and perfecting methods of operating procedure, the rules were modified on June 8, 1943, to increase the authorized test period for all civilian defense stations from an aggregate of two hours to an aggregate of six hours per week. This modification permitted all stations to use the Sunday and Wednesday test periods without the previous restriction on the Wednesday periods, and included a new two hour test period on Mondays.

At the request of the Board of War Communications, the rules were again modified on June 22, 1943, to permit civilian defense stations to render emergency communication service in accordance with a new Mutual Aid Plan sponsored by the Office of Civilian Defense. Upon proper application and showing of need, certain specific stations may be authorized to communicate for the first fifteen minutes of each hour for the exclusive purpose of handling essential communications preparatory to any anticipated emergency involving safety of life or important property. This privilege was considered necessary inasmuch as under wartime conditions, the loss of life, personal injuries, and property damage resulting from fire, earthquake, hurricane, sabotage, etc., could seriously hinder the war effort. The purpose of this Mutual Aid Plan is to assure the maximum use of available and remedial facilities throughout the continental United States and for effective operation is dependent upon the continuous availability of adequate communication facilities, especially in rural areas between various fire department headquarters.

The rules also were amended at this time to permit civilian defense station licensees to use their stations during emergencies endangering life or property to provide essential communications for the United States Government when requested to do so by the government department or agency concerned. In addition, stations of this class are now permitted to operate during any emergency endangering life, public safety, or important property relative to civilian defense or national security.

During the 1943 spring floods in the midwest, three civilian defense radio stations were used to the advantage of the general public in the affected area.



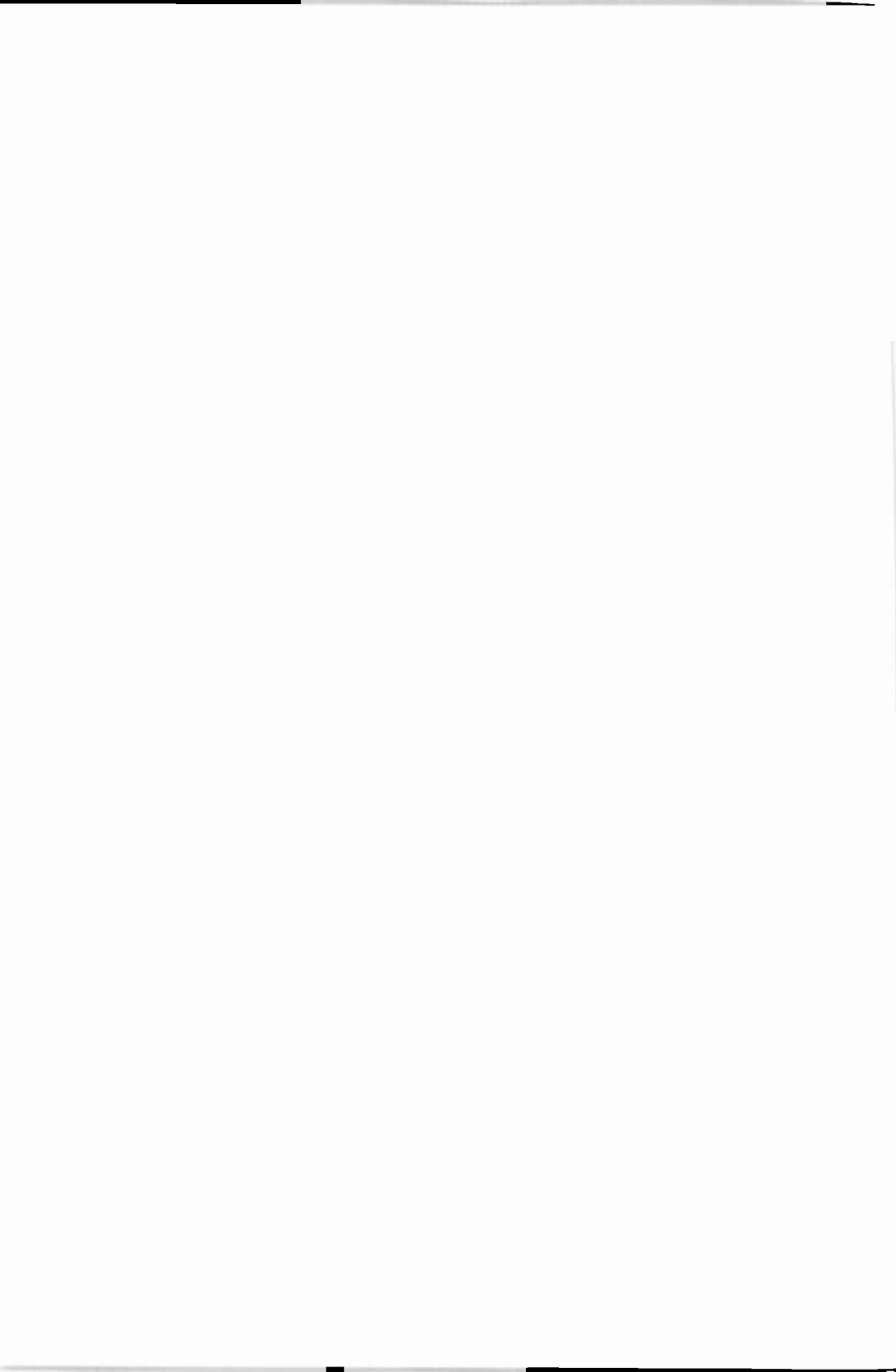
## 5. Experimental Radio Service

Experimentation in various phases of radio has been greatly stimulated by the war. More emphasis is being placed on radio research today than at any other period in the history of the art. Fundamental research is being supported and financed by the federal government acting primarily through the National Defense Research Committee. One large educational institution alone employs hundreds of engineers and physicists whose activities are directly primarily to the development and perfection of radio detecting and ranging, generally known as "radar". Other radio projects equally as revolutionary and far-reaching are being conducted in hundreds of laboratories throughout the country.

Many experimental authorizations have been issued to scientific laboratories and industrial organizations engaged in radio research and development under contracts issued by government organizations including the Army, the Navy and National Defense Research Committee. For military reasons the results of this unprecedented research cannot be revealed at this time; however, it is commonly predicted that after the war the whole field of radio communication will be greatly affected by the revolutionary discoveries now being carefully guarded in the laboratories.

In accordance with the Commission's rules, experimental stations are licensed for fundamental, general, or specific radio research and experimentation directed toward the general advancement of the radio art, while Class 2 experimental stations are authorized for experimentation in radio directed toward the development of a new or proposed radio service, or some new methods of operation in an established radio service.

Class 3 experimental stations were authorized to citizens of the United States interested in radio technique solely with a personal aim to conduct certain experiments on their own behalf which required radio transmissions for a limited time. In some respects this class of station resembles the type of authorizations previously issued in the amateur radio service. In accordance with the Commission's Memorandum Opinion of July 7, 1942, no additional authorizations for this class of station are being authorized under present conditions.



## CHAPTER VII

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RADIO OPERATORS

1. General
  2. Commercial Operators
  3. Amateur Operators
- 

1. General

The extraordinary role played by radio in this war created a scarcity of operators at the very outset. To meet the emergency, many courses were conducted by commercial radio schools, Civilian Defense organizations, public educational systems and other groups. The Commission, which is charged with the responsibility of examining and licensing all operators of non-government stations, issued several orders somewhat relaxing its requirements.

Despite these emergency measures, a substantial shortage of licensed operators continued throughout the year.

The large number of trainees prepared in the wartime classes greatly increased the number of applicants examined by the Field Division of the Engineering Department during the past fiscal year.

The Commission prescribes the qualifications of both commercial and amateur operators, classifies them, fixes the form of licenses, examines applicants and issues licenses to those who qualify.

The Communications Act authorizes issuance of radio licenses only to citizens of the United States. By its Order No. 75 issued in 1940, the Commission requires each licensed radio operator and each applicant for new or renewed license to file a standard questionnaire under oath, fingerprint card and documentary evidence to prove United States citizenship. On April 27, 1943, the Commission, by Order No. 75-C, authorized a formal inquiry into any pertinent phase of the applicant's or licensee's qualifications to hold an operator license under wartime conditions demanding loyalty and integrity. Under this order, all licensed radio operators and

every person who applies for a radio operator license must furnish such additional information bearing upon his qualifications as the Commission may request. Revised applications for radio operator license require the submission of information bearing upon any criminal record of convictions.

Approximately 238,800 responses had been received and analyzed as of June 30, 1943, since the adoption of Order No. 75, the number for the fiscal year being 56,800.

Similar information had been obtained from a total of 58,765 communications company employes, the number for the year being 13,000.

The former requirement of an oath on application forms for operator licenses was eliminated during the year as a result of the broad provisions of Section 35 (A) of the United States Criminal Code making it an offense punishable by fine and/or imprisonment to make a false statement or representation to any government department or agency as to any matter within its jurisdiction. As a precautionary measure, a caveat is conspicuously printed on the revised forms directing the applicant's attention to the criminal penalties of Section 35 (A) of the Code.

As a result of the more stringent requirements as to evidence of citizenship, numerous licenses were surrendered and cancelled; more were allowed to lapse. Possibly the most important result has been a deterrent effect on applications by improper persons. No measure of this is available, but numerous operators already licensed apparently attempted to evade the requirement by simply ignoring it. Where this has been clearly established, the license has been suspended. Special attention was given persons whose birth or antecedents connected them with Axis countries. Occasionally these led to field investigation that disclosed the location of a short-wave transmitter on premises of an alien, contrary to application statements, in which event licenses were suspended or revoked. Several thousand of the fingerprint cards served to disclose previous records and the Commission has supplemented its requirements to be in a position to consider individual cases.

The information used primarily in passing upon applications for operator license has been useful in connection with other aspects of the Commission's work and the check on the citizenship of thousands of individuals has entailed extensive cooperation with numerous other agencies.

## 2. Commercial Operators

A total of 76,210 applicants for commercial operator licenses were examined during the year, with 61,714 qualifying. Of the 68,992 applicants for radiotelephone licenses, 56,761 passed the tests, while of the 7,218 applicants for radiotelegraph licenses, 4,953 qualified.

It is estimated that at the close of the fiscal year, 150,000 individuals held valid commercial licenses, including 125,000 restricted radiotelephone permits, 18,000 Class I and Class II radiotelephone licenses and 12,000 radiotelegraph licenses.

Because of the shortage of radiotelephone first-class operators normally required for broadcast station operation certain regulations of the Commission were modified to permit the operation of such stations by operators holding lower class licenses. Commission Orders 91, 91-A and 91-B adopted during the previous fiscal year had relaxed the operator rules pertaining to broadcast stations and had permitted many stations in dire need of operating personnel to continue operation.

Further manpower shortages during the past year, however, required additional relaxation of the operator rules on a temporary basis. Consequently, Order 91-C, superseding the aforementioned orders by extending the relaxations which they provided, was adopted by the Commission on January 19, 1943. The latter order permits the operation of broadcast stations of 1000 watts or less by holders of restricted radiotelephone operator permits endorsed by the Commission to confirm the individual operator's ability to operate satisfactorily the particular broadcast station at which he is employed. An appropriate certification by the first-class radiotelephone operator in charge of the station, attesting to this ability of the permittee, is the principle requirement upon which such endorsement depends. Under the terms of this special operating authority the permittee operator is allowed to make only minor routine adjustments and if an equipment failure occurs when the higher grade operator is not available, he must immediately shut down the station until the first-class operator arrives. The operation of broadcast stations in accordance with these temporary regulations permits their continued activity during the war under technical supervision sufficient reasonably to safeguard valuable equipment and to assure operation in accordance with the terms of the station licenses.

At the close of the year a study was in progress to determine whether temporary relaxation of the operator rules was necessary or

desirable in regard to coastal, emergency and other radio communication services under jurisdiction of the Commission.

The adoption of Order 77-B on December 8, 1942, continued in effect the Commission's policy of renewing radio operator licenses without a showing of operating service under the license, as is normally required. Thus, many holders of operator licenses who are engaged in radio work essential to the war effort which, however, does not require them actually to be licensed, are permitted to maintain their availability as licensed operators. Likewise, renewal licenses may be obtained upon proper application by radio operators who have entered the military or naval service in large numbers and who cannot comply with the rules of the Commission with respect to the normally required showing of operating service under conditions requiring them to hold a license.

The Congress has authorized the Commission to waive the provisions of Section 353(b) of the Communications Act in regard to the employment of experienced radio operators on board ocean-going vessels which, under the law, are compelled to have adequate radio installations. Having found a shortage of radiotelegraph operators who possess the stipulated six months previous experience as a qualified operation in a station on board a ship or ships of the United States, the Commission waived, by its Order 83-D adopted June 29, 1943, the six months experience requirement for the period July 1, 1943, to December 31, 1943. Order No. 83-D continues the substance of Order 83, adopted December 16, 1941, when the shortage of experienced operators first developed with the rapid expansion of the American Merchant Marine. Subsequent Orders 83-A, 83-B and 83-C were progressively issued for periods of six months each, inasmuch as the supply of experienced operators for ships had substantially decreased due to other war requirements.

An unusually large number of operators were initially licensed during the fiscal year. Many persons obtained restricted radiotelephone operator permits to operate Civil Air Patrol, Civilian Defense, and State Guard stations, and various classes of stations in the Emergency Service. Under present conditions, the Commission permits persons selected for operating stations in these services to be examined for the restricted radiotelephone operator permit by mail under the supervision of local authorities instead of requiring the applicant to appear personally at one of the Commission's examining points. The Commission's standard operator examination questions were reviewed during the year and revised as necessary to keep pace with the advance of the radio art and changes in the Commission's rules and regulations.

### 3. Amateur Operators

On September 15, 1942, the Commission promulgated Order 87-B, which provided that no renewed or modified amateur station licenses would be issued until further order of the Commission, and permitted outstanding amateur station licenses to remain valid, unless revoked by specific order, until expiration. Inasmuch as the Commission has not permitted the operation of amateur stations since January 9, 1942, this action was taken to eliminate the work involved in the handling of thousands of applications which continued to be filed by amateurs requesting modification or renewal of their station licenses for the apparent purposes of maintaining their status and assigned call letters as amateur station licensees.

Nevertheless, amateurs have continued their interest in radio and allied subjects and have taken an active part in the war effort. Thousands of amateur operators have entered the military services of the nation, where the experience they gained as operators of amateur stations has proven invaluable. Amateurs holding operator licenses issued by the Commission have received special recognition by military authorities who endeavor to assign them to communication branches of the services, where their special qualifications are most useful.

It became evident during the past year that many amateurs were unable to apply for renewal of operator licenses because of circumstances beyond their control as a result of the war. Service overseas, employment in war industries away from home, and other reasons made it difficult or impossible for amateurs to comply with the Commission's license renewal requirements.

On May 25, 1943, the Commission therefore adopted Order 115, reinstating amateur radio operator licenses which by their terms expired during the period December 7, 1941 to May 25, 1943, inclusive, and which had not been renewed but were in good standing. This Order also extends the terms of these licenses for a period of three years from the date of their individually designated expiration dates. The order further provides that the license term of every amateur radio operator in good standing which expires within the period May 26, 1943 to December 7, 1944, is extended for a period of three years from the date of expiration designated in the license. Under these provisions of Order 115, continuity of the operator license status of amateurs, who otherwise could not maintain current amateur operator license privileges, is assured.

Amateurs in large numbers have affiliated with the various local civilian defense organizations and have aided in the

establishment of radio stations for this purpose in the relatively new War Emergency Radio Service. In the majority of cases such organizations have appointed licensed amateur operators to serve as the "radio aides" required by regulations of the Commission. The appointment of many amateurs to assume the responsibilities of "radio aide" in this work indicates widespread recognition of technical qualifications and experience obtained through amateur station operation. At the close of the fiscal year the Commission's records indicated that 208 organizations operating stations in the War Emergency Radio Service, where the total number of such organizations was 259, had given the position of "radio aide" to amateur operators.

The urgent need for radio equipment for use in the War Emergency Radio Service challenged amateurs, among others, to cope with the problems of supplying equipment without the assistance of government priority authorizations. Through skill, ingenuity, and determination, amateurs have constructed innumerable stations from scrap and rejected materials and miscellaneous parts from discarded radio receivers, and in many instances have donated or loaned equipment formerly operated in their amateur stations.

Operating conditions in the short-distance radio frequency band 112 to 116 megacycles, which is utilized on a temporary basis by stations in the War Emergency Radio Service, are familiar to amateur operators, inasmuch as all frequencies within this band are allocated to the amateur service by the Commission's rules, and prior to the war were utilized in connection with widespread amateur station activity.

During the year the Commission continued to examine applicants for new amateur operator licenses. Many persons obtained amateur operator licenses in order to become familiar with the Commission's examining procedure preparatory to taking the technical examination given for a commercial radio operator license. Other persons about to enter military service obtained amateur operator licenses as evidence of certain technical qualifications which receive consideration by the military services, in the placement of personnel.

More than 16,000 applications were received during the year for new amateur licenses, renewals and modifications.



## CHAPTER VIII

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TECHNICAL STUDIES

1. General
  2. Technical Committees
  3. Ground Waves
  4. Ionospheric Waves
  5. Tropospheric Waves
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1. General

The Technical Information Division advises on scientific and advanced engineering phases of all forms of radio and wire communications, assists in the preparation of plans for the gathering of scientific data, maintains contact with commercial and government research organizations, makes special studies and renders reports as required on wave propagation and new developments in the art to the Commission, the Board of War Communications and other agencies of the Government engaged in war work. In conformance with the policy announced in the Eighth Annual Report, all work considered as routine and not essential to the winning of the war was curtailed, wherever possible, in order that full time might be given to problems bearing directly on the war effort.

2. Technical Committees

Personnel of the Division also serves on various committees within the Commission, such as the Diathermy Registration Committee, Technical Apparatus Committee, Committee on Allocation, etc. A considerable portion of the committee work of the Commission's staff, principally that performed in preparation for international conferences, agreements or treaties, has been suspended, the facilities for such work being no longer in existence. The staff has, however, served on many important technical committees throughout the year, principally in connection with the work of the Institute of Radio Engineers. During the present year the Chief of the Division was elected President of the Institute without opposition. In his capacity as President of the Institute,

the Chief of the Division has been instrumental in bringing about the organization of the Radio Technical Planning Board, or RTPB. This is a post war planning board organized jointly by professional radio engineers, manufacturers, and others. The RTPB is entirely independent of the Commission and the Chief of the Division will take no part in the actual organization and decisions of the RTPB.

### 3. Ground Waves

Ground waves are responsible for the primary service areas of both standard broadcast stations operating on the lower frequencies and of high-frequency broadcast and television broadcast stations operating on the ultra-high frequencies. The study of ground wave propagation has been curtailed completely during the latter part of the year. Early in the year, monographs were prepared which make possible rapid calculation of radio wave propagation over distance ranges of 200 miles for frequencies between 20-500 megacycles and antenna heights ranging from 30 to 1000 feet. These are widely used by the armed services.

### 4. Ionospheric Waves

In 1938 a project was instituted for the recording of ionospheric waves, or sky waves, which contemplated the continuous 24 hour recording for an eleven-year period of field strengths of standard broadcast stations and of noise in that part of the frequency spectrum. Any interruption of the program would greatly decrease the value of the four years of records already taken. In addition, statistical analysis of the data so far obtained has been found of great value in connection with wartime communication problems. Accordingly, it has been continued, but wherever it has been determined that the value of records would not be affected appreciably in the final statistical analysis, recording schedules were modified so as to require a minimum of supervision by field personnel.

### 5. Tropospheric Waves

The study of tropospheric waves is important in connection with the assignment of frequencies for the rapidly growing commercial and government radio services operating in the very-high-frequency regions of the spectrum. Tropospheric wave propagation is dependent on the weather, and experimental investigation of its behavior requires field intensity recordings of relatively few stations and over a shorter period of time - only one year or two - as compared to the eleven-year period required for ionospheric

waves. Some recordings of tropospheric waves were begun from a location in Washington during the early part of 1942. The arrangements proved unsatisfactory because of interference to reception caused by diathermy machines at this location. Equipment is now installed at the Commission's monitoring station at Laurel, Md., and has been recording continuously on four ultra-high-frequency broadcast stations since February, 1943.

The recordings have shown certain unexpected results with regard to radio propagation over distances of several hundred miles. These results indicated the necessity for a rapid expansion of the program in order to record simultaneously at several points throughout the eastern and central parts of the United States. Additional equipment is now being installed at the Commission's monitoring stations at Allegan, Mich.; Atlanta, Ga.; Grand Island, Neb., and Portland, Ore. When completed, there will be a total of fifteen recorders at the five monitoring stations. The expansion of this program has been accomplished without the purchase of any new equipment. Some of the equipment was obtained on a loan basis from radio station owners, consulting engineers, and others; and some was obtained by transferring it from other recording projects of less urgency. The reason for the expanding program at this time, in spite of the accent on war efforts, is the fact that this recording program will be impossible when several radio stations are assigned and are operating simultaneously on each frequency, as will be the case during the post war expansion.

## CHAPTER IX

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STATISTICS

1. Common Carrier Statistics
2. Broadcast Financial Data
3. Broadcast Statistics
4. Other Radio Service Statistics
5. Engineering Field Statistics
6. Publications

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1. Common Carrier StatisticsReports of Carriers

Common carriers and controlling companies filed 218 reports for the calendar year 1942, including 133 telephone carriers, 38 wire-telegraph, ocean-cable and radiotelegraph carriers, and 47 holding companies. Reports pertaining to traffic damage claims paid were filed by 37 wire-telegraph, ocean-cable and radiotelegraph carriers in addition to the foregoing. Data pertaining to the communications industry are shown in the yearbook published annually entitled "Statistics of the Communications Industry in the United States". Certain selected statistical data relating to large common carriers for the years ended December 31, 1942, and 1941, are presented in the following tables:

## Telephone Carriers

Item	1942	1941	Percent Increase or Decrease
Investment in plant and equipment	\$5,652,506,023	\$5,393,579,802	4.80 /
Depreciation and amortization reserves	<u>1,649,187,666</u>	<u>1,526,682,183</u>	8.02 /
Net investment in plant and equipment	4,003,318,357	3,866,897,619	3.53 /
Local service revenues	956,407,209	902,430,445	5.98 /
Toll service revenues	557,255,266	435,466,402	27.97 /
Total operating revenues <u>1/</u>	1,590,312,393	1,407,761,066	12.97 /
Operating expenses <u>1/</u>	1,021,818,170	918,194,439	11.29 /
Taxes, including income and excess profits	337,285,766	243,581,162	38.47 /
Net operating income after all taxes	231,208,757	245,985,765	6.01 -
Net income	178,012,225	209,211,000	14.91 -
Dividends paid	182,193,395	183,758,960	0.85 -
Company telephones:			
Business	7,669,677	7,613,967	0.73 /
Residential	14,071,664	12,857,584	9.44 /
Average number of calls originating per month:			
Local	3,227,608,668	3,095,457,129	4.27 /
Toll	103,560,468	92,203,482	12.32 /
Number of employees at end of year	359,941	345,439	4.20 /
Male	112,534	130,240	13.60 -
Female	247,407	215,199	14.97 /
Total payroll for the year	670,787,483	603,410,323	11.17 /

1/ Intercompany general service and license fees and rents amounting to approximately \$35,000,000 for 1942 and \$32,000,000 in 1941, have not been eliminated.

## Wiretelegraph and Ocean-Cable Carriers

Item	1942	1941	Percentage Increase. or Decrease
Investment in plant and equipment	\$489,767,605	\$486,844,562	0.60 /
Depreciation and amortization reserves	<u>188,606,221</u>	<u>180,056,404</u>	4.75 /
Net investment in plant and equipment	\$301,161,384	306,788,158	1.84 -
Domestic service revenues	135,105,313	119,669,958	12.90 /
Foreign service revenues	21,312,581	18,259,540	16.72 /
Total operating revenues	167,764,531	149,315,654	12.36 /
Operating expenses	139,539,005	125,927,627	10.81 /
Taxes, including income and excess profits	14,179,339	11,061,137	28.19 /
Net operating income after all taxes	13,502,246	11,838,086	14.06 /
Net income	6,858,934	6,111,860	12.22 /
Dividends declared	2,157,217	2,810,643	23.25 -
Revenue messages transmitted:			
Domestic	224,002,294	211,858,194	5.73 /
Foreign	7,768,017	7,285,072	6.63 /
Number of employees at end of year	69,010	74,298	7.12 -
Total payroll for the year	100,055,705	90,942,052	10.02 /

## Radiotelegraph Carriers

Item	1942	1941	Percent Increase or Decrease
Investment in plant and equipment	\$28,342,793	\$30,314,488	6.51 -
Depreciation and amortization reserves	<u>15,900,204</u>	<u>16,682,606</u>	4.69 -
Net investment in plant and equipment	\$12,442,589	\$13,631,882	8.73 -
Continental and insular fixed revenues	1,671,964	2,271,042	26.38 -
Foreign fixed service revenues	7,649,898	10,723,945	28.67 -
Marine service revenues	36,978	613,456	93.97 -
Total operating revenues	12,605,322	15,725,900	19.84 -
Operating expenses, depreciation, and other operating revenue deductions	10,192,434	12,171,409	16.26 -
Net operating revenues	2,412,888	3,554,491	32.12 -
Income and excess profits taxes	2,906,025	1,884,302	54.22 -
Net income	707,832	1,645,940	57.00 -
Dividends declared	2,069,480	2,452,050	15.60 -
Revenue messages transmitted:			
Continental and insular fixed	1,466,775	2,447,923	40.06 -
Foreign fixed	3,529,317	6,094,816	42.09 -
Marine	11,743	534,540	97.80 -
Number of employees at end of year	2,887	3,852	25.05 -
Total payroll for the year	6,992,851	7,133,569	1.97 -

## 2. Broadcast Financial Data

The sale of station time by networks and standard broadcast stations in the United States amounted to \$190,147,052 during the calendar year 1942, as compared to \$178,091,043 for the year 1941 according to reports filed with the Commission by four major networks, six regional networks and 851 standard broadcast stations. Commissions paid on these sales were \$26,504,107 for 1942 and \$24,501,946 in 1941. In addition to the revenues from the sale of time, these same networks and stations reported revenues from incidental broadcast activities amounting to \$15,196,554, an increase of \$6,219 over that reported for the previous year. This over-all increase was accompanied by a large increase in operating expenses leaving a broadcast service income (revenues less expenses but before taxes on income) amounting to \$44,632,238 or \$206,788 less than the amount reported for the year 1941.

The four major networks (CBS, Mutual, Blue and NBC) reported combined standard broadcast time sales amounting to \$84,383,571 for the year or approximately six percent over 1941. They paid to standard broadcast stations under contract and to other networks \$28,458,865 as compared with \$25,651,249 for the previous year. The combined net income of the four major networks and their stations (including other than standard stations) amounted to \$16,195,903 before Federal income and excess profits taxes. After provisions for Federal income and excess profits taxes, the combined net income amounted to \$7,296,253 as compared with \$8,642,279 for the preceding calendar year.



The revenues received from non-network business, including time sold to national, regional and local users by the 851 standard broadcast stations amounted to \$104,958,075, an increase of \$7,578,465, or approximately eight percent over the amount of such sales reported by 817 stations for the previous year. Of these non-network time sales for 1942, \$12,270,741 was reported by 32 standard stations owned by or operated for the networks, and \$92,687,334 by 819 stations not so owned or operated. The broadcast service income (revenues less expenses) of these 819 standard broadcast stations amounted to \$27,675,476, an increase of \$619,314, or approximately two percent over the amount reported by 784 such stations for 1941.

There were 194 standard broadcast stations reporting broadcast service deficits, or approximately 22.8% of all the stations which submitted reports for 1942. This compares to 177 in 1941, or approximately 21.7% of all stations reporting for that year. The 194 stations showing deficits reported total broadcast revenues of \$8,425,428, total expenses of \$9,764,871, and lost in the aggregate \$1,339,443.

There were 29,588 persons employed by the four major and six regional networks and 851 standard broadcast stations as of December 31, 1942, with a total pay roll for the year of \$72,011,233. For 1941, the three major and seven regional networks and 817 standard broadcast stations reported total pay roll of \$66,706,897 and 29,625 employees at the end of the year.

### 3. Broadcast Statistics

#### NUMBER OF STATIONS IN BROADCAST SERVICE FOR FISCAL YEAR ENDING JUNE 30, 1942 and 1943

Class of Station	As of	New	Licenses or CP's surren- dered or ab- andoned	As of
	June 30 1942			June 30 1943
Standard Broadcast.....	925	1	14	912
High Frequency Broadcast (Exp.)	13	0	9	4
High Frequency Broadcast (Tem- porary Class II Experimental)	0	5	0	5
High Frequency Broadcast (FM)...	61	3	16	48
Low Frequency Relay.....	248	4	3	249
High Frequency Relay.....	275	33	8	300
Television (Experimental).....	36	0	8	28
Television (Commercial).....	10	0	2	8
International.....	14	2	0	16
Developmental.....	8	0	4	4
ST.....	10	1	1	10
Facsimile.....	4	0	1	3
Non-Commercial Educational.....	8	0	1	7
Class II (Experimental).....	2	0	1	1
	<u>1614</u>	<u>49</u>	<u>68</u>	<u>1595</u>

## BROADCAST APPLICATIONS

Service	Applica- tions Received	Authoriza- tions Issued	Special Authori- zations
Standard Broadcast.....	2255	3 019	252
Relay Broadcast.....	336	373	43
International Broadcast.....	98	41	23
Television Broadcast (Commercial)	36	21	8
Television Broadcast (Experimental)	23	59	28
Facsimile Broadcast.....	1	13	0
High Frequency Broadcast (Exp.)...	71	24	73
High Frequency Broadcast (FM).....	322	145	143
High Frequency Broadcast (Temporary Class II Experimental).....	5	5	0
Non-Commercial Educational Broadcast	22	15	3
Developmental Broadcast.....	11	14	1
ST (Studio-Transmitter) Broadcast..	40	31	19
Class II Broadcast (Experimental)..	1	1	0
Totals.....	3221	3761	653

NOTE - Figures include formal and informal applications for broadcast stations. The applications consist of construction permits; modification of construction permits, licenses, modification of licenses, renewal of licenses, determination of operating power by direct method, installation of equipment, assignment of license and/or construction permit, special experimental or service authorizations, transfer of control of license corporation, etc.

## NEW STATIONS AUTHORIZED

Call Letters	License and Location	Power	Frequency (kc)	Time Designation
KTKN	Edwin A. Kraft Ketchikan, Alaska	1 kilowatt	930	Unlimited

4. Other Radio Service Statistics  
For Fiscal Year Ending June 30, 1943

Service	Applica- tions Received	Authoriza- tions Issued	New Sta- tions Authorized	Total Stations June 30/43
<u>AVIATION</u>				
Aeronautical	620	614	20	361
Aeronautical Fixed	267	287	3	136
Acro. & Acro. Fixed	56	51	6	0
Aircraft	6500	4411	1798	2795
Airport Control	72	91	5	22
Flying School	13	32	2	12
Flight Test	37	33	7	12
Sub-Total	7651	5525	1841	3338

<u>Service</u>	<u>Applica- tions Received</u>	<u>Authoriza- tions Issued</u>	<u>New sta- tions Authorized</u>	<u>Total sta- tions June 30, 1945</u>
<u>SHIP</u>	7100	6303	1398	6091
<u>EMERGENCY</u>				
Municipal Police	2177	1271	152	1708
State Police	532	344	93	431
Zone Police	36	23	4	94
Interzone Police	7	4	0	30
Forestry	251	134	16	837
Special Emergency	765	649	42	448
Marine Fire	13	6	1	10
Sub-Total	3781	2431	314	3558
<u>WAR EMERGENCY RADIO SERVICE</u>				
Civilian Defense	600	325	202	202
State Guard	56	11	8	8
Civil Air Patrol	5	2	4	4
Sub-Total	661	338	214	214
<u>EXPERIMENTAL</u>				
Class 1	537	529	90	288
Class 2	256	247	30	161
Sub-Total	793	776	120	449
<u>MISCELLANEOUS</u>				
Geological	427	395	35	325
Motion Picture	16	10	0	10
Provisional	84	69	32	36
Mobile Press	2	3	0	3
Relay Press	5	5	0	5
Sub-Total	534	482	67	379
<u>PT. TO PT. TELEGRAPH</u>				
Public	360	336	16**	37
Press	95	74	2**	6
Agriculture	7	7	0	7
Sub-Total	462	417	18**	50
<u>PT. TO PT. TELEPHONE</u>				
Public	91	89	8**	16
<u>U.S. COASTAL</u>				
Coastal Telegraph	74	57	0	26
Coastal Harbor	81	80	0	35
Marine Relay	55	35	0	15
Coastal Telephone	6	4	0	4
Coastal Harbor (Ltd.)	0	0	0	2
Coastal Telegraph (Ltd.)	0	0	0	3
Sub-Total	216	176	0	85

Service	Applica- tions Received	Authoriza- tions Issued	New stations Authorized	Total sta- tions June 30, 1943
<u>ALASKAN SERVICES</u>				
Aviation	428	401	3*	215
Fixed Public	342	326	20	275
Coastal	184	181	4	158
Experimental	8	6	0	4
Sub-Total	<u>962</u>	<u>914</u>	<u>27</u>	<u>652</u>
Grand Total -	22,251	17,451	4,007	14,832
<u>WIRE CERTIFICATES</u>				
Telephone	66	49		
Telegraph	<u>209</u>	<u>211</u>		
	275	260		

\* The count for new stations authorized for Alaskan Aircraft is included figure for U.S.

\*\* Figures represent call letters assigned for frequencies at additional locations. A total of five new point to point stations were authorized.

#### 5. Engineering Field Statistics

Ship Inspections - The nation's huge ship-building program sharply increased the number of initial ship inspections made by the Field Staff during the past fiscal year. The total for the year was 2077 as compared with 1290 the previous year.

The total for all types of ship inspections was 2110. Of these, 6069 were U.S. vessels and 2041 vessels of foreign registry. As a result of these inspections, 5942 violation notices were served and 2773 violations were cleared.

Other Inspections - A total of 5267 inspections of other stations were completed, including 3604 radiotelegraph stations, 199 radiotelephone stations and 1464 broadcast stations. A total of 839 violation notices were served as a result of these inspections.

Examinations - Applicants examined for operator licenses (exclusive of Class "C" Amateur) totalled 81,003. Of these, 76,210 were applicants for commercial licenses, including 68,992 radiotelephone and 7218 radiotelegraph licenses. Applicants for Class "A" Amateur radio operator licenses totalled 4793. As a result of the examinations, 61,714 Commercial operator licenses were issued - 56,761 telephone and 4953 telegraph.

Frequency Measurements - Measurements were made in the three classes of frequencies as follows: 12,878 radiotelegraph, 1211 radiotelephone and 4823 broadcast, totalling 18,912. These measurements developed

540 violation notices, 139 reports of deviation beyond tolerance and 73 notices of harmonics. In addition 452 special monitoring assignments were completed.

Investigations - Routine investigations numbered 724. Of these 123 were broadcast, 223 electric and power and 378 miscellaneous. At the close of the fiscal year, nine cases remained unclosed.

### 6. Publications

Following is a list of Federal Communications Commission publications of general interest available at the Government Printing Office, Superintendent of Documents, Washington, D.C.

Title	Price
Communications Act of 1934 with Amendments and Index thereto.....	\$0 15
Federal Communications Commission Reports (Bound volumes of decisions and orders, exclusive of annual reports).....	
Volume 1 - July, 1934, July 1935 .....	1.00
Volume 2 - July 1935, June 1936.....	2.00
Volume 3 - July 1936, February 1937.....	2.00
Volume 4 - March 1937, November 15, 1937.	1.50
Volume 5 - November 16, 1937, June 30, 1938	1.50
Volume 6 - July 1, 1938, February 28, 1939.	1.50
Volume 7 - March 1, 1939, February 29, 1940	1.50
Volume 8 - March 1, 1940, August 1, 1941...	1.50
Annual Reports of the Commission:	
First Annual Report - Fiscal Year 1935...	.15
Third Annual Report - Fiscal Year 1937...	.30
Fifth Annual Report - Fiscal Year 1939...	.30
Sixth Annual Report - Fiscal Year 1940...	.20
Seventh Annual Report - Fiscal Year 1941.	.10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	.15
Standards of Good Engineering Practice Concerning Standard Broadcast Stations (550-1600 kc)...	.30

Title	Price
Statistics of the Communications Industry in the United States (1939).....	\$0.25
Statistics of the Communications Industry in the United States (1940).....	.20
Statistics of the Communications Industry in the United States (1941).....	.30
Report on Chain Broadcasting.....	.30
Rules and Regulations of the Federal Communications Commission:	
Part 1, Practice and Procedure.....	.10
Part 2, General Rules and Regulations.....	.10
Part 3, Rules Governing Standard Broadcast Stations.....	.10
Part 4, Rules Governing Broadcast Services (Other than Standard Broadcast).....	.10
Part 5, Experimental Rules.....	.05
Part 6, Rules Governing Fixed Public Radio Services.....	.05
Part 7, Rules Governing Coastal and Marine Relay Services.....	--
Part 8, Ship Rules.....	.15
Part 9, Aviation Radio Services.....	.05
Part 10, Rules Governing Emergency Radio Services.....	.10
Part 11, Rules Governing Miscellaneous Radio Services.....	.05
Part 12, Rules Governing Amateur Radio: Stations and Operators.....	.10
Part 13, Rules Governing Commercial Radio Operators.....	.05
Part 14, Rules Governing Radio Stations in Alaska (Other than Amateur and Broadcast).....	.05
Part 15, Rules and Regulations Governing All Radio Stations in the War Emergency Radio Service.....	.10
Parts 31 and 32, Uniform System of Accounts Class A and Class B Telephone Companies, Units of Property Class A and Class B Telephone Companies (1 pamphlet).....	.15
Part 33, Accounting by Class C Telephone Companies.....	.15
Part 34, Uniform System of Accounts, Radio Telegraph Carriers.....	.25

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Title	Price
Part 35, Uniform System of Accounts for Telegraph and Cable Companies.....	\$0.35
Part 41, Rules Governing Telegraph and Tele- phone Franks.....	.05
Part 42, Rules Governing the Preservation of Records.....	.10
Part 43, Rules Governing the Filing of Information, Contracts, etc., of Telecommunications Carriers.	.05
Part 61, Tariffs - Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service...	.10
Part 62, Rules Governing Application Under Sec. 212 of the Act to Hold Interlocking Directorates....	.05
Federal Communications Commission Report on Social and Economic Data, Pursuant to In- formal Hearing etc., July 1, 1937.....	.60
Federal Communications Commission - Proposed Report Telephone Investigation (Pursuant to Public Resolution No. 8, 74th Congress).....	1.00

In addition, the following are available without charge from the  
Federal Communications Commission:

An ABC of the FCC - (1940)  
Radio - A Public Primer (1941)  
Information Regarding Ship and Coastal Harbor  
Radiotelephone Service (1941)

Summary of Monthly Reports of Large Telephone  
Carriers in the United States.

Summary of Monthly Reports of Wiretelegraph,  
Ocean-Cable, and Radiotelegraph carriers.

Salary Report of Telephone and Telegraph  
Carriers and Holding Companies (1941)

Telephone Hand-set Charges and Changes since  
January 1, 1942.

TENTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION

FISCAL YEAR ENDED JUNE 30, 1944



COMMISSIONERS  
MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION  
(As of January 1, 1945)

CHAIRMAN  
PAUL A. PORTER  
(Term expires June 30, 1949)

PAUL A. WALKER  
(Term expires June 30, 1946)

CLIFFORD J. DURR  
(Term expires June 30, 1948)

NORMAN S. CASE  
(Term expires June 30, 1945)

EWELL K. JETT  
(Term expires June 30, 1950)

RAY C. WAKEFIELD  
(Term expires June 30, 1947)

(One Vacancy)

LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION  
Washington 25, D. C., January 9, 1945

To the Congress of the United States:

In accordance with the requirement of Section 4(k) of the Communications Act, the Tenth Annual Report of the Federal Communications Commission for the fiscal year ending June 30, 1944, is submitted herewith.

Significant activities of the Commission since the close of the fiscal year include the following:

Allocation hearings for a complete review of the spectrum from 10 kilocycles to 30,000,000 kilocycles to determine the post-war frequency needs of the various radio services were conducted by the Commission, sitting en banc, from September 28 through November 2. During 25 hearing days, the Commission heard 4559 pages of testimony by 231 witnesses, including representatives of the radio industry, of other interested organizations and government agencies and by members of its own staff, and received 543 exhibits. Most of the industry recommendations were presented by the 13 panels of the Radio Technical Planning Board which, since its inception one year before, had conducted detailed studies. At the close of the calendar year, the Commission was studying the various recommendations and conferring with the Interdepartment Radio Advisory Committee preparatory to issuing proposed findings.

Some 35 witnesses representing a dozen railway systems, industry and government agencies who testified in the Commission's railroad radio hearings September 13 to 18 were unanimous in recommending some type of radio communications on trains for increased safety and efficiency regardless of the communication and signalling techniques now in use. The testimony provided a basis for the consideration of providing frequencies for radio in railroad operations at the general allocation hearings which opened September 29. The railroad radio hearings were held before Commissioners Paul A. Walker (chairman), Norman S. Case and E. K. Jett.

Concerned by the high prices being paid for radio stations, the Commission on July 24 asked the Congress for guidance on the policy it should follow in passing on the sale of stations where the sales prices are far in excess of the going-concern and physical property values of the stations and appear to involve compensation for the radio frequencies themselves. The statute makes it clear that the frequencies are not in any way the property of the licensees, the Commission pointed out.

A report, "Preliminary Studies on Some Aspects of the Availability of Landline Wire Communications Service," issued by the Commission on November 15, disclosed the limited availability of telegraph service and a decline in farm telephone service. The report showed that only 5.2 per cent of the cities in the 5,000-25,000 population group, only 18 per cent in the 25,000-50,000 group and only 49 per cent in the 50,000-100,000 group have telegraph offices always open. From 1920 to 1940 farms having telephones decreased 39 per cent.

As part of an over-all program agreed to earlier in conferences with the Commission, the American Telephone & Telegraph Company filed tariffs from August through December putting into effect new reduced rates on overseas telephone calls between the United States and several points in South America, Central America, the West Indies, Bermuda and Hawaii.

To give the public fuller information concerning the source and kind of payment received by radio stations for sponsored programs, including political broadcasts, the Commission on December 12 adopted a rule requiring appropriate announcements.

Respectfully,



PAUL A. PORTER  
Chairman

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## S U M M A R Y

Fostering improvement of American wire and radio services at home and abroad despite extra wartime burdens, obtaining substantial common carrier rate reductions and preparing for far-reaching postwar communications developments were highlights of the activities of the Federal Communications Commission during the past fiscal year.

The number of standard broadcast stations increased from 912 to 924, the additional permits having been issued to applicants who showed that the grant would serve an outstanding public need and that they had materials available. In line with its fundamental policy of encouraging diversification of ownership, the Commission prohibited ownership by one person of more than one station in the same locality. Another expression of this policy, the network rules, effective since June 15, 1943, had a full year of operation during the period covered by this report. It is apparent that program service throughout the nation has benefited through increased competition between networks and the extension of network service to a greater number of stations. In recognition of the advancement of the radio art and the growth of the radio industry, the Commission increased the standard broadcast license period from two to three years. Revenues of networks and broadcast stations increased 19 percent over the previous year.

At the close of the fiscal year 47 frequency modulation (FM) stations were operating, with an estimated 500,000 FM receiving sets in use. Indicative of the expansion to be expected when materials and manpower are available was the total of 202 applications on file for permits to construct new FM stations. In the field of television, six commercial stations and two experimental stations were rendering program service and 52 applications for commercial stations were on file.

Wartime demands for telephone service continued to mount during the year. Traffic of the Long Lines Department of the A.T. & T., for example, was one-seventh heavier than last year but the speed of service improved. Reductions of approximately \$3,000,000 annually in interstate rates were agreed to by the Bell System Companies, following negotiations by the Commission with the A.T. & T. On December 10, 1943, the Commission held that surcharges on interstate and foreign toll calls from hotels, apartment houses and clubs in the District of Columbia were subject to regulation by the Commission, and it ordered the telephone companies to file proper

tariffs. The Bell Companies throughout the country subsequently filed tariffs having the effect of requiring the discontinuance of the surcharges by such establishments. This matter is now being contested in the courts. The elimination of these surcharges would result in an annual saving of over \$2,000,000 to users, in addition to the rate reductions of \$8,000,000 mentioned above.

Improvement in the financial condition of the domestic telegraph industry has resulted from the merger of Western Union and Postal Telegraph which was approved by the Commission September 27, 1943. There was also an improvement in the speed of telegraph service. The time required for the fastest 95 percent of ordinary full rate messages to pass through Western Union message centers was reduced from 14.1 minutes to 10.1 minutes.

Radiotelegraph carriers have been able to maintain efficient communication with various countries throughout the world and even to establish new circuits. Prior to the allied invasion operations in Italy and France, the Commission assisted the Joint Chiefs of Staff and the Board of War Communications in making arrangements to have the United States companies install and operate semi-portable stations in the invasion areas for the speedy handling of press and government messages.

Many reductions in international rates were made during the fiscal year and the Commission ordered an investigation of the rates and charges of all carriers. A delegation consisting of a Commissioner, a Commission staff member and a representative of the State Department conferred with officials of a number of South American countries with the result that several of the nations agreed to the reduced rates provided for in an order issued by the Commission on June 22, 1943.

Following several disastrous train wrecks in 1943, wide interest developed in the experimental use of radio on railroads and during the year 35 applications for railroad radio authorizations were received by the Commission. Many of these were granted. On May 2, the Commission ordered a public hearing to obtain information on the feasibility of the regular use of radio by railroads to promote efficiency and safety.

Technical studies inaugurated by the Commission during the year included the Low Frequency Recording Project, the Very High Frequency Recording Project and the Determination of Origin of Burst Signals.

The Radio Intelligence Division (RID), which is charged with safeguarding the nation's radio channels from misuse, investigated 1895 complaints of illicit or subversive transmission and of



interference; located 32 unlicensed stations and continued to render emergency direction finding service to aircraft. The Foreign Broadcast Intelligence Service (FBIS) regularly monitored programs from stations in 55 countries in 41 languages for the use of agencies of this and allied governments.

To assist in the transition of the radio communications industries from wartime conditions to the many new and enlarged opportunities of peace, the Commission began extensive studies for frequency allocation hearings. Simultaneous studies were conducted by the Interdepartment Radio Advisory Committee on which the Commission is represented, and by the Radio Technical Planning Board, representing industry groups. The Commission assigned staff members as observers at meetings of the RTPB and also made information available. Near the end of the fiscal year, the Commission set up a committee composed of representatives of all of its departments and divisions to develop plans for a public allocations hearing. It was deemed necessary to complete such a review of the spectrum and make allocation recommendations as soon as possible for forthcoming telecommunications conferences and to enable manufacturers to prepare for the production of new apparatus designed on the basis of such recommendations as soon as the facilities and manpower are available for the manufacture of civilian radio equipment.

The Commission, on January 13, 1944, closed the record and dismissed the investigation into the newspaper ownership of radio stations. The Commission concluded, in the light of the record in the proceeding and of the grave legal and policy questions involved, not to adopt any general rule regarding such ownership.

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G E N E R A L

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- 

1. ADMINISTRATION

At the beginning of the fiscal year a Director of Personnel and a Budget and Planning Officer were appointed to carry out the functions of the Commission's Administrative Order 2-G, adopted March 25, 1943.

Several changes were made in the operations of the Radio Intelligence Division and the Foreign Broadcast Intelligence Service during the last quarter of the fiscal year in order to bring about a reduction in operations in line with the Commission's 1945 budget. No other significant administrative changes were made.

2. COMMISSION MEMBERSHIP CHANGES

On February 15, 1944, Ewell K. Jett, of Maryland, was sworn in as Commissioner, to succeed George Henry Payne, whose term expired June 30, 1943. The term of T. A. M. Craven expired on June 30, 1944.

3. STAFF ORGANIZATION

The Commission's organization consists of four operating departments: Engineering Department, Law Department, Accounting Department, Foreign Broadcast Intelligence Service. There are four staff service units: The Office of the Secretary, Information Office, Personnel Office, and the Budget and Planning Office.

An Administrative Board comprising the General Counsel, Chief Engineer, Chief Accountant and Secretary act on matters delegated to it by the Commission. A Rules Committee initiates, considers proposals for new or revised rules, regulations, forms and procedures, and advises the Commission with respect to such matters.

#### 4. PERSONNEL

During the last quarter of the fiscal year the total personnel of the Commission was reduced approximately 25%, from 2159 to 1670, to conform with the Commission's reduced 1945 budget effective July 1, 1944. Of these, 326 were stationed in Washington, 650 were employed in the field (135 outside of the continental United States), and 59 on terminal leave. The total number of employees in the Engineering Department was 820; Law Department, 71; Accounting Department, 118; Foreign Broadcast Intelligence Service, 316; Secretary's Office, 6; License Division, 91; Records Division, 42; Service Division, 70; Personnel Office, 29; Budget Office, 16; Information Office, 5.

#### 5. APPROPRIATIONS

For the fiscal year, the Commission was appropriated a total of \$7,609,914. Of this amount, \$2,000,000 was for its regular activities, \$5,590,314 for its war activities, and \$19,600 for printing and binding.

#### 6. LEGISLATION

No legislation amending the Communications Act of 1934 nor any other legislation relating to matters within the Commission's jurisdiction was passed during the fiscal year.

Extensive hearings were held between November 3 and December 16, 1943, before the Senate Committee on Interstate and Foreign Commerce on S. 814, 78th Congress, 1st Session, to amend the Communications Act. This bill was introduced on March 2, 1943, by Senators White and Wheeler. No further action on the bill has been announced by the Committee.

#### 7. LITIGATION

There were two cases in the United States Court of Appeals for the District of Columbia at the beginning of the fiscal year. Both were dismissed shortly afterward. In addition, two new appeals were filed in the same Court during the year. Both were pending at the close of the year. There was one case pending in the United States District Court of Massachusetts at the beginning of the year and five more cases were filed in various United States District Courts during the year, two of them in the District of Columbia, two in the Southern District of New York and one in the Northern District of Illinois.

All of the cases in the United States Court of Appeals for the District of Columbia were appeals to set aside orders of the Commission in proceedings on applications for radio station licenses, filed pursuant to the provisions of Section 402(b) of the Communications Act of 1934. All the litigation in the district courts involved cases arising in connection with the Commission's jurisdiction over common carriers engaged in interstate and foreign communication by wire. Two cases related to accounting matters and four were with the Commission's jurisdiction over charges by hotels for interstate and foreign long-distance telephone service.

The case in the United States District Court of Massachusetts involved an appeal brought by the New England Telephone and Telegraph Company to set aside an order of the Commission requiring that company to make certain adjustments in its accounts relating to its employees' pension fund. The District Court upheld the Commission's order as being within its statutory powers under the Communications Act and not at odds with fundamental principles of correct accounting. No further appeal was taken in this case. New England Telephone and Telegraph Company v. United States, et al., 53 F. Supp. 400 (D. Mass., 1943)

Another accounting issue is presented in the case of the New York Telephone Company v. United States, brought in the District Court for the Southern District of New York on February 11, 1944. In this action the New York Telephone Company seeks to set aside an order of the Commission of December 14, 1943, made after extensive hearing, requiring the New York Telephone Company to make certain adjustments in its accounts. These adjustments relate to certain transactions between the Company and its parent corporation, American Telephone & Telegraph Company, under which the New York Telephone Company acquired from the American Telephone & Telegraph Company properties at a price in excess of original cost to American Telephone & Telegraph Company. The New York Telephone Company recorded these transactions by entering in its books the prices charged it by American Telephone & Telegraph Company. The Commission disapproved this accounting, holding that in transfers of property between parent and affiliate the book figures of the parent company for the property in question should have been used by the affiliate. The New York Telephone Company has sought to review this order. Oral argument was presented before a statutory three-judge court on June 1, 1944, and the case was still pending at the close of the fiscal year.

The remaining four actions in the district courts relate to the question of the Commission's jurisdiction over charges made by hotels in connection with interstate and foreign long-distance telephone calls made by their guests. On January 6, 1942, the Commission instituted a proceeding for the purpose of determining whether charges by hotels made for or in connection with such calls are within the jurisdiction of the Commission under the Communications Act of 1934. In these proceedings, it was disclosed that certain hotels in the District of Columbia and elsewhere made certain charges known as "surcharges" or "service charges" in connection with interstate and foreign telephone calls made by their guests, which were in addition to the charges specified in the effective tariffs filed by the telephone companies supplying service to such hotels. After hearing, the Commission concluded that it possessed jurisdiction with respect to such charges by hotels, and by its order of December 10, 1943, directed the American Telephone & Telegraph Company and the Chesapeake & Potomac Telephone Company (D.C.) to file tariffs showing the charges collected by hotels or the condition upon which telephone service is furnished to hotels. On January 22, 1944, these companies filed tariffs effective February 15, 1944, providing that telephone service is furnished to hotels on the condition that use of the service by guests, tenants and others shall not be made subject to any charge in addition to the toll charges set forth in the effective tariffs of the telephone company. Similar tariffs were filed on behalf of all other companies in the Bell System.

On February 14, 1944, the Hotel Association of Washington, D.C., instituted a suit pursuant to the provisions of Section 402(a) of the Communications Act of 1934, to set aside the Commission's order of December 10, 1943. The case is still pending.

On February 19, 1944, the Commission, having determined that certain hotels in the District of Columbia were not complying with the tariffs provisions of the telephone companies effective February 15, 1944, relating to the making of charges in addition to those set forth in the effective tariffs of the telephone companies, had a suit instituted pursuant to the provisions of Section 401(c) of the Communications Act to enjoin violation of Section 203 of the Communications Act relating to the furnishing of service at charges other than those specified in the filed effective tariffs. After hearing and oral argument, Justice O'Donoghue of the District Court issued an injunction against the defendant hotels on June 8, 1944.

On February 23, 1944, the United States, on behalf of the Commission, instituted a similar suit in the District Court for the Southern District of New York under Section 401(c) of the Communications Act to enjoin violation of Section 203 of the Communications Act by certain hotels in New York City. A hearing was held before the District Court on June 26, 27 and 28, 1944, and the case is now awaiting decision.

On February 24, 1944, a similar action was instituted in the District Court for the Northern District of Illinois to enjoin violation of Section 203 of the Communications Act by certain Chicago hotels. That case is still pending.

## 8. DOCKETS

The Commission heard 91 docket cases, of which number 66 were broadcast, one telephone, and 24 telegraph; held 14 oral arguments, of which 9 were on broadcast matters, four telephone and one telegraph. A total of 203 motions, petitions, and other pleadings were acted upon, of which 164 were granted, 35 denied, and four were dismissed. Included in the total of 205 motions, 136 were on broadcast matters (109 granted, 25 denied, two dismissed), 67 on telephone and telegraph (55 granted, 10 denied, two dismissed).

## 9. INTERNATIONAL

In preparation for the Commission's impending appearance in the Senate Interstate and Foreign Commerce Committee hearing on international communications, comprehensive charts, lists and reports on the subject have been prepared.

Because of the crowded spectrum, and because of the wartime demand for frequencies by the Armed Forces, considerable time and effort have been devoted during the past fiscal year to maintaining complete frequency

records for immediate reference. The "Master Frequency List" revised as of May 1, 1944, gives detailed information on approximately 5000 channels between 10 kc and 438,000 kc. Unforeseen developments in the rapidly-expanding aviation service have required considerable additional work on the frequency plan for allocation and assignment of frequencies for the Inter-American International Air Routes. This plan cannot be completed in final form until international agreement concerning the allocation and use of specific frequencies has been effected.

It is expected that an Inter-American conference will be called early in 1945 to consider revision of the Inter-American Radio Communications Convention (Havana 1937) and the Inter-American Radio Communications Agreement (Santiago 1940). The United States proposals for these treaties are being prepared and probably will be available by the end of the calendar year 1944. The North American Regional Broadcasting Agreement (Havana 1937) will expire on March 29, 1946, and preparation is being made for a conference to modify and renew this Agreement before that date. It is also expected that an international conference will be held at the end of the war to consider revision of the International Telecommunications Convention (Madrid 1932) and the Annexed Regulations (Cairo 1933).

The information contained in the International Telecommunications Survey reports, which were prepared by the Division, has been supplied to various government agencies desiring such information in connection with their respective problems.

Courses in telecommunications techniques were given to eight South and Central American holders of trade scholarships sponsored by the Inter-American Training Administration.

Approximately 790 cases of treaty violation and interference were handled during the year. These matters, with the exception of minor violations which are reported to the foreign administrations directly by the Commission, are handled through the Department of State and such action has been indirectly instrumental in improving the communication services of the United States.

#### 10. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Interdepartment Radio Advisory Committee approved 1927 new assignments, 346 deletions, and numerous modifications in existing assignments, bringing the total number of outstanding assignments made by IRAC since its inception to 31,044. IRAC is a committee of the Board of War Communications and advises the Board of assignments involving new frequencies, or changes in method or type of employment of existing frequencies. During the fiscal year it prepared a revised Executive Order assigning approximately 4500 frequencies to government stations.

## 11. FREQUENCY ALLOCATION

Frequency allocation is of particular importance at this time because of the new devices and new uses for radio which, appearing during the war, may have peace time application. The work of determining in what portion of the spectrum the various services shall operate must be completed before the end of the war in order that manufacturers may begin production as soon as the plants are turned back to the manufacture of civilian radio equipment.

Extensive studies are being conducted on means of conserving frequency space by reducing the width of the space to be occupied by individual stations and by examining operating practices and systems. For example, international communication requirements may be reduced and the service improved by a system of relay stations at appropriate points around the world. The adoption of automatic switching systems, the coordinated use of frequencies and multi-channel techniques made possible by automatic relay would greatly improve the international service and provide additional frequency space for the tremendous expansion expected in the aeronautical and maritime services.

The Commission activities in this field have been conducted during the fiscal year 1944 by a committee representing the various divisions of the Engineering Department. Simultaneous studies have been conducted by the Interdepartment Radio Advisory Committee, on which the FCC is represented, and by the Radio Technical Planning Board. The Commission has cooperated with the industry by making information available and by sending observers to the meetings of the various Radio Technical Planning Board panels.

Near the end of this fiscal year, the Commission recognized that the engineering work involved in the allocation studies had progressed to the point where meetings between the Commission and other interested parties would be required. It was also realized that hearings on the broad subject and on particular phases would be necessary. The Commission's engineering committee was replaced by a committee under the Chairman of the Commission with representatives of all Commission departments and divisions which are concerned with the use of radio facilities. It is expected that this work will proceed rapidly during the coming year and that satisfactory means will be found for the continuation and expansion of the radio communication facilities of the United States and possessions.

## 12. NEWSPAPER OWNERSHIP

On January 13, 1944, the Commission closed the record and dismissed the proceeding instituted pursuant to Orders 79 and 79A relating to newspaper ownership of radio stations. The Commission concluded, in the light of the record in this proceeding and of the grave legal and policy questions involved, not to adopt any general rule with respect to newspaper ownership of radio stations.

A summary of the evidence in the proceeding was forwarded to the appropriate committees of the Senate and House of Representatives in order to inform them of the facts developed by the investigation and for any consideration which they might desire to give the matter.

Aside from the specific question of common ownership of newspapers and radio stations, the Commission recognized the serious problem involved in the broader field of the control of the media of mass communications and the importance of avoiding monopoly of the avenues of communicating fact and opinion to the public. All the Commissioners agreed to the general principle that diversification of control of such media is desirable. The Commission stated that it does not desire to discourage legally qualified persons from applying for licenses, but does desire to encourage the maximum number of qualified persons to enter the field of mass communications, and to permit them to use all modern inventions and improvements in the art to insure good public service.

In the processing of individual applications for licenses, the Commission stated that it will inquire into and in its decisions give expression to "public interest" considerations. The Commission further stated that it does not feel that it should deny a license merely because the applicant is engaged or interested in a particular type of business, but, it does not intend in granting licenses in the public interest to permit concentration of control in the hands of the few to the exclusion of the many who may be equally well qualified to render such public service as is required of a licensee.

## 13. COMMISSION COMMITTEES

Frequency Allocation Committee - Chairman Fly and Commissioner Jett, with staff members. To make studies and to confer with government and industry groups in preparation for the general Allocation Hearings heard by the Commission sitting en banc.

Railroad Radio Committee - Commissioners Walker (chairman), Case and Jett. To preside at initial hearings in the matter of investigating the establishment and use of radio in railroad operations.



Bar Committee - Commissioners Walker (chairman), Case and Durr. To review applications by attorneys for admission to practice before the Commission.

Telephone Committee - Commissioners Walker (chairman) and Wakefield. To study over-all problems of the telephone industry.

Agency Committee on Deferment of Government Employees - Commissioners Case (chairman), Walker and Durr.

Telegraph Committee - Commissioners Case (chairman), Wakefield and Durr, with staff members. To study possible revision of Western Union's domestic telegraph rate structure.

## STANDARD BROADCAST

1. General
2. Materials and Manpower
3. North American Regional Broadcasting Agreement
4. Multiple Ownership
5. Extension of License Period
6. Network Regulations
7. Financial Data
8. Statistics

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### 1. GENERAL

The engineering problems involved in frequency assignments were complicated during the year by the large number of applications considered by the Commission for new frequency assignments, transfers of control, changes in existing facilities and for renewals. The Commission considered 843 such applications. In the other than renewal class, 252 applications were granted, 46 dismissed without prejudice or denied, 58 designated for hearing. Of the renewal applications, 478 were granted, one denied, eight designated for hearing. These applications also emphasized the need for a revision of existing rules and standards. Studies looking towards such a revision are being made by the Commission and by the Broadcast Allocation Committee of the Radio Technical Planning Board. The number of standard stations was increased from 912 to 924.

### 2. MATERIALS AND MANPOWER

As shortages of materials and manpower continued through the year, the Commission retained the following orders:

No. 91-C relaxing requirements for radio operators at broadcast stations.

No. 94-A permitting stations to operate at only one third of their licensed time during the broadcast day.

No. 107 reducing the power of stations by one decibel (approximately 21 per cent).

The Freeze Order of April 27, 1942, which was modified on September 22, 1942, was still further modified on August 11, 1943, when the Commission announced that under certain stated conditions it would be in the

public interest to grant applications for permits involving the use of idle equipment to increase the power of 100-watt channel standard broadcast stations to 250 watts and for the construction of new 100-watt and 250-watt local channel stations.

On January 26, 1944, the Commission released its Supplemental Statement of Policy Concerning Applications for Permits to Construct or Change Radio Stations, which said in part:

"Present indications are that despite the tremendous expansion of radio production that has taken place in the last two years, the large burden on the industry of meeting military needs will not permit production of equipment for new stations or the expansion of existing stations. All orders and practices looking toward the conservation of equipment (such as Order 107, relating to operation with reduced power) should be retained in full force and effect. It would not be in the public interest to issue and have outstanding permits for authorizations the terms of which cannot be met within a reasonable period.

"The Commission will give consideration to the issuance of conditional grants upon applications where it is shown (1) that a grant will serve an outstanding public need or national interest; (2) that the operation proposed is consistent with the provisions of the Rules and Regulations of the Commission and the conditions and standards prescribed in the Act; and (3) that, after due consideration of the policies and orders of the War Production Board and the facts with respect to existence or availability of necessary materials, there is reasonable prospect that the proposed operation in the vicinity in question can be provided for without substantial delay."

These changes made it possible for the Commission to grant 12 additional licenses and construction permits in addition to several authorizations for an increase in facilities. The changes also encouraged the filing of an increased number of applications for new facilities or changes in existing facilities.

### 3. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

The successful operation of this agreement for the third year was additional proof of its value in resolving the radio problems between the signatory nations despite the stress of war.

### 4. MULTIPLE OWNERSHIP

On November 23, 1943 the Commission adopted Order No. 84-A promulgating Section 3.35, effective May 31, 1944, which provides that no license

shall be granted for a standard broadcast station, directly or indirectly owned, operated or controlled by any person where such station renders or will render primary service to a substantial portion of the primary service area of another standard broadcast station, directly or indirectly owned, operated or controlled by such person, except upon a showing that public interest, convenience and necessity will be served through such multiple ownership.

Procedures were established by adoption of Order No. 84-B dated April 4, 1944, for the purpose of obtaining compliance with the multiple-ownership regulation without hardship in any particular case where disposition of stations or compliance with the order by other means would not be feasible prior to May 31, 1944. The Commission also issued a statement indicating principal factors to be considered in determining whether or not an overlapping of signal strengths in any given situation resulted in a standard broadcast station rendering primary service to a substantial portion of the primary service area of another broadcast station within the meaning of the regulation. Also the Commission announced, April 4, 1944, that upon the granting of applications for consent to the assignment of licenses or for consent to the transfer of control of licensee corporations, filed for the purpose of effecting compliance with the policy established in the multiple ownership rule, appropriate certificates would be issued pursuant to the provisions of Section 123 of the Revenue Act of 1943, relating to gain from sale or exchange of property necessary or appropriate to effectuate the policies of the Commission with respect to ownership and control of broadcast stations.

There have been filed a total of 22 applications for consent to transfer control of licensee corporations or for consent to assignment of licenses. Of this number, 7 applications have been granted.

#### 5. EXTENSION OF LICENSE PERIOD

The Commission, on December 14, 1943, adopted a change in its rules and regulations which formerly provided for a license period of two years for standard broadcast stations, to provide for issuance of licenses for a normal license period of three years, the maximum permitted under Section 307(d) of the Communications Act. At the same time, the regulations were so amended as to distribute the work load in the examination of renewal of license applications of all classes of standard broadcast stations over the entire three year license period.

#### 6. NETWORK REGULATIONS

The regulations of the Commission applicable to stations engaged in chain broadcasting were made effective June 15, 1943, following a decision of the Supreme Court of the United States. Accordingly, this has been the first year of operation of stations since the adoption of the regulations. In every instance where a violation of network regulations has been brought to the attention of licensees and network organizations, changes have been made in order to comply with the regulations. One major network, known as

the Blue Network, formerly owned by the Radio Corporation of America, was transferred to new ownership, effective October 12, 1943, in order to comply with the policy of the network regulations.

While a study of the effects of these regulations has not been completed, it is apparent that program service throughout the nation has benefited through increased competition between networks and the extension of network service to a greater number of stations.

## 7. FINANCIAL DATA

Four major and five regional networks and 841 standard broadcast stations in the United States reported net revenues from the sale of time amounting to \$195,704,153 in 1943 as compared to \$163,642,745 reported by 10 networks and 851 standard broadcast stations for the previous year or an increase of 19.59%. One small regional network discontinued operations in April 1943 and did not submit a report covering its 1943 operations. In addition these networks and stations received \$19,613,621 in 1943 from the sale of talent and other incidental broadcast activities as compared to \$15,196,554 for the previous year, an increase of 29.07% in this class of revenue. After deducting operating expenses, excluding Federal income tax, these stations and networks reported operating income amounting to \$66,475,586 as compared to \$44,632,238 for the previous year, an increase of 48.94%.

The four major networks (CBS, Blue, Mutual and NBC) and their 9 key stations reported revenues from the sale of time aggregating \$71,027,292 in 1943 as compared with \$59,400,110 for 1942. Combined broadcast revenues of these networks and stations were \$64,301,538 in 1943 as compared with \$52,845,641 for the previous year; and broadcast income (revenues less expenses before Federal income tax, and excluding net losses from other than standard broadcast operations amounting to \$351,092 for 1943 and \$1,839,136 for 1942) amounted to \$19,455,701 for 1943 and \$13,918,712 for 1942, or an increase of 39.78%.

In general standard broadcast stations reported substantial improvement in the results of operations for 1943. Excluding the 9 key stations of major networks for which the reports did not include adequate segregations of expenses between these stations and network operations, the average broadcast income of clear channel stations with operating power of 50,000 watts, unlimited time, amounted to \$400,170 in 1943, or an increase of 21.81% over 1942 and such income reported by the clear channel unlimited time stations with operating power of 5,000 to 25,000 watts averaged \$61,850, or an increase of 56.45% over the corresponding amount reported for 1942. The average broadcast income reported by regional stations amounted to \$79,724 in 1943 as compared with \$52,867 in 1942, an increase of 50.91%. Local unlimited time stations reported average broadcast income of \$4,399 in 1942 and \$12,682 in 1943, showing an average increase of 188.29%. Broadcast income reported by local unlimited time stations

affiliated with major networks averaged \$15,109 in 1943, or an increase of 169.18% over the average for 1942, while local unlimited time stations not affiliated with a major network reported an average increase of 185.88% over 1942.

Ninety-four of the 641 stations reported losses (total broadcast expenses in excess of total broadcast revenues) in 1943 as compared with 194 of the 851 included in the statistics in 1942. The average loss per station in 1943 was \$5,348, while the average loss in 1942 amounted to \$6,904. Only 42 of the stations reporting losses in 1943 were affiliated with the major networks while there were 86 in 1942.

The total number of stations affiliated with the major networks and included in the statistics for 1943 was 604 and 572 in 1942. The average broadcast income of the 604 stations amounted to \$72,975, an increase per station of 30.71% over the average of \$55,828 for the 572 stations in 1942.

### 8. STATISTICS

#### NUMBER OF STATIONS IN THE BROADCAST SERVICE FOR FISCAL YEAR ENDING JUNE 30, 1944

Class of Station	As of June 30		Licenses or CP's surren- dered or aban- doned	As of June 30 1944
	1943	New		
Standard Broadcast.....	912	16	4	924

#### BROADCAST APPLICATIONS

Service	Applica- tions Received	Authoriza- tions issued	Special authoriza- tions
Standard Broadcast.....	1,689	1,318	209

## NEW STATIONS AUTHORIZED

Call Letters	Licensee and Location	Power (watts)	Frc- quency (kc)	Time Designation
KJAN	KMOE, Inc. Monroe, L.	250	1450	Unlimited
KONP	Evening News Press, Inc. Port Angeles, Wash.	250	1450	Unlimited
KTHH	Texas Star Broadcasting Co. Houston, Texas	250	1230	Unlimited
KVOP	W.J. Harpole & J.C. Rothwell, a partnership, Plainview, Texas	250	1400	Unlimited
KWBU	Century Broadcasting Co. Corpus Christi, Texas	50 KW	1010	Day to sunset at Little Rock, Ark.
WELO	Birney Imes, Jr. Tupelo, Miss.	250	1490	Unlimited
WENT	Scandaga Broadcasting Corp. Gloversville, N.Y.	250	1340	Unlimited
WFEB	Alabama Broadcasting Co. Sylacauga, Ala.	250	1340	Unlimited
WROT	South Bend Broadcasting Corp. South Bend, Ind.	250	1490	Unlimited
WJEF	John E. Fetzer and Ken Y. Fetzer, d/b as Fetzer Broad- casting Co. Grand Rapids, Mich.	250	1230	Unlimited
WKLA	Karl L. Ashbacker and Grant F. Ashbacker d/b as Ludington Broadcasting Co. Ludington, Mich.	250	1450	Unlimited
WMOH	The Fort Hamilton Broadcasting Co. Hamilton, Ohio	250	1450	Unlimited
WOCB	E. Anthony & Sons, Inc. West Yarmouth, Nr. Hyannis, Mass.	250	1240	Unlimited
WRHI	Ernest H. Carroll, et al, d/b as York County Broadcasting Co. Rock Hill, S.C.	250	1340	Unlimited
WRLD	L.J. Duncan, et al, d/b as Valley Broadcasting Co. West Point, Ga.	250	1490	Unlimited
WROX	Robin Weaver, Sr., Clarksdale, Miss.	250	1450	Unlimited

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NONSTANDARD BROADCAST

1. General
2. High Frequency (FM) Broadcast Service
3. Television Broadcast Service
4. International Broadcast Service
5. Noncommercial Educational Broadcast Service
6. ST (Studio-Transmitter) Broadcast Service
7. Relay Broadcast Service
8. Facsimile Broadcast Service
9. Developmental Broadcast Service
10. Statistics

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1. GENERAL

The construction of new United States international broadcast stations used in psychological warfare has proceeded rapidly during the year. In high frequency (FM), television, and facsimile broadcasting, the authorization of new stations has continued to be severely limited by the Commission's Memorandum Opinion of April 27, 1942, adopted to conserve critical materials. Few new stations have been authorized in other nonstandard broadcast services, because of shortages of materials and personnel as well as other wartime conditions affecting station construction and operation.

Several applications for new stations in the nonstandard broadcast services have been considered pursuant to the supplemental policy statement of January 26, 1944, which provided for new authorizations under certain conditions, including certification of the War Production Board that any required authorization of that Board to carry the construction to completion has been obtained.

The Commission's policies provide for the wartime licensing of FM and television stations to cover partial construction and to permit their operation on a regular basis until conditions allow full completion of the construction originally authorized. Several additional licenses have been issued during the year for stations on this basis. Stations in these new services have continued to furnish broadcast service during the war, although hampered by shortages of personnel and replacement equipment. On July 6, 1943, the Commission adopted a simplified procedure for authorizing changes relating to technical operation of FM, television, and noncommercial educational broadcast stations.

Much interest has been shown in the post-war establishment of commercial television and frequency modulation (FM) broadcast stations and



many applications for construction permits have been filed. While authorizations for such stations are not being granted under present "freeze" orders, applications are not being dismissed but are being retained in the Commission's pending file without present action. In addition, many educational agencies are planning to establish noncommercial educational FM stations for use both in advancing classroom work and for furnishing educational and entertainment programs to the public. These applications may likewise be retained in the pending file although action may be taken if equipment is available.

The needs of the nonstandard broadcast services, particularly FM and television, are receiving full attention in connection with post-war allocation studies now under way. In view of the probable rapid expansion of these services as soon as construction may be authorized, their needs for frequency space are the subject of much study and planning. These matters are also being considered fully by the Radio Technical Planning Board, and meetings of panels and committees of that Board have been attended by Commission representatives in the capacity of observers.

## 2. HIGH FREQUENCY (FM) BROADCAST SERVICE

Four additional high frequency (FM) broadcast stations were authorized. These stations were previously in operation as experimental stations and the authorization for commercial operation did not require the use of substantial amounts of material. Otherwise, however, no construction permits for new FM stations have been granted under the wartime "freeze" policies.

As of June 30, 1944, FM program service was being furnished by 47 stations, including three experimental high frequency broadcast stations. Except for ten stations which had previously completed full construction and testing, all commercial FM stations in operation have been issued wartime licenses to cover partial construction. This policy, which was adopted August 4, 1942, has provided a practicable arrangement for wartime operation of FM stations. Although FM stations are required to operate a minimum of six hours per day (excluding Sunday), stations in some areas are furnishing a program service throughout the day and evening, and it is estimated that approximately one-half million FM receiving sets are in use. To assist in alleviating the manpower shortage, Order No. 111-A was adopted on July 6, 1943, to permit FM stations to use duplicated material for all FM programs if necessary. Previously it was required that a minimum of two hours of the daily broadcast schedule consist of programs not duplicated in the same area by a standard or by another FM broadcast station. Most of the existing FM stations are operated by licensees of standard broadcast stations and therefore have program material readily available.

On August 24, 1943, the Commission adopted letter calls for FM stations, effective November 1, 1943. This system replaced the letter-numeral system formerly employed whereby the call letters W45D, for example, denoted

a station operating on 44,500 kc in Detroit. Licensees found that the letter-numeral system was somewhat cumbersome and that it did not meet with general favor. One complication arose when stations changed frequency and required a change of call letters. The new system provides four-letter calls like those used in standard broadcasting and in many other services. An FM broadcaster who also has a standard broadcast station may, if he desires, be assigned the standard broadcast station call letters with the suffix "FM". Thus the licensee of a standard broadcast station with the call "WABC" may be assigned "WABC-FM" for the FM station.

A great deal of interest has been shown in establishing FM broadcast stations after the war, and it is expected that as soon as personnel and materials are available a large expansion will begin. Indicative of this is the fact that as of June 30, 1944, 202 applications requesting construction permits for new FM stations were on file with the Commission. Inasmuch as these applications are contrary to the provisions of the Memorandum Opinion of April 27, 1942, they are not being granted at this time. However, the Commission has continued to apply its policy of February 23, 1943, in which it stated that applications for FM (and television) broadcast stations would not be dismissed, but would be retained in the pending files without present action. Although the majority of the pending applications have been filed by the licensees of standard broadcast stations, a considerable portion have been submitted by applicants new to radio broadcasting.

### 3. TELEVISION BROADCAST SERVICE

Throughout the fiscal year, commercial television broadcast stations have been subject to wartime policies, the most important of which are (1) That no authorizations for commercial television stations would be granted which involved the use of critical materials; (2) That the Commission would not dismiss applications for commercial television stations, but instead would retain such applications in the pending

files without present action thereon; and (3) that holders of construction permits might obtain licenses to operate existing facilities provided construction had reached a point where the station was capable of rendering a substantial service.

At the beginning of the past fiscal year, four television broadcast stations were rendering service on a commercial basis, two in New York City, one in Schenectady and one in Philadelphia.

Two additional commercial stations have been authorized during the year, one in Chicago, and one in New York City. These two stations had been constructed previously and were in operation as experimental television broadcast stations. Consequently they were not affected by the freeze policy. Under the Commission's rules, each commercial television station is required to render minimum of four hours of program service per week.

Experimental television stations, under the Commission's wartime policy, may be authorized provided a worthwhile research program is to be conducted. Of the twenty-two experimental television stations licensed, two have rendered a limited program service throughout the fiscal year. One of these stations is located in Los Angeles, the other is in Chicago.

Of the experimental stations, fourteen are relay stations used for transmitting television programs from the studio or from other local points of program origination to the main television stations (commercial or experimental). Another use is for relaying television broadcasts from one city to another for experimental rebroadcasting.

Much interest is being shown in the post-war establishment of commercial television stations, and at the close of the fiscal year fifty-two applications for such stations were on file. These are being held without present action in the same manner as applications for FM stations. Most of these television applications propose stations in the larger cities.

#### 4. INTERNATIONAL BROADCAST SERVICE

During the past fiscal year, the installation of new international broadcast stations in the United States has progressed rapidly. These stations are programmed during the war by the Office of War Information and the Coordinator of Inter-American Affairs. An expansion of the facilities existing at the onset of war was urgently required to provide for the needs of psychological warfare, and a total of thirty-six international broadcast transmitters were determined to be necessary in a plan proposed by the Interdepartmental Committee for International Radiobroadcasting

Facilities. By the close of the fiscal year, twenty-one of these stations were in operation and the remainder were under construction, all of which are authorized to those companies which were operating international stations before the war. The new stations are being completed as quickly as possible, and during their construction supplementary facilities are being provided by the use of available equipment of point-to-point stations. As of June 30, 1944, six such transmitters were in use, providing a total of twenty-seven stations furnishing international broadcast service at that time.

#### 5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

FM stations in this service are licensed to organized non-profit educational agencies for use in the advancement of their educational programs and the transmission of educational and entertainment programs to the public. The frequencies are adjacent to those used in commercial FM broadcasting, thus making both services readily available on one receiving set.

One new station was authorized during the year, and of the total of eight stations authorized, five had completed construction and were furnishing service. Although the authorization of new educational stations has not been subject to the Commission's "freeze" policy, wartime conditions have served practically to stop new construction. Much interest is developing in this field and when personnel and materials again become available for the purpose, it is expected that many stations will be constructed. At the close of the fiscal year, seven applications for new stations were pending, and correspondence indicated that scores of applications were in preparation. Applications proposing post-war construction of such stations may be retained by the Commission without present action, similar to the policy adopted for the FM and television services.

Applications filed and correspondence with the Commission indicate that many states are planning the installation of groups or networks of educational FM stations, providing for coverage of individual school systems and for program interchange between stations. The Commission has worked with the United States Office of Education in the preparation of material for assisting applicants in this field, most of whom are new to the ownership and operation of broadcast stations.

#### 6. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

Stations in this service operate experimentally on frequencies between 330 and 344 megacycles and provide program circuits between the studio and transmitter of a number of high frequency (FM) stations. The rules also provide for their use by international broadcast stations. ST broadcast transmitters are particularly useful where the main transmitter is

remotely located, such as on a mountain top or other isolated place, and the ST facilities furnish dependable program circuits having high fidelity characteristics. Several years of use of such equipment indicates that interruptions to service are infrequent. Since ST broadcast stations are used principally with FM broadcast stations, in which service new construction is severely restricted, no particular change in the status of ST broadcasting has occurred during the past year.

#### 7. RELAY BROADCAST SERVICE

Relay broadcast stations are licensed as adjunct stations for other classes of broadcast stations, and are used to transmit from the point of origin to the main station when wire circuits are not available. A secondary use is to provide an emergency program circuit between the studio and transmitter of standard broadcast stations during interruption to the regular wire circuits. Since many relay broadcast transmitters are powered by batteries, difficult to obtain during the war, the use of relay equipment has been curtailed. The shortage of licensed personnel has also served to limit the use of such apparatus.

While the construction of new relay broadcast stations previously was restricted under the Memorandum Opinion of April 27, 1942, the Commission announced on August 28, 1943, that the use of equipment for additional or improved relay broadcast facilities would be authorized under certain conditions. Applications, therefore, must indicate that the required materials are available without priority, and this policy has permitted the use for relay broadcast work of equipment found unnecessary or unsuited for more urgent wartime needs. During the year, thirteen construction permits for new relay broadcast stations were granted, although a number of deletions of existing stations reduced the total number authorized from 549 to 540.

#### 8. FACSIMILE BROADCAST SERVICE

Facsimile broadcast stations provide a means for the transmission of still pictures and text to special receivers in homes and offices. Only three stations are authorized - none having been added during the past year.

The rules governing high frequency (FM) broadcast stations provide for the multiplex transmission of facsimile. Little interest has been shown in this service, and no regular FM broadcast stations have been authorized to transmit multiplex facsimile.

## 9. DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are used by equipment manufacturers and others when actual transmission is required in connection with research or development of broadcast equipment. Since wartime conditions have limited this research during the past year little activity in this service has occurred.

One application was granted during the fiscal year for a developmental broadcast station to be used in connection with radio propagation studies and other problems pertaining to FM broadcasting. It is expected that considerable activity in this field will ensue as soon as personnel and materials become available.

## 10. STATISTICS

Number of Stations in the Nonstandard Broadcast Service  
For Fiscal Year Ending June 30, 1944

Class of Station	As of		Licenses or CP's Surrendered or Abandoned	As of June 30 1944
	June 30 1943	New		
High Frequency Broadcast (Exp.)..	4	0	1	3
High Frequency Broadcast (Temp. Class II Experimental) .....	5	0	2	3
High Frequency Broadcast (FM) ...	48	4	0	52
Low Frequency Relay .....	249	12	7	254
High Frequency Relay .....	300	6	14	292
Television (Experimental) .....	28	0	1	27
Television (Commercial) .....	8	1	0	9
International .....	16	21	0	37
Developmental .....	4	1	1	4
ST (Studio-Transmitter) .....	10	0	2	8
Facsimile .....	3	0	0	3
Non-Commercial Educational .....	7	1	0	8
Class II (Experimental) .....	1	0	0	1
Total .....	683	46	28	701

The June 30 figures in Item 10 above, "ST (Studio-Transmitter)" include three confidential stations.

Nonstandard Broadcast Applications

Service	Appls. Recd.	Author. Issued	Special Author- izations
Relay Broadcast .....	453	390	20
International Broadcast .....	67	68	2
Television Broadcast (Com'l.) .....	73	12	9
Television Broadcast (Exp.) .....	76	45	11
Facsimile Broadcast .....	3	8	0
High Frequency Broadcast (Exp.) ...	28	15	23
High Frequency Broadcast (FM) .....	259	70	23
High Frequency Broadcast (Temp. Class II Experimental) .....	6	3	0
Non-Com'l. Educational Broadcast ..	36	7	1
Developmental Broadcast .....	9	6	4
ST (Studio-Transmitter) Broadcast .	28	30	0
Class II Broadcast (Exp.) .....	1	1	0
Total .....	1039	655	93

## COMMON CARRIERS

1. Telephone (Wire, Radio)
2. Telegraph (Wire, Cable, Radio)
  - (A) Domestic
  - (B) International

## 1. TELEPHONE (WIRE, RADIO)

Service and Facilities

Construction of Wire Facilities - One hundred sixty-four applications for construction certificates were received, of which 163 were for supplementing existing facilities and one for extension of facilities. One hundred twenty-eight applications were approved, including two filed during the 1943 fiscal year. These projects involved construction ranging from a few hundred dollars to \$2,386,000. The estimated total construction cost was \$9,582,239.

Wire Telephone Applications for Construction  
Approved by the Commission From July 1, 1934  
to June 30, 1944

Period	Number of Applications	Estimated Construction Cost	Miles of Cable Placed	Miles of Open Wire Placed	Channel Miles of Carrier System
7/1/34 to 6/30/35	7	\$ 1,145,851	254.3	0	
7/1/35 to 6/30/36	15	275,625	24	.475	
7/1/36 to 6/30/37	50	5,551,702	206	17,045	
7/1/37 to 6/30/38	45	3,921,000	499	1,212	
7/1/38 to 6/30/39	45	6,960,123	646	1,967	
7/1/39 to 6/30/40	72	9,070,952	1,209.2	3,501	
7/1/40 to 6/30/41	137	38,319,399	5,263	15,521	
7/1/41 to 6/30/42	169	45,046,250	5,099.7	34,583	
7/1/42 to 6/30/43	48	8,683,527	418	4,501	
7/1/43 to 6/30/44	121	9,582,239	374.8	7,268	181,592
Total	709	\$128,556,768	14,174.0	86,773	181,592

In the above table, coaxial cable is represented as follows: Fiscal year 1935, 94.5 miles, 2 units; Fiscal year 1939, 195 miles, 4 units; Fiscal year 1940, 42 miles, 4 units; Fiscal year 1942, 296 miles, 4 units, and 101 miles, 6 units. The increase in the number of applications for Fiscal year 1944 over 1943 results from the amendment to Section 214 requiring authority for carrier construction. Sixty-three applications were for carrier systems.



The reduced construction cost covered by the applications approved during the year despite the increased demands for telephone toll service, is in line with the drastic reduction during the fiscal year of 1943 from the fiscal years of 1941 and 1942. This downward trend is caused by the scarcity of critical materials and the greatly increased use of multi-channel carrier current systems.

Twenty-six applications involving construction costs estimated at \$31,902,819 had not been acted upon by the Commission at the close of the year.

During the year the use of the "EB" emergency type of carrier equipment has provided on an emergency basis over 400,000 miles of additional telephone channels, making a total of about 1,000,000 miles of such additional emergency channels now in use.

A proceeding was instituted to determine whether, under Section 214(a), an authorization from the Commission is required for the establishment of carrier systems, known as Type K Carrier Systems, on existing conductors providing additional facilities for interstate communications. The American Telephone and Telegraph Company and the New York Telephone Company were made parties respondents in the proceeding and were directed to show cause why authorization from the Commission was not required for the construction and operation of their carrier system between New York City and Boston. Type K carrier systems, superimposed upon wires, provide the means of transmitting twelve simultaneous conversations. In the New York-Boston case, eight Type K Carrier Systems, providing 96 additional telephone channels, were installed in lieu of the additional wires necessary to carry a comparable number of simultaneous conversations. It was decided by the Commission

in its final report adopted on January 25, 1944, that the construction or operation of carrier systems used for interstate or foreign communication by any carrier subject to the provisions of Section 214, without prior application to, and authorization from, the Commission, constitutes a violation of Section 214. Accordingly, the Commission concluded that all such carriers should make application to, and obtain authorization from, the Commission for all pending and future construction of carrier systems.

Planned Wire Projects - A tentative plan for coaxial cable construction announced by A.T. & T. Company calls for the installation of 6,000 to 7,000 route miles of coaxial facilities in the next five or six years for both the expansion of toll telephone service and for interconnecting television stations for network operations. Two applications pending before the Commission involve proposed construction of six coaxial units in cables between Terre Haute, Ind., and St. Louis, Mo., and between Atlanta, Ga., and Meridian, Miss., a total distance of 497 miles at an estimated cost of \$10,000,000.

Radio Experimentation - On June 20, 1944, the Commission authorized the A.T. & T. Company to construct two ultra and super-high frequency experimental Class 2 fixed radio stations in New York City and Boston as terminals of a proposed wide-band, multi-station, point-to-point, beamed radio repeater circuit to operate simultaneously in both directions. Upon completion of construction, the stations will utilize frequencies ranging between 1,914,040 and 12,511,250 kilocycles in experimental radio communication embracing telephone, telegraph, facsimile and television transmission. This will be the first time construction of this character has been undertaken and the Commission will observe the development with interest.

Through Routes and Interconnections - The Commission considered again the petition of the Oklahoma-Arkansas Telephone Company which was filed under Section 201(a) of the Communications Act of 1934. This Section authorizes the Commission to order the establishment of physical connections between carriers, where the Commission "finds such action necessary or desirable in the public interest". This petition

sought to compel the Southwestern Bell Telephone Company to reestablish a physical telephone connection which prior to 1928 had existed between the facilities of Southwestern Bell and toll line facilities of the Oklahoma-Arkansas company. The Commission, by its order of December 8, 1943, denied the relief sought by the petitioner, and dismissed the proceeding after concluding that the petitioner failed to meet the statutory requirements which were prerequisite to a grant of the relief sought. This conclusion was premised on the findings made by the Commission that rehabilitation of the petitioner's circuits would require the unnecessary use of critical materials and labor, and that the available circuits of Southwestern Bell were adequate, having ample capacity to handle the traffic demands involved.

Volume and Speed of Toll Service - The volume of toll calls continues at an unprecedented level. During the fiscal year 660,000,000 toll board calls were handled by the Bell System and 605,000,000 short haul toll calls were handled through other than toll boards. Traffic of the Long Lines Department of the A. T. & T. Company is now running at the rate of 175,000,000 messages annually, compared with 150,000,000 at the end of the last fiscal year. Despite the growing increase in toll usage, service has improved during the year. The average time required to establish toll board connections in June, 1944 was 3.3 minutes. In June, 1943, 4.2 minutes were required as compared with 1.7 minutes in 1941.

Approximately 1,500,000 channel miles for toll telephone message service were added between toll centers of the Bell System, an increase of about 20% over the mileage at the beginning of the year. Approximately 85% of these added channel miles were derived from application of carrier system to existing physical circuits - principally cable conductors.

Oversens telephone service during the year was extended to the Union of Soviet Socialist Republics, Curacao and Trinidad.

Abandonments - Pursuant to Board of War Communications Order No. 10, the Commission has been notified of the closing of eight small rural exchanges, six telephone toll stations, 417 telephone toll stations with telegraph tariff listings, and the removal of 13,680 miles of copper wire, 662 miles of iron wire, five miles of cable, and 115 miles of poles. Except in the case of the small rural exchanges serving a few subscribers, these abandonments have not affected service and result from the substitution of cable for aerial wire routes and the involuntary removal of telephone stations.

(The use of telephone facilities as well as telegraph facilities for the transmission of racing information is discussed on page 39)

Radiotelephone Service - War conditions and the Board of War Communication's Order No. 19-B have continued to restrict the number of public transoceanic telephone calls between the United States and many foreign countries.

Direct commercial radiotelephone service was opened for the first time to the U.S.S.R. (European), Curacao (Dutch West Indies) and Trinidad (British West Indies). Tests with Afghanistan and China revealed that satisfactory radiotelephone service could not be established until better equipment is installed at the foreign terminals. New and efficient equipment is being installed at the Chinese terminal and it is expected that service between the United States and that nation may be opened during the first part of 1945.

During the fiscal year 53 applications were received for point-to-point telephone service and 52 authorizations were issued. Stations as of June 30, 1944, totaled 16 (includes 3 domestic stations used for short distance toll telephone service within the United States).

#### Rates and Tariffs

Rate Schedules - At the close of the year, 349 communication carriers had tariffs and concurrences on file with the Commission. They filed 20,638 tariff publications containing changes in rates, regulations, practices and classifications of service or establishing new communication services and new or revised instruments of concurrence. Of the total number filed, 10,958 related to telephone services; 6,696 related to telegraph services, and 2,984 related to both telephone and telegraph services. A total of 28 tariff publications were rejected for failure to conform to statutory requirements.

Numerous irregularities in the rate schedules were corrected or eliminated through correspondence with the carriers.

Special Permissions - During the year, 17 applications for special permission to make changes in tariffs or file tariffs to become effective on less than statutory notice were received from telephone carriers, of which 16 were granted and one was denied.

Special Telephone Charges of Hotels, Apartment Houses and Clubs on Interstate and Foreign Communications - After a joint hearing with the District Public Utilities Commission, the Commission in a final report and order issued on December 10, 1945, held that in collecting surcharges on interstate and foreign toll calls hotels, apartment houses and clubs in the District of Columbia were agents of the telephone companies involved and hence that such surcharges were subject to regulation by the Commission. The companies were ordered to file proper tariffs with the Commission covering such surcharges. The District Commission reached a similar conclusion as to its jurisdiction over surcharges on local calls.

Following the issuance of the Commission's decision in this matter, the various Bell System telephone companies filed provisions in their respective tariffs on file with the Commission to the effect that interstate and foreign long distance telephone service would, on and after February 15, 1944, be furnished to hotels, apartment houses and clubs on condition that no surcharges or service charges be collected on interstate and foreign long distance telephone calls. The American Telephone and Telegraph Company concurred in these provisions. (See pp.2-4 for discussion of suits instituted by the Attorney General, at the Commission's request, in Federal District courts in Washington, D.C., New York, N.Y., and Chicago, Ill., to enjoin various hotels in each of those cities from continuing to collect "surcharges" notwithstanding this tariff provision and to enjoin telephone companies from furnishing service to those defendants who continue to make such collections.) Elimination of such surcharges will result in an estimated saving to the users of the service of over \$2,000,000 annually. Complaints have been filed with the Commission by certain hotel associations against the Bell System telephone companies attacking the lawfulness of such tariff provisions. At the request of the complainants, however, the hearings on these complaints have been postponed indefinitely.

American Telephone and Telegraph Company, Long Lines Department, and Associated Bell System Companies Rate Reductions - Following negotiations by the Commission with the American Telephone and Telegraph Company, the Bell System agreed to effect an annual reduction in interstate rates of approximately \$2,000,000. Approximately \$5,600,000 of the reduction is expected to derive from an agreement pursuant to which the night rate period, during which reduced rates are applicable to long distance interstate telephone calls, has been lengthened to make such reduced rates applicable beginning at 6 p.m. instead of 7 p.m.,

effective March 1, 1944. The remaining portions of the reductions, an estimated \$2,350,000, will accrue to users of TWX message service by a reduction, also effective March 1, 1944, in the overtime rate on interstate TWX messages. This reduction is composed of a cut in over-time charges from one-third to one-fourth of the initial-period rate on all TWX messages for which the initial-period charge is over thirty cents.

Effective May 1, 1944, the New York Telephone Company reduced charges for certain local channels and interexchange studio transmitter channels furnished in connection with channels for Program Transmission.

Effective May 20, 1944, the Illinois Bell Telephone Company reduced charges for certain local channels and interexchange studio transmitter channels furnished in connection with channels for Program Transmission.

Independent Telephone Companies - Effective November 15, 1943, the West Coast Telephone Company and the West Coast Telephone Company of California reduced their requirements for a monthly guarantee of revenue from Teletypewriter Exchange Service from \$30 to \$10 and changed the duration of the initial contract period for such service from one year to one month pursuant to the Commission's Order in Docket No. 5897.

Reduction of Rates For Overseas Message Toll and Program Transmission Service - On June 29, 1944, the American Telephone and Telegraph Company filed amendments to its tariffs to become effective August 1, 1944, reducing 3-minute week-day and Sunday rates for overseas message toll telephone service and rates for overseas program transmission service. Reductions in rates for message toll service apply between the United States on one hand, and Argentina, Brazil, Chile, Peru, Colombia, Haiti and Puerto Rico, on the other hand. Reductions in program transmission service rates will be made between the United States and all the countries named except Puerto Rico. It is expected that similar amended tariffs will be filed by the American Telephone and Telegraph Company which will effect a reduction in rates for message toll telephone service to and from the United States from and to Costa Rica, Guatemala, Honduras, Nicaragua, Curacao, Panama and Surinam, and a reduction in charges for program transmission channels between the United States and most of the Central American countries indicated above.

Supervision of Accounts

New York Telephone Company Accounting - Hearings were held jointly with the New York Public Service Commission to investigate the accounting performed by the New York Telephone Company with respect to certain inter-company property transfers, and to require the company to show cause why an amount equivalent to the inter-company profit on the transfers of property should not be charged to Account 413, "Miscellaneous Debits to Surplus". The transactions in question involved the transfer of certain property from the American Telephone and Telegraph Company to its subsidiary, the New York Telephone Company, at a price which was \$4,166,000 in excess of the depreciated cost of the property to the American Telephone and Telegraph Company. The New York Telephone Company, recorded such "price" which included the \$4,166,000 "profit" to A.T.&T., as "book costs". After public hearings and argument, the Commission found that the accounting performed by the New York company with respect to the inter-company transfers resulted in a purely inflationary write-up of the company's accounts. Accordingly, the Commission directed the New York Telephone Company to charge the entire amount of \$4,166,000 to surplus with appropriate concurrent entries. At the close of the fiscal year the Commission's order was involved in litigation.

Bell System License Service Contracts - As part of a long range program for the study of certain fundamental problems of telephone rate regulation, the Commission, acting in close cooperation with the State Commissioner's Committee designated for the purpose, is continuing its investigation into the Bell System license service contracts. Considerable data have been compiled which will be of material assistance to this Commission and the state regulatory commissions concerned with the regulation of telephone rates.

Pennsylvania Telephone Corporation Accounting - The Pennsylvania Telephone Corporation was ordered to appear and show cause why the Commission should not refer the matter of certain accounting violations to the Attorney General of the United States for the institution of appropriate proceedings. These violations involved the practice of making charges to operating expense to amortize amounts in its Account 100.4 "Plant Acquisition Adjustment", without the prior approval or direction of the Commission as required by the Commission's accounting orders and regulations. The Commission also ordered a general investigation into the accounting performed, and the accounts, records, and memoranda kept by the company with respect to all entries made in Account 100.4 and further ordered that all charges to operating expenses which were

made on or after January 1, 1943, for the purpose of amortizing the amounts in said Account 100.4 be suspended pending determination by the Commission as to the propriety and reasonableness of such charges. The proceedings are now pending additional hearings before the Commission.

Amendments to Uniform System of Accounts - Several amendments were made to the uniform system of accounts prescribed by the Commission, to simplify the accounting requirements, because of an acute shortage of accounting personnel, without sacrifice of records of essential information.

Restatement of Plant Accounts on Basis of Original Cost - Studies of restatements filed by communication carriers were continued, but were primarily limited to the instances where the matter was under consideration by State Commissions with respect to certain carriers hereinafter discussed. On the basis of the studies undertaken thus far, it is apparent that the pursuit of this work in the future will result in showing that there should be substantial reductions in the recorded investments of the carriers in communications plants.

Pacific Coast Restatements - Further studies, and exchanges of views with the several State regulatory commissions, with respect to the proposed restatement of the plant accounts by three telephone carriers on the Pacific Coast have revealed considerable laxity on the part of these carriers in complying with the provisions of the uniform accounting regulations.

Continuing Property-Records - The presently effective uniform system of accounts provide for the establishment and maintenance of continuing property records. Each of the several carriers has filed with the Commission, after extended conferences with representatives of this Commission and State Commissions, plans for the establishment and maintenance (or the improved maintenance) of such records as soon as competent personnel is available.

Depreciation - Studies of the changes in depreciation rates of common carriers by wire and radio are being continued in view of the vital importance of this work in connection with the control by the Commission of prices for communication services in line with the Federal anti-inflation program. Members of the staff have devoted substantial time to the activities of the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners, particularly to the review of the comments upon its report for 1943, and to the preparation of its report for 1944. Current conditions have occasioned close scrutiny of the net effect upon depreciation



rates, and consequent charges to operating expenses, of such factors as (1) the abnormally short life of emergency facilities, (2) war-imposed overloading of equipment, and (3) deferment of plant replacements due to labor and material shortages.

Miscellaneous - In this field, the Commission also:

Simplified procedures in the accounting for transactions involving foreign-currency exchange.

Completed a study of the accounting organization of a large telephone carrier, to determine the extent to which the procedures of the carrier conform to accounting regulations, and to obtain information concerning the nature and extent of the accounting data that are readily available from the carrier's records.

Made examinations of the accounts of two large telephone carriers to determine the manner in which the carriers segregated their depreciation reserves by primary accounts.

Continued studies of the Long Lines Department of the American Telephone and Telegraph Company with respect to plant additions, working capital requirements, depreciation reserves, receipts and payments for lease and joint use of plant, and division of revenues from joint interstate business with other participating carriers.

Continued investigations of the methods of telephone carriers with respect to restatement of plant accounts on basis of original cost and the establishment and maintenance of continuing property records.

Made an examination of the distribution of radio program transmission wire costs between the networks, on the one hand, and the individual stations, on the other hand.

Commenced examinations in the offices of several of the larger communication carriers in the matter of extension of credit and accounting for uncollectible revenues.

#### Statistics and General Studies

There were 163 common carriers and 42 controlling companies which filed annual reports containing financial and operating data for the calendar year 1943, including 132 telephone carriers and 31 wire-telegraph, ocean cable, and radiotelegraph carriers.

The publication "Statistics of the Communications Industry in the United States" is issued annually. Certain statistical data summarized from the annual reports filed by the principal telephone carriers, are presented in the following table:

Item	1943	1942	Percent Increase or (Decrease)
Investment in plant and equipment.....	\$5,749,404,257	\$5,652,506,025	1.71
Depreciation and amortization reserves	1,815,817,128	1,649,187,666	10.10
Net investment in plant and equipment.....	\$3,933,587,129	\$4,003,318,357	( 1.74)
Local service revenues ..	1,015,417,529	956,407,209	6.17
Toll service revenues..	683,249,600	557,255,266	22.61
Total operating revenues .....	1,779,244,520	1,590,312,393	11.28
Operating expenses ..	1,143,350,306	1,021,818,179	11.89
Taxes, including income and excess profits...	393,854,121	337,285,766	16.77
Net operating income after all taxes.....	242,040,393	231,208,757	4.60
Net income.....	194,244,968	178,012,225	9.12
Dividends paid .....	181,860,721	182,193,395	( .18)
Company telephones:			
Business.....	8,389,888	7,669,677	9.39
Residential.....	14,683,244	14,071,664	4.35
Average number of calls originating per month:			
Local.....	3,230,537,627	3,227,608,660	.15
Toll.....	121,494,120	103,860,462	17.32
Number of employees at end of year:			
Male.....	360,603	359,941	2.41
Female.....	103,330	112,534	( 9.18)
Female.....	265,273	247,407	7.22
Total payroll for the year.....	\$ 752,259,155	\$ 670,787,483	12.15

Intercompany general service and license fees and rents amounting to approximately \$35,000,000 for each of the years 1943 and 1942, have not been eliminated in Items 6 and 7 above, "Total operating revenues" and "Operating expenses."

Occupational Classifications of Employees - During the fiscal year, revised regulations relating to occupational classifications of employees of land line telegraph carriers and Class A and B telephone carriers were promulgated by the Commission, including corresponding revisions in the schedules contained in the annual report forms for the reporting of labor information. These revisions were adopted after consultation with representatives of the industries, labor organizations and other governmental departments interested in this matter. It is anticipated that the additional information that will be supplied in the revised report forms will eliminate the necessity of obtaining numerous special reports from the carriers by this Commission and other governmental agencies.

Economic Studies - In view of changing operating methods and facilities and types of services rendered by the various branches of the communications industry, and the rapid growth of the industry during recent years, it has been necessary to undertake certain basic economic studies which will aid the Commission in reaching well-informed policy judgments on matters of rate and service regulations. Such developments as the growing competitive threat of air mail to the private communications industry may call for a reappraisal of traditional regulatory policies, and it is to such questions as these that the basic studies are addressed. Analytical studies of the trends in demand for communications facilities in general, and for particular segments of the industry are being made, and continuing studies of such matters as investments, earnings, expenses, and justifiable rates of return to the carriers are projected.

## 2. TELEGRAPH (WIRE, CABLE, RADIO)

### (A) DOMESTIC

#### Service and Facilities

Merger of Western Union & Postal Telegraph - Pursuant to the provisions of Section 222 of the Communications Act of 1934, as amended, the Commission after extensive hearings on the application to merge filed by Western Union & Postal Telegraph, Inc., issued its final Report and Order on September 27, 1943, authorizing and approving the proposed merger of the two telegraph systems, effective October 7, 1943. In its final order the Commission stated that the proposed merger would be in the public interest by providing opportunities and advantages which, if properly availed of by the merged company, would place the industry on a sounder financial basis, permitting it to progress and meet the needs of the

public for a more efficient record communication service. The Commission concluded that the merger will permit a unified management of the domestic telegraph industry, and noted Western Union's assertion that merger will make possible long-term planning for the modernization of plant and the improvement of service standard. In the interest of providing a completely adequate telegraph service in keeping with the technical accomplishments and public requirements, it is expected that the company will have developed completely and submitted to the Commission, one year from the effective date of the merger, a comprehensive plan for converting, within the shortest possible time, its existing facilities into a modern, efficient nation-wide communications system capable of effectively competing with other communications services.

It was also concluded that the merger would enable elimination by the merged company of many uneconomic expenditures incurred by reason of competitive conditions which, until merger, were a continual drain on the resources of the industry; that merger would permit a unified management of the domestic telegraph industry and facilitate long-term planning for the modernization of service standards; and that through the elimination of duplicate operations, the ensuing consolidation of the personnel of the two companies would afford relief from the wartime manpower shortage, with consequent betterment of the working conditions of the labor force as a whole, possible curtailment of turnover trends and a resulting increase in efficiency and productivity. It was expected that the financial condition of the merged company would be stronger than that of either of the merged companies separately, and the merged company would be better able to undertake the steps necessary to provide improved service at reduced cost to the public.

It was found by the Commission that the proposed merger provided for the divestment of the international telegraph operations being carried on by Western Union, as required by paragraph (2) of Section 222 (c) of the Act. In accordance with such statutory provision, the Commission ordered that Western Union exercise due diligence to bring about such divestment as promptly as it reasonably can and not later than one year from the date of the order unless such period is extended by the Commission. In a separate report and order, the Commission, pursuant to Section 222(c) of the Act, approved formulas for the distribution of international traffic among the various international telegraph carriers and the division of charges for such traffic. In general, the distribution of traffic approved was based upon distribution during a representative past period, adjusted to correct past inequities.

The Commission recognized that present telegraph rate structures were developed under competitive conditions which produced numerous anomalies and questionable discriminations; and which resulted in establishment of preferential rates service classifications rather than basic reductions. The elimination of competition within the domestic telegraph industry is expected to correct these and other anomalies, and the economies and other benefits resulting from the merger would make possible substantial reductions in rates. The Commission observed that such reduction should be accompanied by a rationalization of the rate structure so that unwarranted preferences are eliminated, and the basic classifications are established in such a manner as to stimulate greatly increased volumes of traffic, with resulting savings in costs. The Commission concluded that if appropriate action along these lines is not undertaken voluntarily, it would initiate appropriate action to this end.

In the course of the hearings Western Union made various commitments with respect to the manner in which the labor forces of both systems would be integrated. Among other commitments, it undertook to merge the seniority of the employees of both systems on an equitable basis, to adjust the wages of Postal employees to the levels of wages paid to Western Union employees, and to give Postal employees jobs comparable to those held by them prior to the merger.

Since the merger the Commission has received about 5,000 complaints from employees of the carriers arising under these commitments and under Section 222(f) of the Act. All complaints arising under Section 222(f) were referred to the National Labor Relations Board. The Commission also rendered assistance to the War Labor Board in connection with its arbitration of disputes certified to it concerning commitments made by the company during the course of the merger hearings.

Acting under Section 214 of the Act, Western Union filed an application on October 14, 1943, for authority to integrate the offices, facilities and equipment formerly owned or controlled by Postal with those of Western Union. This application was granted with five important conditions designed to safeguard service.

The grant stated that upon request of the Commission made because of formal complaint of any state commission for any other reason, the Western Union was to re-establish any office closed, replace any facilities or equipment removed, re-establish the former hours of service, or otherwise restore the service formerly furnished in a manner satisfactory to the Commission.

The Commission announced that it would continue to study the overall adequacy of service, including particularly the need for new offices, relocation of existing offices, increased hours of operation of existing offices, and improvements in the types of service and adequacy of facilities.

Supplemental applications filed by Western Union and approved by the Commission have permitted the closure of certain functional offices and offices located more than one-quarter of a mile from the nearest available telegraph office.

Although the integration of the system's 90 functional offices and outside plant will require additional time, the integration of branch, tributary and other offices was practically completed by end of the fiscal year. These steps toward integration had been taken: Offices closed: Functional, 20; Tributary, 635; Branch, 523; Agency, 458; Joint, 27. New Offices opened: Branch, 32; Agency, 321. Hours of operation extended: Public Offices, 377. Customer printer tie lines: Duplicate, removed, 3,621; Installed, new customers, 2,017. Customer call boxes: Duplicate, disconnected, 94,221.

Improvement in the financial condition of the domestic telegraph industry has already been effected as the result of the merger. As of the date of the merger, Postal had notes payable to the Reconstruction Finance Corporation in the principal amount of \$12,563,452. Most of this money had been used to finance its operating deficits over a period of about three years. Under the merger agreement these loans were assumed by Western Union. On January 7, 1944, Western Union repaid the loans in full, plus interest, using funds realized from the sale of short term securities held by it, thus reducing annual fixed charges of the merged company by approximately \$500,000.

Construction of Wire Facilities - The most notable advancement during the year, aside from the merging of telegraph operations, was the installation of reperforator switching systems in Western Union's large message centers at St. Louis and Dallas and the partial installation at Washington, D.C. Reperforator switching provides for the automatic switching of messages from an incoming message channel to an outgoing channel, thus eliminating manual relaying. Six such offices are now in operation and at each the speed of relaying messages is substantially faster than in manual message centers.

During 1943, Western Union installed six carrier current systems between certain cities west of Chicago. Carrier systems provide high grade telegraph paths at relatively low cost by employing high frequency electrical impulses guided over physical wires.

Seventy-seven applications for wire telegraph construction certificates were filed with the Commission. Seventy such applications were granted, 12 of which authorized extension of lines to military and naval establishments, and involved the leasing of approximately 5,211 channel miles, constructing about 160 wire miles and installing carrier systems costing \$526,810. Two applications were dismissed as not being in proper form.

Overall Improvement of Service - The Commission is continuing with informal studies in connection with the overall adequacy and improvement of domestic telegraph service. It is understood that Western Union is also engaged in studies with respect to the overall adequacy and improvement of such telegraph service, and it is expected that the company will submit a plan for the modernization of its plant and the improvement of its service standards pursuant to the terms of the merger report.

Speed of Service - Pursuant to Order 113, adopted April 27, 1943, Western Union and the Postal Telegraph on July 20, 1943, filed with the Commission their first speed of service reports, covering the service rendered during June, 1943. These initial reports, with other data, were analyzed in the September, 1943 Commission report to the Board of War Communications on telegraph service, the first of periodic reports made pursuant to the request contained in Board Order 25-C.

The year saw an improvement in the speed of telegraph service. In June, 1943, it required an average of 14.1 minutes for the fastest 95% of ordinary full rate messages to pass through a Western Union message center. In June, 1944, this had been cut to 10.1 minutes. The percent of such messages completed in 15 minutes improved from 61.9 to 81.1, respectively. While these figures are still substantially below the objectives established in BWC Order No. 25-C, it is apparent that the measures taken by the BWC, and the Commission, and the merging of telegraph operations are becoming progressively effective. Other tests of speed of telegraph service, such as public office handling and messenger delivery, performance, also indicate improvement during the year.

Improvement in the quality of TWX (Teletypewriter Exchange Service) service during the year is likewise noted. In June, 1943, 1,240,256 connections were completed at an average of 2.7 minutes. In June, 1944, the calls completed totalled 1,214,791, a decrease of 2.1%, and the average time of completion was 1.8 minutes.

Abandonments - Section 214 of the Communications Act of 1934 was amended by Congress on March 6, 1943, to provide, among other things, that no carrier shall discontinue, reduce or impair service to a community, or part of a community, unless and until there shall first have been obtained from the Commission a certificate that neither the present nor future public convenience and necessity will be adversely affected thereby.

At the beginning of the fiscal year, eight applications filed under this amendment were pending and 36 were received during the year. Of these 44 applications, 21 were granted, 3 were denied, 7 were withdrawn, and 13 were pending as of June 30, 1944. Thirty-seven of the applications were requests for authority to close telegraph offices and seven involved the reduction of office hours at telegraph offices.

Pursuant to the requirements of BWC Order No. 10, the Commission has received notification from telegraph companies of the abandonment or suspension of service as follows: 5 offices, 166 miles of iron wire, and 85 miles of pole line. These abandonments are the result of removal of railroad lines authorized by the Interstate Commerce Commission.

Use of Facilities for Racing Information - An investigation into the use of telegraph and telephone facilities for non-essential purposes including the dissemination of racing information by other than press associations, newspapers and radio stations was made pursuant to an Order of the Commission issued on September 21, 1943. This investigation was in response to a request from the BWC.

#### Rates and Tariffs

(For data relating to rate schedules filed by telegraph carriers see page 27 )

Improvement of Domestic Rate Structure - At the close of the fiscal period, pursuant to the merger report, the Commission was engaged in studies of the rationalization of the rate structure of Western Union.



Special Permissions - During the year, 332 applications for special permission to make changes in tariff or file tariffs to become effective on less than statutory notice were received from telegraph carriers. Of this number, 306 were granted, 14 were denied and 12 were withdrawn. One application relating to both telephone and telegraph service was received and granted during the year.

Government Message Rates - As authorized by the Post Roads Act of 1865 and subsequent legislation, the Commission promulgated the annual Order fixing rates applicable to United States Government telegraph messages for the ensuing fiscal year. The new order (No. 116) continued in effect the same rates prescribed for the past fiscal year. The rates for government domestic telegraph messages may not exceed 80 percent of the normal rates charged the public and the rates for international messages of the United States Government shall not exceed 50 percent of the rates for commercial full rate messages except that government code message rates may not exceed 50 percent of the commercial code rates.

Rates Applicable to Army Post Exchange Telegrams - Upon consideration of a complaint filed by the Secretary of War alleging that the Western Union Telegraph Company had refused to accept telegrams of the Army Post Exchanges as Government telegrams, the Commission in its Order No. 116-A required the Western Union Telegraph Company to accept and transmit telegraph communications of the United States Army Post Exchanges relating exclusively to the business of such exchanges at the rates prescribed for government telegrams in Commission Order No. 116 of June 28, 1943, fixing charges for government messages at 80% of the rate for corresponding commercial messages.

#### Supervision of Accounts

Relief and Pensions - A study was made of the data which were submitted concerning relief and pensions in the matter of the merging of Postal Telegraph, Inc., into The Western Union Telegraph Company, particularly with respect to the establishment by Western Union of a book reserve representing the accrued actuarial liability in respect to future payments to Postal pensioners. Considerable time was also given to the matter (which is still pending) of excluding from the current operating expenses of Western Union all pension costs in excess of normal accruals on the full-service basis. Studies were made of the pension and benefit plans of the several carriers which may be consolidated into an international telegraph carrier with the view of developing the

most appropriate pension and benefit plan, from an economic and sociological standpoint, for the proposed international carrier. Consideration was given to the proposed revision by the Bell System companies of their actuarial computations and the resultant payments into their pension-trust funds, the revision being occasioned by the alleged reduction of the average rate of interest, now being earned by the funds. Certain studies were made also in connection with data which were submitted by communication carriers regarding their pension and other benefit plans.

Western Union Telegraph Company - Original Cost and Restatement of Plant Accounts and Establishment and Maintenance of Continuing Property Records - Since the adoption by the Commission of a Unified System of Accounts for Wire-Telegraph and Ocean-Cable Carriers, effective January 1, 1942 (later postponed to January 1, 1943), the Commission's staff has been engaged in conducting an examination of the accounts and records of The Western Union Telegraph Company and has participated in numerous conferences with representatives of the carrier with the view of effecting a restatement of the accounts of that company on the basis of original cost, establishing retirement units for future accounting and installing a continuing property record system, all of which are required by the regulations. Since October 7, 1943, the date of the merger of the domestic telegraph carriers, the staff has likewise conducted examinations and conferred on numerous occasions with representatives of the carrier with a view of establishing a sound plan for accounting for the properties acquired from the Postal Telegraph-Cable Company. As a result of these examinations and discussions, Western Union has submitted proposals for reclassifying amounts for plant and equipment, establishing continuing property records and integrating accounts for Postal plant and equipment, which are now being considered by the Commission.

#### Statistics and General Studies

Thirty-one wire-telegraph, ocean-cable, and radio-telegraph carriers filed annual reports containing financial and operating data for the year 1943. (See Economic Studies, page 34.)

Certain statistical data summarized from the annual reports filed by wire-telegraph carriers, including data relating to

ocean-cable operations of Western Union which are not adequately segregated in the reports filed by the company to permit segregation from wire-telegraph operations, are presented in the following table:

Item	1943	1942	Percent Increase or (Decrease)
Investment in plant and equipment .....	\$344,034,810	\$417,862,737	(17.67)
Depreciation and amortization reserves .....	<u>112,814,280</u>	<u>133,374,910</u>	(15.42)
Net investment in plant and equipment .....	\$231,220,530	\$284,487,827	(18.72)
Domestic service revenues .....	153,133,698	134,772,289	13.62
Foreign service revenues .....	11,507,878	8,796,776	30.82
Total operating revenues .....	178,887,319	156,466,776	14.33
Operating expenses, depreciation, and other operating revenue deductions .....	165,168,770	140,161,854	17.84
Net operating revenues .....	13,718,549	16,304,922	(15.86)
Income and excess profits taxes .....	4,940,000	5,183,000	( 4.69)
Net income .....	1,750,626	5,162,136	(66.09)
Dividends declared .....	2,090,080	2,090,080	
Revenue messages transmitted:			
Domestic .....	232,083,099	223,729,534	3.73
Foreign .....	5,656,573	3,908,516	44.72
Number of employees at end of year .....	62,352	65,992	( 5.52)
Total pay roll for the year ....	\$114,872,601	\$ 95,022,484	20.89

In above table, Item 1, "Investment in plant and equipment," includes net book cost of plant of Postal Telegraph, Inc., acquired by The Western Union Telegraph Co. in the amount of \$16,754,143, on basis of gross book cost of \$69,320,179 less tentative allowance for depreciation of \$52,566,036. Item 9, "Income and excess profits taxes," includes \$320,000 state and foreign government taxes for 1943, the corresponding amount for 1942 being included in operating expenses as it was not segregated in the reports for that year.

## (B) INTERNATIONAL

Service and Facilities

Mackay Merger - On December 31, 1943, Mackay Radio & Telegraph Company (California) was merged with Mackay Radio & Telegraph Company (Delaware). These two companies were non-competing radiotelegraph carriers and the outstanding stock of both companies was owned by the same parent company. An outstanding feature of this merger was the ear-marking of a portion of the surplus of the merged company to provide for restatement of the plant accounts on basis of "original cost" and adjustment of the allowance for depreciation on the reserve requirement basis, as soon as the necessary studies for making such adjustments have been completed.

Radiotelegraph Circuits - The radiotelegraph carriers have been able to maintain efficient communication with various countries throughout the world and at the same time to establish new circuits despite the exigencies of war. Restoration of circuits to some of the enemy and enemy occupied territory, following the invasions by the Allied Forces, has already begun and it is expected that pre-war circuits to other areas will be similarly restored shortly after their liberation by the Allied Forces.

During the past year direct radiotelegraph circuits were established for the first time to Gambia, British Guiana and Madagascar. A direct circuit to Ethiopia was authorized and it is expected that it will be open for service some time during the ensuing year. Additional direct circuits between the United States and Brazil and Uruguay were opened by companies other than those already communicating with these two countries. A similar additional circuit to Chile was authorized although as of June 30, 1944, it had not been opened for traffic in both directions. The circuit to Afghanistan, which was opened in May, 1943, was closed for a temporary period during the past fiscal year due to a lack of transmitting tubes at the foreign station.

Prior to the Allied invasion operations in Italy and France, the Commission assisted the Joint Chiefs of Staff and the Board of War Communications in making arrangements to have United States companies install and operate semi-portable stations in the invasion areas. The necessary equipment and personnel were in readiness just before the invasions, and shortly thereafter the stations were placed in operation on direct circuits to the United States. Upon completion of the installation of the invasion area stations, which were under the control of the Military Forces, the Commission promptly authorized

the companies in the United States to communicate with their respective stations in Italy and Western France at points designated by the Military. Service over these circuits was inaugurated immediately, handling press and government traffic, and any other classes permitted by the Office of Censorship.

In accordance with the recommendations of the Board of War Communications, the Commission continued to authorize one company only to operate with each new point of communication in a war zone for handling all classes of commercial, press and government traffic. Since one of the United States radio-telegraph carriers is normally authorized to handle press and government traffic only it requested authority to handle commercial traffic in order that it might qualify to establish circuits to war areas where press traffic generally predominates. This matter was set for hearing. The report of the Commission concluded that this carrier may be authorized to handle all classes of commercial traffic, as well as press and government traffic, over circuits to war-zone points which may be authorized to the company by the Commission whenever this company only is permitted to establish circuits to these points. Consequently, when the Commission authorized this company to communicate with the invasion area in Western France, it was also authorized to handle all classes of commercial traffic over the circuit.

In accordance with outstanding recommendations of the Board of War Communications made during the preceding fiscal year the Commission has referred to the Board all applications for the establishment of trans-oceanic circuits, and where such circuits were authorized by the Commission, they were continued on a temporary basis for periods not exceeding one year. The policies of the preceding fiscal year regarding procedure in the establishment of new circuits, involving the Board of War Communications, Department of State, Joint Chiefs of Staff and the Commission, were also continued in effect during the past fiscal year.

All radiotelegraph carriers have experienced some difficulty in handling the present large volume of international traffic because of the limited number of frequencies, interference, and comparatively inefficient equipment being used at most foreign terminals. With a view to alleviating this situation, one of the carriers applied for authority to operate on certain "side frequencies" 2.5 kc and 5 kc from its regularly assigned frequencies. The Commission granted authority for operation on such frequencies and the applicant has advised that under certain conditions these frequencies are used considerably, although not as extensively as the regular frequencies, due mainly to insufficient selectivity of receivers at many of the foreign points.

No new point-to-point radiotelegraph stations were licensed. A total of 258 applications, covering various matters were received and of these, 245 authorizations were granted.

The study to determine whether efficient use was being made of frequencies authorized to the carriers was continued through the year. This was necessitated primarily by the need of the Armed Forces for frequencies to be used in connection with important war operations.

Ocean Cable - Cable communication services of the American companies to continental Europe and to Far Eastern points remained suspended because of the war. Direct facilities are available to the United Kingdom, Eire and the Azores. The Pacific cable is operated to Hawaii and Midway Islands only. Direct cable service has also been maintained to the West Indies, Central and South America.

Reconsideration of Applications for Authority to Communicate with Algiers, Dakar and Rabat - On May 23, 1944, the Commission affirmed its temporary authorization to Mackay and its denial to RCAC and Press Wireless to communicate with Algiers; its temporary authorization to RCAC and its denial to Mackay to communicate with Dakar and Rabat; its temporary authorization to RCAC to operate a broadcast cue and contact control channel to Algiers.

Applications had been filed by RCAC and Press Wireless for reconsideration by the Commission of its original action of February 19, 1943 granting Mackay the Algiers circuit and denying it to RCAC and Press Wireless. This original action was taken by the Commission on the recommendation of the BWC which was based on the decision of the Joint Chiefs of Staff that only one company should be authorized and that company should be able to handle all classes of traffic.

The Commission granted the temporary authorization to RCAC to operate the broadcast cue and contact control channel on August 3, 1943, after being advised that the Joint Chiefs of Staff had no objection to such a grant.

Press Wireless Application for Modification of Licenses From "Fixed Public Press" to "Fixed Public" Service - Press Wireless originally sought authority to render commercial service on all its presently operating foreign circuits and on any new circuits which it might be authorized to establish in the future. Subsequently, the application was amended limiting it to a request for authority to handle commercial messages on those foreign circuits which under wartime policy would be authorized to one, and only one, United States carrier, and only for the duration of such policy. The hearing was held on

November 18 and 19, 1943, following which the Commission's final report concluded that Press Wireless shall be regarded as eligible for consideration in the authorization of circuits to points where the "one-carrier" policy may apply, so long as such policy is applicable.

### Rates and Tariffs

Special Permissions - During the year 1943, 332 applications for special permission to make changes on less than statutory notice were received from telegraph carriers. 306 were granted, 14 were denied and 12 were withdrawn.

Rate Changes - RCAC and the Western Union reduced rates for message telegraph traffic between the United States and the French Cameroon via RCAC direct circuit to Brazzaville, effective July 25, 1943. The rates for full rate messages between New York, N.Y., and the Cameroons were reduced from 88 cents to 62 cents a full rate word.

Mackay reduced rates for message telegraph service between the United States and Madagascar coincident with the establishment of a direct radiotelegraph circuit between New York and Madagascar, effective July 29, 1943. The rates were reduced from 75 cents a word to 50 cents a word for full rate traffic between New York City and Madagascar.

All America, Western Union, Postal, RCAC and Tropical reduced rates for message telegraph service from the United States to Central and South America and the West Indies pursuant to the Commission's Order in Docket No. 6046, effective August 16, 1943. This was the first step in a program for the establishment of lower rates between the United States and Latin America which when complete will result in an estimated annual savings to the public of more than \$2,000,000.

All America reduced rates for message telegraph service from Bolivia to the United States pursuant to the Commission's Order in Docket No. 6046.

Western Union, All America, Mackay, RCAC and Tropical reduced rates for message telegraph service between San Francisco and Panama to the level of the rates for service between New York City and Panama, effective December 3 and 6, 1943, pursuant to Commission's Order in Docket 6046.

Press Wireless established rates for deferred press messages between its offices in the United States and Rio de Janeiro, Brazil, effective December 24, 1943.

RCAC reduced rates for message telegraph service from the United States to French Guiana via the direct radiotelegraph circuit to Paramaribo, Dutch West Indies, effective January 21, 1944. Reductions of 13 to 21 cents a full rate word were made with proportionate reductions for other classes of traffic.

RCAC established rates for message telegraph service, program transmission service and radiophoto service between the United States and Italy via a new direct radiotelegraph circuit, effective February 1, 1944. The new message telegraph rates between New York City and Italy are the same for messages in plain language, cipher and code and are equal in both directions in terms of United States currency. The basic rate between New York and Italy is 15 cents a word for full rate messages. The basic rate for ordinary press messages is 5 cents a word.

RCAC and Western Union reduced rates for ordinary press messages between the United States and New Caledonia via the direct radiotelegraph circuit between San Francisco and New Caledonia, effective March 27, 1944. The basic rates are 5 cents a word between San Francisco and New Caledonia, a reduction of 5 cents a word.

Press Wireless and Western Union established joint through rates for message telegraph service coincident with the establishment of through routes by these companies between places in the United States and foreign countries with which Press Wireless has direct radiotelegraph circuits, effective April 24, 1944.

RCAC, Mackay and Western Union reduced the rates for ordinary press messages which ranged from 12 to 16 cents a word between the United States and Australia to levels which range from 5 to 9 cents a word depending upon the origin or destination in the United States, effective April 27, 1944.

Mackay, RCAC., Commercial Cable and Western Union reduced rates for message telegraph service from the United States to Madagascar, Comoro Islands and Reunion Island, effective May 1, 1944. Reductions range from 15 to 11 cents a full rate word with proportionate reductions in other classifications.

RCAC, Mackay and Western Union reduced the rates for ordinary press messages between the United States and New Zealand, effective May 10, 1944. The new rates and the amount of the reductions are the same as in the case of Australia, preceding.



All America established rates for Drop Copy Press Service from certain places in South and Central America and the West Indies to Washington, D C., effective May 15, 1944. At the same time the company reduced the minimum wordage requirements of this service from 300,000 words to 250,000 words per annum.

All America, RCAC, Mackay and Western Union reduced rates for message telegraph service between the United States and the "wireless stations" in Chile, effective May 16, 1944. The rates for full rate messages are reduced 12 cents a word; the rates for other classifications are reduced proportionately.

Press Wireless established rates for message telegraph service and program transmission service between the United States and France (European Theatre of War) via the new direct radiotelegraph circuit of Press Wireless, effective June 14, 21 and 23, 1944. The rates for message telegraph service are the same for messages and plain language, cipher and code and are equal in both directions in terms of United States currency. The basic rate for full rate traffic between New York City and France is 14 cents a word. The ordinary press rate is 5 cents a word to and from New York, N.Y.

Investigation of All Foreign Telegraph Rates - After investigation and hearing in the latter part of 1942, the Commission issued a proposed report concluding that the rates and charges of Press Wireless, Inc., for ordinary press service between Los Angeles and China were unjust and unreasonable, and should be reduced. Subsequently, the Commission issued an order directing that an investigation be instituted into all of the rates and charges of Press Wireless, and requesting Press Wireless to show cause why such rates and charges are not unjust and unreasonable, and why an interim reduction should not be made pending the conclusion of the proceedings. The Commission also ordered that the proceedings concerning communication service furnished by Press Wireless between the United States and China be reopened. The Commission thereafter instituted an investigation into the rates and charges of all carriers in connection with telegraph service between the United States and all foreign points. The proceeding concerning all of the rates and charges of Press Wireless was consolidated with the new investigation. Hearings in the consolidated proceedings have not yet been held. The re-hearing with respect to rates and charges between Los Angeles and China has been concluded and the carrier has filed its proposed findings and conclusions.

Rates between the United States and South America, Central America and the West Indies - The first step in the Commission's program for the establishment of lower rates

between the United States and Latin America, as provided in a report and order issued by the Commission on June 22, 1943, was taken on August 16, 1943. On or about that date, rate reductions, in accordance with the Commission's order became effective for service from the United States to South America, Central America and the West Indies by All America Cables and Radio, Inc., Western Union, Postal Telegraph-Cable, RCA Communications, Inc., Mackay Radio & Telegraph Co. Inc., and Tropical Radio Telegraph C .

Southbound rates from the United States to all Central and South American points and to the West Indies have been substantially reduced. Seven Latin American countries failed to adopt the northbound unified rates and a delegation consisting of a Commissioner, a staff member, and a representative of the State Department conferred with leading communication officials of the respective South American nations on general communication matters and particularly the acceptance of the northbound unified rate. Reduced northbound rates have become effective from the Central American Republics, most of the West Indies, Peru, Ecuador, Bolivia, Brazil and Uruguay and further reductions are expected shortly as a result of conferences in South America by the American delegation during May and June.

The Commission, on February 8, 1944, ordered Cable and Wireless of West Indies, Ltd., and its connecting carrier Western Union to show cause why they should not be ordered to cease and desist from receiving rates for telegraph communications from Puerto Rico to the continental United States different from the charges specified in the tariffs of Cable and Wireless of West Indies, Ltd., and concurred in by Western Union, and different from the principles enunciated by the Commission in its Report and Order of June 22, 1943, with respect to rates between the United States and the West Indies including Puerto Rico. It was also ordered that the carriers show cause why they should not be ordered to cease handling the communication service involved, and why their apparent violation of the Communications Act of 1934, as amended, should not be referred to the Attorney General for appropriate proceedings. Subsequent to the hearings held on March 2, 1944, the carriers filed revised tariffs with the Commission, which conform to the rates provided for in the Commission's Report and Order of June 22, 1943, and the proceedings were dismissed.

Foreign Contract Press Service - Effective July 15, 1943, the Western Union Telegraph Company established rates for Foreign Contract Press Service between Washington, D.C., and London, England. The service was established primarily

for the use of the departments and agencies of the United States Government at rates which range from 3.6 cents to 5.6 cents a word, depending upon the number of words sent during a year. The regular press rates are 6 cents a word.

Photo Service Rates by Wire or Radio - It appearing that increasing use is being made of photo service, and that the charges for such service may not presently be established on a proper basis and may be unjust and unreasonable, the Commission ordered that an investigation be instituted into the lawfulness of the charges for interstate and foreign photo service by wire or radio. All carriers who furnish such service were made parties respondent. Hearings in this matter have been held and the proceeding is now in recess, subject to further call.

Rates for Government Telegraph Communications Between the United States and Turkey - The Commission, upon its own motion, ordered a hearing concerning the lawfulness of proposed increased charges for government messages between the United States and Turkey, proposed by the Commercial Cable Company, Mackay Radio & Telegraph Company and The Western Union Telegraph Company. The Commission suspended the proposed rates until July 15, 1944. A hearing was held by the Commission on May 18, 1944, and the proceedings are now pending decision by the Commission.

Supervision of Accounts

The Commission made a general examination of the accounts and records of a large radiotelegraph carrier and also of a large ocean-cable carrier.

The Commission also conducted investigations to determine compliance of wire and radiotelegraph carriers with the prescribed Uniform System of Accounts.

Statistics

<u>Class of Station</u>	<u>Applications Received</u>	<u>Authori- zations Issued</u>	<u>Total Stations as of Jan. 30, 1944</u>
Fixed Public:			
Point to Point Telegraph .....	195	202	38
Point to Point Teleg. Press ..	<u>63</u>	<u>43</u>	<u>2</u>
Total .....	258	245	40

In the above table, Item 1, "Point to Point Telegraph" includes stations in Puerto Rico and Hawaii which are used for intra-territory and territory to continental United States communications service.

The following tables contain statistical data summarized from the annual reports filed by the principal international carriers:

Ocean-Cable Carriers

Item	1943	1942	Percent Increase or (Decrease)
Investment in plant and equipment .....	\$80,830,592	\$80,771,679	.07
Depreciation and amortization reserves .....	<u>56,321,142</u>	<u>55,231,311</u>	1.97
Net investment in plant and equipment .....	\$24,509,450	\$25,540,368	(4.04)
Domestic service revenues ...	527,706	333,024	58.46
Foreign service revenues ....	12,783,442	12,515,805	2.14
Total operating revenues ....	14,275,053	13,190,620	8.22
Operating expenses, depreciation, and other operating revenue deductions .....	10,432,276	9,832,670	6.10
Net operating revenues .....	3,842,777	3,357,950	14.44
Income and excess profits taxes .....	1,933,691	1,002,537	92.88
Net income .....	1,941,537	1,696,798	14.42
Dividends declared .....	811,332	67,137	1108.47
Revenue messages transmitted:			
Domestic .....	399,187	272,760	46.35
Foreign .....	4,102,844	3,859,501	6.31
Number of employees at end of year .....	3,023	3,018	.17
Total pay roll for the year .	\$ 5,443,594	\$ 5,033,221	8.15

Item 9 in the above table, "Income and excess profits taxes," includes \$268,075 state and foreign government taxes for 1943, the corresponding amount for 1942 being included in operating expenses as it was not segregated in the reports for that year.

The above table does not include data relating to cable operations of Western Union, as they are not adequately segregated from wire-telegraph operations in the reports filed by the company.

Foreign service revenue and message data from cable operations reported by Western Union for 1943 and 1942 were as follows:

	<u>1943</u>	<u>1942</u>	<u>Percent Increase</u>
Foreign service revenues.....	\$11,507,878	\$8,796,776	30.82
Foreign revenue messages transmitted .....	5,656,573	3,908,516	44.72

#### Radiotelegraph Carriers

<u>Item</u>	<u>1943</u>	<u>1942</u>	<u>Percent Increase of (Decrease)</u>
Investment in plant and equipment .....	\$26,671,803	\$28,342,793	( 5.90)
Depreciation and amortiza- tion reserves .....	<u>15,693,482</u>	<u>15,900,204</u>	( 1.30)
Net investment in plant and equipment .....	\$10,978,321	\$12,442,589	(11.77)
Continental and insular fixed revenues .....	865,179	1,671,964	(48.25)
Foreign fixed service revenues .....	8,578,412	7,649,898	12.14
Marine service revenues .....	16,953	36,978	(54.15)
Total operating revenues .....	13,482,746	12,605,322	6.96
Operating expenses, deprecia- tion, and other operating revenue deductions .....	10,269,573	10,192,434	.76
Net operating revenues .....	3,213,173	2,412,888	33.17
Income and excess profits taxes .....	3,522,964	2,906,025	21.23
Net income .....	2,069,500	707,832	192.37
Dividends declared .....	920,000	2,069,480	(55.54)
Revenue messages transmitted:			
Continental and insular fixed .....	655,066	1,466,775	(55.34)
Foreign fixed .....	5,170,231	3,529,317	46.49
Marine .....	6,831	11,743	(41.83)
Number of employees at end of year .....	3,293	2,887	14.06
Total payroll for the year	\$ 8,087,853	\$ 6,992,851	15.66

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S A F E T Y   A N D   S P E C I A L   S E R V I C E S

1. Marine Services
2. Aviation Radio Services
3. Emergency Radio Services
4. War Emergency Radio Service
5. Experimental Radio Services
6. Miscellaneous Radio Services
7. Statistics
8. Inspections

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1. MARINE SERVICES

Coastal Radiotelegraph Stations

As of June 30, 1944, 29 coastal telegraph stations were licensed by the Commission, exclusive of those in Alaska. Three of these stations were authorized for limited (governmental) coastal telegraph service and the remaining 26 stations were authorized for public coastal telegraph service. During the year 12 applications were received and 17 authorizations issued. Three stations at Thomaston, Maine; Lake Worth, Florida, and New York, N. Y., which had been closed because of the decrease in ship-shore traffic resulting from earlier wartime restrictions of the Navy Department, were opened during the year and were re-licensed by the Commission.

Coastal Radiotelephone Stations

Because of wartime conditions, the four stations licensed by the Commission at the close of the year for public telephone service with oceangoing vessels were not rendering that service, but in some cases were being utilized temporarily to supplement facilities employed in the international or overseas fixed public service.

Coastal Harbor Radiotelephone Stations

At the close of the year, 36 coastal harbor stations were licensed by the Commission, exclusive of those in Alaska. Two were authorized for limited (governmental) coastal harbor service and the remaining 34 for public coastal harbor service. During the year 16 applications were received and 19 authorizations issued. A new station at Louisville, Ky., established for communication with ships on the Mississippi River and connecting inland waters, began operation with service tests in June, 1944.

### Marine Relay Radiotelegraph Stations

As of June 30, 1944, there were 17 marine relay stations licensed by the Commission. During the year nine applications were received and 14 authorizations were issued. Wartime restrictions resulted in decreased activity for stations in this classification.

### Great Lakes Radiotelephone Procedure

It has been the practice for several years in the ship radiotelephone service on the Great Lakes, based upon the Commission's Rules, for ship radiotelephone stations to initiate ship-to-ship and ship-to-shore telephone communications on the calling and safety frequency 2182 kilocycles. After establishing contact, the stations involved would shift to an associated working frequency. As a result of rather intensive use of radiotelephone communication on the Great Lakes, the calling and safety frequency became congested at times of peak message traffic and abnormal delays in establishing communication have been experienced. With a view to relieving this condition and expediting telephone messages, the Commission amended its Rules to permit direct calling by ship radiotelephone stations on the working (traffic) frequency 2158 kilocycles when establishing communication with land stations at which the proper technical facilities have been provided for accepting initial calls on this frequency.

### Relaxation of Naval Regulations

During the fiscal year the Navy Department relaxed the restrictions on the use of radio communication in the Great Lakes region and on certain inland waters between ships and between ship and shore which had been imposed pursuant to Orders No. 1 and 2 of the Defense Communications Board. The restrictions had the effect, among others, of prohibiting radio transmissions (except distress) from non-commercial vessels, limiting the use of radio by commercial vessels to communications concerning distress situations, navigation, and ships' business, placing certain limitations on the contents of messages and conversations, and prohibiting the use of marine radiotelephone circuits by other than designated persons.

### Weather and Hydrographic Information

In previous years, the Commission, in cooperation with the Canadian Administration, the United States Weather Bureau, and United States Naval Authorities, developed schedules for the encoded transmission of weather and hydrographic information to ships in the Great Lakes area. Coastal harbor radio stations located at Lake Bluff, Ill.; Rogers City, Mich.; Port Washington, Wisc.; Duluth, Minn.; and Lorain, Ohio, were authorized to transmit such information in accordance with these schedules. These authorizations were extended during the fiscal year with certain changes and with relaxed restrictions relative to the transmission of encoded weather information to permit transmission of this information in plain language, insofar as such transmissions do not conflict with Naval regulations.

## Studies of Lifeboat Radio Equipment

During the fiscal year the Commission has cooperated, by request, in a study designed to coordinate air and sea rescue work, being conducted by government agencies, including the Navy Department, under direction of the Joint Chiefs of Staff. Projects involved in this study in which the Commission has participated include the determination of radiation efficiencies of various types of lifeboat radio antennae, the testing of experimental models of lifeboat radio equipment embodying certain technical advantages not available on the presently approved types of lifeboat apparatus, and a survey of the deficiencies of equipment of this nature now in use. As a result of certain recommendations made at the conclusion of this study, the Commission has been requested to modify its requirements relative to lifeboat radio equipment to cover requirement of the additional facilities which have been found desirable.

### Approval of Equipment

During the fiscal year, the Commission extended approval of several new types of marine radio equipment for use on board oceangoing vessels, which equipment was designed and constructed to meet certain requirements in accordance with the Commission's Rules and Regulations.

Six additional types of shipboard radio receivers were approved during the year as capable of being used and operated within the limitation imposed by the Commission to prevent the radiation of energy which may be detected at sea by enemy vessels. Three additional types of direction finder receivers were similarly approved.

One new radio transmitter of the "permanently-installed" type and two portable radio transmitters for use in lifeboats were approved as complying with the applicable Rules of the Commission.

One new type of shipboard radiotelegraph transmitter, designed to operate as a main and as an emergency transmitter, was approved by the Commission.

### Exemptions

The Commission is authorized by Section 352(b) of the Communications Act of 1934, as amended, to grant exemptions from the ship radio requirements prescribed therein and established by the International Convention for the Safety of Life at Sea, London, 1929, to certain vessels and classes of vessels when navigated



within certain specified limits, provided the Commission considers that the route and conditions of the voyage, or other circumstances, are such as to render compliance therewith unnecessary or unreasonable for the purpose of this Act and Convention. It has been the continued policy of the Commission to grant exemption on an annual basis for certain classes of vessels and to exempt individual vessels for limited periods of time sufficient to cover specified voyages.

The Commission renewed for another year the exemption previously granted to small United States passenger vessels of less than 100 gross tons when navigated off the Gulf Coast solely in coastal waters between Naples, Fla., and New Orleans, La.

The exemption previously granted to small United States passenger vessels, as a class, up to and including 15 gross tons was renewed for an additional period of one year. Many of the vessels to which this exemption applies normally are engaged in sportfishing, sightseeing and the water taxi business.

In addition to the foregoing class exemptions, the Commission granted exemption for a period of one year to certain individual passenger and cargo vessels operating on international voyages. All of these exemptions, during the period of the present war, are coordinated with the Navy Department before final action is taken by the Commission.

#### Fixed Public and Marine Services in Alaska

Measures were taken to simplify the licensing of Alaskan stations in the Coastal and Fixed Services and to conserve call letter groups by consolidating certain station licenses. A single instrument of authorization bearing one call letter group is now being issued for point-to-point telephone and point-to-point telegraph stations at the same locations instead of the two authorizations with two call letter groups previously issued. Licenses are being consolidated in a similar manner in the case of Coastal Harbor and Coastal Telegraph stations.

At the close of the fiscal year, the following stations were authorized by the Commission in the fixed public and public coastal services in the Territory of Alaska:

Coastal Harbor, 115; Coastal Telegraph, 38; Point-to-Point Telegraph, 69; Point-to-Point Telephone, 208.

There has been little change since the last annual report in the total number of stations of these classes authorized. The War Department, through Order No. 14 of the Board of War Communications, exercises wartime control and supervision over all licensed stations in Alaska, except ship, coastal, and marine relay stations that are subject to similar control by the Navy Department under DCB Orders Nos. 1 and 2.

### Marine Radio Publications

As in former years, the Commission published a list of licensed U. S. Great Lakes ship radiotelephone stations for distribution to ship and shore stations on the Great Lakes. This list, which is in pamphlet form, contains the names of the ships, call letters, ringer numbers, and licensed frequencies. In addition, it contains approved schedules for the transmission of weather and hydrographic information to ships.

In accordance with an understanding with the Navy Department, the Commission regularly furnishes that Department certain detailed information necessary for a list of oceangoing radio-equipped ships which the Department prints and distributes.

### Changes in Regulations

In order that the production of essential radiotelegraph transmitters for oceangoing ships would not be delayed due to the scarcity of materials, the Commission repealed certain provisions of its rules which would have required additional electric meters for certain transmitters manufactured after January 1, 1944.

### Marine Watch on 500 kc

The Commission, through the medium of its Field Division monitoring stations, continued to maintain a marine watch on the International distress frequency 500 kilocycles for safety purposes and supplied appropriate naval authorities with details of each distress communication immediately upon interception. In addition, the data and records resulting from this marine watch were analyzed and furnished by request to the Commandant, U. S. Coast Guard, in accordance with previous arrangements.

## 2. AVIATION RADIO SERVICES

### General

As a result of wartime conditions which have imposed upon the commercial airlines heavy traffic to be handled with a limited number of aircraft, the use of radio has been accelerated in an effort to maintain safety and efficiency.

In accordance with correlated policies of this Commission and the War Production Board, the majority of authorizations for new aviation radio stations issued during the fiscal year involved the contemplated use of equipment already in the possession of applicants. In exceptional cases it has been necessary to authorize new ground station construction utilizing new equipment where necessary priorities were granted by the War Production Board because of a vital connection with the war effort.

A total of 3,689 authorizations for the use of radio transmitting equipment in the aviation services, including aircraft, aeronautical, aeronautical fixed, airport control, flying school, flight test, and marker beacon radio stations were issued by the Commission during the year.

### Domestic Aviation Communication

A number of engineering problems concerning air-ground communications and interference from relatively high power ground station transmitters have been investigated during the year. Conferences were held with representatives of the industry and of other government agencies and in most instances satisfactory results were attained.

At certain route terminal locations it is necessary for aeronautical and aeronautical fixed stations to use powers substantially in excess of the average power provided for normal service, and unless proper restrictions are imposed with respect to the characteristics of the emission of such stations, serious interference is caused to the service of other stations. At the request of the Board of War Communications, a comprehensive technical investigation was made by the Commission's engineers at several locations where interference to communication with aircraft was caused by the operation of transmitters using high power on frequencies adjacent to those used by aeronautical receiving stations in the same localities. Information secured in the course of these investigations indicated precisely the technical conditions under which adjacent-frequency operation may be performed in any area

without causing objectionable interference to nearby stations. Stations operating under such conditions require close regulation of frequency tolerances and modulation characteristics. Thorough investigation of all related engineering factors is necessary before frequencies may be assigned to stations at new locations with the assurance that destructive interference will not result.

The Civil Aeronautics Board is currently considering numerous applications for inter-state routes and these prospective airlines in all probability will be required to provide radio communication systems deemed adequate for safe operation before final operating certificates are issued by the Civil Aeronautics Administration. The Commission in coordination with the CAA and the IRAC is considering the problem of frequency allocation for these new routes in the hope that their communication needs can be satisfied.

According to reports made to the Commission, technical developments in radio communication and in radio aids to air navigation have advanced to such an extent during the war that considerable changes are expected to be made after the war in methods of operation and in radio equipment used by commercial airlines. Predictions are that wide expansion of this industry will commence at the conclusion of hostilities, and therefore it is of prime importance that the Commission's Rules and Regulations Governing Aviation Services be periodically revised so as to provide the maximum safety of life and property in the air, consistent with the practical limitations of available frequency channels in the radio spectrum, and consistent with space, weight and uniformity where aircraft equipment is concerned.

#### Airport Control Stations

In the maintenance of airports and in emergency circumstances, it has been found desirable to provide radiotelephone communication between an airport control radio station and various mobile units, including crash trucks, ambulances, fire apparatus, repair equipment and patrol launches, which have access to the areas in which aircraft landings and take-offs are made. In cooperation with the Civil Aeronautics Administration, the Commission has made an intensive study of the requirements of this particular type of service at airports where heavy air traffic requires coordination between all mobile units on the airport in order to prevent serious accidents that might occur if such units were obstructing an area during aircraft landings or take-offs. During the fiscal year several experimental authorizations were granted for this type of service, and as the result of these activities the Commission is considering early modification of its rules regularly to provide for this service at the larger airports.

The service performed by airport control radio stations, in regulating and directing air traffic in the control areas of airports, has reduced landing and take-off hazards to such an extent that all aircraft making use of certain airports are required by the Civil Aeronautics Administration to be equipped for two-way radiotelephone communication on airport control frequencies.

Although there is a continued shortage of very high frequency radio equipment for installation aboard non-military aircraft and at airport control towers, it has been demonstrated that the use of very high frequencies has definite advantages over the low frequencies now employed. It is expected that very high frequencies will be used extensively and successfully for this purpose when suitable equipment becomes generally available.

#### Flying School Stations

There was no important change in the activity of flying school radio stations during the fiscal year and only one additional station of this class was licensed. Although the training of pilots for the Army and Navy by private flying schools under contract has decreased considerably, the need for flying school radio stations continues to exist.

#### Flight Test Stations

The number of flight test radio stations licensed by the Commission increased from 12 to 27 during the fiscal year. All of these stations perform vital communication services in connection with the production and testing of aircraft for the armed forces.

#### International and Alaskan Aviation Radio Services

The total number of licensed radio stations of all classes in the aviation service in Alaska increased from 215 to 274 during the fiscal year. The Alaskan radio system of aeronautical communications is still in a developmental stage. Efforts are being made to obtain increased coordination of the communication services of several airlines in the Territory in order to obviate unnecessary duplication of operations at aeronautical ground stations.

During the fiscal year there has been a considerable increase in the activity of commercial airlines operating on international routes. This has required special study by the Commission in the related allocation and assignment of frequencies to assure adequate safety communication for the additional aircraft. In particular, increased activity has occurred on the Inter-American Routes from

Miami, Fla.; New Orleans, La.; Brownsville, Texas, and Los Angeles, Calif., to points in Mexico, Central and South America, and the West Indies. It has been necessary to assign additional frequencies and types of emissions to aircraft stations aboard planes flying these routes and to aeronautical and aeronautical fixed stations in the United States and island possessions of the United States, in order to provide for safety communication, including radiotelephone circuits, which are considered desirable and necessary in the operation of these routes.

It is customary to employ radiotelegraphy on the long distance international routes, with an increasing tendency toward the use of telephony for short distance communication between aircraft and ground stations. Telephony, however, if widely adopted, may involve certain foreign language difficulties and problems of standardizing international operating procedures. Inasmuch as governmental policies involving the establishment and operation of international airlines are indefinite at the present time, further and more intensive study of these problems will be necessary. It is becoming increasingly apparent that the postwar aviation service on a world-wide basis will demand the use of a large share of the radio spectrum.

#### Aviation Radio Committees

From time to time the Commission is represented on committees which deal with aviation matters and make recommendations concerning the use of radio by the various aviation interests. Prominent among these committees is the Radio Technical Commission for Aeronautics (RTCA), a continuing organization through which aviation radio technical subjects of interest to United States government agencies, the industry, and private flyers are coordinated.

The outbreak of the present war interfered with the normal activity of the RTCA and most of its activities were discontinued. During the fiscal year, however, the RTCA resumed its activities with renewed interest in view of the need for immediate consideration of new problems concerning frequency allocation, radio equipment, and international flying, which lately have arisen as a result of technological developments of the war.

## 3. EMERGENCY RADIO SERVICES

General

The Emergency Radio Services include stations classed as municipal police, state police, zone and interzone police, special emergency, forestry, and municipal fire which are operated by instrumentalities of government, public utilities, and organizations concerned with the protection of life, public safety, and property.

Three hundred and five new emergency radio communication systems were authorized during the fiscal year. The small number is attributed to the scarcity of equipment.

Class of Sta.	FISCAL YEAR -- 1944			No. of licensed stations at close of fiscal year			
	Appls. rec'd.	Authrzs. issued	New stas. authorized	1941	1942	1943	1944
Municipal Police	4352	3080	162	1196	1672	1708	1906
State Police	714	737	61	513	378	431	452
Zone Police	67	101	3	69	85	94	88
Interzone Police	26	28	0	30	33	30	31
Forestry	1144	1143	84	807	844	837	925
Special Emergency	158	80	10	340	435	448	451
Marine Fire	29	21	0	6	8	10	10
Total	6490	5190	320	2961	3455	3558	3863

Each "station" referred to in this tabulation usually is a complete radio communication system consisting of one land station and a plurality of associated mobile units operated under a single license. In many cases the communication system covered by one station license includes from one to four land station transmitters at the same fixed location and as many as 100 or more associated mobile units. Some states and large municipalities operate as many as 200 mobile units. In some cases all of these transmitter units are covered by a single authorization. This method of administration is followed to simplify licensing procedure and minimize the number of applications handled. Separate applications are required and separate licenses are issued, however, for land stations at different fixed locations. Many of the applications for authorizations for municipal and state police stations received during the year constitute requests for license renewals. The number of such applications is approximately the number of stations in these two classifications.

Nearly all authorizations for new stations in the emergency radio services are for frequency modulated equipment for operation on the very high frequency communication channels. The relatively few authorizations issued for use of amplitude modulated equipment were generally to licensees making additions to existing radio facilities.

In some instances, licensees having obsolete emergency radiocommunication equipment have been successful in obtaining new FM equipment for replacement. It is expected that as soon as new equipment becomes generally available, many of the present emergency radio systems utilizing "amplitude modulated" equipment will be replaced by FM.

#### Police Radio Stations

To compensate for the loss of personnel to the armed forces and to war industries by municipal and state police departments during the fiscal year, several hundred portable-mobile police units have been licensed and placed in operation.

The operation by police departments of radio equipment using frequency modulation on very high radio frequencies has resulted in a substantial increase in the range of portable-mobile units, and fortunately the more widespread use of these systems has relieved to some extent the mutual interference between these stations. With the continued increase in the number of transmitters operated by municipal and state police departments, however, the difficulties and concurrently the importance of frequency allocations and assignments increase proportionately. It is necessary, therefore, to require close cooperation between applicants and licensees in the selection and use of each of the limited number of frequencies available for assignment.

Several reports from licensees received during the year indicated serious interference between stations separated by a considerable distance. This somewhat intermittent long distance skip interference is considered a major problem in frequency allocation. It is hoped, however, that plans presently being formulated for possible postwar use will result in more interference-free communication for the expected large number of stations.

Many municipal and state police departments have extended their emergency radiocommunication facilities to the military police in their respective areas. Informal reports indicate that the increased use of radiocommunication coordinated with the local police has permitted a substantial reduction in the number of the military police for the area concerned.



On November 30, 1943, a hearing was held at Lansing, Mich. on an application filed by the State of Michigan for construction permit for a new State Police radio station proposed to be located at Sault Ste. Marie, Michigan. This station, classed as State Police, was proposed to be operated jointly by the Michigan State Police and Michigan Department of Conservation and used primarily for the prevention and control of forest fires. Additional information on the application was considered necessary in view of the requirements of the Commission's related Memorandum Opinion and the Rules and Regulations regarding proper control of the station. The records of the hearing demonstrated the need for the additional facilities requested and satisfactory compliance with the Communications Act and the Rules and Regulations of the Commission. The authorization was subsequently granted by the Commission.

#### Municipal Fire Radio Stations

Effective June 23, 1944, the rules concerning "marine fire" radio stations were modified to change the name of this class of station to "municipal fire." Prior to this change, marine fire radio stations were operated by a few of the larger cities for intercommunication by telephony between fire headquarters and fire boats and vehicles operated by the municipal fire departments for the control and suppression of water-front fires. Heretofore all fire department radiocommunication with mobile units relative to other types of fires has been effected through occasional use of the municipal police radio systems. This change provides for authorization of municipal fire stations for the larger cities to operate on the one medium frequency and the two very high frequencies previously allocated for use of marine fire stations and to handle messages relative to any fire; water-front or otherwise. Because of the intermittent nature of fire department communication, the limited number of frequencies available for the entire Emergency Service, and the limited interference range of the very high frequencies, it is impracticable and unnecessary to provide separate frequencies for each municipal fire department desiring this service. Furthermore, only cities whose fire departments serve a population of 150,000 or more persons are eligible under the Commission's rules to receive licenses for municipal fire stations, unless special circumstances warrant the use of a separate communication system for the police and the fire departments. This plan makes it possible for the larger cities to use designated frequencies for their fire departments independently of police communications, since it is considered that in emergencies, the peak message traffic on municipal police radio frequencies of the larger municipalities is of such proportions that radio service to the fire department cannot be rendered efficiently by the police department. It is expected that emergency radiocommunication required by fire departments of the smaller municipalities normally will be furnished by municipal police stations located in the same general area.

As a result of this change in the rules, all licensees of marine fire stations requested modification of license to change the class of each "marine fire" station to "municipal fire" station. Since marine fire stations were authorized only to the larger municipalities, it followed that each of the licensees concerned was eligible for a municipal fire radiocommunication system. This change in the classification of the stations does not materially affect the service rendered, nor was any change in the existing communication facilities of such stations necessary.

Recent inquiries received by the Commission indicate that additional municipalities are making plans for installation of new fire department radiotelephone systems. It appears that local radiotelephone communication between fire department personnel on the ground and those on the upper floors of buildings at the scene of a fire is being considered by some fire departments and awaits only the availability of small pack type portable transmitters and receivers. One frequency in the 100,000-200,000 kilocycle range which is available to fire departments on an experimental basis is adaptable to this type of communication because of the comparatively small antenna required for operation of such very high frequencies and the need for communication over short distances only.

#### Forestry Radio Stations

The first objective of forestry radiocommunication systems is to provide rapid communication by telephony between forest fire lookout towers in order that the tower men by triangulation may quickly determine the exact location of a "smoke." The second purpose is in connection with suppression of forest fires. In this second type of operation the forestry radiotelephone systems function in a manner similar to the police radio systems in that land radio stations are used at central bases of operation (fire lookout towers and district or area headquarters) to furnish emergency dispatching and communication service to mobile units operating in a particular area. Like the police, the forestry services have endeavored to compensate for the wartime loss of personnel by increasing and expanding their radiocommunication facilities.

Following the successful use of frequency modulation in police radiocommunication, some of the licensees of forestry radio stations are now using more recently developed type of equipment which provides a greater communication range than the older type of amplitude modulated equipment of comparable size and power. This extended communication range is particularly desirable for the small and necessarily low power portable and mobile forestry radio units.

### Special Emergency Radio Stations

Public utilities, organizations established for relief purposes, and persons having establishments in remote locations are eligible for authorizations for special emergency radio stations. This class of station is authorized for essential communications arising from an emergency jeopardizing life, public safety or important property. Special emergency radio stations provide a means of direct communication to repair trucks and maintenance crews of public utilities, which have been of considerable value during emergency conditions in maintaining adequate transportation, gas, or electric power for the public and for plants engaged in the manufacture of war materials.

The majority of special emergency stations are operated by public utilities and, considering the usefulness of these radio facilities to such organizations, the unusually small increase in the number of authorizations for this class of station during the fiscal year apparently was related to the limited amount of radio-communication equipment manufactured for civilian use during that period.

In addition special emergency radio stations are used by The Western Union Telegraph Company and by the Associated Bell Telephone Companies to bridge gaps in wire communication where such wire failure is caused by storms, floods and similar disasters. Portable radio stations are kept in readiness by these licensees and rushed, in emergencies, to places where wire lines are down or inoperative. Of the special emergency radio stations licensed by the Commission 125 portable or portable-mobile stations and six land stations are used for this purpose.

#### 4. WAR EMERGENCY RADIO SERVICE

This temporary service comprises Civilian Defense, State Guard and Civil Air Patrol stations operating on the very high frequencies (above 112,000 kilocycles). Licenses for these stations are issued only to municipalities, state military organizations, and the Wing Commanders of the Civil Air Patrol. This service makes available on a voluntary basis the skill and equipment of amateur radio operators and other qualified citizens under conditions which assure responsible control, and at the same time permit sufficient flexibility of operations.

The growth of this service, the number of applications received, and the number of authorizations granted are shown in the following table:

Class of Sta.	FISCAL YEAR - 1944			No. of Stations	
	Appls. Recd.	Authorizs. Issued	New Stas. Authorized	Fiscal Year 1943	1944
Civilian Defense	452	447	80	199	253
State Guard	35	23	3	3	11
Civil Air Patrol	<u>51</u>	<u>44</u>	<u>13</u>	<u>4</u>	<u>17</u>
Total	538	514	96	211	281

The term "station" in the above table may, and usually does, include several fixed, portable, and portable-mobile transmitter and receiver units which are operated as a single coordinated emergency communication system. There are two Civilian Defense Station licenses issued to municipalities which authorize over 250 units each. A considerable number of the transmitters used in this service consists of portable and portable-mobile transmitters and include the so-called pack or walkie-talkie radio units. Although three frequency bands above 112,000 kilocycles have been authorized for use by this service, the majority of stations operate on the 112,000-116,000 kilocycle band because the equipment available for these stations at the present time performs more efficiently on the lower frequencies.

During the fiscal year, the only change made in the rules governing this service was an amendment effective on November 12, 1943, which provides more convenient week-day test periods for Civilian Defense Stations located in the eastern and central time zones.

The activities of the majority of Civilian Defense Stations have continued at approximately a constant level even though other Civilian Defense activities have abated somewhat. Civilian Defense Stations are permitted to use their communication facilities during emergencies endangering life, public safety, or important property, for essential communication relating to civilian defense or national security.

In one instance the communication facilities of a Civilian Defense Station were used to assist in a search for unexploded projectiles which were accidentally discharged from the anti-aircraft gun of a freighter lying in a coastal harbor dock. In another instance, the communication facilities were used to assist in the capture of escaped prisoners of war. A number

of reports have been received from licensees in the New England area indicating that Civilian Defense Station communication facilities were used for emergency communications to assist in fighting forest fires. Reports also have been received indicating that these communication facilities have been used during floods, fires, explosions, and other emergencies endangering life, public safety, or important property.

## 5. EXPERIMENTAL RADIO SERVICES

### General

Under the stimulus of war experiment in the field of radio and electronics continued to expand during the year. Federal funds made available for this purpose to educational institutions and engineering laboratories have greatly aided radio and electronic research. Exemplifying this situation is the existence of 80 experimental radio stations authorized by the Commission for use by an important laboratory where hundreds of specially trained scientists and engineers are developing new devices. It is anticipated that some of the resulting developments will be widely used in the postwar period to provide improved radio navigation, communication, and broadcast facilities.

In most cases, experimental authorizations were granted to technical schools and scientific laboratories in which radio research and development work is being carried on under contracts issued by the War Department, the Navy Department and the Office of Scientific Research and Development. For security reasons, full information concerning these projects cannot be made available.

In accordance with the Commission's Rules, experimental stations are licensed for fundamental, general or specific radio research and experimentation directed toward advancement of the radio art. Experimental stations are authorized also for experimentation in radio directed toward the development of a new or proposed radio service or new methods of operation in an established radio service.

Considerable interest is being shown in the experimental use of beamed microwaves, more specifically designated as "ultra-high" and "super-high" frequencies (300,000 to 30,000,000 kc).

### A. T. & T. New York-Boston Experiment

On June 20, 1944, the Commission granted permits to the American Telephone and Telegraph Company for construction of an experimental microwave radio communication system between the

cities of Boston and New York for operation on bands of frequencies within the limits of 1,900,000 to 13,000,000 kilocycles. This point-to-point communication circuit, using low power and highly directive antennas, will be designed to handle multiplex telegraphy and telephony, teletype messages, broadcast programs, television, and facsimile material. Present plans contemplate that these microwave signals, which are inherently limited in effective use to "line-of-sight" or optical distances, will be received and retransmitted instantaneously and automatically by seven unattended repeater stations to be installed at elevated locations between Boston and New York.

The maximum number of telecommunication channels that can be provided by use of these proposed facilities depends on the technical characteristics of the radio system, and these will not be entirely known until the experimental installation is in operation. The circuits, however, probably will be suitable for multiplex telephone and telegraph transmission, and will be tested in this respect by using them experimentally to handle regular message traffic diverted temporarily from normal land-line wire circuits. Furthermore, it is contemplated that the system will be technically satisfactory for the transmission of television programs to television broadcast stations when the need arises. Pending further developments, the Commission has not authorized the use of these proposed experimental facilities for commercial telecommunication services nor for supplementing existing regular facilities except as may be appropriate for the free point-to-point transmission of television programs and high-fidelity broadcast programs on an experimental basis.

#### Railroad Radio

Subsequent to the occurrence of certain passenger train wrecks on the Eastern Seaboard during 1943, with resultant heavy loss of life and injury, and to some extent because of related investigation of the matter of railway safety by Committees of the Congress, widespread interest has arisen in the experimental use of radio on railroads. Some authorities have expressed the belief that railroads can be operated with increased safety and efficiency through the use of radio communication primarily in connection with railway mobile units, i. e., between the ends of trains, between separate trains, and between dispatchers and trains. Communication of this nature can be provided in many cases either by space radio waves or by the use of other telecommunication methods commonly designated by the terms "wired-wireless" and "carrier-current" systems.

At the close of the fiscal year, the Commission had received 35 applications for authorizations to construct low power experimental radio stations for use in testing the practicability of radio communication in connection with the operation of trains. At the close

of the fiscal year there were 17 authorizations outstanding for experimental work of this kind, involving participation therein by several radio equipment manufacturers and at least six of the major railroads. In acting upon related applications for construction permits and licenses, the Commission considers the availability and proposed use of the associated radio equipment in relation to prevailing policies and regulations of the War Production Board.

On May 2, 1944, the Commission ordered an investigation and public hearings to inquire into the feasibility of using radio as a safety measure and for other purposes in railroad operations. On June 27, the Commission designated September 13, 1944, as the opening date for the hearings and appointed a committee composed of Commissioners Walker (Chairman), Case and Jett to preside.

The Commission has continued to license, on an experimental basis, very high frequency radio stations on airport vehicles, such as fire trucks, crash trucks, maintenance trucks and police cars. These experimental stations have been authorized to determine the practical value of such a service from the standpoint of safety of life and property in the vicinity of airports.

The Commission has authorized the use of certain frequencies in the 116,000-119,000 kc band on an experimental basis to determine the usefulness of these frequencies for municipal police service. Reports from licensees indicate that frequencies in this part of the spectrum will provide a two-way radio communication service comparable to that now being obtained in the 30,000-40,000 kilocycle band. Specific reports received in the Commission show that in one large city, a 25-watt FM (Frequency Modulation) transmitter operating on 118,550 kc with an antenna elevated 203 feet above ground, provided completely reliable communication to police cars to a distance of 18 miles. These frequencies present certain definite advantages over the more commonly used frequencies between 30,000 and 40,000 kc. Among these are absence of static and noise, freedom from "skip" and the possibility of duplicating frequencies at closer intervals. To date, the expectation that serious "dead spots" would exist in communication areas on these higher frequencies has been proven false.

## 6. MISCELLANEOUS RADIO SERVICES

The Miscellaneous Services include stations in the Geophysical, Special Press Service, and Intermittent Service. The classes of stations in these services are Geological, Relay Press, Mobile Press, Motion Picture, and Provisional. The Geological and Provisional stations continue as the most prominent classes of stations in the Miscellaneous services, and, as shown in the following tabulation of statistics, comprise over 96 per cent of the total number of stations licensed in these services.

Class of Station	Applications Received	Authorizations Issued	Total Stations		
			1942	1943	1944
Geological	108	94	302	325	358
Provisional	179	132	22	36	87
Motion Picture	8	10	15	10	8
Mobile Press	3	3	3	3	3
Relay Press	<u>5</u>	<u>6</u>	<u>7</u>	<u>5</u>	<u>5</u>
Total	303	245	349	379	461

Geological stations are used by oil companies and other organizations for the determination of the character of the underground strata of the earth in order to establish the probable location of oil deposits. Low power portable and mobile geological stations are used for communication by personnel of field parties prospecting for oil and for transmitting signals and impulses to the seismic recording instruments from the geophones at the various pickups located at distances up to fifteen miles from the centrally located recording truck.

Provisional stations, restricted in use for communications relating to safety or for communications of practical necessity, relative to projects of benefit to the public, are licensed on a temporary basis only and for a limited period of time not to exceed one year, subject to renewal of license if the need for the temporary facilities continues.

The increase in the number of Provisional stations during the past year is attributed mainly to the installation of radiotelephone communication systems for use by the plant guards at large plants producing war materials. Another type of Provisional station is the radiotelephone installations on barges indefinitely moored at isolated locations in the marshes of the Gulf Coastal areas of Louisiana and Texas.



Relay Press stations are used for short-distance communication on very high frequencies from the scene of important news events to the nearest point where wire line facilities are available.

Mobile Press stations operating on high frequencies (4,000-23,000 kilocycles) are authorized to provide radiotelegraph communication between maritime mobile stations and land stations, and are open to public correspondence for the handling of press traffic. At the close of the fiscal year, there were three mobile press stations licensed by the Commission, which, under the terms of Order No. 2 of the Defense Communications Board, were subject to wartime control of the Navy Department.

Motion Picture stations are used for communication with parties on "location" in isolated areas where no other communication facilities are available and for communications pertaining to the coordination and direction of activities of various units in the filming of motion pictures.

#### 7. STATISTICS

Service	Applica- tions Received	Authori- zations Issued	New Stations Authorized	Total Stations June 30, 1944
<u>U.S.</u>				
<u>AVIATION</u>				
Aeronautical	235	199	31	365
Aeronautical Fixed	77	84	17	105
Aero. & Aero. Fixed	40	39	0	0
Aircraft	5053	3016	1744	2631
Airport Control	34	31	6	28
Flying School	10	5	1	12
Flight Test	44	34	15	27
Marker Beacon	4	3	1	3
Instrument Landing	2	0	0	0
Sub-Total	5499	3411	1815	3171
<u>SHIP</u>	7442	6978	1911	6301
<u>EMERGENCY</u>				
Municipal Police	4252	3080	162	1906
State Police	714	737	61	452
Zone Police	67	101	3	88
Interzone Police	26	28	0	31
Forestry	1144	1143	84	925
Special Emergency	158	80	10	451
Marine Fire	29	21	0	10
Sub-Total	6390	5190	320	3863

<u>Service</u>	<u>Applica- tions Received</u>	<u>Authori- zations Issued</u>	<u>New Stations Authorized</u>	<u>Total Stations June 30, 1944</u>
<u>WAR EMERGENCY RADIO SERVICE</u>				
Civilian Defense	452	447	80	253
State Guard	35	23	3	11
Civil Air Patrol	51	44	13	17
Sub-Total	<u>538</u>	<u>514</u>	<u>96</u>	<u>281</u>
<u>EXPERIMENTAL</u>				
Class 1	669	618	139	377
Class 2	303	289	48	195
Sub-Total	<u>972</u>	<u>907</u>	<u>187</u>	<u>572</u>
<u>MISCELLANEOUS</u>				
Geological	108	94	41	358
Motion Picture	8	10	0	8
Provisional	179	132	48	87
Mobile Press	3	3	0	3
Relay Press	5	6	0	5
Sub-Total	<u>303</u>	<u>245</u>	<u>89</u>	<u>461</u>
<u>FIXED PUBLIC</u>				
Pt. to Pt. Telegraph	195	202	0	38
Pt. to Pt. Teleg. Press	63	43	0	2
Pt. to Pt. Telephone	53	52	0	16
Sub-Total	<u>311</u>	<u>297</u>	<u>0</u>	<u>56</u>
<u>AGRICULTURE</u>				
Pt. to Pt. Telegraph	0	0	0	7
<u>U.S. COASTAL</u>				
Coastal Telegraph	12	17	0	26
Coastal Harbor	16	19	0	34
Coastal Telephone	0	0	0	4
Marine Relay	9	14	0	17
Coastal Telegraph Ltd.	0	0	0	3
Coastal Harbor Ltd.	0	0	0	2
Sub-Total	<u>37</u>	<u>50</u>	<u>0</u>	<u>86</u>
<u>WIRE CERTIFICATES</u>				
Telephone	167	112		
Telegraph	101	95		
Interlocking Directorates	23	24		
Petitions	14	3		
Phone Discontinuances	0	0		
Graph Discontinuances	69	33		
Sub-Total	<u>374</u>	<u>267</u>		
U. S. TOTAL	21,866	17,859	4,418	14,798

(continued)

Service	Applica- tions Received	Authori- zations Issued	New Stations Authorized	Total Stations June 30, 1944
<u>ALASKAN</u>				
<u>AVIATION</u>				
Aeronautical	35	73	0	79
Aeronautical Fixed	22	61	0	59
Aero. & Aero. Fixed	60	32	7	0
Aircraft	<u>237</u>	<u>112</u>	<u>0</u>	<u>136</u>
Sub-Total	354	278	7	274
<u>FIXED PUBLIC</u>				
Pt. to Pt. Telegraph	116	97	3	69
Pt. to Pt. Telephone	<u>237</u>	<u>275</u>	<u>17</u>	<u>208</u>
Sub-Total	353	372	20	277
<u>COASTAL</u>				
Coastal Telegraph	57	75	0	38
Coastal Harbor	135	146	10	115
Coastal Telephone	0	0	1	0
Marine Relay	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Sub-Total	192	221	11	153
ALASKAN TOTAL	899	871	38	704
U.S. TOTAL	21,866	17,859	4,418	14,798
ALASKAN TOTAL	<u>899</u>	<u>871</u>	<u>38</u>	<u>704</u>
GRAND TOTAL	22,765	18,730	4,456	15,502

## 8. INSPECTIONS

Ship Inspections

Ship station inspections for the year totalled 11,409, of which 10,157 were U. S. vessels, 1,252 were foreign, resulting in 7,660 violation notices of which 5,580 were cleared.

Other Inspections

A total of 5,454 inspections were completed, 3,665 emergency stations, 1,050 aircraft and aeronautical stations, and 739 miscellaneous stations. A total of 1,378 violation notices were served.

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## RADIO OPERATORS

1. General
  2. Commercial Operators
  3. Amateur Operators
  4. Examinations
- 

### 1. GENERAL

The shortage of radio operators continued acute throughout the year, despite the large number of trainees from wartime classes and various orders by the Commission relaxing requirements.

It is the responsibility of the Commission to prescribe the qualifications of commercial and amateur operators, classify them, fix the form of license, examine applicants and issue licenses to those who qualify.

At the end of the fiscal year, more than 350,000 radio operators, applicants and communications company employees, had complied with Order 75 which required a showing of identity and citizenship in accordance with the provision of the Communications Act which provides that licenses may be issued only to citizens of the United States.

### 2. COMMERCIAL OPERATORS

At the close of the fiscal year, 200,000 individuals held valid commercial licenses.

On June 27, 1944, effective July 1, 1944, the Commission suspended for another six months its rule which provides that the holder of a radiotelegraph first or second class license may not act as chief operator or sole operator on a cargo vessel until he has had at least six months' satisfactory service as a qualified radiotelegraph operator on a vessel of the United States.

During the year, the Commission authorized the operation of a number of broadcast stations under its Order 91-C, adopted January, 1943. This Order provides that a broadcast station of any class which, by reason of actual inability to secure the services of an operator or operators of a higher class, could not be otherwise operated, could be operated by the holder of any class of commercial operator's license, subject to certain restrictions stated in the Order.

Because of the obvious difficulty encountered by commercial radio operator licensees and amateur radio licensees and operators, particularly those in the service, in endeavoring to submit evidence normally required for renewal of license for the purpose of showing a period of service as a licensed operator, the Commission on December 21, 1943, continued its suspension of this requirement for another year.

Other orders of the Commission, promulgated prior to the fiscal year, were continued in effect and provided temporary and necessary relaxation of operator qualifications and requirements. These were Order 93 which under the waiver provisions of Section 318 of the Communications Act, permits the operation of certain aircraft radio transmitting apparatus in the United States by qualified Latin American students during periods of training under the auspices of the Civil Aeronautics Administration; Order 97 establishing Temporary Limited Radiotelegraph Second Class Operator licenses for ship station operation exclusively, and Order 102 which authorizes the holders of properly endorsed radiotelephone operators licenses and permits to operate radiotelegraph aeronautical and aeronautical fixed stations whenever the individual licensee has demonstrated the required proficiency as a radiotelegraph operator.

Order No. 104, permitting American nationals who are regular employees of police departments in Hawaii to operate mobile police radio transmitting apparatus, also was continued in effect during the year under the waiver provisions of Section 318 of the Communications Act.

The Commission is giving attention to the effect of changing conditions upon the operator requirements for a number of existing radio services such as forestry, police, broadcast, and many others, and in addition is studying and analyzing the probable requirements for radio operators in new radio services expected to develop in the post-war era.

### 3. AMATEUR OPERATORS

Although amateur radio stations remained silent, by order of the Commission, for military and security reasons, the Commission, in accordance with the expressed desire of the Armed Forces, continued to conduct examinations for amateur radio operator licenses and issued such licenses to qualified applicants for the purpose of stimulating interest in the field of radiotelegraph and to encourage the development of skilled radiotelegraph operators and technicians for both the military and the commercial enterprises.

About 4,000 applications were received during the year for amateur licenses, renewals and modifications.

## 4. EXAMINATIONS

Applicants examined for operator licenses (exclusive of Class "C" Amateur) totalled 67,424 as compared to 81,003 for the previous year. Of these, 64,258 were applicants for commercial licenses, including 49,953 radiotelephone, and 14,305 radiotelegraph. Applicants for Amateur Class A and B radio operator licenses totalled 3,166. As a result of the examinations, - 51,406 commercial operator licenses were issued - 44,803 telephone and 6,603 telegraph.

## CHAPTER VII

## TECHNICAL STUDIES

1. General
  2. Sunspot Cycle Field Intensity and Noise Project
  3. Low Frequency Recording Project
  4. VHF Broadcast Recording Project
  5. Determination of Origin of Bursts Signals
  6. Ground Waves
  7. Radiofrequency Generators
  8. Root Sum Squares Measuring Project
- 

## 1. GENERAL

In the past year, the peak of production in the radio industry has been reached, and emphasis in planning has shifted to post-war allocation and reconversion. The Radio Technical Planning Board (RTPB), was organized by the radio industry in November, 1943, to consider post-war problems. The RTPB is divided into Panels, each of which is charged with the consideration of specific problems and the preparation of reports and recommendations thereon. The Chief Engineer of the Commission has appointed an engineer as a non-voting observer on each Panel dealing with subjects of interest to the Commission. Much of the information relating to radio propagation and allocation which is relied upon by the Panels in reaching their decisions is supplied to them by the Commission, either through the observers or by direct reports to the Chairman of the Panels concerned.

In anticipation of these needs, certain changes had been made in the technical investigations which were already under way, and a new investigation of propagation conditions affecting the very high frequencies was started as reported in the Ninth Annual Report.

The Technical Information Division is charged with the direction of three projects which have been set up during the year: The Low Frequency Recording Project, the VHF (Very High Frequency) Recording Project, and the Determination of Origin of Burst Signals. The Division acts in an advisory capacity in two other projects which have been set up, the Root Sum Squares (RSS) Interference Measuring Program and The Ship Receiver Radiation Measurement Program. The Division is also directing the Sunspot Cycle Field Intensity and Noise Program which has been in progress since February 1938.

## 2. SUNSPOT CYCLE FIELD INTENSITY AND NOISE PROJECT

As the program was originally set up, recordings of standard broadcast station sky waves and of atmospheric noise in and adjacent to the broadcast band are being made at four widely separated recording sites: Atlanta, Ga.; Baltimore, Md.; Grand Island, Neb., and Portland, Ore. At various times additional data were recorded at other sites in connection with specific problems and these are also available to help in supplying the need for comprehensive information on sky wave fields and atmospheric noise throughout the continental United States. However, it has since become apparent that the original program would not reflect conditions along the Gulf Coast, where the noise levels are the worst to be encountered in the country.

Prior to the war, equipment was purchased for the installation of two noise recorders at Kingsville, Texas, but only recently has it become possible to complete the installation. Atmospheric noise levels in the Pacific Northwest have proven to be so low that it was found unnecessary to continue recording at Portland. This recorder is now being used in the VHF Broadcast Recording Project. The recordings of certain broadcast stations which were being made continuously on individual recorders are now being made alternately on fewer recorders. The equipment released by this change is being used in the following program.

## 3. LOW FREQUENCY RECORDING PROJECT

This program has been instituted to extend the recorded sky wave and noise frequencies down to about 200 kilocycles. Noise recorders are installed at Baltimore and Grand Island and will be installed at Kingsville. Aeronautical beacon stations in the frequency range between 200 and 400 kilocycles are to be recorded at Atlanta, Baltimore, Grand Island and Portland.

## 4. VHF BROADCAST RECORDING PROJECT

The effect of the troposphere, the lower part of the atmosphere in which the various weather conditions occur, on radio propagation is more marked as the frequency of the wave is increased. Thus as higher frequencies become useful, it becomes increasingly important to determine the effects of the weather on radio transmission. It is necessary to know not only the maximum and minimum field strengths to be expected but also, in many instances, the relation of field strengths to specific weather conditions.

The initiation of a program for recording broadcast stations in the very high frequency range above 40 mc. cycles was set



forth in the Ninth Annual Report. The expansion anticipated in that report has been realized and there are fifteen recorders operating as follows: Atlanta-2; Allegan, Mich.-5; Grand Island-3; Laurel, Md.-4; Portland, Ore.-1. Substantially all of the equipment which was obtained on a loan basis from radio manufacturers, consulting engineers and others, as previously reported, has been returned and surplus equipment from the Radio Intelligence Division is being used in its stead.

In the course of making the initial recordings at Laurel, a type of propagation was recorded in which short bursts of signal were received over much greater distances than had been anticipated. Since the signals held the possibility of long range interference, recorders at each of the sites were tuned to a selected high powered station as soon as installed. Although some signals were recorded up to distances of 1400 miles from the station, a full year's recording indicates that the levels of the signals have not been sufficiently great at any distance to cause objectionable interference to FM programs under the present standards of the Commission. An analysis of these recordings was sent to the Panel Chairmen of four Panels of the RTPB.

The recordings have shown a second type of long distance signals known as sporadic E layer transmission. Although its existence at these frequencies has been known for some time, little was known of the field intensities to be expected. This need is being supplied by the records now being obtained, which indicate intensities sufficient in many cases to override the desired signals from nearby transmitters.

#### 5. DETERMINATION OF ORIGIN OF BURSTS SIGNALS

This project was initiated to obtain needed information on the directions of arrival and, if possible, the medium responsible for the bursts of signal from the VHF broadcast stations. It is desired to know whether the signals recorded over the past year or two are typical of what may be expected or whether in succeeding years interference may result in services which are now relatively free from interference from this cause. Knowledge of the angles of arrival is important because of its bearing upon the design of transmitting and receiving antennas to minimize the interfering effects of the bursts. The project is as yet in the formative stage.

#### 6. GROUND WAVES

The theoretical study of ground wave propagation which was in progress in pre-war years has been curtailed for the past two years. These waves are responsible for the primary

service areas of standard broadcast stations in the frequency range of 550 to 1600 kilocycles as well as for the service ranges of stations in the very high and ultra high frequency bands. Using data prepared under the previous theoretical study, a signal range chart for television stations operating at 300 megacycles was issued, supplementing similar charts at other frequencies which form a part of the Standards of Good Engineering Practice.

Ground waves are to a large extent responsible for the great distances spanned by the very low frequency telephone and telegraph channels upon which communications must rely when radio fade-outs and ionospheric storms prevent communication over large distances by way of sky waves. They form the reliable part of the low frequency aeronautical radio range beacons which mark the airways throughout the United States. While the primary object of the Low Frequency Recording Program, referred to above, is to determine the sky wave characteristics at frequencies below the present standard broadcast band, the program will yield needed additional data on ground waves in this range of frequencies.

#### 7. RADIOFREQUENCY GENERATORS

It is anticipated that there will be a vast post-war expansion in the use of radiofrequency generators for medical, industrial and scientific purposes, and perhaps an appreciable increase in the number used in the home. A Panel has been organized by the RTPB to study this question and to recommend the necessary standards to prevent interference to communications.

Under present regulations, the limit of permissible field strength from low power generators, such as wireless record players, remote control devices and carrier current systems, is 15 microvolts per meter measured at a distance in feet equal to 157,000 divided by the frequency in kilocycles. This is the distance at which the radiation component of the field begins to predominate over the induction component, and the rule was formulated in this manner in an effort to distinguish between radio and non-radio apparatus. Heretofore, the majority of the devices of this nature were operated at frequencies within the standard broadcast band and for these the requirement has been satisfactory. The maximum permissible field strength has approximated the average noise levels at these frequencies and the allowable distances have been reasonable. However, disadvantages are apparent as the operating frequencies are selected either below or above the broadcast band. The allowable distances increase rapidly below the band. While this is somewhat compensated by the

fact that the ambient electrical noise and atmospheric noise increase as the frequencies are decreased, yet the distances at which the signals may cause interference become quite large. At higher frequencies the usable distances decrease, so that operation under the rule finally becomes impractical.

Realizing the necessity for the formulation in the near future of regulations for the control of high powered generators and for the revision of present regulations relating to low powered generators, a complete recapitulation of the problem was prepared. This included not only an analysis of the technical problems involved in the prevention of interference, but also a review of regulations and amendments to the Communications Act, which have been previously proposed in an effort to find a solution to these problems.

### 8. ROOT SUM SQUARES MEASURING PROJECT

Recording equipment was installed at the Laurel Monitoring Station to establish more accurately the extent of the composite interference to broadcast stations on shared channels. The purpose of the project is to measure the contributing effects of each of several undesired signals of various intensities to the composite interference to a desired service of broadcast stations. This project is as yet in the formative stage.

## CHAPTER VIII

## WAR ACTIVITIES

1. Radio Intelligence Division
2. Foreign Broadcast Intelligence Service
3. FCC Assistance to the Board of War Communications
4. Enforcement of Radio Silence
5. Protection of Facilities Against Sabotage
6. Manpower Problems

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### 1. RADIO INTELLIGENCE DIVISION

In carrying out its function of safeguarding the ether waves of America, the Radio Intelligence Division during the fiscal year investigated 1,895 complaints of illicit or subversive transmission and of interference, bringing the total since its inception in 1940 to 11,622.

Thirty-two unlicensed radio stations were discovered during the year, making a total of 379.

A total of 434 planes in distress were aided by radio fixes, courses to fly or both, bringing the total cases of assistance up to 616 planes. Many of these planes included Army and Navy bombers and air transports. In addition, 823 other requests for this type of service were received, including practice drills and cases in which the RID was alerted but was unable to render assistance either because the plane's transmitter could not be heard or because radio propagation conditions were unsuitable for direction finding operations. Many commercial airlines have placed requests for direction finding service with the RID which is the only agency maintaining a service of this type on a national scale.

The RID at the close of the fiscal year was patrolling the ether with 22 secondary stations on the continent and eight in the Territories, with 12 primary stations, and 65 mobile units, a substantial reduction having been made following an appropriation cut by Congress. The Radio Security Center in Hawaii was closed, although one primary and five secondary stations were retained. The Radio Intelligence Center in San Francisco was transferred to the primary station at San Leandro, Calif. The Eastern Intelligence Center in Washington was retained. Intercepts of certain Merchant Marine traffic, foreign weather reports, certain clandestine radio traffic formerly requested by the armed services and radio bearings on specific types of enemy radio stations have

been discontinued. RID services for Allied governments and for the State Department and other agencies of the federal Government are maintained at their former level.

## 2. FOREIGN BROADCAST INTELLIGENCE SERVICE

The Foreign Broadcast Intelligence Service, during the year, established a monitoring and editing station in Hawaii, substantially increased its monitoring and distribution of broadcast information from Far East transmitters and extended arrangements to obtain material monitored by other agencies and foreign nations.

At the close of the year, the FBIS was receiving substantial files of material monitored by other agencies of the United States and allied or friendly powers in London, Stockholm, Algiers, Bari (Italy), Cairo, New Delhi and Melbourne. This was in addition to information obtained by FBIS monitors in Washington, Portland, San Francisco and Hawaii.

The Japanese translation post at Denver was absorbed in the headquarters staff. The monitoring stations in Puerto Rico and Kingsville (Texas) were discontinued.

FBIS regularly monitored programs from stations in 55 countries in 41 languages. Significant news and intelligence obtained from these broadcasts was translated into English and this, with English language materials, was distributed to agencies and officials of the United States and its Allies. Broadcasts which were of unusual significance or appeared likely to have historical importance were recorded by sound equipment for permanent preservation.

An automatic teletype-wire service carried significant monitored items to 18 offices on a 24-hour basis. This service was supplemented by a mimeographed "Daily Report of Foreign Radio Broadcasts" containing items required by several hundred officials and employees in approximately 60 agencies.

FBIS continued to provide bi-weekly summary of broadcast information relating to Far East and Pacific area for officials and employees in 40 departments and agencies. Weekly publications summarizing and analyzing information relating to various European countries and intermittent reports on special problems and events were also furnished.

## 3. FCC ASSISTANCE TO THE BOARD OF WAR COMMUNICATIONS

The Commission submitted to the Board three reports, in September, 1943, January and June, 1944, on speed and quality of

domestic telegraph service; reported on the use of telegraph and telephone facilities for the dissemination of racing information, pursuant to an investigation authorized by Order 117, September 22, 1943; continued checks to determine the extent of compliance by the telegraph carriers and the public with Board Order 25-C and 28; and advised the Board regarding telecommunications service between the United States and Europe.

The Commission assisted in the preparation of the following orders issued by the Board:

Order No. 19-B, dated February 19, 1944, amending Board Order No. 19-A and relating to the conditions under which international radiotelephone communications may presently be conducted.

Order No. 21-A, dated March 16, 1944, exempting point-to-point radiotelegraph service in the Agriculture Service, operated by the Federal-State Market News Service from the closure provisions of the Board's Order No. 11, dated June 25, 1942.

Orders Nos. 27-B, dated January 13, 1944 and 27-C dated April 28, 1944, amending the Board's previous Orders Nos. 27 - and 27-A with respect to precedence for telegraph messages essential to the war effort or public safety. These amendments were designed to permit the Office of War Information and the United Nations Relief and Rehabilitation Administration to expedite the transmission of important telegraph messages through greater use of the telegraph priorities provided for in the orders being amended; and

Order No. 30, dated April 13, 1944, establishing the offices of Traffic Coordinator and Assistant Traffic Coordinator and defining the duties of persons designated to fill those offices, including the maintenance of an effective and continuous liaison between the Board and United States communications carriers engaged in handling communications between this country and European points so that the Board might be informed of the speed and efficiency with which such traffic was being handled.

The members of the Board at the end of the fiscal year were:

FCC Chairman James Lawrence Fly, Chairman; Major General Harry C. Ingles, Chief Signal Officer of the Army; Rear Admiral Joseph R. Redman, Director of Naval Communications; Adolf A. Berle, Jr., Assistant Secretary of State in Charge of the Office of Transportation and Communications; Herbert E. Gaston, Assistant Secretary of the Treasury in Charge of

Treasury Inforcement Activities, Secretary; Captain E. M. Webster, Chief of Communications, U.S. Coast Guard, Assistant Secretary.

#### 4. ENFORCEMENT OF RADIO SILENCE

During the year, the Interceptor Section of the Field Division of the Engineering Department was gradually reduced and finally abolished. At the beginning of the fiscal year, the Section had twenty 4-man interceptor units located in the Army Air Forces Information Centers along the East, West and Gulf Coasts and in the Chicago, Ill., and Saulte Ste. Marie areas to assist the Army in enforcing radio silence. The personnel was reduced as Army reorganizations were effected. On April 5, 1944, in preparation for the indicated reduction in the Commission's appropriation, the Section was abolished.

#### 5. PROTECTION OF FACILITIES AGAINST SABOTAGE

Acting under Executive Order 9165 of May 19, 1942, which directed the Commission to take steps to safeguard communications facilities from sabotage, the Security Section of the Field Division of the Engineering Department by May of 1944 had completed 954 initial surveys, at 1254 locations, forwarding security recommendations to the facility owners. Routine re-inspections followed on an approximate six-month schedule.

#### 6. MANPOWER PROBLEMS

The survey as to availability for employment of the holders of radiotelephone and radiotelegraph licenses, which was undertaken during the preceding year for the purpose of assisting the broadcast industry in obtaining qualified personnel, has been continued and is being expanded materially at the request of the War Shipping Administration in connection with the need of the Merchant Marine for ship operators.

Current data is also being maintained on employment labor turnover, training facilities and programs, and labor requirements in the communications industry for the Board of War Communications and other governmental departments, such as the War Manpower Commission, Selective Service and U. S. Office of Education.

## APPENDIX

Publications

Following is a list of Federal Communications Commission publications of general interest available at the Government Printing Office, Superintendent of Documents, Washington, D.C.:

Title	Price
Communications Act of 1934, with Amendments and Index thereto, Revised to March 6, 1943.....	\$ .15
Federal Communications Commission Reports (Bound volumes of decisions and orders, exclusive of annual reports):..	
Volume 1 - July 1934 - July 1935 .....	1.00
Volume 2 - July 1935 - June 1936.....	2.00
Volume 3 - July 1936 - February 1937.....	2.00
Volume 4 - March 1937 - November 15, 1937.....	1.50
Volume 5 - November 16, 1937 - June 30, 1938.....	1.50
Volume 6 - July 1, 1938 - February 28, 1939 .....	1.50
Volume 7 - March 1, 1939 - February 29, 1940.....	1.50
Volume 8 - March 1, 1940 - August 1, 1941 .....	1.50
Volume 9 - August 1, 1941 - April 1, 1943.....	1.25
Annual Reports of the Commission:	
First Annual Report - Fiscal Year 1935.....	.15
Third Annual Report - Fiscal Year 1937.....	.30
Sixth Annual Report - Fiscal Year 1940.....	.20
Seventh Annual Report - Fiscal Year 1941.....	.10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	.15
Standards of Good Engineering Practice Concerning Standard Broadcast Stations (550-1600 kc).....	.30
Statistics of the Communications Industry in the United States (1939).....	.25
Statistics of the Communications Industry in the United States (1940).....	.20
Statistics of the Communications Industry in the United States (1942).....	.35



Title	Price
Report on Chain Broadcasting.....	\$ .30
Rules and Regulations of the FCC:	
Part 1 - Practice and Procedure, Effective August 1, 1939.....	.10
Part 2 - General Rules and Regulations, Effective June 15, 1939.....	.10
Part 3 - Rules Governing Standard Broadcast Stations, Revised to October 5, 1940.....	.10
Part 4 - Rules Governing Broadcast Services (Other than Standard Broadcast), Revised to May 14, 1942	.10
Part 5 - Experimental Rules, Effective October 1, 1939	.05
Part 6 - Rules Governing Fixed Public Radio Services, Revised February 20, 1943.....	.05
Part 7 - Rules Governing Coastal and Marine Relay Services, Revised April 5, 1941.....	--
Part 8 - Ship Rules, Revised May 31, 1943.....	.15
Part 9 - Aviation Radio Services, Revised November 1, 1942.....	.05
Part 10 - Rules Governing Emergency Radio Services, Revised February 15, 1943.....	.10
Part 11, Rules Governing Miscellaneous Radio Services, Effective January 1, 1939.....	.05
Part 12 - Rules Governing Amateur Radio Stations and Operators, Revised April 18, 1940.....	.10
Part 13 - Rules Governing Commercial Radio Operators, Effective July 1, 1939.....	.05
Part 14 - Rules Governing Radio Stations in Alaska (Other than Amateur and Broadcast) Revised April 2, 1942.....	.05
Part 15 - Rules and Regulations Governing All Radio Stations in the War Emergency Service, Revised May 26, 1943.....	.10
Part 31 - Revised October 25, 1940, and Part 32, Effective January 1, 1937, Uniform System of Accounts Class A and Class B Telephone Companies, Units of Property Class A and Class B Telephone Companies, (One Pamphlet).....	.15
Part 33 - Accounting by Class C Telephone Companies, Effective January 1, 1939.....	.15
Part 34 - Uniform System of Accounts, Radio Telegraph Carriers, Effective January 1, 1940.....	.25
Part 35 - Uniform System of Accounts for Telegraph and Cable Companies, Effective January 1, 1943....	.35

Title	Price
Part 41 - Rules Governing Telegraph and Telephone Franks, Effective August 11, 1939.....	\$ .35
Part 42 - Rules Governing the Preservation of Records, Revised May 27, 1943.....	.10
Part 43 - Rules Governing the Filing of Informa- tion, Contracts, etc. of Telecommunications Carriers, Revised September 29, 1943.....	.05
Part 61 - Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, Revised September 29, 1943.....	.10
Part 62 - Rules Governing Application under Sec. 212 of the Act to Hold Interlocking Directorates, Effective September 1, 1939.....	.05
Part 63 - Extension of Lines and Discontinuance of Service by Carriers, Effective March 18, 1944...	.05
Federal Communications Commission Report on Social and Economic Data, pursuant to Informal Hearing etc. July 1, 1937.....	.60
Federal Communications Commission - Proposed Report Telephone Investigation Pursuant to Public Resolution No. E, (74th Cong.).....	1.00
Final Report on Telephone Investigation, House Document 340.....	.65
Annual Report Form H for year ending Dec. 31, 1943.	1.00
Annual Report Form H for year ending Dec. 31, 1944...	1.00
Annual Report Form M, Paper, loose-leaf, shoe-string fastener.....	.75
Statistical Circular No. I.....	.05
FCC Form 901.....	.05 ea. 1.25 C
FCC Form 902.....	.05 ea. 1.25 C
Form 903.....	.05 ea. 1.25 C
FCC Form 905A.....	.05 ea. .85 C
FCC Form 905B.....	.05 ea. .25 C

In addition to the foregoing, the following are available without charge from the FCC:

An ABC of the FCC - (1940)  
 Radio - A Public Primer (1941)  
 Information Regarding Ship and Coastal Harbor  
 Radiotelephone Service (1941).

Statistics of Classes A and B Telephone Carriers Reporting Annually to the Commission (1943).

Statistics of Principal Telegraph and Cable Carriers (1943).

Statistics of Principal Radiotelegraph Carriers (1943).

Salary Report of Telephone and Telegraph Carriers and Holding Companies (1942).

An Analysis of the Traffic Damage Claims Paid During 1943.

Telephone Carriers Filing Annual Reports for 1942, arranged in order of annual reporting revenues.

Class A and B Telephone Carriers, arranged in order of 1942 operating revenues, by revenue groups and by jurisdiction.

Telephone Hand-set Charges and Changes since January 31, 1943.

Summary of Broadcast Revenues, Expenses and Income of 4 Major Networks, 5 Regional Networks, and 841 Standard Broadcast Stations - 1943.

Summary of Broadcast Revenues, Expenses and Income of 832 Standard Broadcast Stations - 1943 (Excludes 9 Key Stations of Major Networks)

Summary of Functional Employee Data of Networks and 815 Standard Broadcast Stations by Districts as reported to the Commission for the week beginning October 17, 1943.

Financial and Employee Data Respecting Networks and 851 Standard Broadcast Stations - 1942 (22 Tables Containing Detailed Data).

Operating Data From Monthly Reports of Large Telephone Carriers.

Operating Data From Monthly Reports Of Telegraph, Cable And Radiotelegraph Carriers.

ELEVENTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1945

## COMMISSIONERS

### MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

[As of January 1, 1946]

#### CHAIRMAN

**PAUL A. PORTER**

(Term expires June 30, 1949)

**PAUL A. WALKER**  
(Term expires June 30, 1946)

**EWELL K. JETT**  
(Term expires June 30, 1950)

**RAY C. WAKEFIELD**  
(Term expires June 30, 1947)

**CHARLES R. DENNY**  
(Term expires June 30, 1951)

**CLIFFORD J. DURR**  
(Term expires June 30, 1948)

**WILLIAM H. WILLS**  
(Term expires June 30, 1952)

## LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
*Washington 25, D. C., April 3, 1946.*

*To the Congress of the United States:*

In accordance with the requirements of section 4 (k) of the Communications Act, the Eleventh Annual Report of the Federal Communications Commission for the fiscal year ending June 30, 1945, is submitted herewith.

Respectfully,

CHARLES R. DENNY, *Acting Chairman.*

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## SUMMARY

Most far-reaching of all the activities of the Federal Communications Commission during the fiscal year was its reallocation of bands of frequencies in the radio spectrum to provide for the postwar development of new services and the expansion of existing ones. This was made possible by the extension of the usable spectrum space from a prewar ceiling of 300 to 30,000 megacycles through wartime inventions developed to meet military needs. Even with the addition of this space, the demand for channels still exceeded the supply, indicating the vast amount of radio activity that may be expected in the postwar era.

Channels were allocated for FM, television, facsimile, rural telephone systems, railroads, buses, trucks, autos, radar, personal walkie-talkie, and many other types of radio service.

Standard broadcasting profits continued to rise. Total net income of stations and networks (reported for the calendar year of 1944) before Federal income tax, was up 35 percent over the preceding year. Concerned over the high prices being paid for stations, the Commission called the matter to the attention of the Congress. At the end of the fiscal year, 931 standard stations, 46 FM stations and 6 television stations were on the air.

Reductions in interstate rates on calls beyond 790 miles negotiated by the Commission with the American Telephone & Telegraph Co. will save users \$21,000,000 annually. An annual saving of \$2,000,000 will result from the Commission's order prohibiting surcharges by hotels on interstate telephone calls. Construction of \$70,000,000 worth of wire telephone facilities was approved—an increase of 85 percent over last year.

Substantial reductions were made in various overseas radiotelephone rates and some new overseas radiotelegraph circuits were established. Following in the wake of United Nations victories, radiotelegraph circuits were re-established between the United States and France, Belgium, Netherlands, Norway, Czechoslovakia, and other European countries. Effective May 1, 1945, a uniform 20-cent per word rate was established for telegraph service to Europe, Central America, West Indies, Latin America, and the Philippine Islands reducing prewar rates which had ranged as high as 36 cents per word to Europe and 48 cents to Latin America.

Experimentation in radio and electronics reached a new high due to the pressure of military demands and the availability of Federal funds for research. Experimental authorizations by the Commission totaled 1,143—a 100-percent increase over the previous year. There is active experimentation in the operation of radio relay systems for the transmission of standard broadcast, FM and television programs, facsimile and telegraph messages as well as in the use of two-way radio for land, marine, and air mobile units.

In the course of enforcing regulations to promote the safety of life and property at sea, Commission inspectors made 15,731 ship inspections, served 9,391 violation notices. The Commission examined 64,260 applicants for commercial radio operators licenses, issued 61,038 licenses.

The Commission's technical research program includes its 7-year-old recording project to determine the effect of the sunspot cycle on standard broadcast reception, studies of sky-wave interference in the very high frequencies—bursts, Sporadic-E layer reflections and F2 layer reflections, and other vagaries of propagation at these frequencies.

The Radio Intelligence Division (RID), established in 1940 particularly to monitor the ether lanes for wartime espionage transmissions and to guard communications vital to the war from interference, discovered 46 unlicensed stations, investigated 1,445 complaints of suspicious transmission or interference and furnished directions to 283 lost planes, many of them military craft.

The Foreign Broadcast Intelligence Service continued the work started in 1941 of monitoring several million words of text broadcast by foreign stations daily and transmitting significant portions to our Government and allied governments. At the end of the fiscal year, listening posts were being maintained at Silver Hill, Md.; Portland, Oreg.; the Island of Kauai of the Hawaiian Islands and Guam. The FBIS also had access to monitored material of the British Broadcasting Co.

#### HIGHLIGHTS OF ACTIVITIES JUNE 30, 1945, TO JANUARY 1, 1946

In the 6-month interval from the close of the fiscal year to January 1, 1946, the Commission made substantial progress in its reconversion program for communications in the postwar era.

The "freeze" on new broadcasting construction was lifted in October. The postwar pattern for the immediate development of FM and television was completed with the issuance of rules, standards of good engineering practice, and plans allocating the frequencies over the Nation. At the close of the calendar year, the Commission had issued conditional grants to 230 of nearly 750 applicants for FM channels, had on file 520 standard and 150 television applications. Indicative of the vast number of conflicting claims of various applicants was the Commission's action of December 5 scheduling 271 public hearings for the first 3 months of 1946.

The new Railroad Radio Service was authorized on a regular basis. Experimental licenses were being issued for the General Mobile Service. The first experimental license for the civilian use of radar was issued December 13. Amateurs returned to the air on certain bands on November 15.

Another major rate reduction negotiated by the Commission with the AT&T effective February 1, 1946, is expected to result in a \$20,000,000 annual saving for telephone users. Commission representatives participated in the United States-British Commonwealth Telecommunications Conference at Bermuda which resulted in arrangements for sharply reduced rates between the United States and British points throughout the world, expected to go into effect by April 1, 1946. In addition, arrangements were made for the establishment of a number of new radio circuits and retention of existing wartime circuits to certain British points. Since the end of the war new radiotelegraph circuits, operating at reduced rates, have been opened to various Far Eastern points formerly held by the Japanese.

The Foreign Broadcast Intelligence Service was transferred at the end of the year to the War Department.

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## **CHAPTER 1**

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### **General**

- 1. ADMINISTRATION**
- 2. COMMISSION MEMBERSHIP CHANGES**
- 3. STAFF ORGANIZATION**
- 4. PERSONNEL**
- 5. APPROPRIATIONS**
- 6. LEGISLATION**
- 7. LITIGATION**
- 8. DOCKETS**
- 9. INTERNATIONAL**
- 10. INTERDEPARTMENT RADIO ADVISORY COMMITTEE**
- 11. FREQUENCY ALLOCATION**

## CHAPTER I—GENERAL

### 1. ADMINISTRATION

There were no significant administrative changes during the fiscal year.

### 2. COMMISSION MEMBERSHIP CHANGES

Paul A. Porter was given a recess appointment as Chairman of the Commission by the President on December 21, 1944, to fill the unexpired term of James Lawrence Fly, who resigned on November 15, 1944. Mr. Porter's nomination as Chairman was confirmed by the Senate January 18, 1945. Commissioner E. K. Jett was designated by the President to serve as Interim Chairman from November 16, 1944, until Mr. Porter's recess appointment.

On March 30, 1945, Charles R. Denny was sworn in as Commissioner to succeed T. A. M. Craven, whose term expired June 30, 1944.

On July 23, 1945, William H. Wills was sworn in as Commissioner, to succeed Norman S. Case, whose term expired June 30, 1945.

### 3. STAFF ORGANIZATION

The Commission's organization consists of four operating departments: Engineering Department, Law Department, Accounting Department, Foreign Broadcast Intelligence Service. There are four staff service units: The Office of the Secretary, Information Office, Personnel Office, and the Budget and Planning Office.

An Administrative Board comprising the General Counsel, Chief Engineer, Chief Accountant and Secretary acts on matters delegated to it by the Commission. A Rules Committee initiates, considers proposals for new or revised rules, regulations, forms and procedures, and advises the Commission with respect to such matters.

### 4. PERSONNEL

At the close of the fiscal year, the Commission personnel totaled 1,513, of whom 784 were in Washington and 729 in the field (151 outside the continental United States). The total number of employees in the Engineering Department was 700, Law Department 68, Accounting Department 119, Foreign Broadcast Intelligence Service 331, and Administrative 295.

### 5. APPROPRIATIONS

For the fiscal year, the Commission was appropriated a total of \$6,312,343. Of this amount, \$2,104,500 was for its regular activities; \$4,191,143 for its war activities, and \$16,700 for printing and binding.

## 6. LEGISLATION

No legislation amending the Communications Act of 1934, as amended, or directed to the functions of the Commission was passed during the fiscal year. However, extensive hearings were held before the Senate Committee on Interstate Commerce, pursuant to Senate Resolution 187, Seventy-eighth Congress, second session, authorizing a study of international communications by wire and radio, on the subject of merger of international wire and radio carriers. The Commission cooperated with the committee in these proceedings, and in hearings held before the committee during March and April, 1945, representatives of the Commission furnished testimony and extensive data. On April 3, 1945, the hearings were adjourned subject to the call of the chairman of the committee.

## 7. LITIGATION

At the beginning of the fiscal year two cases involving the Commission were pending in the Court of Appeals for the District of Columbia and during the year four additional cases involving the Commission were filed in that court. Of the two that were pending, one was dismissed by the court on motion of the Commission, and the Commission's action was upheld in the other. With respect to the four cases filed during the year, two were dismissed and two are still pending. Review of one of the cases dismissed in the court of appeals has been granted by the United States Supreme Court and is pending in that court.

At the beginning of the fiscal year there were also five cases involving the Commission pending in the district courts of the United States. Of these, judgment for the Commission was rendered in four cases; two of which were appealed to the Supreme Court, which affirmed the judgments below. In the other district court case the court ruled against the Commission, and this case is now pending in the Supreme Court on appeal by the Commission.

Included in the above litigation were the following cases of particular interest:

*New York Telephone Co. v. United States.*—In this action, which was one of the five cases pending in the district courts at the beginning of the fiscal year, the New York Telephone Co. sought to have set aside an order of the Commission of December 14, 1943, made after extensive hearings, requiring the New York Telephone Co. to make certain adjustments in its accounts. These adjustments relate to certain transactions between the company and its parent corporation, American Telephone & Telegraph Co., under which the New York Telephone Co. acquired from the American Telephone & Telegraph Co. properties at a price in excess of original cost to American Telephone & Telegraph Co. less accrued depreciation. The New York Telephone Co. recorded these transactions by entering in its books the prices charged to it by American Telephone & Telegraph Co. The Commission disapproved this accounting, holding that in transfers of property between parent and affiliate the book figures of the parent company for the property in question should have been used by the affiliate. The New York Telephone Co. obtained review of this order before a statutory three-judge court in accordance with section 402

(a) of the Communications Act of 1934, as amended (47 U. S. C. § 402 (a)). The motion of the Commission for summary judgment was denied on August 28, 1944, and an injunction was issued setting aside the Commission's order (*New York Telephone Co. v. United States*, 56 F. Supp. 932). The case is now pending in the United States Supreme Court on appeal by the Commission.

*Hotel Surcharge cases.*—Four of the five cases involving the Commission and pending in the Federal district courts at the beginning of the fiscal year involved the Commission's jurisdiction over charges made by hotels in connection with interstate and foreign long-distance telephone calls made by their guests. On January 6, 1942, the Commission instituted a proceeding for the purpose of determining whether charges by hotels made for or in connection with such calls are within the jurisdiction of the Commission under the Communications Act of 1934. In these proceedings, it was disclosed that certain hotels in the District of Columbia and elsewhere made certain charges known as "surcharges" or "service charges" in connection with interstate and foreign telephone calls made by their guests, which were in addition to the charges specified in the effective tariffs filed by the telephone companies supplying service to such hotels. After hearing, the Commission concluded that it possesses jurisdiction with respect to such charges by hotels, and by its order of December 10, 1943, directed the American Telephone & Telegraph Co. and the Chesapeake & Potomac Telephone Co. (D. C.) to file tariffs showing the charges collected by hotels or the condition upon which telephone service is furnished to hotels. On January 22, 1944, these companies filed tariffs effective February 15, 1944, providing that telephone service is furnished to hotels on the condition that use of the service by guests, tenants, and others shall not be made subject to any charge in addition to the toll charges set forth in the effective tariffs of the telephone company. Similar tariffs were filed on behalf of all other companies in the Bell system.

On February 14, 1944, the Hotel Association of Washington, D. C., instituted a suit pursuant to the provisions of section 402 (a) of the Communications Act of 1934, to set aside the Commission's order of December 10, 1943, which was dismissed by the court on June 6, 1945, after the litigation discussed below had been concluded in favor of the Commission.

On February 19, 1944, the Commission, having determined that certain hotels in the District of Columbia were not complying with the tariff provisions of the telephone companies effective February 15, 1944, relating to the making of charges in addition to those set forth in the effective tariffs of the telephone companies, had a suit instituted in the United States District Court for the District of Columbia pursuant to the provisions of section 401 (c) of the Communications Act to enjoin violation of section 203 of the Communications Act. The district court found the tariff provision involved to be valid and on June 8, 1944, issued an injunction against the defendant hotels prohibiting further violation of that tariff provision. On appeal by the defendant hotels the action of the district court was upheld by the United States Supreme Court in a decision affirming the holding below that the tariff provision in question was a valid regulation of the use of telephone service by subscribers and that departure therefrom constituted a violation of the Communications Act. The Supreme Court held that

this conclusion clearly followed from provisions of the Communications Act vesting in the Commission a supervisory authority over "charges, practices, classifications, and regulations" connected with interstate and foreign wire communication service and requiring that provisions of the tariffs filed with the Commission governing such service be "just and reasonable" (*Ambassador, Inc., et al v. United States*, decided May 21, 1945).

On February 23, 1944, and February 24, 1944, the United States, on behalf of the Commission, instituted similar suits in the district courts of the United States for the Southern District of New York and the Northern District of Illinois, respectively, under section 401 (c) of the Communications Act to enjoin violation of section 203 of that act by certain hotels in New York City and Chicago and by the telephone carriers which furnish them service. In the New York case the court announced its decision on August 31, 1944, granting the motion for injunction (*United States v. American Telephone & Telegraph Co., et al.*, 57 F. Supp. 451) which on appeal was upheld by the United States Supreme Court in a per curiam decision on the authority of the previously decided case, discussed above, involving the Washington hotels, (*Hotel Astor, Inc., et al. v. United States*, decided May 28, 1945). In the Chicago case an injunction against the hotels and telephone companies involved was granted on June 9, 1945.

#### 8. DOCKETS

The Commission heard 116 docket cases, of which 98 were broadcast, 17 common carrier, 1 hearing applicable to all services which was the allocation proceeding; held 10 oral arguments, of which 5 were on broadcast matters, 2 common carrier, 3 allocation proceedings. A total of 380 motions, petitions and other pleadings were acted upon, of which 304 were granted, 69 denied, 7 dismissed. Included in the total of 380 motions, 352 were on broadcast matters (278 granted, 67 denied, 7 dismissed), 28 on telephone and telegraph (26 granted, 2 denied).

#### 9. INTERNATIONAL

Maintenance of complete records of all frequencies transmitted and received by radio stations operating in the United States and its possessions was continued. These records assumed increased importance because of the crowded spectrum and the unprecedented wartime demand for frequencies by the armed forces. The Commission's "Master Frequency List" was again revised and was used extensively in connection with the frequency allocation hearing.

A complete course in telecommunications techniques was given one engineer from Chile who was sponsored by the Commission. Shorter courses were given three engineers from South American and Cuba as holders of trade scholarships sponsored by the Inter-American Training Administration of the Coordinator of Inter-American Affairs. Twelve Chinese engineers sponsored by the Foreign Economic Administration and the Office of War Information were given courses concerning the Commission's administrative practices and Standards of Good Engineering Practice. A 1-year nonacademic program of training in industry was prepared for six of the above Chinese engineers.

Treaty violations and interference cases numbering approximately 850 were handled during the year, the more important cases being presented directly to the Department of State for transmission to the respective foreign administrations. Such action has resulted in the elimination or alleviation of many serious problems of interference and consequently in the improvement of communications in the United States.

#### 10. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Interdepartment Radio Advisory Committee approved 3,631 new assignments and 635 deletions, bringing the number of assignments recommended by it since its establishment to 40,363. Outstanding assignments now total 34,040. During the year, 231 changes in assignments and 3,771 temporary assignments, which are not included in the above figures, were made. A total of 8,739 applications and requests were processed by the committee during the year.

A proposed international frequency allocation table covering the range from 10 kilocycles to 30,000 megacycles was coordinated with the allocation table proposed by the Commission and this will be the basis of the United States proposal at the next International Telecommunications Conference.

#### 11. FREQUENCY ALLOCATION

To enable the radio art to take advantage of the important wartime technical advances, to meet the greatly increased demands for the use of radio and to facilitate orderly planning for postwar development, the Commission held comprehensive hearings during the fiscal year for a complete review of the spectrum. The proceeding was entitled "In the Matter of Allocation of Frequencies to the Various Classes of Non-Governmental Services in the Radio Spectrum From 10 Kilocycles to 30,000,000 Kilocycles."

The hearings opened on September 28, 1944, pursuant to an order issued August 15, 1944. The Commission sat en banc. The preliminary hearings lasted through November 2, 1944, for a total of 25 hearing days. A total of 4,559 pages of testimony were taken, 543 exhibits were received, 231 witnesses testified. Testimony at the Commission's hearings on the use of radio for railroads, September 13-18, 1944, was incorporated in the allocation hearing by reference.

Extensive cooperation in preparing for the allocation hearing was provided by the Radio Technical Planning Board, which was organized in September 1943, by a committee composed of the representatives of the Radio Manufacturers Association and the Institute of Radio Engineers. It was sponsored by nonprofit associations and societies having an important interest in radio.

The Commission issued a proposed report on allocations from 25,000 to 30,000,000 kilocycles on January 15, 1945. Hearings on this proposed report were held from February 28 to March 3, inclusive, and on March 12. In addition, closed hearings were held March 12 and 13, to consider evidence classified as a military secret. A final report on this section of the spectrum, was issued May 25, 1945, with the exception of the portion from 44 to 108 megacycles, for which the



Commission offered three alternative proposals concerning the position of FM. Hearings were held on this latter section on June 22 and 23, and a report issued on June 27, 1945.

Salient points of the allocation above 25,000 kilocycles are discussed in the various sections of this annual report dealing with the respective subjects. FM was located in the 88 to 106 megacycle region. Commercial television was assigned 13 channels below 300 megacycles, with the 480-920 band being assigned for experimental television. Channels were allocated for a number of new services such as railroad radio, citizens radiocommunication service, rural telephone service and industrial and medical service.

The new allocations were to become effective as soon as the Commission could prepare regulations and standards of good engineering practice and as soon as manpower and materials become available.

A report on the proposed allocation below 25,000 kilocycles was issued on May 21, 1945.

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## **CHAPTER II**

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### **Standard Broadcast**

- 1. MATERIALS AND MANPOWER**
- 2. PROPOSAL TO EXTEND BAND**
- 3. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT**
- 4. CLEAR CHANNEL HEARING**
- 5. MULTIPLE OWNERSHIP**
- 6. SALES PRICES OF BROADCAST STATIONS**
- 7. FINANCIAL DATA**
- 8. STATISTICS**

## CHAPTER II—STANDARD BROADCAST

### 1. MATERIALS AND MANPOWER

Due to the continuation of wartime restrictions on the use of equipment, material, and manpower for the construction of new broadcast stations, authorizations for new broadcast facilities have been confined in general to 250-watt stations where the necessary equipment and manpower have been shown to be available.

Several changes in Commission policy on authorizations were ordered during the fiscal year.

The policy in effect on July 1, 1944, permitted the installation of stations where equipment and manpower were shown to be available and War Production Board approval of the construction could be obtained. A number of new stations were authorized under this policy until December 1944 at which time, the War Production Board advised that manpower was becoming increasingly scarce and that construction should be restricted to those cases where the service would contribute to the war effort. Accordingly, on January 16, 1945, the Commission decided to restrict grants to localities not receiving primary broadcast service from any existing stations. Changes in existing facilities were permitted only if substantial construction was not needed and the cost was less than \$500.

All applications on file on January 16, 1945, were automatically held in status quo unless the applicant specifically requested immediate consideration on the basis that the application met the requirements of the new policy.

### 2. PROPOSAL TO EXTEND BAND

The Commission's proposed report on frequency allocation below 25,000 kilocycles issued on May 21, includes a plan to extend the low-frequency end of the band so as to include 540 kilocycles. The addition of 540 kilocycles to the standard broadcast band would open one new channel for the use of standard broadcast stations. The number of stations that may be assigned to this new channel will be dependent on the classification of the frequency as a clear, regional, or local channel. The Canadian Government at present uses the new channel under special arrangement for a 50-kilowatt station at Calgary, Alberta. Any extensive use of the channel by the United States will require revision of existing Treaties and Agreements with North American countries.

### 3. NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

The existing agreement with Canada, Mexico, Cuba, Newfoundland, Haiti, San Domingo, and the Bahamas (North American Regional Broadcasting Agreement) relative to joint use of frequencies in the standard broadcast band expires in March of 1946 and efforts are being made to extend the treaty for another year. Need for revision of the

agreement has become apparent, particularly with respect to clarification of some of its requirements. In addition, changes will be requested if 540 kilocycles is added to the standard broadcast band and Commission rules governing clear channels are changed as a result of the forthcoming clear channel hearing. The matter of extension and possible alterations will be discussed at the Inter-American Conference in September 1945.

#### 4. CLEAR CHANNEL HEARING

A general public hearing to determine what changes, if any, should be made in the present policies on allocation of clear channels in the standard broadcast band, was ordered by the Commission on February 20, 1945. The date was later fixed for January 14, 1946.

Commission studies have shown that there are still large areas in the Nation which receive no radio service at all during the daytime hours and no primary radio service at night. Moreover, the Commission has received many applications for authority to use power in excess of 50,000 watts which is the maximum power now permitted a clear channel station.

Committees composed of both industry and Government representatives are now engaged in various studies in preparation for this hearing.

#### 5. MULTIPLE OWNERSHIP

Order No. 84A promulgating section 3.35 of the Rules and Regulations effective on May 31, 1944, provided that no license shall be granted for a standard broadcast station directly or indirectly owned, operated or controlled by any person where such station renders or will render primary service to a substantial portion of the primary service area of another broadcast station directly or indirectly owned, operated or controlled by such person. Provision was made, however, for exceptions where the public interest, convenience, and necessity would be served by such multiple ownership.

Since the effective date of this regulation the Commission has approved 19 applications for the severance of multiple ownership of broadcast facilities. In addition, there were pending at the close of the fiscal year 5 applications which provide for the sale of facilities to comply with this policy. Where a licensee is required to dispose of facilities to meet the terms of the regulation, the Commission has issued a certificate pursuant to section 112M of the Internal Revenue Code, which affords the licensee an opportunity to treat the sale as an involuntary conversion of property with a resulting effect on the gain realized for income tax purposes.

#### 6. SALES PRICES OF BROADCAST STATIONS

The profitability of broadcast operation and the wartime restrictions on the construction of new stations resulted in a sharp increase in the sales prices of broadcast facilities. From an examination of applications for the sale of existing stations it became apparent to the Commission that licensees were selling their stations for amounts far in excess of the value of the physical assets to be transferred.

In letters to the Senate Interstate Commerce Committee, and the House Interstate and Foreign Commerce Committee, the Commission called attention to this trend and requested congressional direction as to the policy it should follow in passing on the sale of radio stations where the sales prices are in excess of the going concern and physical property values. In its letter the Commission pointed out:

The Congress has had before it proposals to limit the amount of consideration to the value of the physical properties (of radio stations) transferred but no provision of this character has been adopted. The statute does make clear that the frequencies are not in any way the property of the licensees. The Commission has rejected and is prepared to reject any transfer which on its face involves a consideration for the frequency. The Commission, apparently consistent with congressional policy, has approved transfers that involve going-concern values, good will, etc. There remains, however, a serious question of policy and one on which the law is not clear, as to whether the Commission should approve a transfer wherein the amount of the consideration is over and beyond any amount which can be reasonably allocated to physical values plus going-concern and good will, even though the written record does not itself show an allocation of a sum for the frequency. Our concern in this regard is heightened by the tremendously high prices which radio stations are commanding in the present state of the market. This is illustrated by the fact that one local station was sold for a half million dollars and some regional stations are selling for a million or more.

It is the Commission's policy to disapprove of transfers which obviously represent the activities of a promoter or broker, who is simply acquiring licenses and trafficking in them. Under the present state of the law, however, it is not clear that the Commission has either the duty or the power to disapprove of a transfer merely because the price is inordinately high—even though it may well be deduced that a substantial value is placed on the frequency. In the absence of a clear congressional policy on this subject, we thought best to draw the matter to the attention of your own Committee and the House Committee on Interstate and Foreign Commerce.

## 7. FINANCIAL DATA

*All networks and stations.*—Four major and five regional networks and 875 standard broadcast stations in the United States, Hawaii, Alaska, and Puerto Rico reported net revenues from the sale of time amounting to \$246,339,532 in 1944 as compared with \$195,704,153 reported by 9 networks and 841 standard broadcast stations for the previous year, or an increase of 25.87 percent. In addition, these networks and stations received \$28,959,079 in 1944 from the sale of talent and other incidental broadcast activities as compared with \$19,613,621 for the previous year, an increase of 47.65 percent in this class of revenue. After deducting operating expenses, and before Federal income tax, these stations and networks reported operating income amounting to \$90,272,851 as compared with \$66,475,586 for the previous year, an increase of 35.80 percent.

*The four major networks.*—The four major network companies (CBS), American (formerly Blue), Mutual, and NBC) and their 10 key stations reported total revenues from the sale of time aggregating \$84,068,954 in 1944 as compared with \$71,027,292 for 1943. The net revenues from the sale of time amounted to \$63,656,085 in 1944 and \$54,479,894 in 1943 and these amounts plus revenues from the sale of talent, etc., gave combined broadcast revenues of these networks and stations of \$79,030,449 in 1944 as compared with \$64,301,538 for the previous year; and broadcast income (revenues less expenses before Federal income tax, and excluding net losses from other than stand-

ard broadcast operations amounting to \$741,680 for 1944 and \$351,092 for 1943) amounted to \$20,283,746 for 1944 and \$19,455,701 for 1943, or an increase of 4.26 percent.

*Average broadcast income per station.*—In general, standard broadcast stations reported a substantial improvement in the results of operations for 1944. Excluding the 10 key stations of major networks for which the reports did not include adequate segregations of expenses between these stations and network operations, the average broadcast income of clear channel stations with operating power of 50,000 watts, unlimited time, amounted to \$196,247 per station in 1944, or an increase of 24.01 percent over 1943, and such income reported by the clear channel unlimited time stations with operating power of 5,000 to 20,000 watts averaged \$129,534 per station, or an increase of 109.43 percent over the corresponding amount reported for 1943. The average broadcast income reported by regional unlimited stations amounted to \$114,380 per station in 1944 as compared with \$79,784 in 1943, an increase of 43.36 percent. Local unlimited time stations reported average broadcast income of \$12,682 per station in 1943 and \$23,421 in 1944, showing an average increase of 84.68 percent. Broadcast income reported by local unlimited time stations affiliated with major networks averaged \$25,815 per station in 1944, or an increase of 70.86 percent over the average for 1943, while local unlimited time stations not affiliated with a major network reported an average increase of 85.58 percent over 1943.

*Stations reporting losses.*—There were 41 of the 875 stations reporting losses (total broadcast expense in excess of total broadcast revenues) in 1944 as compared with 94 of the 841 included in the statistics for 1943. The average loss per station in 1944 was \$3,764 while the average loss in 1943 amounted to \$5,348. Only 27 of the stations reporting losses in 1944 were affiliated with the major networks while there were 42 in 1943.

*Stations affiliated with major networks.*—The total number of stations affiliated with major networks and included in the statistics for 1944 was 689 and for 1943 was 604. The average broadcast income of the 689 stations amounted to \$94,004, an increase per station of 28.82 percent over the average of \$72,975 for the 604 stations in 1943.

*Employes and compensation.*—There were 34,281 persons employed by the 4 major and 5 regional networks and 875 standard broadcast stations as of December 31, 1944, with a total pay roll for the year of \$99,773,425. For 1943 the 4 major and 5 regional networks and 841 standard broadcast stations reported total pay roll of \$82,171,023, and 31,806 employes as of the end of the year.

## 8. STATISTICS

As of June 30, 1945, there were 931 standard stations licensed and 24 under construction. During the year, 33 new stations were added, 2 were deleted.

The Commission received 822 formal applications for new stations and changes in existing facilities, granted 418; received 704 applications for renewal of licenses, granted 1,064 renewals and extensions; issued 214 special authorizations.

*New stations authorized*

Call letters	Permittee and location	Power (watts)	Frequency (kc)	Time designation
KALL.....	Abrella S. Hinckley, George C. Hatch, and Wilda Gene Hatch, a partnership, d/b as Salt Lake City Broadcasting Co., Salt Lake City, Utah.	(1)	910	Unlimited DA.
KCMJ.....	Richard W. Joy and Donald C. McBain, d/b as Palm Springs Broadcasting Co., Palm Springs, Calif.	250	1340	Unlimited.
KCOK.....	Herman Anderson, Tulare, Calif.	250	1240	Do.
KCRA.....	Ewing C. Kelly, David R. McKinley, and Vernon Hanson, d/b as Central Valleys Broadcasting Co., Sacramento, Calif.	250	1340	Do.
KFLW.....	Herald Publishing Co. of Klamath Falls, Klamath Falls, Ore.	250	1450	Do.
KGAK.....	Albert E. Buck and Merle H. Tucker, a partnership, d/b as Rio Grande Broadcasting Co., Gallup, N. Mex.	250	1230	Do.
KNAK.....	Granite District Radio Broadcasting Co., Salt Lake City, Utah.	250	1400	Do.
KNOE.....	James A. Noe, Monroe, La.	250	1450	Do.
KPKW.....	Western Radio Corp., Pasco, Wash.	250	1340	Do.
KSMA.....	Hugh G. Shurtliff, Charles A. Shurtliff, Mareby Cardella (Della) Shurtliff, and Cleo Agnes Center, Santa Maria, Calif.	250	1450	Do.
KXOA.....	Lincoln Dellar, Sacramento, Calif.	250	1490	Do.
WATT.....	Midwestern Broadcasting Co., Cadillac, Mich.	250	1240	Do.
WBAC.....	Robert W. Rounsaville, Cleveland, Tenn.	250	1340	Do.
WCMA.....	Corinth Broadcasting Co., Inc., Corinth, Miss.	250	1230	Do.
WDAD.....	Indiana Broadcast, Inc., Indiana, Pa.	250	1450	Do.
WFEB.....	Alabama Broadcasting Co., Inc., Sylacauga, Ala.	250	1340	Do.
WHGB.....	Herbert Kendrick and G. L. Hash, a partnership, d/b as Harrisburg Broadcasting Co., Harrisburg, Pa.	250	1400	Do.
WHNC.....	Henderson Radio Corp., Henderson, N. C.	250	890	Daytime.
WHTB.....	Voice of Talladega, Inc., Talladega, Ala.	250	1230	Unlimited.
WJXN.....	P. K. Ewing, Jr., F. C. Ewing, a partnership, d/b as Ewing Broadcasting Co., Jackson, Miss.	250	1490	Do.
WKIX.....	Inter-City Advertising Co., Columbia, S. C.	250	1490	Do.
WKWF.....	John M. Spottswood, Key West, Fla.	500	1600	Do.
WKVM.....	American Colonial Broadcasting Corp., West of Arecibo, Puerto Rico.	250	1230	Do.
WLAT.....	Loys Marsdon Hawley, Conway, S. C.	250	1490	Do.
WLEE.....	Thomas Garland Tinsley, Jr., Richmond, Va.	250	1450	Unlimited except when WBBI operates.
WMLT.....	George T. Morris, Wilmer D. Lanier, and J. Newton Thompson, d/b as Dublin Broadcasting Co., Dublin, Ga.	250	1340	Unlimited.
WMSA.....	Brockway Co., Massena, N. Y.	250	1340	Do.
WNEX.....	Macon Broadcasting Co., Macon, Ga.	250	1400	Do.
WNHC.....	Elm City Broadcasting Corp., New Haven, Conn.	250	1340	Do.
WPAQ.....	Washtenaw Broadcasting Co., Inc., Ann Arbor, Mich.	250	1050	Daytime.
WPIK.....	Potomac Broadcasting Corp., Alexandria, Va.	250	730	Do.
WSSV.....	Southside Virginia Broadcasting Corp., Petersburg, Va.	250	1240	Unlimited.
WSTN.....	Charles F. Blackley, Staunton, Va.	250	1400	Do.

*Stations deleted for fiscal year ending June 30, 1945*

Call letters	Grantee and location	Date of deletion
KCRJ.....	Central Arizona Broadcasting Co., Jerome, Ariz. (licensee voluntarily submitted license for cancellation).	Aug. 8, 1944
WFEB.....	Alabama Broadcasting Co., Inc., Sylacauga, Ala. (C. P. only. Request for extension of time within which to meet procedural requirements of Commission Statement of Policy of Jan. 26, 1944, denied Sept. 26, 1944 and application designated for hearing. Granted Dec. 12, 1944).	Sept. 26, 1944

<sup>1</sup> Kilowatts.

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## CHAPTER III

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### Nonstandard Broadcast

1. GENERAL
2. FREQUENCY MODULATION (FM) BROADCAST SERVICE
3. TELEVISION BROADCAST SERVICE
4. INTERNATIONAL BROADCAST SERVICE
5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE
6. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE
7. RELAY BROADCAST SERVICE
8. FACSIMILE BROADCAST SERVICE
9. DEVELOPMENTAL BROADCAST SERVICE
10. STATISTICS



## CHAPTER III—NONSTANDARD BROADCAST

### 1. GENERAL

Due to the continued wartime restrictions on manpower and materials, the construction of commercial frequency modulation (formerly designated as high frequency broadcasting), television, and facsimile broadcast stations has been negligible during the past fiscal year. The authorization of new construction has been limited to those cases where the applicant was pursuing a program of technical research and development. Some additional construction has gone forward in the international broadcast service employed for psychological warfare. Few new stations have been authorized in the remaining non-standard broadcast services.

FM and television stations built before the outbreak of the war have continued to furnish broadcast service. Many of these stations could not be fully completed and have been licensed to operate with available equipment until conditions permit the completion of construction. Since the manufacture of receiving sets was discontinued early in the war, the extent of public participation in these new services has necessarily been limited.

There has been increased planning for the postwar construction of frequency modulation (both commercial and noncommercial educational) and television broadcast stations. Many applications were filed, although no action was taken on them under the wartime "freeze" policy.

A number of experimental television and developmental broadcast stations were authorized during the year for technical research and development. Due to the relative newness of services in the portion of the spectrum used in FM and television broadcasting, many technical subjects need further study in order to provide the most efficient use of these frequencies. Considerable progress has been made during the year on such studies.

The frequency allocation provides the basis for postwar planning of station construction, design of transmitting and receiving equipment, and the basis for the adoption of rules and standards relating to the allocation and operation of the various classes of broadcast stations in the high frequency portion of the spectrum.

### 2. FREQUENCY MODULATION (FM) BROADCAST SERVICE

The only new FM station authorized during the year was an existing experimental station which was granted permission to operate on a commercial basis. As of June 30, 1945, 53 commercial FM broadcast stations were authorized, 46 being licensed and in regular operation. Although the Commission's rules provide for a minimum daily operating schedule of 6 hours per day (except Sunday), some stations are furnishing a program service throughout the day and evening.

The large amount of interest in FM is indicated by the 429 applications for new stations on file at the end of the fiscal year and hundreds of requests for information and application forms. Predictions by witnesses at the allocation hearing indicated the possible establishment of several thousand FM stations within a few years after the war, or several times the number of standard broadcast stations now in operation.

The choice of channel space for FM broadcasting was the subject of a thorough review by the Commission at the frequency allocation hearing. For several years there had been concern that FM broadcasting in the vicinity of 50 megacycles would be subject to serious skywave interference, nullifying to a great extent the possibilities of interference-free reception expected of FM. The Commission has been conducting a recording program for over 2 years, measuring the extent and intensity of skywave signals from existing FM stations; the data collected during this program served to emphasize the amount of interference that would be expected when a large number of FM stations were installed and in operation in the vicinity of 50 megacycles. There was divergence of opinion as to the expected amount and effect of skywave interference in the future, some believing that the characteristics of FM transmission and reception would serve to minimize the deleterious effects of skywave transmission, and others believing that the service would be severely degraded during summer seasons and during times of high sunspot activity. Following the allocation hearing the Commission proposed to place FM in the vicinity of 100 megacycles. In order to obtain additional data relating to radio wave propagation, a closed hearing was held on March 12 and 13, 1945, since much of this material was classified. This hearing was attended by the Commission, members of its staff, and industry and broadcasting personnel who had been cleared by the military for the purpose.

Since it appeared at the time that the production of FM equipment could not be resumed in 1945, or even in the first part of 1946 unless Japan capitulated, and since the Commission desired to have as much information as possible before it prior to making a decision about the FM band, the Commission announced on May 25 that it would withhold the allocation for FM pending further propagation measurements to be made during the summer of 1945. Subsequently, however, the War Production Board advised the Commission that the manufacture of FM, AM and television transmitters and receivers might begin at an earlier date than was originally indicated to the Commission, and that it would probably not be possible for the War Production Board to give 90 days advance notice to the Commission before the resumption of production. Accordingly, the Commission on June 5, 1945, ordered a further argument and hearing in order that a final decision might be reached at the earliest possible date.

Many factors are involved in a decision of this nature, including ground wave coverage, skywave interference, transmitting and receiving equipment, present investment, and other matters of a minor character. Based on the testimony and data before it, the Commission was convinced that a superior FM broadcast service would be furnished by operation in the vicinity of 100 megacycles and, accordingly, on June 27, 1945, it allocated the band of 88 to 92 mega-

cycles for noncommercial educational FM broadcasting and the band of 92 to 106 megacycles for commercial FM broadcasting. In addition, the band of 106 to 108 megacycles was allocated to facsimile, with the provision that if in the future this band would not be required for facsimile, it would be available for FM.

### 3. TELEVISION BROADCAST SERVICE

Throughout the fiscal year commercial television broadcast stations have also been subject to the freeze policy, and no new commercial television broadcast stations were placed in operation. At the close of the fiscal year six commercial and three experimental television broadcast stations were furnishing a television service. Under wartime rules, commercial television broadcast stations need operate only 4 hours per week, as compared to the 15 hours a week previously required.

Considerable interest was shown during the year in establishing experimental television broadcast and relay stations for the purpose of developing television equipment and techniques, and 20 experimental television broadcast stations were authorized. Of the 47 experimental television stations authorized at the end of the fiscal year, approximately half are relay stations used for transmitting television programs from the studio or from other points of program origination to the television broadcast transmitter. Experimentation began in the transmission of television programs over a series of relay stations between Washington and Philadelphia, and the satisfactory results obtained indicated that prospects are good for future network television broadcasting on a large scale. City-to-city relaying of television material may, of course, also be carried on by the use of coaxial cable, and it is likely that the postwar period will employ both methods for network television.

While commercial television construction has been restricted under wartime freeze policies, applications have been accepted and at the end of the fiscal year 118 applications for new stations were on file. The great amount of interest in television broadcasting indicates that dozens of cities and their surrounding areas will have television broadcast service as soon as equipment can be constructed and installed.

Much testimony was presented during the frequency allocation hearing concerning the prospects of postwar television. Considerable controversy arose as to whether television should proceed with present channel widths in the portion of the spectrum now employed for television broadcasting, or whether emphasis should be placed on television experimentation and operation in the higher bands where wider channels are available for pictures having greater detail and color. While the higher frequencies offer the only opportunity for a large number of channels of sufficient width to provide this form of television service, insufficient information appeared to be available upon which to guarantee the prompt establishment of television broadcasting in this portion of the spectrum. It appeared that it would be some time before transmitting and receiving equipment would be adequately developed and standards could be adopted for the establishment of television broadcasting in the upper frequency range. The Commission, therefore, provided as

many 6-megacycle channels as possible, (13) between 44 and 216 megacycles for immediate postwar television broadcasting; in addition, the band from 480 to 920 megacycles was provided for experimental television broadcasting, looking toward the future establishment of a superior television service in this range.

#### 4. INTERNATIONAL BROADCAST SERVICE

During the past fiscal year, the installation of new international broadcast stations in the United States has been completed in accordance with plans made at the beginning of the war to provide expanded facilities for the needs of psychological warfare. A total of 36 international broadcast stations, including five 200-kilowatt transmitters, are now operating. At the close of the European war the emphasis was shifted to west coast operations, where 10 transmitters licensed to international broadcast licensees and 6 transmitters leased from point-to-point companies, as well as 1 transmitter in Hawaii, were employed to concentrate programs on Japan and Japanese-held areas on a round-the-clock schedule. Meanwhile, on the east coast 26 transmitters continued to operate on somewhat reduced schedules with programs for Europe, Africa, and Central and South America, with the emphasis shifted from psychological warfare to troop entertainment and news. All international broadcast stations continue to be programmed and operated under the direction of the Office of War Information and the Office of Inter-American Affairs.

During the latter part of the fiscal year several conferences were held with representatives of the Office of War Information, the Office of Inter-American Affairs, the State Department, and licensees of international broadcast stations concerning the postwar status of international broadcasting. No policy has as yet been formulated concerning this matter.

#### 5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

This service was established in 1938 to provide a service for organized nonprofit educational agencies to advance their educational work by transmitting programs to schools in an educational system as well as educational and entertainment programs to the public. At the end of the fiscal year 6 such stations were in regular operation, construction permits for 6 others were outstanding, and 22 applications for new stations were on file. Although the authorization of new stations in this service has not been restricted, the severe limitations on equipment and personnel have not permitted much progress in this service during the war.

A great deal of testimony was presented at the frequency allocation hearing indicating the expected rapid postwar development of FM broadcasting by educational institutions. Witnesses stressed the need for an adequate number of channels to provide facilities for the many educational stations being planned, including State-wide networks of educational stations in many States.

The Commission has provided for this expected growth by allocating 20 FM channels in the band 88 to 92 megacycles, adjacent to the commercial FM band of 92 to 108 megacycles. FM receivers will include both bands, enabling noncommercial educational FM to grow with commercial FM, both services being available to the public.

## 6. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

ST broadcast stations are used to provide program circuits between the studio and transmitter of FM and international broadcast stations. Radio circuits of this type are particularly desirable where the main transmitter is located on a mountain top or other isolated places and where it would be difficult to install and maintain adequate wire circuits having high fidelity and low noise level characteristics and at the same time be relatively free from failure due to sleet storms and other maintenance problems. Although only a few ST broadcast stations are in operation, these furnish satisfactory service with a minimum of interruptions. No additional ST broadcast stations were authorized during the fiscal year, but it is probable that many will be installed as soon as the construction of new FM broadcast stations is resumed. Largely the result of wartime research and development, higher frequencies than those now employed for ST broadcasting (330 to 344 megacycles) appear desirable for this purpose and, accordingly, the Commission has provided a band from 940 to 960 megacycles for this service. In addition, higher frequency bands allocated for fixed and mobile services will be available for experimentation in the ST broadcast service, and certain television channels may also be used on the basis of no interference to television operation.

## 7. RELAY BROADCAST SERVICE

In connection with standard and other classes of broadcast stations, relay broadcast stations are used for the purpose of transmitting program material to the main station when wire circuits are not available. In addition, relay broadcast stations may be used for emergency program circuits between the studio and transmitter of broadcast stations during failures of regular wire circuits. Various factors during the war have resulted in the limited use of relay broadcast equipment but it is expected that in the future the use of these stations will again expand.

Construction of these stations during the past fiscal year has been authorized where it was shown that the required materials were available without priority and that a need for the service existed. During the year 23 construction permits were granted, and the total number of stations authorized as of June 30, 1945, was 560.

Some changes in frequency allocations for relay broadcast stations were announced by the Commission following the allocation hearing.

## 8. FACSIMILE BROADCAST SERVICE

Experimentation in facsimile broadcasting has been continued on a limited scale during the past fiscal year by the three stations authorized in this service. However, considerable interest has been shown in facsimile, and two construction permits for facsimile experimentation were granted during the year.

During the frequency allocation hearing a number of witnesses testified to the expected importance of facsimile broadcasting during the postwar period, indicating that transmission speed has increased considerably and that fidelity of reproduction has been improved. There was testimony to the effect that facsimile broadcasting would be an

important service to the public and that adequate frequencies should be provide for this purpose.

The Commission has provided a band of 2 megacycles (106 to 108 megacycles) adjacent to the FM band and the band 460 to 470 megacycles for facsimile broadcasting. In the event that the 106- to 108-megacycle band will not be required for this service in the future, this band will be available for assignment to FM broadcast stations, and FM receiver manufacturers have been encouraged to include the entire band of 88 to 108 megacycles in their receivers.

Should multiplex transmission of sound and facsimile on the same FM broadcast channel prove to be entirely feasible without degrading the sound service with receivers used by the public, such multiplex operation may be authorized. In addition, the Commission has announced that it will authorize FM broadcast stations to transmit simplex facsimile over their FM broadcast transmitters during periods not required for sound broadcasting.

### 9. DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are authorized for the purpose of conducting research, development, and experimentation relating to broadcast equipment and techniques when such work requires the use of radiation. The past fiscal year has seen a great amount of interest develop in this service, and the number of stations authorized has increased during the year from 4 to 27. The accelerated interest in broadcasting in the high frequency portion of the spectrum has, of course, been reflected in this service, and many licensees are conducting programs of research relating to the development of equipment and the measurement of signal intensities and service areas in high frequency broadcasting. The research programs conducted by licensees of developmental broadcast stations have in the past contributed materially to the development of high standards in broadcast equipment, and it is expected that the same result will follow from many of the problems now being investigated.

### 10. STATISTICS

*Number of stations in the nonstandard broadcast service for fiscal year ending June 30, 1945*

Class of station	As of June 30, 1944	New	Licenses or CP's surrendered or abandoned	As of June 30, 1945
High-frequency broadcast (Exp.)	3	0	2	1
High-frequency broadcast (Temp. class II Exp.)	3	0	2	1
High-frequency broadcast (FM)	52	1	0	53
Low-frequency relay	254	16	9	261
High-frequency relay	292	7	0	299
Television (Exp.)	27	20	0	47
Television (Commercial)	9	0	0	9
International	37	1	0	38
Developmental	4	23	0	27
ST (Studio-Transmitter)	18	0	0	18
Facsimile	3	0	0	3
Noncommercial educational	8	4	0	12
Class II (Exp.)	1	0	0	1
Total	701	72	13	760

<sup>1</sup> Includes 3 confidential stations.

*Nonstandard broadcast applications*

Service	Applica- tions received	Authoriza- tions issued	Special authoriza- tions
Relay broadcast.....	113	105	20
International broadcast.....	28	18	28
Television broadcast (Commercial).....	97	6	17
Television broadcast (Exp.).....	92	63	87
Facsimile broadcast.....	0	0	0
High-frequency broadcast (Exp.).....	1	0	21
High-frequency broadcast (FM).....	325	14	23
High-frequency broadcast (Temp. class II Exp.).....	5	0	1
Noncommercial educational broadcast.....	42	10	0
Developmental broadcast.....	52	34	11
ST (Studio-Transmitter) broadcast.....	2	2	1
Class II broadcast (Exp.).....	0	0	0
Total.....	757	252	208

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**CHAPTER IV**

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**Common Carriers**

- 1. TELEPHONE (WIRE AND RADIO)**
- 2. TELEGRAPH (WIRE, CABLE, AND RADIO)**
  - (a) DOMESTIC**
  - (b) INTERNATIONAL**



## CHAPTER IV—COMMON CARRIERS

### 1. TELEPHONE (WIRE AND RADIO)

#### SERVICE AND FACILITIES

*Construction of wire facilities.*—The year showed a marked increase in construction activity. As materials were released from military use, the industry expanded its construction activities to meet the constantly growing demands for toll service. Two hundred and twenty applications were received for supplementing existing facilities of which 199 involved construction projects ranging up to \$9,480,000, 2 covered leasing, 8 purchases. Two hundred and ten applications were approved, including 26 filed during the 1944 fiscal year. The estimated total construction cost was \$70,091,140, an increase of \$60,508,901 over the preceding fiscal year.

*Wire telephone applications for construction approved by the Commission from July 1, 1934 to June 30, 1945*

Period	Number of applications	Estimated construction cost	Route miles of cable placed	Miles of coaxial units	Miles of open wire placed
July 1, 1934 to June 30, 1935.....	7	\$1,145,851	234.8	189	0
July 1, 1935 to June 30, 1936.....	15	275,625	24	0	475
July 1, 1936 to June 30, 1937.....	50	5,551,702	206	0	17,045
July 1, 1937 to June 30, 1938.....	45	3,931,000	499	0	1,212
July 1, 1938 to June 30, 1939.....	45	6,960,123	646	780	1,967
July 1, 1939 to June 30, 1940.....	72	9,070,952	1,209.2	168	3,501
July 1, 1940 to June 30, 1941.....	137	38,319,399	5,263	0	15,521
July 1, 1941 to June 30, 1942.....	169	45,046,250	5,099.7	1,790	34,583
July 1, 1942 to June 30, 1943.....	48	8,683,627	418	0	4,501
July 1, 1943 to June 30, 1944.....	121	9,582,239	574.8	0	7,968
July 1, 1944 to June 30, 1945.....	210	70,091,140	2,378.3	7,902	2,963
Total.....	919	198,647,906	16,552.3	10,829	89,736

Fourteen applications involving construction cost estimated at \$17,576,215 were received during the year which were still pending before the Commission at the close of the year.

Approximately 1,700,000 miles of toll message channels were added to the Bell system facilities—an increase of 18.5 percent over the total miles in service at the beginning of the year. Of this increase 85 percent resulted from the use of carrier systems.

The use of the EB emergency type of carrier channels continues to grow. Of the 1,700,000 total channel mile increase, about 500,000 miles were of the EB type.

*Planned wire projects.*—In our tenth annual report, reference was made to the American Telephone & Telegraph Co.'s program for installing 6,000 to 7,000 route miles of coaxial facilities during the next 5 or 6 years. During the year under report, the Commission authorized the construction of 1.112 route miles of this type of cable

carrying 7,902 coaxial unit miles and involving an estimated expenditure of \$20,286,000. Coaxial units are designed for the transmission of high frequencies suitable for both telephone and television transmission.

*Volume and speed of toll service.*—The demand for telephone toll service continues to grow to new peak levels. During the year 730,000,000 toll board calls were handled by the Bell system and 621,000,000 short haul calls were handled through Bell operated boards other than toll boards. These figures represent increases over the preceding year of 11 and 3 percent, respectively. Traffic of the long lines department of the American Telephone & Telegraph Co. increased from 175,000,000 to 196,000,000 calls—an increase of 12 percent.

The average time required to complete toll board calls in June 1945 was 3.4 minutes—an increase of 0.1 minute when compared with a year ago.

*Abandonments.*—Three applications were filed pursuant to section 214 of the Communications Act requesting authority to discontinue toll service to three towns on the Western Union telephone network. Authority in each of these cases was granted by the Commission, since adequate telephone toll service is provided by the Bell system to these points.

Pursuant to the requirements of the Board of War Communications Order No. 10, the Commission has been notified of the closing of 1 small rural exchange, 10 telephone toll stations, 166 telephone toll stations with telegraph listings, and the removal of 7,620 miles of copper wire, 874 miles of iron wire, 231 miles of steel wire, 31 miles of cable and 459 miles of poles. Except in the case of the small rural exchange serving a very few subscribers, these abandonments have not affected service and result mainly from the substitution of cable for aerial wire routes and the involuntary removal of telephone stations. The materials salvaged, particularly copper, as a result of these operations, are available for future construction, thus supplementing the nation's stockpile of critical materials.

*Interstate and foreign telephone toll service at Maryville, Mo., and surrounding rural areas.*—On February 20, 1945, the Commission issued an order instituting an investigation to determine whether adequate and comprehensive telephone service was available to persons residing at Maryville, Mo., and its surrounding rural areas. This action was taken by the Commission because it appeared that the subscribers of the People's Telephone Exchange, Inc., which operated a telephone exchange serving Maryville and its surrounding areas, had no interstate and foreign telephone service except to certain nearby communities in Iowa. It further appeared that the Hanamo Telephone Co., which also operated a telephone exchange in Maryville, connected with the lines of the Southwestern Bell Telephone Co. by means of which interstate and foreign telephone toll service was available to its subscribers; and that the Peoples Telephone Exchange requested both Hanamo and Southwestern Bell to establish a connection with its facilities, but that such requests were refused. Accordingly, the Commission's order also directed Southwestern Bell and Hanamo to show cause why the Commission should not order each or either of them, pursuant to section 201 of the Communications Act of 1934, as amended, to establish a physical connection of their facilities with those of the Peoples Tele-

phone Exchange, and also directed Southwestern Bell to show cause why the Commission should not order it, pursuant to section 214 of the Communications Act, to extend its lines to connect with the facilities of the Peoples Telephone Exchange.

The proceedings in this matter are pending further action by the Commission, it appearing that since the Commission's order of investigation was issued, the Hanamo and Peoples companies have been consolidated into the Nodaway Telephone Co., and that interstate and foreign telephone toll service is now available to all subscribers of both companies. It appears that physical consolidation of the two exchanges will be accomplished in the near future.

*Domestic radiotelephone services.*—New developments in the radio-communications art have indicated the apparent feasibility of extending common carrier communications service via radio, to all types of mobile vehicles on land, the sea, and in the air. This means that the mobile common carrier radio services heretofore limited exclusively in operation for communications between waterborne vessels and shore connections will probably be extended to passengers in airborne craft as well as to persons in automobiles, trains, busses, and other vehicles where wire communication is not feasible. Great public interest has already been evinced in this service by such groups as doctors, delivery services, truck and bus carrier organizations, taxicabs, etc. Many Bell system companies, serving some of the principal cities of this country, have filed applications for experimental authorization to inaugurate this service.

The wartime developments in the art have also opened the way to a great extension in the field of radio relays. These developments look to the installation of radio relay telephone circuits which will further extend and enhance existing radio telephone and wire networks helping to make available radio telephone service to rural or isolated areas where such service was not before feasible. A further major development along this line relates to the experimentation being conducted with a view to the use of these circuits for the transmission of both aural and visual program material, aircraft and ship position reporting service, etc. During the fiscal year, experimental authorizations for the construction of stations of this type were granted to American Telephone & Telegraph Co., International Business Machines Corp., General Electric Co., Raytheon Manufacturing Co.

*Fixed public and marine services in Alaska.*—During the fiscal year, 781 applications relating to the operation of both telephone and telegraph common carrier stations in Alaska were granted. Included among these were 49 authorizations for new facilities, bringing the total count of Alaskan common carrier stations to 648.

*International radiotelephone circuits.*—A new circuit was established between the United States and Quito, Ecuador during the United Nations Conference, and a new circuit was also opened between San Francisco and Khabarovsk, USSR, to supplement the existing New York-Moscow circuit. During the fiscal year the New York-Rome radiotelephone circuit was re-established, with Italcable operating the foreign terminal. Construction of facilities for a circuit between San Juan, P. R., and St. Thomas, V. I., was authorized but as of June 30, 1945, the circuit had not yet been opened to the public. Radiotelephone tests which were conducted with Afghanistan indicated that a circuit with such country could not be operated on a satisfactory basis until

more efficient equipment is installed at the foreign terminal. Similarly the establishment of a new direct circuit to China is contingent upon the installation of new equipment at the Chinese terminal. During the fiscal year, a number of so-called cue channels used for controlling program transmission, were established on a temporary basis by the American Telephone & Telegraph Co. and by certain of the radiotelegraph carriers.

As a result of the end of the war in Europe, the Board of War Communications on May 10, 1945, canceled all of its orders restricting public radiotelephone service and the Office of Censorship undertook to formulate the necessary rules relating to the censorship on all of this service.

During the fiscal year 81 applications were received for point-to-point telephone service and 82 authorizations were issued. As of June 30, 1945, there were 16 licensed radiotelephone stations (including 3 domestic stations used for short distance toll telephone service within the United States).

#### RATES AND TARIFFS

*Rate reductions—American Telephone & Telegraph Co., long lines department, and Associated Bell system companies.*—Following negotiations by the Commission with the American Telephone & Telegraph Co. the Bell system agreed to effect an annual reduction in rates for long distance interstate telephone service anywhere in the United States beyond the distance of 790 miles and for foreign long distance telephone service beyond 810 miles between points in the United States and points in Canada, effective July 1, 1945. It is estimated that such reduced rates will save users of long distance telephone service approximately \$21,000,000 a year. Individual reductions range from 10 to 37 percent, varying with distance and type of service. Coast-to-coast daytime station-to-station calls are reduced from \$4 to \$2.50 by reason of this reduction. When the Commission was created in 1934, the rate for a coast-to-coast call was \$10.25. The Commission has been successful in obtaining subsequent reductions in this rate as follows: 1936, \$8.50; 1937, \$7.25; 1940, \$4.

*Special telephone charges of hotels, apartment houses, and clubs on interstate and foreign communications.*—The United States Supreme Court on May 21, 1945, affirmed the decision of the Federal district court in Washington, D. C., enjoining various hotels in that city from continuing to collect surcharges on interstate and foreign telephone toll calls. This injunction was to enforce a provision included in message toll telephone tariffs filed by the Chesapeake & Potomac Telephone Co. (Washington, D. C.) with this Commission, effective February 5, 1944, providing that "message toll telephone service is furnished to hotels, apartment houses, and clubs upon the condition that use of the service by guests, tenants, members, or others shall not be made subject to any charge by any hotel, apartment house, or club in addition to the message toll charges of the telephone company, as set forth in this tariff." Identical tariff provisions had also been filed by the other Bell system telephone companies. The Supreme Court held that under the Communications Act of 1934, as amended, the tariff provision in question was a valid regulation of the use of telephone service; that a departure from this regulation was a viola-

tion of the Communications Act; and that a prosecution of an action to restrain such violation was authorized.

The Supreme Court, on May 28, 1945, in a per curiam opinion, also affirmed a decision of the Federal district court in New York, N. Y., enjoining various hotels in that city from continuing to collect surcharges on interstate and foreign telephone toll calls in violation of a tariff regulation of the New York Telephone Co. like the above-quoted regulation of the Chesapeake company. In this case, the New York Telephone Co. and the American Telephone & Telegraph Co. were also enjoined from furnishing interstate and foreign long distance telephone service to such of the defendant hotels as continued to violate the tariff regulation in question. On June 8, 1945, an injunction was granted by the Federal district court in Chicago, Ill., enjoining the collection of surcharges by various hotels in that city and enjoining the Illinois Bell Telephone Co. and the American Telephone & Telegraph Co. from giving interstate foreign toll service to any defendant hotel which continued to collect surcharges in violation of the tariff provision in question.

These enforcement proceedings were instituted by the Attorney General at the Commission's request, to enforce the tariff provision in question. (See pp. 5-6 for further discussion of the Supreme Court and the district court decisions.)

Complaints have been filed with the Commission by certain hotel associations against the Bell system telephone companies attacking the reasonableness of the tariff prohibition against collection of surcharges. At the request of the complainants, however, the hearings on these complaints have been postponed indefinitely.

It is estimated that elimination of these hotel surcharges will result in a saving to the users of the service of approximately \$2,000,000 annually.

*Reductions in rates for overseas message toll and program transmission services.*—In the Commission's annual report for the fiscal year ended June 30, 1944, it was indicated that the American Telephone & Telegraph Co. had filed amended tariffs to become effective August 1, 1944, reducing the 3-minute week-day and Sunday rates for overseas message toll telephone service between the United States on the one hand and Argentina, Brazil, Chile, Peru, Colombia, Haiti, and Puerto Rico, on the other hand, and that rates for overseas program transmission channels would be reduced between the United States and the countries named, except Puerto Rico.

Following these changes the rates for overseas message toll service were substantially reduced between the United States and Costa Rica, Curacao, Guatemala, Honduras, Nicaragua, Panama, and Surinam on September 1, 1944; to and from Bahama Islands, Jamaica, and Hawaii on November 1, 1944; Bermuda on December 1, 1944; Trinidad on February 1, 1945; and Great Britain on June 23, 1945. The charge for a three-minute telephone call between New York City and London is now \$12 as compared with the former week-day rate of \$21.

On May 1, 1945, reduced rates for night message toll service were established to and from Brazil. The charges for program transmission channels are based on the message toll telephone rates and concurrent reductions followed for this service. Prior to the close of the year the company had filed amended tariff schedules reducing the rates for message toll and program services between the United States on

the one hand and Switzerland and Italy on the other hand. It had also reported the progress of negotiations tending toward lower rates to Australia, Barbados, Belgium, Bolivia, Holland, Norway, Paraguay, Portugal, Russia, and Uruguay.

Effective August 4, 1944, Press Wireless, Inc., established rates and regulations for "Leased Radiotelephone Service." This service permits a customer to select the frequencies desired by means of remote-control apparatus on his premises.

Effective August 26, 1944, Press Wireless, Inc., established rates for voice scheduled transmission service. This service permits for the first time the transmission of multiple address press messages by voice.

On September 24, 1944, Press Wireless, Inc., established point-to-point addressed program transmission service between New York and the liberated area of Belgium and the occupied area of Germany, and on November 15, 1944, to and from the Philippines.

Effective November 21, 1944, the Public Utilities California Corp. reduced rates for both interstate and intrastate message toll telephone service, the total annual savings to users being approximately \$8,500.

Effective December 20, 1944, the Lorain County Radio Corp. discontinued report charges in connection with ship telephone service on the Great Lakes.

Effective January 1, 1945, as a result of the purchase of the Bridgeport Telephone & Telegraph Co. (Calif.) by the Interstate Telegraph Co., a reduction was made in rates for message toll telephone service.

Effective January 18, 1945, R. C. A. Communications, Inc., established rates for program transmission and reception service between New York and France.

Effective March 4, 1945, R. C. A. Communications, Inc., established rates for monthly program transmission service between New York, N. Y., and Buenos Aires, Argentina.

Effective March 13, 1945, the Bell Telephone Co. of Pennsylvania, the Diamond State Telephone Co. and the New Jersey Bell Telephone Co. discontinued the so-called "qualified toll line service." Under this service a 10-cent additional charge was applicable on message toll calls between certain exchanges in New Jersey and certain exchanges in Delaware and Pennsylvania.

Effective April 15, 1945, the American Telephone & Telegraph Co. reduced the rates for monthly program transmission service between New York and London, resulting in a savings of approximately \$150,000 annually.

Effective May 7, 1945, R. C. A. Communications, Inc., reduced the rates for program transmission service between the United States and Ecuador.

On June 12, 1945, the Pacific Telephone & Telegraph Co. filed amended tariff schedules effective on July 15, 1945, establishing rates and regulations for ship telephone service through its new coastal harbor station at Eureka, Calif.

On June 29, 1945, the New England Telephone & Telegraph Co. filed amended tariff schedules, effective August 1, 1945, reducing the landline charges in connection with ship telephone service through its coastal harbor radiotelephone station at Boston, Mass.

*Bell system license service contracts.*—The Commission, acting in close cooperation with the committee designated by the National Association of Railroad and Utilities Commissioners, is continuing

its investigation of services performed by the American Telephone & Telegraph Co. for the Bell system associated companies and the American Telephone & Telegraph's long lines department, allegedly in fulfillment of the obligations imposed by the "license contract" between the American company and the 21 associated operating telephone companies. Studies are being conducted which include analyses of services rendered, the cost incurred in performing such services, and the reasonableness of the methods used in allocating such costs among the operating companies, including the long lines department.

*Division of revenue contracts between American Telephone & Telegraph Co. and the associated companies.*—During 1944 and 1945 the American Telephone & Telegraph Co. entered into new contracts with most of the associated companies for the division of revenues from interstate telephone toll service on hauls of more than 40 airline miles. Under these contracts the long lines department and the associated company agreed to divide net operating income from this business (before Federal income taxes) on the basis of the relative book cost of plant contributed by each of the contracting companies. The procedures for separations conform substantially to those considered at the public hearings. The results of operations under the new contract are being carefully studied.

*Rate schedules.*—At the close of the year, 345 communication carriers had tariffs and concurrences on file with the Commission.

Numerous irregularities in the rate schedules were corrected or eliminated through correspondence with the carriers.

*Special permission.*—During the year, 43 applications for special permission to make changes in the tariffs or to file tariffs to become effective on less than statutory notice were received from telephone carriers, all of which were granted.

#### SUPERVISION OF ACCOUNTS

*New York Telephone Co. accounting.*—On January 2, 1945, a three-judge district court, upon complaint by the New York Telephone Co., permanently enjoined and set aside the Commission's order of December 14, 1943, directing the New York Telephone Co. to charge \$4,166,510.57 to its appropriate surplus accounts, which amount, after investigation and hearings by the Commission, was found to represent an inflationary write-up in the company's plant accounts. In a proceeding described in the last annual report of the Commission, the Commission had found that such write-up resulted from certain transfers of property to the New York Telephone Co. by its parent company, the American Telephone & Telegraph Co., at "prices" in excess of the net book cost to the parent company. This case is now pending before the United States Supreme Court. (For further discussion of the district court's decision see p. 4.)

*Uniform system of accounts.*—Several amendments were made to the uniform system of accounts prescribed by the Commission. These amendments, simplified the accounting requirements without sacrifice of records of essential accounting information. Among these amendments, for example, were provisions for direct credits to the telephone plant accounts of amounts representing property contributed to telephone carriers and the concurrent elimination of the liability account for such contributions. This change in accounting procedure simplifies the utilization of the accounts in rate cases.

Some progress was made toward a general revision of the uniform system of accounts for class A and class B telephone companies, prescribed by the Commission on June 19, 1935. Changes in the communications art and in the nature of the operations of the carriers as well as advancements in the science of accounting, particularly those that tend to make the books of account more informative, lead to the natural outmoding of many of the requirements of a uniform system of accounts and lead to the need for a comprehensive revision of such a system.

*Original cost restatements and disposition of plant acquisition adjustments.*—Efforts were continued toward appropriate adjustment of carriers' accounts reflecting amounts, reported as valid cost of communicating plant, in excess of prescribed original cost. Such amounts included in plant acquisition adjustment accounts were reduced during this year to the extent of approximately \$3,000,000. In certain instances amounts were disposed of immediately through charges to income or surplus; in others the Commission approved amortization, through charges to income or surplus, over periods ranging up to 15 years. These reductions were accomplished without resort to formal proceedings. Reductions in larger amounts are expected to be effected in the future.

*Continuing property records.*—The date for completion of continuing property records has been extended from June 30, 1945, to June 30, 1946. Requirements of the uniform system of accounts with respect to the plans for the installation and maintenance of continuing property records have been the subject of conferences among representatives of this Commission and those of State commissions and the carriers. The carriers have substantially complied with such requirements.

*Pacific Coast restatements.*—As a result of further studies by the Commission and exchanges of views with the West Coast Telephone Co. and the State commissions of Oregon and Washington, the recorded investment of the telephone company was reduced by approximately \$1,800,000.

*Depreciation.*—Further studies were pursued regarding the changes in, and the property of, the depreciation rates of common carriers by wire and radio, in view of the vital importance of this work to the regulatory duties of the Commission with respect to rates and charges.

*Relief and pensions.*—A study was made of the proposed revision by the Bell system telephone companies of their actuarial computations and the resultant payments into their pension-trust funds, the revision being necessitated by the alleged increase in wage and salary scales. Certain studies were made with respect to the propriety of the methods used by certain carriers to determine the adequacy of the pension-trust funds. Consideration was given to the matter of charging current operating expenses with the cost of pensions based on service prior to the adoption of the pension plan. Other studies were also made of the data which were submitted by communication carriers regarding their pension plans.

*Pennsylvania Telephone Corp. accounting.*—On February 16, 1944, the Commission ordered a general investigation into the accounting performed, and the accounts, records, and memoranda kept by the Pennsylvania Telephone Corp. with respect to all entries made in its



account 100.4 "Plant Acquisition Adjustment," and further ordered that all charges to operating expenses which were made on or after January 1, 1943, for the purpose of amortizing the amounts in said account 100.4 be suspended, pending determination by the Commission as to the reasonableness and propriety of such charges. The company was also ordered to appear and show cause why the Commission should not refer the matter of certain apparent accounting violations to the Attorney General of the United States for the institution of appropriate proceedings. These violations involved the practice of making charges to operating expense to amortize amounts in its account 100.4, without the prior authorization of the Commission, as required by the Commission's accounting orders and regulations. Hearings in this matter were held in March 1944, in conjunction with the Pennsylvania Public Utilities Commission, and further hearings are pending.

*Miscellaneous.*—Other activities of the Commission in this field include:

Completed studies in the offices of two large telephone companies of the policies and practices of the carriers in extending credit and the accounting performed for uncollectible items.

Continued studies of the relative magnitude of the earnings of the carriers in relation to their investments.

Continued studies of American Telephone & Telegraph Co. long lines department, with respect to plant additions, working capital requirements, depreciation reserves, receipts and payments for lease and joint use of plant, and division of revenues from joint interstate business with other participating carriers.

The annual report form (Form M) for telephone companies was revised to reflect the changes in the methods of classifying employes (referred to in the report for the fiscal year 1944), to provide a more consistent method of reporting the carrier's depreciation practices, and to eliminate parts of several schedules of detailed information not deemed necessary of compilation during the wartime shortage of personnel.

After extended conferences among representatives of the Commission, the State commissions, and the telephone industry, amendments simplifying and clarifying the "standard practices for the establishment and maintenance of continuing property records by telephone companies" were adopted by the Commission.

#### ECONOMICS AND STATISTICS

*Economic studies.*—Basic economic studies were begun in 1945 on several questions related to the telephone industry. One of these concerned the availability of service. A preliminary report on some aspects of the availability of landline communications service was prepared and published in October 1944. While such study dealt with both telegraph and telephone service, the most striking result of the analysis was the disclosure of the declining trend which prevailed between 1920 and 1940 in the availability of telephone service to farmers. Between those years the number of telephones on farms decreased 39 percent while the number of farms with the dwelling lighted by electricity increased 34 percent.

*Statistics and general studies.*—Annual reports containing financial and operating data were filed by 156 common carriers, and 41 controlling companies for the calendar year 1944. The number of common carriers reporting includes 129 telephone and 27 wire telegraph, ocean cable, and radiotelegraph carriers.

Considerable data are shown in the publication "Statistics of the Communications Industry in the United States," which is published annually. A few financial and operating items are shown in the following table, which were compiled from the annual reports filed by telephone carriers:

*Telephone carriers*

Item	1944	1943	Percent, increase or (decrease)
Investment in plant and equipment.....	\$5,856,316,360	\$5,749,404,257	1.86
Depreciation and amortization reserves.....	\$1,987,629,404	\$1,815,817,128	9.46
Net investment in plant and equipment.....	\$3,868,687,956	\$3,933,587,129	(1.65)
Local service revenues.....	\$1,052,143,699	\$1,015,417,529	3.62
Toll service revenues.....	\$766,160,211	\$683,249,698	12.13
Total operating revenues <sup>1</sup> .....	\$1,904,406,470	\$1,779,244,520	7.03
Operating expenses <sup>1</sup> .....	\$1,234,521,876	\$1,143,350,306	7.97
Taxes, including income and excess profits.....	\$438,581,635	\$393,854,121	11.36
Net operating income after all taxes.....	\$231,303,259	\$242,040,393	(4.44)
Net income.....	\$183,740,662	\$194,244,968	(5.41)
Dividends paid.....	\$185,670,632	\$181,860,721	2.09
Company telephones:			
Business.....	8,339,007	8,399,888	(.61)
Residential.....	15,044,664	14,683,244	2.46
Average number of calls originating per month:			
Local <sup>2</sup> .....	3,225,654,398	3,232,537,623	(.21)
Toll.....	132,586,772	121,494,120	9.13
Number of employes at end of October:			
Male.....	365,308	368,603	(.89)
Female.....	102,230	103,330	(1.06)
Total.....	263,078	265,273	(.83)
Total pay roll for the year.....	\$807,110,401	\$752,259,155	7.29

<sup>1</sup> Intercompany general service and license fees and rents amounting to approximately \$35,000,000 for each of the years 1944 and 1943, have not been eliminated.

<sup>2</sup> Partly estimated.

## 2. TELEGRAPH (WIRE, CABLE, RADIO)

### (a) Domestic

#### SERVICE AND FACILITIES

*Integration of domestic telegraph systems—Consolidation of telegraph facilities.*—Following the Commission's final report and order authorizing and approving merger of Western Union and Postal facilities (discussed at length in our tenth annual report), Western Union has, with the exception of 3 functional offices, completed the consolidation of duplicating telegraph offices. Between October 7, 1943, and June 30, 1945, the following offices have been closed: Functional, 87; tributary, 637; branch, 530; agency, 462; joint, 27. As part of the consolidation program, 105,682 duplicate call boxes and 3,682 duplicate teleprinter customer tie lines were removed. The removal or abandonment of duplicating trunk pole lines has not, as yet, been undertaken although local and branch line facilities comprising 6,000 miles of wire and 324 miles of pole line have been removed.

During the year, Western Union opened new offices as follows: Tributary, 24; branch, 32; agency, 169; joint, 33; and the company installed 1,983 new customer teleprinter tie lines.

*Integration of Postal Telegraph employes into the Western Union system.*—In the course of the hearings on the application of the Western Union Telegraph Co. and Postal Telegraph, Inc., to merge various commitments were made by Western Union on matters of seniority, job assignment and wage parity of employes affected by the merger. Compliance with these commitments was subsequently incorporated by the Commission as a condition in numerous orders issued under section 214 of the Communications Act authorizing Western Union to close former Postal functional offices. Disputes arose subsequent to merger and numerous complaints were received by the Commission with respect to compliance by Western Union with its commitments. Arbitration machinery was established by the National War Labor Board in June 1944, for the settlement of these disputes and under this machinery, integration of the two labor forces was substantially completed. An employe election was held by the National Labor Relations Board and in January 1945, the American Federation of Labor was certified as the collective bargaining representative for employes in six of the seven divisions of the Western Union system. Thereupon, the A. F. of L. challenged the authority of the arbitrator to continue the settlement of disputes presented to him by ex-Postal employes and, at the close of the fiscal year, the National War Labor Board suspended further arbitration of these disputes outside New York City pending disposition of the union's protest.

*Construction of wire facilities.*—During the year under report, 102 applications for wire telegraph construction certificates were filed with the Commission and 8 were on hand from the preceding year. Of these 104 were granted and 6 were pending at the close of the year. The authorizations involved the construction of 269,965 channel miles of carrier systems at an estimated cost of \$1,162,651 and the leasing of approximately 2,214 miles of circuits by the applicants.

A notable improvement in Western Union's method of handling traffic in the Pacific coast area resulted from the inauguration on December 30, 1944, of the company's reperforator switching office in Oakland, Calif. This large office, operating direct channels to many cities in the country, provides methods for the rapid relaying and routing of telegraph messages in this important area.

New telegraph carrier systems were installed by Western Union during the year between Chicago and St. Louis and between New York and Washington. Carrier systems provide high grade communication channels at relatively low cost and definitely tend to improve the stability of transmission.

*Speed of service.*—The quality of telegraph service supplied by Western Union continued to improve as the merging of personnel and facilities progressed. The average time required for the fastest 95 percent of ordinary full rate messages to be relayed through a telegraph message center (for Western Union and former Postal offices combined) in June, 1944, was 9.8 minutes. In June 1945 the performance had improved to 8.8 minutes. The percent of such messages completed in 15 minutes was 82 and 87.8, respectively.

The volume of TWX connections (Teletypewriter Exchange Service operated by the Bell Telephone system), declined from 1,214,791 in June 1944 to 1,095,687 in June 1945—a reduction of 10 percent. The

average time required to establish TWX connections between subscribers has improved from 1.8 minutes in June 1944 to 1.6 minutes.

*Domestic radiotelegraph.*—As in the case of radiotelephony, many new developments have been made and are being made in radiotelegraphy. During the fiscal year the Western Union Telegraph Co., the American Telephone & Telegraph Co. and other communications common carriers applied for and obtained experimental authorizations looking forward to the development of radio relay systems capable of carrying multitelegraphic as well as other types of communications channels. A number of applications have been granted to enable other organizations to carry on similar experiments (e. g., International Business Machine Corp., General Electric Co., Westinghouse Electric Co., Raytheon Manufacturing Co.).

Radiotelegraph relay systems may prove capable of carrying a great number of telegraph channels of all types, including facsimile. Such systems will allow the Western Union Co. to remove some of its pole lines on main line trunk routes.

*Discontinuance, reduction, or impairment of service.*—Section 214 of the Communications Act of 1934 was amended by Congress on March 6, 1943, to provide, among other things, that no carrier shall discontinue, reduce, or impair service to a community, or part of a community, unless and until it has obtained from the Commission a certificate that neither the present nor future public convenience and necessity will be adversely affected thereby.

As of the beginning of the fiscal year, 13 applications filed under this amendment were pending and 133 were received during the year. Of those received, 38 were for authority to reduce office hours, 51 to close agency offices at military points, 28 to close railroad operated agency offices due to abandonment by railroads or shortage of railroad operators, 6 to close branch offices, 6 to close agency offices, 2 to close main offices, 1 to remove an ocean cable, and 1 to discontinue operation by the substitution of another company. With the exception of a very few cases alternate service was provided to the community or part of a community affected. Of these 146 applications, 95 were granted, 3 were denied, 1 was withdrawn, and 47 were pending as of June 30, 1945.

#### RATES AND TARIFFS

*Rationalization of the domestic telegraph rate structure.*—In the report accompanying its order of approval of the merger of the domestic telegraph carriers, the Commission pointed out that it recognized that the present telegraph rate structures were developed under competitive conditions which produced numerous anomalies and questionable discriminations, and which resulted in the establishment of preferential rate classifications; that the elimination of competition within the domestic telegraph industry will permit correction of these and other anomalies; and that the economies and other benefits resulting from the merger are expected to make possible substantial reductions in rates. The Commission observed that such reductions should be accompanied by a rationalization of the rate structure so that unwarranted preferences are eliminated, and the basic classifications are established in such a manner as to stimulate greatly increased volumes of traffic, with resulting savings in cost. The Commission is now studying telegraph rates and services with a view to accomplishing the merger objectives outlined above, and has been following closely

the activities of Western Union in attempting to develop a revised rate structure.

*Telegraph rate changes.*—On July 1, 1944, the American Telephone & Telegraph Co. established rates for 100-speed private line teletypewriter service for a trial period of 1 year at charges 33⅓ percent higher than for 60-speed service. Later in the fiscal year the Pacific Telephone & Telegraph Co. and the Western Union Telegraph Co. established the service at the same charges.

On June 29, 1945, the American Telephone & Telegraph Co. filed amended tariff schedules effective July 1, 1945, reducing the charges for 75- and 100-speed private line teletypewriter service, resulting in an estimated annual saving to users of \$120,000. These reductions followed conferences between representatives of the company and members of the staff of the Commission.

*Government rate order.*—Pursuant to the authority of the Post Roads Act of 1866 and subsequent legislation, the Commission promulgated its annual order fixing rates applicable to United States Government telegraph messages for the ensuing fiscal year beginning July 1, 1945. The new order (No. 125) continues in effect the same rates prescribed for the past fiscal year except for certain minor changes which will result in annual savings to the Government of approximately \$32,900. Since July 1, 1943, the rates for Government domestic telegraph messages have been fixed at 80 percent of the rates charged the public for the same class of service, and the rates for international messages of the United States Government are not to exceed 50 percent of the United States carriers' proportions of the rates for commercial messages of the corresponding classes.

*Special permissions.*—During the year 289 applications for special permissions to make changes in tariffs, or to file tariffs to become effective on less than statutory notice, were received from the carriers rendering domestic and international telegraph services. Of this number 262 were granted, 16 were denied, and 11 were withdrawn.

#### SUPERVISION OF ACCOUNTS

*Uniform systems of accounts.*—Several amendments were made to the uniform systems of accounts prescribed by the Commission.

*Original cost restatement of plant accounts and establishment and maintenance of continuing property records.*—Conferences and examinations conducted by the Commission concerning the accounts and records of Western Union have resulted in substantial progress in connection with the restatement of such accounts on the basis of original cost, and the establishment of property units for accounting purposes and for purposes of continuing property-record procedure required by the Commission's rules and regulations.

*Depreciation.*—Studies of the changes in, and the propriety of, the depreciation rates and the adequacy of the depreciation reserves of telegraph common carriers by wire, cable, and radio were pursued, in view of the vital importance of this work to the regulatory duties of the Commission with respect to rates and charges for communication services.

In the case of Western Union, there was substantial continuation of the program of reducing, on the basis of findings by the Commission's staff, the net recorded investments in fixed capital (that is,

plant investment accounts less depreciation and amortization reserves) by adjustments increasing the reserves and directly reducing the recorded surplus. The total adjustment in this respect as of December 31, 1944, amounted to approximately \$77,400,000. A further proposed adjustment of about \$31,000,000 was the subject of additional study at the end of the year.

*Relief and pensions.*—Further studies were made regarding the matter (which is still pending) of excluding from the current operating expenses of Western Union all pension costs in excess of normal accruals on the full-service basis (that is to say, the respective annual amounts that would be paid into a pension trust fund if the company had established such a fund, during the employes' successive periods of service). Studies were also made of the propriety of the accounting pursued by certain communication carriers in recording the cost of maintaining their pension plans.

*Miscellaneous.*—The annual report form (Form 0) was revised in several instances and particularly to reflect the changes in the methods of classifying the employes of domestic wire telegraph companies.

The time required for the retention by domestic telegraph carriers of copies of telegraph messages transmitted by them was extended to a period of 6 months.

*Statistics and general studies.*—There were 27 wire telegraph, ocean cable, and radiotelegraph carriers that filed annual reports for the year 1944. A few financial and operating items compiled from the report filed by the Western Union Telegraph Co. are shown in the following table. The figures include the ocean cable operations of Western Union, which are not adequately segregated in the report filed by that company to permit segregation from the wire telegraph operations. The data relating to other ocean cable carriers are shown on page 48.

*The Western Union Telegraph Co.*

Item	1944	1943	Percent, increase or (decrease)
Investment in plant and equipment.....	<sup>1</sup> \$389,086,101	\$344,034,810	13.09
Depreciation and amortization reserves.....	<sup>1</sup> 164,991,222	112,814,280	46.25
Net investment in plant and equipment.....	\$224,094,879	\$231,220,530	(3.08)
Domestic service revenues.....	\$158,032,270	\$153,133,698	3.20
Foreign service revenues.....	\$12,199,047	\$11,507,878	6.01
Total operating revenues.....	\$185,903,644	\$178,887,319	3.92
Operating expenses, depreciation, and other operating revenue deductions.....	\$166,277,089	\$105,168,770	.67
Net operating revenues.....	\$19,626,555	\$13,718,549	43.07
Income and excess profits taxes.....	\$3,831,000	\$4,940,000	(22.45)
Net income.....	\$8,316,229	\$1,750,626	375.04
Dividends declared.....	\$2,166,747	\$2,090,080	3.67
Revenue messages transmitted:			
Domestic.....	233,188,694	232,083,099	.48
Foreign.....	5,515,588	5,656,573	(2.49)
Number of employes at end of June.....	63,818	68,846	(7.30)
Total pay roll for the year.....	\$116,130,330	\$114,872,601	1.09

<sup>1</sup> Not comparable with amounts reported for Dec. 31, 1943, because of accounting adjustments for Postal Telegraph plant purchased Oct. 7, 1943; comparable 1943 amounts are \$390,600,846 and \$165,340,316 for plant and depreciation allowance, respectively.

(b) International

SERVICE AND FACILITIES

*General.*—In March 1945, the Senate Committee on Interstate Commerce held hearings pursuant to Senate Resolution 187, Seventy-

eighth Congress, (as extended by S. Res. 24, 79th Cong.), directing a study of international communications by wire and radio. The Commission, through its Chairman, presented testimony at such hearing.

In April 1945, Press Wireless, Inc., filed a petition for the assignment to it of not less than 15 additional frequencies and requested the Commission to hold hearings to determine the relative efficiency of the use being made by the various carriers of the frequencies presently assigned to them. As of the close of the fiscal year, no final disposition of this petition had been made.

The Commission actively participated in the preparation of the United States proposals for the Third Inter-American Radio Communications Conference to be held in Rio de Janeiro in September 1945, and also continued detailed preparations for the World Telecommunications Conference expected to be held in 1946, and for various telecommunications conferences with other countries, preliminary to the World Conference.

During the fiscal year, Globe Wireless, Inc., which had discontinued commercial operations of its radiotelegraph stations on June 3, 1942, and had leased its facilities to the United States Army, resumed commercial operation of its radiotelegraph circuit between San Francisco and Honolulu, T. H. The reactivation of this company's station in New York was approved on May 3, 1945, but has not yet been placed in operation. Prior to the war, Globe Wireless, in addition to its circuit to Hawaii, operated circuits from the United States to China, the Philippine Islands, Cuba, and Colombia.

*Radiotelegraph circuits.*—During the fiscal year, radio-telegraph circuits were established between the United States, on the one hand, and France, Belgium, Netherlands, Denmark, Norway, and Czechoslovakia on the other hand, restoring direct radiotelegraph services which had existed prior to the war. In each of these cases, except Belgium and Netherlands, Press Wireless, Inc., was authorized to establish a circuit for the handling of press traffic only, while one or more of the other United States carriers was authorized to open circuits handling all classes of traffic. In addition to these circuits with fixed stations in liberated European countries, three carriers were authorized to communicate with portable radiotelegraph stations which were operated by them at various points in Europe, as directed by the military authorities. During the active stages of hostilities, these portable stations accompanied the various units of the United States armed forces, and since the conclusion of the European war, such stations have been located in various parts of Germany and Austria, which are under American occupation. A new circuit to Rumania, which was not in existence prior to the war, was also established for general commercial traffic, and an additional press circuit to such country was authorized but had not been placed in operation as of the close of the fiscal year.

The establishment of new circuits to the Far East was on a more limited scale, since active hostilities were in progress in the Pacific area throughout the fiscal year. At the request of the military authorities in the Philippines, one of the United States carriers installed a portable station at Leyte, communicating with its United States terminal, in order to handle all classes of messages passed by Army

ensorship. This station was ultimately moved to Manila, where it is now installed on a permanent basis. Thereafter a second United States carrier was authorized to reopen its prewar circuits between Manila and the United States and between Manila and Hawaii, involving the installation by it of a station at Manila.

New radiotelegraph services instituted during the fiscal year to points in the Western Hemisphere included the establishment of additional circuits for handling press and Government traffic between New York and Buenos Aires and between New York and Santiago, Chile. A direct radiotelegraph circuit between San Francisco and Rio de Janeiro was established at the request of the Brazilian delegation to the United States Conference, and this circuit was continued on a temporary basis after the close of the conference. At the request of the Mexican Government, the Commission authorized the establishment of a new circuit between New Orleans and Merida, Mexico, in order to expedite message traffic between the United States and the Yucatan Peninsula. At the request of the Colombian Government, the Commission also authorized the establishment of a new circuit between Boston and Bogota, Colombia, to supplement the handling of traffic from Miami to that country. A construction permit was granted for the erection of a new radiotelegraph station on St. Thomas, V. I., for communication with San Juan, P. R. This was the only new point-to-point radiotelegraph station licensed during the 1945 fiscal year, and when in operation, will be used to supplement existing cable circuits between the Virgin Islands and Puerto Rico.

In accordance with outstanding recommendations of the Board of War Communications, the Commission continued to refer to the Board all applications for the establishment of transoceanic circuits and to authorize such circuits on a temporary basis only, for a period not to exceed 1 year. Wartime procedures, involving the maintenance of close liaison on these matters with the Board of War Communication, the Department of State and the Joint Chiefs of Staff, were continued. During the fiscal year the Board of War Communications relaxed its former policy of approving the establishment of only one circuit to points in the war zones, and approved the opening of circuits by all interested United States carriers, permitting the Commission to authorize competitive circuits by qualified carriers. All circuits authorized by the Commission were subject to the condition that interference would not be caused to operational circuits of the United States armed forces.

The expansion of radiotelegraph service while hostilities were still in progress caused increased congestion in the frequency spectrum. Such difficulties were particularly acute in the Far East after increased war activities shifted to that region, and because of the continuance of communication needs of occupation forces in Europe, little relief was experienced in that area.

A total of 273 applications, covering various matters, were received and during the fiscal year 282 authorizations were issued. As of the end of the fiscal year a total of 36 fixed public point-to-point radiotelegraph stations were licensed.

*Ocean cables.*—During the fiscal year cable communication services of the United States companies to continental Europe were restored. Direct facilities were made available to France and Italy,



service with the latter country being provided over a former enemy-owned cable between Italy and the Azores. Service to the United Kingdom, Eire, and the Azores, which had not been interrupted during the war, was continued.

The Commission approved the abandonment of 11 short sections of cable totaling 5,073 nautical miles (between various points in Central and South America) the continued use of which had become uneconomical because of extreme age. In view of the small volume of traffic handled over these sections and the availability of alternate wireline facilities connecting the points in question with other cable stations, the Commission determined that public convenience or necessity would not be adversely affected by these abandonments. The Pacific cable between Midway Island and Guam was restored during the fiscal year and reopened for the handling of commercial correspondence, thus providing cable facilities for public communications from the United States to Guam.

#### RATES AND TARIFFS

*Rates and charges for telegraph communication service between the United States and foreign points.*—In line with objectives of obtaining lower and generally uniform international communications rates throughout the world, the Commission, in April 1945, authorized the principal international cable and radiotelegraph carriers to file revised tariff schedules on less than statutory notice, effective May 1, 1945, providing for a uniform 20 cents per word basic rate on full rate messages from the United States gateway points to Europe, Central America, West Indies, South America, and the Philippine Islands. Prior existing rates to European points ranged from 23 to 36 cents per word and to some Latin American points were as high as 48 cents per word. Corresponding reductions in the other classifications were also effected, such rates being, from United States gateways, as follows: Code, 12 cents per word; deferred, 10 cents per word; night letter, 6 $\frac{2}{3}$  cents per word.

The Commission also authorized Western Union to file on less than statutory notice a uniform charge of 4 cents per full rate word effective May 1, 1945, for transmitting international telegrams overland to and from any point in the United States beyond the gateway cities, replacing charges ranging from 4 to 15 cents per full rate word. The charges of Western Union for the overland transmission of messages in the other classifications have correspondingly been placed on a flat charge basis as follows: Code, 4 cents per word; deferred, 3 cents per word; night letter, 2 cents per word; and United States Government plain language and code, 2 cents per word.

Under the new tariffs, which become effective May 1, 1945, the charges for a full rate telegram to any place in Europe, Latin America, and the Philippine Islands from United States gateway cities, is 20 cents per word; from any other point in the United States, the rate is 24 cents per word.

The over-all matter of international telegraph rates is still under investigation by the Commission in its docket 6569, which is a proceeding involving the rates and charges of all international tele-

graph carriers in connection with telegraph service between the United States and all foreign points.

*Rates between the United States and Brazil.*—The Commission adopted an order on October 9, 1944, suspending, and ordering an investigation into the lawfulness of, certain new rates filed with the Commission by Western Union for telegraph communication service from Brazil to the United States, and further ordering an investigation into the lawfulness of the then existing rates of Western Union for service between the United States and Brazil.

After public hearings and argument, the Commission found that Western Union had failed to show the justness and reasonableness of the differentials shown in its existing tariffs and in its suspended tariffs as between the charges for north-bound telegraph messages from points in Brazil to points in the United States and the charge for similar messages in the reverse direction; that Western Union failed to show the justness and reasonableness of the differentials in such tariffs as between the charges for north-bound plain language and code messages in both the ordinary and Government classifications; and that Western Union's maintenance of, or participation in, charges resulting in the aforementioned differentials constitute or would constitute unjust or unreasonable discrimination. Accordingly, by order dated January 25, 1945, the Commission directed Western Union to rescind and cancel the suspended rates and charges and to revise its then effective tariffs to conform with the conclusions in the Commission's accompanying report. In accordance with the Commission's order, Western Union rescinded and canceled the suspended tariffs and subsequently filed revised tariffs which conformed to the Commission's order.

*Telegraph rate changes.*—On July 11, 1944, the ordinary press rates published by the Western Union Telegraph Co. between the United States and Australia and New Zealand via the Vancouver cable were reduced to the level of the rates for charges by the radiotelegraph carriers for similar messages via San Francisco.

On July 24, 1944, Mackay Radio & Telegraph Co., Inc., reduced the rates for Press Bulletin Service to ships and aircraft by approximately 50 percent.

Effective August 15, 1944, Mackay Radio & Telegraph Co., Inc., and R. C. A. Communications, Inc., reduced the rates for ordinary press messages to Egypt via their direct circuits by 10 cents a word to 8 cents a word from Egypt.

Effective September 1, 1944, All American Cables & Radio, Inc., Mackay Radio & Telegraph Co., Inc., R. C. A. Communications, Inc., and the Western Union Telegraph Co. established specially reduced rates for ordinary and code messages of the Pan American Union and the Pan American Sanitary Bureau from the United States to South and Central America and the West Indies.

On September 20, 1944, rates for telegraph messages from Uruguay to the United States were reduced. The reduction followed conferences between representatives of the Commission and the Uruguayan authorities.

Effective October 1, 1944, Press Wireless, Inc., reduced the rates for United States and Mexican Government messages between the company's offices in the United States and certain points in Mexico.

Effective October 7, 1944, Mackay Radio & Telegraph Co., Inc., reduced its rates for telegraph service between the United States and Vatican City via its direct circuit from 27 to 15 cents per word for full rate messages from or to New York with proportionate reductions for other classes of messages. The Western Union Telegraph Co. filed the same rates effective November 20, 1944.

Effective November 1, 1944, the United States-Liberia Radio Corp., and R. C. A. Communications, Inc., reduced the rates between the United States and Liberia over their direct circuits. Full rates were reduced from 72 to 50 cents per word and ordinary press rates from 24 to 10 cents a word. On January 29, 1945, the same rates were established by other carriers via London.

Effective November 10, 1944, R. C. A. Communications, Inc., reduced the rates for ordinary press messages between the United States and Greece by approximately 3½ cents a word.

On December 1, 1944, R. C. A. Communications, Inc., reduced the rates for ordinary press messages from Colombia to the United States by approximately 1 cent a word.

Effective November 16, 1944, All America Cables & Radio, Inc., and R. C. A. Communications, Inc., reduced the rates for telegraph messages (except ordinary press) from Venezuela to the United States.

Effective December 1, 1944, the Commercial Cable Co., Mackay Radio & Telegraph Co., Inc., and R. C. A. Communications, Inc., reduced the rates for ordinary press messages between the United States and India to 11½ cents a word.

Effective January 1, 1945, All America Cables & Radio, Inc., Mackay Radio & Telegraph Co., Inc., R. C. A. Communications, Inc., and Tropical Radio Telegraph Co. reduced the rates for telegraph messages between San Francisco, Calif., and Costa Rica, Guatemala, Honduras, Nicaragua, and Salvador, to the level of the rates to these countries from New York.

Effective in March, April, and May, 1945, telegraph rates applicable to United States Government messages between United States and certain foreign countries were made applicable to messages of the American Red Cross, the United Service Organizations, and the United Nations Relief and Rehabilitation Administration.

#### SUPERVISION OF ACCOUNTS

*Uniform systems of accounts.*—Several amendments were made to the uniform systems of accounts prescribed by the Commission. These amendments simplified the accounting requirements without sacrifice of records of essential accounting information. Important among such amendments were those extending for 1 year the time allowed for the filing of information with respect to the reclassification of the plant accounts and for the completion of continuing property records of ocean cable companies.

A preliminary draft of a new uniform system of accounts, to apply to international telegraph carriers by cable or radio (or a combination of cable and radio), was prepared and was in process of consideration and verification of factual information by the Commission's staff at the close of the fiscal year.

*Original cost restatements and disposition of plant acquisition adjustments.*—Studies by the international telegraph carriers necessary

for reclassification of their operated plant to conform with provisions of the uniform system of accounts are not yet completed and the time for completion has been extended to January 1, 1946. Substantial progress toward completion has been reported by the carriers.

*Continuous property records.*—The date for completion of continuous property records has been extended from June 30, 1945, to June 30, 1946. The Commission has been working closely with the carriers on the subject of requirements for the filing of plans of methods of procedure in the maintenance of such records, which are being pursued.

*Depreciation.*—Studies of the changes in, and the propriety of, the depreciation rates of the international telegraph common carriers were continued.

*Relief and pensions.*—A further study was made by the Commission of the pension and benefit plans of the several international telegraph carriers in view of the pending study being conducted by the Senate Committee on Interstate Commerce of international communications carriers.

Consideration was given to the matter (still pending) of excluding from current operating expenses of Radiomarine Corp. of America and R. C. A. Communications, Inc., all costs relating to pensions based on service prior to the adoption of their present retirement plan. These companies had discontinued, as of August 19, 1932, the provision for pension benefits to new employes, but have revised, as of December 1, 1944, such provisions for employes who entered the service after August 19, 1932.

*The Commercial Cable Co. accounting.*—The Commission ordered the Commercial Cable Co. on June 5, 1945, to suspend all charges and credits with respect to its plan of accounting for the reduction of its capital, pending submission of proof as to the amounts properly includible in its capital surplus accounts. The order also instituted a general investigation into the accounting performed by the company with respect to its surplus accounts.

## STATISTICS

*Statistics.*—Financial and operating data compiled from the annual reports filed by the principal international carriers are shown in the following tables:

*Ocean Cable Carriers*

Item	1944	1943	Percent, increase or (decrease)
Investment in plant and equipment	\$78,566,249	\$80,830,592	(2.80)
Depreciation and amortization reserves	\$56,017,288	\$58,321,142	(.54)
Net investment in plant and equipment	\$22,548,960	\$24,509,450	(8.00)
Domestic service revenues	\$882,846	\$527,706	29.40
Foreign service revenues	\$15,494,684	\$12,783,442	21.21
Total operating revenues	\$16,908,473	\$14,275,053	18.45
Operating expenses, depreciation, and other operating revenue deductions	\$12,308,622	\$10,432,276	17.99
Net operating revenues	\$4,599,851	\$3,842,777	19.70
Income and excess profits taxes	\$1,977,032	\$1,933,691	2.24
Net income	\$2,591,056	\$1,941,537	33.45
Dividends declared <sup>1</sup>	\$5,491,093	\$811,332	576.80
Revenue messages transmitted:			
Domestic	527,633	399,187	32.18
Foreign	4,343,052	4,102,844	5.85
Number of employes at end of year	3,200	3,023	5.86
Total payroll for the year	\$6,179,706	\$5,443,594	13.52

<sup>1</sup> Includes \$3,535,926 charged to capital surplus.

The figures shown above do not include data relating to the cable operations of the Western Union as they are not adequately segregated from the wire telegraph operations in the reports filed by that company. The number of messages and amounts of revenues derived from cable operations as reported by the Western Union for 1944 and 1943 were as follows:

Item	1944	1943	Percent, increase or (decrease)
Foreign service revenues.....	\$12,199,047	\$11,507,878	6.01
Foreign revenue messages transmitted.....	\$5,515,588	\$5,656,573	(2.49)

*Radiotelegraph carriers*

Item	1944	1943	Percent, increase or (decrease)
Investment in plant and equipment.....	\$26,836,664	\$26,671,808	0.62
Depreciation and amortization reserves.....	\$16,066,358	\$15,693,482	2.38
Net investment in plant and equipment.....	\$10,770,306	\$10,978,321	(1.89)
Continental and insular fixed revenues.....	\$876,240	\$865,179	1.28
Foreign fixed service revenues.....	\$11,713,899	\$8,578,412	36.55
Marine service revenues.....	\$25,087	\$16,933	47.98
Total operating revenues.....	\$16,784,362	\$13,482,746	24.49
Operating expenses, depreciation, and other operating revenue deductions.....	\$12,682,987	\$10,269,573	23.50
Net operating revenues.....	\$4,101,375	\$3,213,173	27.64
Income and excess profits taxes.....	\$4,934,666	\$3,522,964	40.07
Net income.....	\$1,664,327	\$2,069,500	(19.58)
Dividends declared <sup>1</sup> .....	\$1,555,000	\$920,000	69.02
Revenue messages transmitted:			
Continental and insular fixed.....	518,314	655,066	(20.88)
Foreign fixed.....	6,351,607	5,170,231	22.85
Marine.....	10,120	6,831	48.15
Number of employes at end of year.....	3,359	3,293	2.00
Total pay roll for the year.....	\$10,244,629	\$8,087,853	26.67

<sup>1</sup> Includes \$246,420 charged to capital surplus.

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## **CHAPTER V**

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### **Safety and Special Services**

- 1. MARINE SERVICES**
- 2. AVIATION RADIO SERVICES**
- 3. EMERGENCY RADIO SERVICES**
- 4. WAR EMERGENCY RADIO SERVICE**
- 5. EXPERIMENTAL RADIO SERVICES**
- 6. MISCELLANEOUS RADIO SERVICES**
- 7. STATISTICS**
- 8. INSPECTIONS**

## CHAPTER V—SAFETY AND SPECIAL SERVICES

### 1. MARINE SERVICES

#### COASTAL RADIOTELEGRAPH STATIONS

As of June 30, 1945, 34 coastal telegraph stations were licensed by the Commission, exclusive of those in Alaska. Three of these were authorized for limited (governmental) coastal telegraph service and the remaining 31 stations for public coastal telegraph service. During the year 61 applications were received and 46 authorizations issued in the coastal telegraph service. Three coastal telegraph stations, which, because of the wartime restrictions of the Navy Department, had been closed, were opened during the past year and were relicensed by the Commission for public service. These stations are WSC, at Tuckerton, N. J.; WSF, at New York, N. Y.; and WDA at Port Arthur, Tex.

#### COASTAL RADIOTELEPHONE STATIONS

Four stations held licenses for public coastal telegraph service at the close of the fiscal year.

#### COASTAL HARBOR RADIOTELEPHONE STATIONS

At the close of the year, 35 coastal harbor stations were licensed by the Commission, exclusive of those in Alaska. Two of these stations were authorized for limited (governmental) coastal harbor service and the remaining 33 stations were authorized for public coastal harbor service. During the year 67 applications were received and 60 authorizations issued in the coastal harbor service. A new public coastal harbor station, KOE, near Eureka, Calif., established for communication with ships in vicinity of San Francisco, was placed in operation.

#### MARINE RELAY RADIOTELEGRAPH STATIONS

Twenty-one marine relay stations held licenses. During the year 31 applications were received and 28 authorizations were issued. The activity of stations in this classification has increased because of the lifting of wartime security restrictions in the Atlantic and Gulf of Mexico areas. The 3 coastal stations listed above—WSC, WSF, and WDA—also render a marine relay service.

#### MOBILE PRESS STATIONS

There were 3 licensed mobile press stations, 3 applications were received and 3 authorizations issued.

#### RELAXATION OF NAVAL REGULATIONS

The Navy Department still further relaxed the restrictions on the use of radio communication between ships and between ship and shore

which had been imposed pursuant to order Nos. 1 and 2 of the Defense Communications Board (now Board of War Communications).

#### WEATHER AND HYDROGRAPHIC INFORMATION

In cooperation with the Canadian Radio Administration, the United States Weather Bureau, and the United States Naval Authorities, the Commission in previous years has developed schedules for the encoded transmission of weather and hydrographic information to ships in the Great Lakes area. Coastal harbor radio stations authorized to transmit such information in accordance with this schedule were WAY, Lake Bluff, Ill.; WLF, Rogers City, Mich.; WAD, Port Washington, Wis.; WAS, Duluth, Minn.; WBL, Buffalo, N. Y., and WMI, Lorain, Ohio. These authorizations were extended this year with certain changes made in the previously used schedule and with the restrictions relative to the transmission of encoded weather information relaxed to permit transmission of this information in plain language insofar as such transmissions do not conflict with Naval regulations.

#### STUDIES OF LIFEBOAT RADIO EQUIPMENT

The Commission continued its cooperation, in a study being conducted by Government agencies under direction of the Joint Chiefs of Staff, designed to coordinate air and sea rescue work. Projects include the testing of experimental models of lifeboat radio equipment and a survey of the deficiencies of equipment of this nature now in use.

#### APPROVAL OF EQUIPMENT

Several new types of marine radio equipment for use on Board ocean-going vessels which were designed and constructed to meet certain requirements of the Commission's rules and regulations were approved by the Commission.

Three additional types of receivers were approved during the year as capable of being used and operated within the limitation imposed by the Commission concerning the radiation of energy which may be detected at sea by enemy vessels. Four additional types of direction finder receivers were similarly approved. Two portable radio transmitters for use in lifeboats were approved as complying with the applicable rules of the Commission. One radiotelegraph transmitter, designed to operate as an emergency transmitter, was approved by the Commission.

#### EXEMPTIONS

The Commission is authorized by the International Convention for the Safety of Life at Sea, London, 1929, and section 352(b) of the Communications Act of 1934, as amended, to grant exemptions from the ship radio requirements prescribed therein to certain vessels and classes of vessels when navigated within certain specified limits, provided the Commission considers that the route and conditions of the voyage, or other circumstances, are such as to render compliance therewith unnecessary or unreasonable for the purposes of the act and treaty. It has been the policy of the Commission to grant exemption on an annual basis for certain classes of vessels and to exempt individual vessels for limited periods of time sufficient to cover the specified voyages.



The Commission renewed for another year the exemption previously granted to small United States passenger vessels of less than 100 gross tons when navigated off the Gulf Coast solely in coastal waters between Naples, Fla., and New Orleans, La.

In addition to the foregoing class exemptions, the Commission granted exemption for a period of 1 year to certain individual passenger and cargo vessels operating on international voyages.

#### FIXED PUBLIC AND MARINE SERVICES IN ALASKA

At the close of the year, the following stations were authorized by the Commission in the fixed public and public coastal services in the Territory of Alaska:

Coastal Harbor, 124; Coastal Telegraph, 33; Point-to-Point Telegraph, 68; Point-to-Point Telephone, 205.

#### PUBLICATIONS

As in past years, the Commission published a list of United States Great Lakes ship radiotelephone stations. This list, which is in pamphlet form, contains the names of the ships, call letters, ringer numbers, and licensed frequencies. In addition, it contains approved schedules for the transmission of weather and hydrographic information to ships. The Commission regularly furnished the Navy the information necessary for a list of oceangoing radio-equipped ships which it prints and distributes.

#### RULE CHANGES

Using the experience gained by the use of lifeboat radio installations as a guide, the Commission found it necessary to modify many of its rules pertaining to lifeboat installations. The technical requirements for lifeboat transmitters were revised to require higher standards of performance. The use of antennas supported by means of kites or gas-filled balloons was authorized in order to increase the range of the transmitters.

## 2. AVIATION RADIO SERVICES

### GENERAL

The aviation radio services as administered by the Commission cover all non-Government use of radio in the aviation industry for both communication and navigation.

During the year, some of the strain which was imposed on commercial air carriers as a result of the war has been alleviated. The commercial airlines have regained the aircraft which were taken over by the armed forces in the early part of the war, and at the close of the fiscal year were operating a total of 533 aircraft. Of these, 375 are operated by domestic airlines.

The Commission's policy of closely coordinating applications for aviation ground radio facilities and for itinerant aircraft radio stations with the War Production Board was still in effect at the close of the fiscal year. This policy was based on the Commission's Memorandum Opinion dated July 7, 1942, relative to the use of critical

materials to construct or change the facilities of certain classes of radio stations.

The use of itinerant civil aircraft has shown a decided increase during the year ending June 30, 1945. This increase in activity is due to a number of factors, among which are the availability for nonmilitary uses of aviation fuel, aircraft, aircraft accessories, and the lifting of some wartime restrictions on the use of such aircraft. As of June 30, 1945, there were approximately 32,000 aircraft registered with the Civil Aeronautics Administration.

The most pronounced effect of the frequency allocation report on aviation radio will be a gradual transfer of such communication wherever technically practicable to the very high frequency range, primarily the band between 108 and 132 megacycles. While operation in the very high frequency range presents certain limitations on the distance over which communications may be satisfactorily conducted, it also offers a number of advantages when compared to the present system particularly with respect to the very small physical size of antennas and the great reduction in atmospheric noise.

#### AERONAUTICAL RADIO STATIONS

Aeronautical radio stations licensed by the Commission provide the non-Government ground radio facilities to permit air-to-ground and ground-to-air radio communications with aircraft in flight within the United States, its Territories, and possessions and between the United States and Canada. These facilities are primarily used by scheduled air carriers for maintaining necessary communications with aircraft in flight for the safety of life and property in the air and for compliance with the requirements of the Civil Aeronautics Administration. All aeronautical radio stations serving the domestic commercial airlines are licensed to Aeronautical Radio, Inc., a corporation owned by and representing all such airlines. These stations under the Commission's regulations, also must serve itinerant aircraft upon request.

During the past year, 731 applications were received and 665 authorizations issued affecting aeronautical radio stations in the United States, together with 64 applications received and 81 authorizations issued affecting stations in Alaska. As of June 30, 1945, there were 411 such stations in the United States and 66 in Alaska. These figures represent an increase of 46 stations for the United States and a decrease of 13 stations for Alaska during the year. The decrease in the number of stations in Alaska was due primarily to the acquisition and operation by the Civil Aeronautics Administration of 12 stations previously licensed by the Commission to Pan American Airways, Inc.

#### AERONAUTICAL FIXED RADIO STATIONS

Aeronautical fixed radio stations provide for the handling of ground point-to-point communications in connection with and relating solely to the actual aviation needs of the licensees. All such stations serving the domestic commercial airlines in the continental United States are licensed to Aeronautical Radio, Inc.

During the year, 211 applications were received and 130 authorizations issued affecting such stations in the United States. Forty-eight

applications were received and 72 authorizations relating to Alaska stations were issued. As of June 30, 1945, there were 98 such stations in the United States and 59 in Alaska—a decrease of 7 stations in the United States with no change in Alaska. The decrease in the United States may be attributed to a current trend of placing such communications on landline facilities wherever possible.

#### AIRPORT CONTROL RADIO STATIONS

The service performed by airport control stations is primarily concerned with regulating and controlling air traffic within the control area of the airport involved. At airports handling a large volume of air traffic the service of an airport control radio station is essential for the safety of life and property in the air. Since many aircraft may be in the air at various altitudes and approaching or leaving the airport from various directions, this service is invaluable during conditions of low visibility.

Airport control radio stations are normally operated by either the Civil Aeronautics Administration or the operators of the airport. In the latter instance such radio stations are licensed by the Commission.

Sixty-four applications were received and 45 authorizations in connection with this type of station were issued. As of June 30, 1945, 31 such stations were authorized, an increase of 3 stations during the year.

The growth of airport control radio service has been seriously impeded by wartime scarcity of equipment and frequencies. It is expected that a large increase in the number of stations operating in this service will follow closely the availability of equipment capable of operating in the very high frequency range. The Commission, in anticipation of such growth, allocated that portion of the frequency spectrum between 118 and 122 megacycles for airport control service.

#### FLIGHT TEST RADIO STATIONS

Flight test radio stations provide communication between aircraft and ground while such aircraft are undergoing flight tests, as in the development of new types, the development and testing of motors, propellers, and other components.

The Commission received 105 applications and issued 82 authorizations affecting stations of this class. As of June 30, 1945, there were 30 stations, a slight increase over the previous year.

#### FLYING SCHOOL RADIO STATIONS

There has been a decrease in the activity of flying schools and consequently a decrease in the number of such radio stations licensed by the Commission. Eleven applications were received and eight authorizations issued. As of June 30, five flying school stations were licensed.

The decrease in flying school stations is the result of the slackening demand of the military services for civilian trained pilots. In the majority of instances civilian pilot training contracts have been completely terminated.

## AIRCRAFT RADIO STATIONS

Aircraft radio stations licensed by the Commission come within two general categories and are normally classified as either "scheduled" or "nonscheduled." The first category represented all commercial air carriers operating on a scheduled basis, the second itinerant operations. Itinerant operations include private flying, commercial flying on a nonscheduled basis, transportation of corporation personnel, etc.

During the year, 6,231 applications were received and 4,043 authorizations issued affecting aircraft stations operating in the United States and possessions, including commercial United States flag aircraft operating in the international service. As of June 30, there were 3,090 such stations including 533 "scheduled aircraft"—an increase of 323.

As of June 30, there were 32,000 aircraft registered with the Civil Aeronautics Administration and it appears that a large increase in the number of aircraft radio stations may be expected within the near future depending primarily upon the speed with which radio equipment becomes generally available.

## VIOLATIONS

During the year, 592 official notices were handled in the aviation radio services covering alleged violations of treaties, Federal statutes or Commission rules and regulations. Penalties were not invoked as the cases were disposed of by conferences and correspondence.

## CHICAGO INTERNATIONAL CIVIL AVIATION CONFERENCE

An important step in international collaboration in the field of civil aviation was taken with the conclusion of an Interim Agreement on International Civil Aviation on December 7, 1944, at the Chicago International Civil Aviation Conference.

The Interim Agreement provides among other things for the establishment of the Provisional International Civil Aviation Organization (PICAO), which will consist of an assembly of all nations accepting the agreement, as well as a 21-member council elected by the assembly every 2 years. The PICAO will have advisory and technical functions, but will not be empowered to regulate the economic phases of air transport. The Interim Council will formulate and recommend the adoption of technical standards and procedures, and will study, report, and recommend on problems relating to air navigation and international air transport.

The Interim Agreement on International Civil Aviation became effective on June 6, 1945, when the twenty-sixth nation announced to the United States Government its formal acceptance. The provisional organization will function for an interim period not to exceed 3 years from June 6, 1945. It is expected to be superseded within that time by the permanent International Civil Aviation Organization, which will be established after 26 nations have ratified or adhered to the Convention on International Civil Aviation.

A representative of the Commission was a member of the United States delegation at the Chicago International Civil Aviation Conference, and participated in committee work in the preparation of

technical annexes relating to aviation radio communication and air radio navigation.

PROCEEDINGS IN DOCKETS 6714 TO 6721 INCLUSIVE AND 6757

These dockets cover a number of applications filed by Pan American Airways, Inc., relating to the radio communications system of that company in the Caribbean area, more generally known as the Latin American Division of Pan American Airways, Inc.

The applications proposed a general expansion of the existing radio communications facilities now operated by the applicant in the involved area. Since a number of the requests made in the applications appeared to be beyond the scope of the Commission's rules covering the operation of aviation radio communications facilities on the inter-American routes and since other issues were presented which could not be determined on the information contained in the applications, the Commission designated the applications for hearing. Aeronautical Radio, Inc., intervened in the proceedings, since the Pan American applications requested authority to share frequencies already in use by stations in the domestic aviation service operated by Aeronautical Radio, Inc. The hearing began on June 6, 1945, and lasted 3 days. As of June 30, no decision had been reached.

3. EMERGENCY RADIO SERVICES

GENERAL

The Emergency Service is a radio communication service conducted by instrumentalities of government, by public utilities and by certain private organizations for emergency communications pertaining to the safety of life and property. This service includes stations classed as municipal, State, zone and interzone police, special emergency, forestry, and municipal fire.

Three hundred and seven new emergency systems were authorized during the year. Even with the wartime restrictions on the general use of the critical materials necessary for installation of radio communication systems and the shortage of trained personnel needed for such installations, the service rendered by these emergency radio stations is of such vital importance that materials have been made available through appropriate allocation programs and issuance of priority ratings to applicants and licensees.

Class of station	Applica- tions pro- cessed fiscal year 1945	Number of licensed stations at close of fiscal year				
		1941	1942	1943	1944	1945
Municipal police.....	1,800	1,196	1,672	1,708	1,906	2,051
State police.....	465	513	378	431	452	477
Zone police.....	8	69	85	94	88	85
Interzone police.....	4	30	33	30	31	30
Forestry.....	193	807	844	837	925	949
Special emergency.....	939	340	435	448	451	566
Municipal fire.....	22	6	8	10	10	12
Total.....	3,431	2,961	3,455	3,558	3,863	4,170

In nearly all cases the "station" referred to in this tabulation is a complete radio communication system and consists of a land station permanently installed at a fixed location and a number of associated mobile transmitter-receiver units operated under a single radio station license. In many cases the communication system covered by 1 station license includes from 1 to 4 land station transmitters at the same fixed location and a number of mobile radio units. Some licensees in the emergency service operate as many as 200 or more mobile radio units. One State (California) has authorizations to operate a total of 473 State police mobile units; 444 of the units being listed on one radio station license.

A large number of the applications filed during the past fiscal year were for construction permits and modification of licenses for new transmitting equipment installed to replace worn-out or obsolete equipment of stations in the emergency service. Nearly all new installations in this service are for equipment using frequency modulation. The comparatively few authorizations issued for use of amplitude modulated equipment were usually to licensees making minor additions to existing radio facilities and it is expected that as soon as new equipment becomes generally available many of these radio systems will be replaced with frequency modulated equipment to provide the more effective operation and extended range afforded by this method of transmission.

As a result of the Commission's frequency allocation hearing, additional frequencies have been made available for the Emergency Radio Services. On the basis of testimony presented by Radio Technical Planning Board committees and by representatives of organizations of licensees of the various classes of stations in the Emergency Radio Services, a substantial increase in the number of channels available for regular operation above 25,000 kilocycles for these stations has been made as shown in the following table:

Class of station	Number of channels before allocation hearing	Number of channels at present
State and municipal police.....	29	132
Municipal fire.....	2	39
Forestry.....	11	41
Special emergency.....	10	47

<sup>1</sup> Including frequencies for power utility and similar stations now operating as special emergency stations but soon to be included in a separate service.

It is expected that with the increase in the number of frequencies available for assignment to these stations, a proportionate increase in the activity and in the number of stations in this service will result.

#### POLICE RADIO STATIONS

The police departments of nearly all cities, large towns, and thickly populated counties now use radio. The systems operated by State police departments are similar to those operated by the municipalities except that the States usually operate several land stations and in many cases a larger number of mobile stations. Some of the licensees of municipal and State police radio systems also operate zone or inter-

zone police stations to provide for the exchange of police messages by radiotelegraph between police departments within each zone and between the departments in different zones. These radiotelegraph facilities are used for the messages pertaining to missing persons, stolen automobiles, criminals wanted, persons apprehended, etc.

Radio makes possible the rapid mobilization of protective agencies at riots, large public disorders or other emergencies resulting from floods, hurricanes, or other similar disasters. The increase in speed of travel provided by the automobile and other modern vehicles makes it possible for a criminal to commit a crime in one city and seek refuge in another community hundreds of miles distant. The use of two-way radio by the police departments offers a primary means of effectively keeping ahead of the criminal. Modern police radio systems provide the police with facilities for instantaneous communication between central headquarters stations and patrol cars operating at any point within the area of jurisdiction of the police department. Communication between patrol cars and police headquarters stations of different police departments is also used to a great extent. Radio also offers the police a method of broadcasting general alarms to stations and mobile units throughout an area and provides for setting up blockades on highways, rerouting traffic and the effective handling of traffic and crowds during emergency periods. Police have in two-way radio communication a modern, effective weapon which is considered more valuable than any other single facility utilized to combat crime.

In addition to the transmission of emergency messages to police mobile units, many police departments transmit messages to other emergency mobile units such as fire department vehicles, private ambulances, and repair units of public utilities where cooperation or coordination with police activities is involved.

The continued increase in the number of transmitters operated by municipal and State police departments has resulted in a proportionate increase in interference between the different communication systems and in the difficulties and importance of definite frequency allocation and assignment plans. In view of the limited number of channels available for police stations, it is necessary to require close cooperation between applicants and licensees in the selection and use of frequencies available for assignment. It is expected, however, with the additional channels made available for these stations, as a result of the frequency allocation hearings, that new frequency assignment plans presently being formulated will result in more interference-free communication for the larger number of police radio stations.

#### MUNICIPAL FIRE RADIO STATIONS

Municipal fire radio systems are operated by municipal fire departments to provide communication between central fire stations and mobile fire fighting units and other vehicles operated by fire departments. The transmitting and receiving equipment, the communication service rendered and method of operation of municipal fire stations are similar to those of the municipal police stations except that the facilities are operated by and for the fire department of the licensee.

The relatively small number of stations of this class authorized for operation is probably due to the fact that this is a comparatively new class of station. Previous to June 23, 1944, stations similar to mu-

nicipal fire were classed as "marine fire" stations and were authorized for operation only by the larger cities operating fire boats used for fighting fires on waterfronts. Effective on June 23, 1944, the rules concerning "marine fire" radio stations were modified to change the name of this class of station to "municipal fire." This change in the rules provided for the authorization of municipal fire stations for the larger cities to operate on the one medium frequency and two very high frequencies previously allocated for the use of marine fire stations and to handle communications concerning fires, whether on waterfronts or elsewhere.

Owing to the limited number of radio channels available, authorizations for municipal fire stations are normally granted only to cities where the fire department serves a population of 150,000 or more. The fire departments of the smaller municipalities ordinarily use the police radio communication facilities as provided for by the rules governing the operation of stations of this class.

The fires and other emergencies to which fire departments respond require the use of especially fast and effective communication facilities, since time is highly important in such emergencies. It is often necessary for the units of the fire department upon reaching the scene of a disaster to call for additional assistance to respond to definite locations, for medical assistance, for ambulances, additional pumping units, special apparatus and gas masks, which are not normally carried as equipment on mobile units. Two-way radio systems provide this essential emergency communication where other communication facilities are not immediately available, are inadequate or are not usable.

With the increased number of frequencies made available to fire departments as a result of the frequency allocation, it is expected that many fire departments, especially those in the large cities, will use radio.

#### FORESTRY RADIO STATIONS

Forestry radio stations are licensed to municipalities, States, and other organizations legally responsible for forestry areas. These stations are operated for communications pertaining to the detection and suppression of forest fires, water shed protection and control, conservation enforcement, protection of wildlife and protection of natural resources in forest areas. Forestry radio stations are authorized primarily for communication with forest-fire-fighting units; however, emergency messages may be transmitted to other mobile units such as fire department vehicles, ambulances, and mobile police units in those cases which require cooperation or coordination with forestry service activities.

An effective communication system is important in the suppression and fighting of forest fires. Radio provides rapid communication between forest fire lookout towers in order that the exact location of a fire may be quickly determined. Radio also provides a means of communication with patrolmen and mobile units in forest areas. Additional equipment or personnel can be immediately dispatched to the scene of forest fires. On large fires where numerous patrolmen, forest fire trucks and special fire fighting and control equipment are used, radio provides the supervisors with a means of controlling all units in operation and of shifting them as conditions require.



Although many of the forestry radio stations use medium power land stations or portable stations operated permanently or temporarily in the lookout towers and headquarters stations, a large number of the licensed stations are of the portable pack or "walkie talkie" type which are carried by the personnel. It appears that with recent wartime developments of light-weight "handie talkie" and "walkie talkie" radio units, a considerable increase in the number of such units operated in the forestry service can be expected in the near future.

#### SPECIAL EMERGENCY RADIO STATIONS

Special emergency radio stations are operated by public utilities, highway maintenance departments, communication common carriers, and urban transportation companies temporarily to augment or to restore communication or other public facilities interrupted or destroyed during emergency conditions such as storms and floods, and also to provide communication to places isolated during times of emergency. The nature of such communication may be classified as follows: (1) Initial restoration, providing quick reestablishments of circuits for handling essential communications relating in large part to preservation of life and property; and (2) Dispatching repair and construction crews to augment or restore wire communication circuits, and to repair electric power distribution circuits, gas and water transmission facilities and highway facilities.

Under the Commission's rules and regulations, only public utilities, organizations established for relief purposes, and persons having establishments in remote locations are eligible for authorizations for special emergency radio stations. This class of station is authorized for essential communications arising from an emergency jeopardizing life, public safety, or important property. Special emergency radio stations provide a means of direct communication to repair trucks and maintenance crews of public utilities. The electric, gas and urban transit utilities operate approximately 80 percent of the stations of this class which are licensed by the Commission. Such communication facilities have been of considerable value in maintaining adequate transportation, gas and electric power for the public and for plants engaged in the manufacture of war materials during the last few years.

#### 4. WAR EMERGENCY RADIO SERVICE

The War Emergency Radio Service is a temporary wartime service established by the Commission on June 12, 1942, to provide a means of rapid emergency local communications which may be necessary in connection with national defense and security or conditions jeopardizing public safety. This service consists of three different classes of radio stations: Civilian Defense, State Guard, and Civil Air Patrol. These stations are intended to provide distinct and separate communication facilities on specified bands of frequencies above 112 megacycles available for use by Municipal Civilian Defense, State Guard, and Civil Air Patrol organizations, respectively. Licenses for these stations are issued only to municipalities, state military organizations and the Wing Commanders of the Civil Air Patrol. This service makes available on a voluntary basis the skill and equipment of amateur radio operators and other qualified citizens under conditions which

assure responsible control, organized practice drills and systematic training, and, at the same time, permits sufficient flexibility of operations.

Class of station	Applica- tions pro- cessed dur- ing fiscal year 1945	Number of stations at end of fiscal year		
		1943	1944	1945
Civilian Defense .....	352	199	253	230
State Guard .....	63	8	11	19
Civil Air Patrol .....	47	4	17	27
Total .....	462	211	281	276

The term "station" in the above table includes several fixed, portable, or portable-mobile transmitter and receiver units which are operated as a single coordinated emergency communication system under one license. There are several licensees in the War Emergency Radio Service authorized to operate more than 200 transmitter units under a single station license. A considerable number of the transmitters used in this service consists of portable and portable-mobile transmitters and includes the so-called pack or "walkie talkie" radio units. Although three frequency bands above 112 megacycles have been authorized for use by stations in this service, nearly all of the stations operate exclusively in the 112-116 megacycles band because the equipment available for these stations at the present time performs more efficiently on these lower frequencies.

Upon the recommendation of the Office of Chief Signal Officer, United States Army, and upon the approval by the Board of War Communications, the Commission on January 25, 1945, designated two additional channels in the medium frequency range for the use of State Guard stations in connection with State Guard operations. As a result of this action, many State Guard organizations have obtained modifications of licenses or new licenses to authorize the operation of several hundred new transmitter units.

On April 10, 1945, the Commission amended its rules and regulations governing stations in the War Emergency Radio Service so as to expand the scope of service for which Civilian Defense stations were originally authorized. In addition to use in connection with national security and defense, civilian defense stations now may be operated for communications in emergencies jeopardizing public safety. Licenses for these stations now may be issued or renewed even though the United States Citizens' Defense corps or equivalent civilian defense organizations are no longer active in the involved areas. The amended rules and regulations also authorize the existing licensees of War Emergency Radio Service stations to cooperate with the United States Weather Bureau in the operation of a proposed flood and storm warning emergency radio network to supplement existing communication facilities for the protection of life and property during emergency or impending emergency periods.

Reports received from licensees of War Emergency Radio Service stations indicate that these stations have been used to furnish emergency communications during floods, fires, explosions, and other emergencies endangering life, public safety, or important property. The

occasion which resulted in the most general use of War Emergency Radio Service facilities to date was the hurricane which struck the Northeastern Seaboard States in September 1944. A total of 34 licenses reported to the Commission that a number of units of their stations were in operation during the disaster. Other reports indicate that on at least two occasions portable-mobile units licensed to civilian defense stations were used to assist in locating aircraft which had crashed in wooded, mountainous terrain. In one instance, during a large fire, it was reported that the use of megaphones was impossible owing to the high noise level and the density of smoke whereas the small, readily portable transmitter and receiver units licensed to the municipality in the War Emergency Radio Service were placed in operation and provided the necessary emergency communications. Another War Emergency Radio Service station handled emergency communications on July 6 and 7, 1944, in connection with the disastrous circus fire at Hartford, Conn.

## 5. EXPERIMENTAL RADIO SERVICES

### GENERAL

The Experimental Radio Service includes three classes of stations, class 1, class 2, and class 3. Authorizations for experimental class 1 stations are granted for the purpose of carrying on experimentation and development leading to the advancement of the radio art. Authorizations for class 2 stations are granted for experimental operations leading to a new type of radio service or a new phase of operation within a service already recognized by the Commission. Class 3 stations are licensed to citizens interested in radio technique solely with a personal aim to conduct experiments on their own behalf.

Under the stimulus of wartime needs, and because of the large Federal funds made available for technological research, experimental activities in the field of radio and electronics have developed to an unprecedented level during the past year. Many highly secret projects sponsored by the Army, Navy, and National Defense Research Committee were placed under contract with radio manufacturers, educational institutions, and engineering laboratories throughout the United States. The radar development projects pursued at Massachusetts Institute of Technology is a typical example. A large number of experimental radio authorizations were necessary to carry out the extensive tests required in the development and perfection of this important weapon of war. In the same manner, hundreds of additional experimental stations were authorized to meet the needs of other radio and electronic projects. While most of these projects are still classified as secret and confidential, it is definitely known that much of the success of the United Nations can be attributed to these technological developments. Radar is only one of these newly developed devices. Others will be revealed when the need for secrecy has disappeared. The full effect of these wartime developments on the future can scarcely be imagined at this early date. It is certain that the technical developments in the electronics field will exert a powerful influence on the lives of people everywhere. Faster and more reliable means of communication will appear. Television and facsimile developments will make it possible for the world to see as well as to

hear by radio. By utilizing higher and higher frequencies, not only will new techniques be unfolded but a much more general use of space radio will become possible.

The number of experimental stations authorized during the year exceeds by far the number authorized in any similar period in the past. One thousand, four hundred and forty-seven applications were received, 1,143 authorizations were issued—a 100-percent increase over the previous year.

During the accelerated research program undertaken as part of the war effort, tremendous advancements have been made in the development of vacuum tubes and associated circuits which permit the operation of radio stations and the rendition of commercial radio service in that portion of the radio spectrum which previously was beyond the range of commercial radio equipment. These developments have resulted in extending the useful portion of the radio spectrum to such an extent that radio channels can now be made available for the establishment of many new radio services and the expansion of certain existing radio services.

New equipment also has been developed which will provide for greater safety and security. The application of radar techniques to anticollision devices for use in the aviation and marine fields may be cited as an example.

Industry, realizing the potential application of these new developments to commercial enterprises, requested frequencies for many new uses of radio during the allocation hearing. While it was impossible to satisfy all of these demands, the Commission, nevertheless, did provide frequencies for many new services, including general highway mobile, urban mobile, railroads, citizens radio, radio relay systems, power and petroleum utilities, as well as for the necessary expansion of facilities for established radio services.

While the use of radio in these new services will unquestionably prove feasible, there are many technical and policy problems which must be solved before the services can be established on a regular basis. The Commission has followed the policy of granting authorizations for the operation of stations in the new services on an experimental basis only in order to collect operational and technical data which can be analyzed and used as a basis for the determination of the needs and requirements of the new service and for the promulgation of rules and regulations governing the operation of stations in the service when established. After studies have been completed, it will be necessary to promulgate rules and regulations to cover each new service, prepare application forms, and establish procedures and policies with respect to the licensing of such stations.

#### RAILROAD RADIO SERVICE

A hearing, to ascertain the facts regarding the use of radio in connection with the operation of railroads as an aid in the protection of life and property, was held by the Commission in September 1944. As a result of that hearing and the frequency allocation hearing, 60 channels in the band 152–162 megacycles were allocated for the exclusive use of railroad radio stations. In addition to these channels, it was proposed that certain television bands be shared by the railroads on a mutually noninterference basis. With this encouragement, the

railroads, acting through the Association of American Railroads, have progressed rapidly with plans to adopt radio communication facilities in the operation of terminal stations, freight trains, and general railway business. Committees of the Association of American Railroads have been working closely with the Commission staff in formulating a Nation-wide allocation plan for the preparation of new rules and regulations for the railroad radio service.

At present, 125 stations are operated by or on behalf of the railroads on an experimental basis. An extensive survey made by the Railway Department of the Office of Defense Transportation indicates that the railroads intend to install a minimum of 1,500 railroad radio stations and the 52 separate railroads plan to install 2-way radio facilities as soon as equipment is available.

#### MOBILE SERVICES

There are two mobile services for which the Commission has allocated frequencies in the frequency allocation report. Twenty-four channels in the 152- to 162-megacycle band have been allocated to the urban mobile service, which relates to radio service for vehicles in metropolitan areas such as delivery trucks, physicians' automobiles, ambulances, taxi cabs, boats and aircraft. Forty channels in the band 30 to 44 megacycles have been allocated for the highway mobile service, which relates to communications to busses and trucks used in inter-city transportation over long distances. Of these 40 channels, 24 were designated for experimental development of a communication common carrier type of operation; 8 channels were designated for use by trucks and 8 for busses.

#### POWER UTILITY SERVICE

The power utility service will enable public utilities (electric, gas, water, steam, and petroleum) to communicate in emergencies with mobile units. Radio will speed the dispatching of repair trucks and will permit emergency communications between a central dispatching or control station and maintenance crews. The commodities supplied by these utilities are capable of inflicting injury, death, and serious property damage if uncontrolled. These utilities therefore require instantaneous, reliable, and continuously available communication between major system control points as well as between control headquarters and mobile crews.

#### RADIO RELAY SYSTEMS

Radio relay systems represent a new phase in medium and long-haul domestic communication methods. The telephone and telegraph companies have maintained extensive wire line circuits throughout the United States. The wartime development of micro-wave radio equipment has made it possible to utilize a series of wide-band super-high frequency radio repeater stations to transmit simultaneously various types of intelligence including broadcast and FM programs, high-definition television and facsimile material, multiplex telephone and telegraph messages, as well as many other special types of intelligence. Well-informed persons in the communication field have visualized the installation in the near future of a Nation-wide network of relay

stations which would supplement present wire line facilities and may eventually replace them. During the year, approximately 125 class 2 experimental stations were authorized to carry on experimentation in the development of new relay systems.

#### RURAL TELEPHONE SERVICE

Another new radio service for which the Commission has allocated frequencies is the rural telephone service. The objective of this service is the development of rural radio-telephones and the extension of telephone service to farms and ranches where the construction of wire lines is physically impossible or economically impractical. Experimental work in this new application of radio has already been initiated. Its future growth is assured.

#### CITIZENS RADIOCOMMUNICATION SERVICE

In past years there has been a demand for a private radiocommunication service. Heretofore no frequencies have been available to provide facilities for a private radio service and all requests for such services had to be denied.

At its frequency allocation hearing, the Commission, on its own motion, allocated the band from 460 to 470 megacycles to a new service, the citizens radiocommunication service. Five authorizations have been granted for class 1 experimental radio stations for the purpose of developing equipment for use in this proposed service. Licensees will be free to use the service for their own purposes, provided no charge is made for the messages. The service will thus be for the private use of the licensee who will be responsible for the use of the facilities under the regulations to be promulgated by the Commission.

Station and operator licenses will be easily acquired. It is anticipated that to procure such a license, an applicant need only show familiarity with the relevant portions of the Communications Act and of the simple regulations governing this service. No technical knowledge will be required to obtain licenses and they will be issued for a period of 5 years with simple renewal provisions.

The citizens radiocommunication service can be used, for example, to establish a physicians' calling service, through which a central physicians' exchange in each city can reach doctors while they are enroute in their cars or otherwise not available by telephone. Department stores, dairies, laundries, and other business organizations can use this service in communicating to and from their delivery vehicles. Similarly it can be used in communicating to and from trucks, tractors, and other mobile units operating in and around large industrial plants and construction projects, many of which spread over a number of square miles. It can be used on farms and ranches for communication to and from men in the fields; on harbor and river craft; in mountain and swamp areas, etc. Sportsmen and explorers can use it to maintain contact with camps and to decrease the hazards of hunting, fishing, boating, and mountain climbing. Citizens generally will benefit from the convenience of this service by utilizing two-way portable radio equipment for short range private service between points where regular communication facilities are not available. During emergencies when wire facilities are disrupted as a result of hurricane,

flood, earthquake, or other disaster, the service, as has been demonstrated by amateur service, will be of inestimable value.

## 6. MISCELLANEOUS RADIO SERVICES

The miscellaneous radio services include the geophysical, special press, and intermittent radio services. These services include five classes of radio stations each of which provides a separate and distinct radio service. The classes of stations are geological, mobile press, relay press, motion picture, and provisional.

Class of station	Applica- tions proc- essed	Number of stations at end of fiscal year			
		1942	1943	1944	1945
Geological.....	465	302	325	358	411
Mobile press.....	3	3	3	3	3
Relay press.....	5	7	5	5	5
Motion picture.....	9	15	10	8	8
Provisional.....	101	22	36	87	142
Total.....	673	349	379	461	569

The most prominent classes of stations in the miscellaneous radio services, the geological and the provisional stations, are licensed by groups of portable or mobile units, and one "station" in the above table may include several complete portable or mobile units.

The allocation report made additional frequencies available to most of the classes of stations in these services. A substantial increase in the number of channels available for regular operation on frequencies above 25,000 kilocycles of the most important of the classes of stations included has been made as shown in the following table:

Class of station	Number of channels before allocation hearing	Number of channels at present
Geological.....	4	49
Motion picture.....	4	18
Provisional.....	9	36
Relay press.....	11	10
Mobile press <sup>1</sup> .....		

<sup>1</sup> All operation is on frequencies below 25,000 kilocycles.

### GEOLOGICAL RADIO STATIONS

Geological stations are authorized for communications pertaining to work in connection with the investigation of the surface of the earth and the physical characteristics of the strata below the surface of the earth. Practically all of the licensed geological stations are operated by oil companies and geophysical exploration companies for the determination of the character of the underground strata of the earth in order to establish the probable location of oil deposits. Low power portable and mobile geological stations are used for communication by personnel of field parties prospecting for oil and for transmitting signals and impulses to seismic recording instruments from the geophones at the various pick-ups located at distances up to 15 miles from the centrally located recording truck.

Petroleum products have been especially important during the intensified industrial and manufacturing programs of the past few years and the immediate availability of an adequate supply of these vital products is a major item in modern civilization. As the more obvious and easily discovered petroleum sources are exhausted, the producers must resort to more scientific and complicated methods of ascertaining the presence of oil pools beneath the surface of the earth. In prospecting for oil, radio is being used for an increasingly important service for communication to isolated locations and for other purposes where the various scientific methods of geophysical prospecting are used.

#### RELAY PRESS STATIONS

Relay press stations are used to transmit to or from points where other communication facilities are not available news for publication, or orders, instructions or inquiries concerning such news to be published or to be disseminated by the news association with which the licensee is regularly affiliated. It is not intended that these stations be used to replace or to compete with wire communication facilities but that these stations be set up temporarily at a point of termination of other communication facilities and at the scene of a news event for the transmission of dispatches from the reporter in the field. Licenses for relay press radio stations are issued only to newspapers and press associations.

Reports received from licensees indicate that very little use has been made of relay press stations during the past year. However, at the frequency allocation hearing, representatives of the United Press and the Associated Press testified that with the recent improvements in the "walkie talkie," plans are being made to use these stations more extensively.

#### MOTION-PICTURE STATIONS

Motion-picture stations are authorized for communication in connection with the filming of motion pictures as an aid in the protection of life and property and the promotion of safety of personnel. These stations are used for communication with parties on location in isolated areas where no other communication facilities are available and for communication pertaining to the coordination and direction of activities of various units in the filming of motion pictures.

As in the case of relay press stations, motion-picture stations have been used very little during the past year; however, correspondence and inquiries from licensees and others eligible for authorizations indicate plans are being made for considerable activity of this class of station when new radio equipment is available.

#### PROVISIONAL RADIO STATIONS

Provisional radio stations are used for communications relative to the safety of life or property or matters which are of practical necessity in connection with projects of benefit to the public. Initial use of provisional radio stations was made in connection with large construction projects. They also are used by oil companies in the deserts, mountains, forests, swamps, inland waters, and in the ocean where other communication facilities are not available. By means of such stations a construction foreman or supervisor can keep in contact with his



crew, direct transportation of supplies and carry on other communications necessary in directing construction and production work. An effective communication system is especially valuable at construction projects and in certain industries where workmen are engaged in hazardous occupations.

Stations of this class are also used on a temporary basis for communication by plant guards or private police of large industrial plants. Many of the new stations of this class are for radiotelephone communication systems for use by plant guards at large manufacturing plants producing war materials. Improved transmitting and receiving equipment for use on the very high frequency channels allocated for use by provisional stations has resulted in an increased use of this class of station on construction projects and certain industrial operations in isolated locations.

## 7. STATISTICS

### United States Stations

Service	Applica- tions re- ceived	Authori- zations issued	New sta- tions au- thorized	Total sta- tions June 30, 1945
<b>Aviation:</b>				
Aeronautical .....	699	640	47	411
Aeronautical fixed .....	169	105	4	98
Aeronautical and aeronautical fixed .....	42	25	0	0
Aircraft .....	6,028	3,918	1,657	12,998
Airport control .....	64	45	8	31
Flying school .....	11	8	0	5
Flight test .....	105	82	12	30
Marker beacon .....	5	3	1	3
Instrument landing .....	0	0	0	0
Subtotal .....	7,113	4,826	1,729	3,576
<b>Emergency:</b>				
Municipal police .....	1,800	1,362	168	2,051
State police .....	465	345	40	477
Zone police .....	8	10	1	85
Interzone police .....	4	6	0	30
Forestry .....	193	145	54	949
Special emergency .....	939	821	123	566
Municipal fire .....	22	16	2	12
Subtotal .....	3,431	2,705	388	4,170
<b>W. F. R. S.:</b>				
Civilian Defense .....	352	316	17	230
State Guard .....	63	29	7	19
Civil air patrol .....	47	39	11	27
Subtotal .....	462	384	35	276
<b>Experimental:</b>				
Class 1 .....	737	718	178	457
Class 2 .....	706	422	157	152
Class 3 .....	1	0	0	0
No classification .....	3	3	3	3
Subtotal .....	1,447	1,143	338	612
<b>Miscellaneous:</b>				
Geological .....	465	501	69	411
Motion picture .....	9	6	0	8
Provisional .....	191	163	49	142
Mobile press .....	3	3	0	3
Relay press .....	5	5	0	5
Subtotal .....	673	678	118	569

<sup>1</sup> 533 are scheduled aircraft and 379 are portable-mobile scheduled aircraft stations.

## United States Stations—Continued

Service	Applications received	Authorizations issued	New stations authorized	Total stations June 30, 1945
<b>Fixed public service:</b>				
Point-to-point telegraph.....	273	282	1	36
Point-to-point telephone.....	81	82	1	18
Subtotal.....	354	364	2	54
<b>Fixed public press: Point-to-point telegraph.....</b>	30	46	0	6
<b>Agriculture: Point-to-point telegraph.....</b>	7	7	0	7
<b>United States coastal:</b>				
Coastal telegraph.....	59	46	3	31
Coastal harbor.....	67	58	1	33
Coastal telephone.....	5	9	0	5
Marine relay.....	31	28	3	21
Coastal telegraph and marine relay.....	3	1	0	0
Coastal Telegraph, Ltd.....	2	0	0	3
Coastal Harbor, Ltd.....	0	2	0	2
Subtotal.....	167	144	7	95
<b>United States total.....</b>	<b>13,684</b>	<b>10,297</b>	<b>2,617</b>	<b>9,365</b>

## Alaskan stations

<b>Aviation:</b>				
Aeronautical.....	43	66	10	66
Aeronautical fixed.....	27	57	8	59
Aeronautical and aeronautical fixed.....	21	15	0	0
Aircraft.....	203	125	0	92
Subtotal.....	294	263	18	217
<b>Emergency: Municipal police.....</b>	1	1	0	0
<b>Experimental:</b>				
Class 1.....	4	4	0	0
Class 2.....	1	0	0	0
Subtotal.....	5	4	0	0
<b>Fixed public service:</b>				
Point-to-point telegraph.....	155	91	6	68
Point-to-point telephone.....	127	229	24	205
Point-to-point telegraph and telephone.....	4	0	0	0
Subtotal.....	286	320	30	273
<b>Coastal:</b>				
Coastal telegraph.....	27	37	0	33
Coastal harbor.....	128	132	19	124
Fixed public and coastal.....	46	24	0	0
Coastal telegraph and coastal harbor.....	3	0	0	0
Subtotal.....	204	193	19	157
<b>Alaskan total.....</b>	<b>790</b>	<b>781</b>	<b>67</b>	<b>647</b>
<b>United States stations.....</b>	<b>13,684</b>	<b>10,297</b>	<b>2,617</b>	<b>9,365</b>
<b>Alaskan stations.....</b>	<b>790</b>	<b>781</b>	<b>67</b>	<b>647</b>
<b>Total stations.....</b>	<b>14,474</b>	<b>11,078</b>	<b>2,684</b>	<b>10,012</b>
<b>Wire certificate:</b>				
Telephone.....	214	220		
Telegraph.....	120	108		
Interlocking direct circuits.....	14	9		
Petitions.....	5	0		
Telephone discontinuances.....	3	3		
Telegraph discontinuances.....	174	135		
Submarine cable licenses.....	2	1		
Total.....	541	476		
<b>Total United States stations.....</b>	<b>13,684</b>	<b>10,297</b>	<b>2,617</b>	<b>9,365</b>
<b>Total Alaskan stations.....</b>	<b>790</b>	<b>781</b>	<b>67</b>	<b>647</b>
<b>Total wire certificates.....</b>	<b>541</b>	<b>475</b>	<b>0</b>	<b>0</b>
<b>Grand total.....</b>	<b>15,015</b>	<b>11,554</b>	<b>2,684</b>	<b>10,012</b>

## 8. INSPECTIONS

### SHIP INSPECTIONS

The Commission's activities in promoting safety of life and property at sea through detailed inspections of radio installations on ships have continued to be a significant contribution to the winning of the war. Every precaution taken to save ships has served to speed the movement of men and supplies to the far-flung theaters of war.

As the result of intensive inspections and the strict enforcement of essential regulations, the efficiency of radio in safeguarding thousands of lives and billions of dollars of property on inland and coastal waters and on intercoastal and international voyages has been maintained at a high level.

Ship inspection has been carried on by the Commission and its predecessor agencies since 1910 when the United States first enacted laws requiring ships to carry radio. Section 303 (n) of the Communications Act of 1934, as amended, provides, in part, that the Commission shall have "authority to inspect all radio installations associated with stations required to be licensed by any act or which are subject to the provisions of any Act, treaty, or convention binding on the United States."

From the beginning of the war to the end of the fiscal year, the tonnage of United States vessels had increased fourfold.

Ship inspections during the year totaled 15,731, of which 13,843 were on board United States vessels and 1,888 on board ships of foreign registry; an increase of 4,429 inspections over the preceding year.

As a result of these inspections, the Commission served 9,391 violation notices for noncompliance with provisions of the law and international treaties, an increase of 1,731 over the preceding year. In addition, inspectors found 7,809 deficiencies and discrepancies which they cleared before leaving the ships.

### OTHER INSPECTIONS

A total of 6,212 inspections were completed, of which 2,873 were emergency stations, 1,770 aircraft and aeronautical stations, and 1,569 miscellaneous stations. A total of 1,554 violation notices were served.

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**CHAPTER VI**

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**Radio Operators**

- 1. COMMERCIAL OPERATORS**
- 2. AMATEUR RADIO SERVICE**
- 3. EXAMINATIONS**

## CHAPTER VI—RADIO OPERATORS

### 1. COMMERCIAL OPERATORS

The commercial radio operator rules provided that, unless otherwise specified by the Commission, the actual operation of any radio station for which a station license is required shall be carried on only by a licensed radio operator of the required class.

In order to meet the needs of the various radio services administered by the Commission, the following classes of commercial operator licenses have been established: Radiotelephone first and second class, radiotelegraph first and second class, and restricted radiotelephone and radiotelegraph operator permits. In addition, a number of temporary licenses have been established because of the shortage of radio operators, as a result of the war.

During the year, the Commission established the temporary emergency radiotelegraph second class operator license. This class of license is valid for a period of 1 year from date of issuance, unless terminated earlier by order of the Commission, and was established to alleviate the shortage of ship station radiotelegraph operators, which developed as a result of the Navy Department's requirement that certain classes of United States merchant vessels must carry at least three radio operators in lieu of a single operator as formerly required.

The temporary emergency second class radio operator license authorizes its holder to stand a radio watch on board a cargo vessel and transmit only emergency communications directly related to the safety of life and property at sea, and is only valid when such cargo vessels carry at least one higher class radiotelegraph operator who maintains at least one-third of the required radio watch per day.

Normally the Commission's rules and regulations required that the holder of a radiotelegraph first- or second-class license may not act as chief operator or sole operator on a cargo vessel until he has had at least 6 months of satisfactory service as a qualified radiotelegraph operator on a vessel of the United States. A shortage of radiotelegraph operators, qualified in this manner, led the Commission to suspend the 6 months' service requirement through its order No. 83, effective July 7, 1941. Inasmuch as the shortage has continued, as a result of the rapidly increasing demands for Merchant Marine radio operators, this suspension period was extended by subsequent orders. Order No. 83-G, effective December 19, 1944, is the latest order and extends the suspension until June 30, 1945.

During the past fiscal year, numerous authorizations have been issued for operation of broadcast stations under the provisions of Commission Order No. 91-C. This order has been continued in force since its adoption on January 19, 1943, and provides that a broadcast station of any class, which by reason of actual inability to secure the services of an operator or operators of a higher class could not other-

wise be operated, could be operated under this order by the holder of any class of commercial radio operators' license, subject to the restrictions provided therein.

The Commission, on December 27, 1944, approved order No. 77-C, extending from January 1, 1945 to December 31, 1945, the suspension of the provisions of its rules which require operators to make a showing of service or use in connection with applications for renewal of outstanding radio operator licenses. This action was taken because of the obvious difficulty commercial and amateur radio operator licensees, particularly those in the armed forces, would have in meeting this requirement.

As a further convenience to many licensed and formerly licensed commercial radio operators now in the military service or employed in war industries distant from their homes, who cannot file timely applications for license renewal, the Commission adopted order No. 124 on January 2, 1945. This order permits a commercial radio operator (other than one holding a temporary emergency radiotelegraph second-class license) to file a renewal application within 1 year from the expiration date of his license providing it is filed prior to December 31, 1945.

A number of orders of the Commission, adopted prior to this fiscal year, were continued in force to provide needed relaxation of operator qualifications and requirements. This group is comprised of the following:

Order No. 93, waiving the provisions of section 318 of the Communications Act, in order to permit the operation of specified aircraft radio transmitting apparatus in the United States by qualified Latin American students, during the training period under the auspices of the Civil Aeronautics Administration. Order No. 97, establishing the temporary limited radiotelegraph second-class operator licenses for ship radiotelegraph station operation exclusively. Order No. 104, permitting regular employees of police departments in Hawaii, who are American Nationals, to operate mobile police radio transmitting apparatus under the provisions of section 318 of the Communications Act. Order No. 102, authorizing operation of aeronautical and aeronautical fixed stations employing types A-1 and A-2 emission by holders of radiotelephone operator licenses or permits, provided that the face of the license or permit has been endorsed, attesting to the holder's ability to transmit and receive International Morse Code at the rate of at least 16 code groups per minute.

The Commission also gave particular attention to requirements of the forestry radio service and as a result of its studies, promulgated less stringent requirements for operators at forestry stations. On August 14, 1944, the rules were amended by the Commission to permit the examination for restricted radiotelephone operator permit to be conducted by mail for prospective employees of forestry station licenses.

Studies and investigations have been made during the year with regard to the qualifications of radio operators in view of changing conditions and developments in the radio field. Examination questions have been revised from time to time in order to keep pace with advancements made in the radio art. At the close of the fiscal year, studies were in progress with respect to the establishment of requirements for radio operators in new radio services expected to develop after the war.

## 2. AMATEUR RADIO SERVICE

During the year, the Commission continued in force its orders No. 87 and 87-A, adopted on December 8, 1941, and January 8, 1942, respectively, which suspended the operation of amateur stations because of the war. On September 15, 1942, the issuance of new or renewal licenses for amateur stations was discontinued. However, the Commission continues to conduct examinations for amateur radio operator licenses and issues such licenses to applicants who establish their qualifications.

The licensing of amateur operators during the war serves a two-fold purpose, since licensed amateur radio operators entering the armed forces of the Nation receive special recognition by the military authorities in view of their technical qualifications, and operators licensed during this period will relieve, to some extent, the rush of applicants for licenses, following the reactivation of amateur stations in the early postwar period.

On November 28, 1944, the Commission adopted order No. 115-A in view of wartime conditions, to alleviate the difficulty for amateur radio operators who are located in the military service of the United States or engaged in war work at locations distant from their homes, to ascertain the expiration dates of their amateur radio operator licenses and to make timely and proper application for their renewal. This order provides that every amateur radio operator license, which by its terms expired during the period December 7, 1941, to December 7, 1942, inclusive, but the duration of which has been extended by Commission order No. 115 for a period of 3 years from the date of expiration provided therein, is extended for a period of 1 year from the date of expiration as extended by order No. 115 and every amateur radio operator license issued during the period December 7, 1941, to December 7, 1942, inclusive, is extended for a period of 1 year from the date of expiration provided therein.

Of major importance to the amateur service was the Commission's frequency allocation hearing.

Studies conducted in preparation for the hearing indicated that a large increase in the number of frequency bands would be required for the amateur service in order to provide for the operation of the large number of amateur stations expected to be licensed after the war.

The American Radio Relay League appeared at this hearing in behalf of the amateur radio service and proposed that the amateur frequency bands below 60 megacycles remain unchanged except for the additional band 21,000 to 22,000 kilocycles and that frequencies above 60 megacycles be allocated by extending the present harmonic frequency family upward by the addition of new frequency bands an octave apart up to the limit of frequency allocations.

As a result of this hearing, the following frequency bands were allocated to the amateur service: 3500 to 4000 kilocycles, 7000 to 7300 kilocycles, 14,000 to 14,400 kilocycles, 21,000 to 21,500 kilocycles, 28 to 29.7 megacycles, 50 to 54 megacycles, 144 to 148 megacycles, 220 to 225 megacycles, 420 to 450<sup>1</sup> megacycles, 1145 to 1245 megacycles,

<sup>1</sup> The frequency band 420-450 megacycles is temporarily to be shared with special or navigational aids.

2300 to 2450 megacycles, 5250 to 5650 megacycles, 10,000 to 10,500 megacycles, 21,000 to 22,000 megacycles. In addition, provisions will be made for amateur disaster communication networks in the band 1605 to 1800 kilocycles. However, the exact width of this frequency band and its location within the 1605- to 1800-kilocycle band is undetermined at this time. Amateurs may also make such use as is possible on the band centered on 27.32 megacycles, assigned for medical and industrial use. Frequencies above 30,000 megacycles are being designated as available for general experimental use and this will include experimentation by amateurs. Actual operation on the frequencies allocated cannot start until the Commission removes its wartime ban on amateur activity and specifically authorizes the use of particular frequencies.

The number of frequency bands allocated to the amateur service and their position in the frequency spectrum have been established with regard to needs of governmental services as well as other services administered by the Commission. The following frequency bands formerly allocated to the amateur service have been reallocated to other services: 1750 to 2050 kilocycles, 29.7 to 30 megacycles, 56 to 60 megacycles, 112 to 116 megacycles, 224 to 230 megacycles, 400 to 401 megacycles.

At the beginning of the war, there were approximately 60,000 licensed amateur stations, which represents the largest single class of station licensees. The American Radio Relay League estimates that within 5 years after the war, the number of amateur stations will increase to approximately one-quarter million stations. It is estimated that approximately 100,000 applicants will request licenses during the first year after amateur station operation is authorized by the Commission.

### 3. EXAMINATIONS

Examinations of applicants for all classes of commercial licenses continued at an unprecedented high level. A total of 64,260 applicants were examined (exclusive of class C amateur) as compared with 67,424 for the previous year. Of these, 62,022 were applicants for commercial licenses including 43,183 radiotelephone and 18,839 radiotelegraph. Applicants for amateur class A and B radio operator licenses totaled 2,238. As a result of the examinations, 61,038 commercial operator licenses were issued; 52,562 telephone and 8,476 telegraph.



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**CHAPTER VII**

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**Technical Studies**

- 1. GENERAL**
  - 2. SUNSPOT CYCLE FIELD INTENSITY AND NOISE PROGRAM**
  - 3. LOW FREQUENCY RECORDING PROGRAM**
  - 4. VERY HIGH FREQUENCY BROADCAST RECORDING PROGRAM**
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## CHAPTER VII—TECHNICAL STUDIES

### 1. GENERAL

The projects under the supervision of the Technical Information Division of the Engineering Department were in the main continuations and extensions of the work underway at the close of the preceding fiscal year. As before, the actual taking of observations continued to be a function of the Field Division, while the general planning of the projects, the analysis of the results, and the preparation of reports based thereon were responsibilities of the Technical Information Division.

### 2. SUNSPOT CYCLE FIELD INTENSITY AND NOISE PROGRAM

This project, which involves making continuous recordings of selected broadcast stations and of atmospheric noise in the standard band at several points throughout the United States, has been continuous for the past 7 years. Recording of several additional sunspot cycles will be necessary to obtain data for allocation policies. Some changes in the details of the program have been made during the year and others will undoubtedly be made in the future.

The present allocation standards of the Commission in the standard broadcast band are based on the analysis of some 3 months' recordings made during the late winter and spring of 1935. The present analysis of the vastly larger amount of data now available is directed toward a revision of those standards. The main objectives are the preparation of new and more reliable field strength versus distance curves, methods of estimating the daily and seasonal variations from the annual mean values, a revised soil conductivity map, the preparation of day and night atmospheric noise intensity maps covering the continental United States, surveys of levels of man-made noise existing in towns and cities of various sizes, and the investigation of ratios of signal to noise to determine what ratio should be adopted as providing an acceptable grade of broadcast service. The progress made toward these objectives may be summarized as follows:

Analysis of the accumulated field intensity recordings for some 160 station-years has thus far progressed only through the first stages of summarizing. Although the point has not yet been reached where definite conclusions can be drawn, it already appears likely that:

(a) The results of the earlier survey will be confirmed as a general average to a considerable degree.

(b) Enough of the nature and the correlation of radio signal strength with the sunspot cycle will be disclosed to permit allocation of standard broadcast stations on a somewhat longer range basis.

(c) The data will disclose a rather considerable latitude effect on standard broadcast transmission which should be pertinent not

only to domestic allocation, but particularly also to allocation within the North American Regional Broadcasting Agreement.

(d) The data will provide substantially improved measures of the night-to-night reliability of serviceable signals and of the probability of interfering signals.

On account of the shortage of personnel nothing has yet been done toward a revision of the ground conductivity map.

The day and night atmospheric noise maps are being prepared principally from data obtained from seven recording sites throughout the United States, operating under the Sunspot Cycle Program. Some additional data from measurements made by others will be included in order to obtain noise levels at other points. The results of at least a year of recording at each site will be correlated with thunderstorm conditions during the year of recording and adjusted to conform with average thunderstorm conditions, using data from the United States Weather Bureau. The analysis of the data has proceeded to the point where thunderstorm correlation is being made.

The surveys of man-made noise levels have not yet been made because of equipment difficulties, but these will be solved soon. The surveys are to be made by consulting engineers and others in the industry, under the direction of the joint F. C. C.-Industry Committee set up for handling noise problems.

The investigation of acceptable signal to noise ratios consists in obtaining audience reaction to specially prepared sound records on which various ratios of signal-to-noise have been recorded. The sample signals include both speech and music and the noise samples include atmospheric noise and man-made noise for various electrical sources such as motors, etc. The signal to man-made noise records have been completed and distributed to the broadcast industry for audience reaction tests. The signal to atmospheric noise records have been delayed by equipment shortages but should be completed in the near future.

### 3. LOW-FREQUENCY RECORDING

This program, which will provide for measuring aeronautical beacon stations in the frequency range from 200 to 400 kilocycles and atmospheric noise at 200 kilocycles, has been for the most part unavoidably postponed because of the diversion of manpower and equipment to the very high frequency broadcast recording program. The 200-kilocycle noise recorder at Grand Island, Nebr., the only recorder now operating in this program, has been in continuous operation since October 1943. Data from this program will be invaluable in studying radio propagation and the intensity and geographical distribution of atmospheric noise in this frequency range.

### 4. VERY HIGH FREQUENCY BROADCAST RECORDING PROGRAM

This project has rapidly expanded in importance and scope during the year. With the advent of VHF broadcasting it was expected that one of the main advantages of using these higher frequencies would lie in the closer spacing possible between stations assigned to the same frequency owing to the absence of sky wave interference which they were presumed to enjoy. While this expectation has been verified in

general, it has nevertheless been found that sky wave interference does occasionally occur at the lower end of the VHF band. It is thus of importance to determine as accurately as possible the intensity, duration and the frequency range of such occurrences. This has been and remains the main objective of the program.

Three types of sky wave interference in the VHF region of the spectrum have been found:

(a) *So-called bursts.*—Work on these has been temporarily abandoned as their effect on broadcast listening appears to be negligible. As a scientific problem this phenomena is highly interesting and investigation of their origin (most probably from ionization tracks set up by meteoric particles entering the atmosphere) should yield results of value both to the radio and other fields of knowledge. Intensive work on the problem did not however seem to be justified under wartime conditions.

Analysis of the meteoric bursts consisted in counting the numbers of bursts exceeding a fixed level and tabulating the numbers occurring per hour. The daily and annual variations in the hourly number of bursts have been correlated with theoretical and observed meteoric occurrences and very good agreement has been found. In addition, visual observation by the engineer in charge of the project has resulted in 13 coincidences between bursts and visible meteors.

(b) *Sporadic E-layer reflections.*—These have been found to exist with extraordinary intensity and for appreciable percentages of the time during the late spring and summer months at distances from the transmitter of from 500 to 1,500 miles. They may occur during any of the years of the Sunspot Cycle and their intensity varies with the distance in such a manner that there exists a maximum at about 900–1,000 miles. The measurements so far made have been mostly in the frequency range 42–50 megacycles. Since the middle of June 1945 regular recording on 83 megacycles has been instituted while recording on 107 megacycles has been done intermittently since that time. It is expected that regular recording on both 106 and 107 megacycles will be begun within a short time. These extensions of the program have been made possible by the cooperation of the industry. The results so far obtained indicate that both the intensity and the frequency of occurrence of sporadic E-layer reflections decreases markedly as we go higher in the spectrum.

The work done under this project has been reported in some detail in exhibits No. 380, No. 4, No. 593, and No. 627 of the frequency allocation hearing.

In this case the fundamental problem of analysis is not the determination of an average field at various distances, but a knowledge of the percentage of the time during which the interfering field exceeds certain fixed intensities at any given distance together with the rate of increase of the percentage of time with increase in the number of paths over which interference is received. This essential difference between the two cases has led to the development of novel methods of analysis and representation which may be described briefly as follows.

For the determination of the occurrence of sporadic E interference within a particular band of frequencies, a single high-powered transmitting station was recorded at several selected recording sites. The recorder tapes for each recording site were analyzed to determine to the

nearest minute the times during which the sporadic E signals exceeded certain selected levels of intensity and the times blocked in on an occurrence sheet for that level. A separate occurrence sheet was prepared for each level at a given recording site and a separate set of sheets for each site. Superposition of sheets from different sites over a light table permitted an optical comparison of the coincidence of occurrences at different recorder sites and permitted an estimate to be made of the rate of increase in interference to be expected with increasing numbers of stations assigned to the same channel. Sample occurrence sheets, each covering a full year, are included in exhibit No. 4 of the frequency allocation hearing. Reference thereto will show that the sheets permit also a quick determination of the daily and annual variations in the time of occurrence of these signals. At the present time occurrence sheets are being prepared on a monthly basis, rather than on an annual basis, in order to increase their accuracy and value as permanent records.

(c) *F2-layer reflections*.—The sky-wave interference from reflections at the upper of the stratified regions of the ionosphere, while most serious when it occurs owing to the greater distances from which it may originate—thus involving the question of international interferences—are of concern only for a few years in the neighborhood of sunspot maxima. Hence there is no experimental work on this source of interference to report at the present time. Work on this project has been confined to theoretical studies, and analysis of the rather meager results known from previous sunspot maximum periods. The conclusions arrived at are set forth in exhibits No. 380, No. 593, and certain exhibits of the frequency allocation hearing.

(d) *Tropospheric effects*.—In addition to the studies of sky-wave interference the VHF broadcast recording program has included studies of the variations in the range of such signals due to variations in the physical state of the lower atmosphere or troposphere. These range variations occur at all frequencies and insufficient data have been obtained in our work up to the present to warrant definite conclusions as to the magnitude of the trend of the effect with increasing frequencies. From the small amount of observations now available it does not appear that the range variations in the neighborhood of 100 megacycles differ sufficiently from those around 50 megacycles to demand any radical differentiation in the allocation policies for the two regions. A considerable amount of information on the matters at these and higher frequencies, some of which may be useful for the Commission's allocation problems, has been accumulated by the armed forces of the Nation and National Defense Research Committee but is not now generally available owing to security restrictions. Recently, certain very high frequency equipment has been made available to the Commission by the Office of Chief Signal Officer and the Army Air Forces, U. S. A. for further investigations at presently measured frequencies and for expanding the program to include frequencies higher than those now under investigation.

VHF tropospheric signals are analyzed in a manner similar to sky-wave signals in the standard broadcast band. That is, the hourly median signal levels are first determined, and these values then used to represent variations of signal levels with time, distance and frequency, in the manner shown in exhibit No. 4 of the frequency allocation hearings.

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**CHAPTER VIII**

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**War Activities**

- 1. RADIO INTELLIGENCE DIVISION**
  - 2. FOREIGN BROADCAST INTELLIGENCE SERVICE**
  - 3. FCC ASSISTANCE TO THE BOARD OF WAR COMMUNICATIONS**
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## CHAPTER VIII—WAR ACTIVITIES

### 1. RADIO INTELLIGENCE DIVISION

The Radio Intelligence Division, established in 1940 to give America wartime protection from misuse of the ether lanes by spies or other illegal operators, discovered 46 unlicensed stations during the fiscal year, investigated 1,445 complaints of suspicious transmission and of interference. These complaints were received from the general public, commercial communication companies, Government agencies, and the military.

During the year, the RID furnished fixes to 283 planes which were in distress. A total of 996 requests for assistance of all types to planes was received. The RID took 85,031 bearings.

A number of alerts originated totaled 25,000. This figure represents the number of instances in which an origination was made by each monitoring station equipped with long-range, high-frequency direction-finding facilities for the purpose of obtaining synchronized bearings from a net of direction finding stations upon a particular radio station under surveillance.

To facilitate its task of identifying the thousands of stations heard around the world so that the enemy, subversive or unlicensed stations may be spotted instantly, the RID compiled an additional 200,000 index cards for its files. These records show the operating characteristics of stations logged or otherwise monitored.

In accordance with a budget reduction, the personnel of the RID was reduced from 468 to 328. The number of secondary stations was reduced from 59 to 28, of which 13 were equipped with long-range, high-frequency Adcock type radio-direction finders. The number of primary stations, totaling 12, was maintained.

### 2. FOREIGN BROADCAST INTELLIGENCE SERVICE

The Foreign Broadcast Intelligence Service carried on its activities under an appropriation 25 percent less than that available for the preceding year. This necessitated a number of changes in the service provided to departments and agencies and in organization and operating procedures.

The changes included:

*a.* The mimeographed publications summarizing and analyzing broadcasts relating to events and conditions in Europe (distributed first on a weekly basis, then biweekly) were discontinued at the end of December 1944.

*b.* The special file of European shortwave broadcasts monitored in Washington, D. C., and delivered by teleprinter to the Office of War Information in New York City was reduced to an 8-hour service from a 24-hour service as had previously been the case.

*c.* A Special Services Section was created which mailed out to the departments and agencies broadcasts of interest which would not be

carried to them by the regular wire service or the mimeographed publications of FBIS.

The service provided to departments and agencies of the Federal government and allied nations after the above changes were instituted may be summarized as follows:

*a.* Texts and summaries of broadcasts originating in some 55 different countries were delivered daily by teleprinter to some 14 different departments and agencies; by mimeographed daily report to some 23 departments and agencies; and by special services to some 22 agencies, some of which did not subscribe to the regular service. This monitored material was also made available to representatives of 22 foreign governments.

*b.* All broadcast messages relating to American and allied servicemen held prisoner of war were communicated immediately by wire to the War Department.

*c.* Broadcasts originating in the Far East were summarized and analyzed in a fortnightly mimeographed publication and delivered to some 23 different departments and agencies.

*d.* Texts of broadcasts and special reports based on broadcast material were prepared as required for military and civil authorities of the United States in both the European and Pacific theaters of war.

The service thus supplied to the governments of the United States and its allies was based on a careful examination of several million words of broadcast text monitored daily. At the beginning of the fiscal year, FBIS maintained three principal monitoring posts (Washington, D. C.; Portland, Oreg.; and San Francisco, Calif.), and one minor post (Honolulu, T. H.). During the year the San Francisco post was abandoned, the Honolulu post was moved to the Island of Kauai (T. H.) and greatly enlarged, and a new post was established on Guam. In addition to the broadcasts intercepted at these stations, FBIS had access to material monitored by various allied nations, principally by the British Broadcasting Corp. at its post near London, and by the British Ministry of Information at its posts near Cairo and New Delhi.

### 3. FCC ASSISTANCE TO THE BOARD OF WAR COMMUNICATIONS

[As the Board of War Communications is an independent agency, the emphasis in this report is on those actions which involved the cooperation of the FCC.]

#### ORGANIZATION

The Board of War Communications (formerly the Defense Communications Board) was created by Executive Order No. 8546 on September 24, 1940, for the purpose of determining, preparing, and coordinating plans for the most efficient control and use of the country's radio, wire, and cable communications facilities during the national emergency. Thereafter, by Executive Order No. 8964, dated December 10, 1941, and by Executive Order No. 9089, dated March 6, 1942, there was delegated to the Board the President's wartime authority under section 606 (a) of the Communications Act to direct that communications essential to the national defense and security shall have preference or priority and, under sections 606 (c) and (d), to direct the use, control or closure of radio and wire communication stations and facilities.



Chairman Paul A. Porter of the Federal Communications Commission is also Chairman of the Board of War Communications. The other members of the Board are Maj. General Harry C. Ingles, Chief Signal Officer of the Army; Rear Adm. Joseph R. Redman, Director of Naval Communications; Hon. William L. Clayton, Assistant Secretary of State in Charge of Economic Affairs; and Hon. Herbert E. Gaston, Assistant Secretary of the Treasury in Charge of Treasury Enforcement Activities, who is Secretary of the Board. Commodore E. M. Webster, Chief of Communications, United States Coast Guard, is Assistant Secretary of the Board.

The Board has no paid personnel, appropriation, or funds. It operates through a coordinating committee and a law committee staffed by personnel from the agencies represented on the Board; through Labor and Industry Advisory Committees and an international Broadcasting Coordinating Committee; and through 13 "numbered committees" for radio amateurs, aviation communications, cable, domestic broadcasting, the Interdepartment Radio Advisory Committee, international broadcasting, radio communications, State and municipal facilities, telegraph, telephone, United States Government facilities, the Communications Liaison Committee for Civilian Defense, and the Priorities Liaison Committee.

#### ACTIVITIES

In addition to assisting in the preparation of the orders issued by the Board of War Communications during the fiscal year ending June 30, 1945, the Commission also cooperated with the Board in its consideration of problems which continued to arise concerning wartime communications such as, for example, the wartime speed and quality of domestic telegraph service. In connection with the speed and quality of domestic telegraph service, the Commission submitted to the Board during the fiscal year ended June 30, 1945, two reports dated, respectively, July 1944, and November 1944, showing the service being rendered by the telegraph industry. Continued checks were also made by the Commission to determine the extent of compliance by the telegraph carriers and the public with Board orders No. 25-C, 28, until those orders were canceled by order No. 31, dated August 16, 1945, and a number of other matters were investigated involving, for example, complaints regarding the abuse of the telephone and telegraph priorities provided for in Board orders No. 20 and 27, as amended.

The Board issued the following orders during the fiscal year ending June 30, 1945:

Order No. 6-A, dated January 25, 1945, canceling order No. 6 dated May 1, 1942, designating for closure the facilities of the French Telegraph Cable Co. within the continental United States.

Order No. 8-C, dated November 23, 1944, exempting from the closure provisions of order No. 8, upon certain specified condition, point-to-point radiotelegraph circuits between New York, N. Y., and San Francisco, Calif., operated by Globe Wireless, Ltd.

Order No. 19-C, dated May 3, 1945, canceling orders No. 15, 17, 18, 19, 19-A, and 19-B, previously issued by the Board and limiting the use of international radiotelephone communications.

Orders No. 25-D and 25-E, dated May 4, 1945, and May 17, 1945, respectively, relaxing the provisions of order 25-C prohibiting the transmission of telegraph messages of felicitation and congratulation to permit the transmission of such messages to or from members of the armed forces and the merchant marine.

Order No. 25-F, dated June 28, 1945, relaxing the ban in order No. 25-C against the performance of nontelegraphic services by domestic telegraph carriers to permit such carriers to participate in the furnishing of shopping service ordered through another carrier from outside of the continental United States.

Order No. 31, dated August 16, 1945, though issued subsequent to June 30, 1945, is listed here because of its importance. It canceled the following previously issued Board of War Communications orders: Nos. 5, 7, 8, 8-A, 8-B, 9, 10, 11, 12, 13, 14, 16, 21, 23, 25, 25-F, 28, 29, 30.

## APPENDIX

### PUBLICATIONS

Following is a list of Federal Communications Commission publications of general interest available at the Government Printing Office, Superintendent of Documents, Washington 25, D. C., unless otherwise indicated:

<i>Title</i>	<i>Price</i>
Communications Act of 1934, with Amendments and Index thereto, revised to June 14, 1945.....	\$0. 15
Federal Communications Commission Reports (bound volumes of decisions and orders exclusive of annual reports) :	
Volume 1—July 1934–July 1935.....	1. 00
Volume 2—July 1935–June 1936.....	2. 00
Volume 3—July 1936–February 1937.....	2. 00
Volume 4—March 1937–November 15, 1937.....	1. 50
Volume 5—November 16, 1937–June 30, 1938.....	1. 50
Volume 6—July 1, 1938–February 28, 1939.....	1. 50
Volume 7—March 1, 1939–February 29, 1940.....	1. 50
Volume 8—March 1, 1940–August 1, 1941.....	1. 50
Volume 9—August 1, 1941–April 1, 1943.....	1. 25
Annual reports of the Commission :	
First Annual Report—Fiscal year 1935.....	. 15
Third Annual Report—Fiscal year 1937.....	. 30
Sixth Annual Report—Fiscal year 1940.....	. 20
Seventh Annual Report—Fiscal year 1941.....	. 10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	. 15
Standards of Good Engineering Practice Concerning Standard Broadcast Stations (550–1,600 kc.).....	. 65
Standards of Good Engineering Practice Concerning FM Broadcast Stations.....	(1)
Standards of Good Engineering Practice Concerning Television Broadcast Stations.....	(1)
Statistics of the Communications Industry in the United States (1939).....	. 25
Statistics of the Communications Industry in the United States (1940).....	. 20
Statistics of the Communications Industry in the United States (1942).....	. 35
Statistics of the Communications Industry in the United States (1943).....	. 30
Report on Chain Broadcasting.....	. 30
Rules and Regulations of the FCC:	
Part 1—Rules of Practice and Procedure, Revised to February 1, 1945.....	(1)
Part 2—General Rules and Regulations, Revised to December 19, 1944.....	. 10
Part 3—Rules Governing Standard and High Frequency Broadcast Stations, Revised to October 5, 1940.....	. 10
Part 4—Rules Governing Broadcast Services Other than Standard Broadcast, Revised to May 14, 1942.....	(1)
Part 5—Experimental Rules, Effective October 1, 1939.....	(1)
Part 6—Rules Governing Fixed Public Radio Services, Revised February 20, 1943.....	. 05
Part 7—Rules Governing Coastal and Marine Relay Services, Revised April 5, 1941.....	(1)
Part 8—Rules Governing Ship Service, Revised to May 31, 1943.....	. 15
Part 9—Aviation Radio Services, Revised November 1, 1942.....	. 05

<sup>1</sup> Obtainable from the Federal Communications Commission, Washington 25, D. C., upon request.

<i>Title</i>	<i>Price</i>
Rules and Regulations of the FCC—Continued.	
Part 10—Rules Governing Emergency Radio Services, Revised October 16, 1944.....	(1)
Part 11—Rules Governing Miscellaneous Radio Services, Effective January 1, 1939.....	\$0. 05
Part 12—Rules Governing Amateur Radio: Stations and Operators, Revised to April 18, 1940.....	. 10
Part 13—Rules Governing Commercial Radio Operators, Effective July 1, 1939.....	. 05
Part 14—Rules Governing Radio Stations in Alaska (Other than Amateur and Broadcast) Revised to April 2, 1942.....	. 05
Part 15—Rules and Regulations Governing All Radio Stations in the War Emergency Service, Revised May 26, 1943.....	. 10
Part 16—Rules and Regulations Governing Railroad Service.....	(1)
Part 31—Revised October 25, 1940, and Part 32, Effective January 1, 1937, Uniform System of Accounts, Class A and Class B Telephone Companies; Units of Property, Class A and Class B Telephone Companies (1 pamphlet).....	. 15
Part 33—Uniform System of Accounts for Class C Telephone Companies, Effective January 1, 1939.....	. 15
Part 34—Uniform System of Accounts for Radio Telegraph Carriers, Effective January 1, 1940.....	. 25
Part 35—Uniform System of Accounts for Wire-Telegraph and Ocean-Cable Carriers, Effective January 1, 1942.....	. 35
Part 41—Telegraph and Telephone Franks, Effective August 11, 1939.....	. 05
Part 42—Rules Governing the Preservation of Records, Revised to May 27, 1943.....	. 10
Part 43—Rules Governing the Filing of Information, Contracts, etc., of Telecommunications Carriers, Revised to September 29, 1943.....	. 05
Part 51—Classification of Telephone Employees.....	. 05
Part 52—Classification of Wire-Telegraph Employees.....	. 05
Part 61—Tariffs: Rules Governing the Construction, Filing, and Posting of Schedules of Charges for Interstate and Foreign Communications Service, Revised to September 29, 1943.....	. 10
Part 62—Rules Governing Applications Under Section 212 of the Act to Hold Interlocking Directorates, Effective September 1, 1939.....	. 05
Part 63—Extension of Lines and Discontinuance of Service by Carriers, Effective March 18, 1944.....	. 05
Federal Communications Commission Report on Social and Economic Data, pursuant to Informal Hearing, etc., July 1, 1937.....	. 60
Federal Communications Commission—Proposed Telephone Investigation Pursuant to Public Resolution No. 8 (74th Cong.).....	1.00
Final Report on Telephone Investigation, House Document 340.....	. 65
Annual Report Form H for year ending December 31, 1944.....	. 05
Annual Report Form M, paper, loose-leaf edition.....	. 05
Statistical Circular No. 1.....	. 05
FCC Form 901.....	.05 ea. 1.25 C
FCC Form 902.....	.05 ea. 1.25 C
Form 903.....	.05 ea. 1.25 C
FCC Form 905A.....	.05 ea. .85 C
FCC Form 905B.....	.05 ea. .85 C

<sup>1</sup> Obtainable from the Federal Communications Commission, Washington 25, D. C., upon request.

TWELFTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1946  
(With Notation of Subsequent Important Developments)

## **COMMISSIONERS**

### **MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION**

(As of January 1, 1947)

#### **CHAIRMAN**

**CHARLES R. DENNY**  
(Term expires June 30, 1951)

**PAUL A. WALKER**  
(Term expires June 30, 1953)

**RAY C. WAKEFIELD**  
(Term expires June 30, 1947)

**CLIFFORD J. DURR**  
(Term expires June 30, 1948)

**EWELL K. JETT**  
(Term expires June 30, 1950)

**ROSEL H. HYDE**  
(Term expires June 30, 1952)

(Vacancy)

## LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
*Washington 25, D. C., Feb. 8, 1947.*

*To the Congress of the United States:*

The Twelfth Annual Report of the Federal Communications Commission is submitted herewith in compliance with section 4 (k) of the Communications Act.

While this report primarily covers the fiscal year ended June 30 last, certain subsequent developments are mentioned in the introductory summary so that the Congress may be more currently informed.

The return of peace has aroused an unprecedented interest in electrical communications that has taxed the limited funds and personnel of the Commission. The showing made has largely been made possible by extraordinary ingenuity and effort on the part of employees in all levels.

Respectfully,

CHARLES R. DENNY, *Chairman.*

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## INTRODUCTORY SUMMARY

### HIGHLIGHTS OF FISCAL YEAR ENDED JUNE 30, 1946

Assisting in the reconversion and expansion of the Nation's electrical communications engaged the major attention of the Federal Communications Commission during the fiscal year ending June 30, 1946.

Construction for civilian purposes having been virtually halted during the war, applications to build facilities in the existing systems or in new systems reached an all-time high.

Expansion in the broadcast services as shown at the fiscal year's end:

Standard: 961 existing stations, 254 construction permits issued, 659 applications pending; frequency modulation (FM): 55 existing stations, 456 construction permits or conditional grants issued, 250 applications pending; television: 6 existing stations, 24 construction permits issued, 40 applications pending.

Several hundred of the applications were in conflict with one or more applications or existing stations and were designated for hearing.

Authorizations were granted for the construction of 3,000 miles of telephone cable, 16,500 miles of coaxial cable, and 12,200 miles of open wire. Western Union launched an extensive modernization program.

Actual construction of facilities authorized by the Commission, as well as related construction such as radio receivers, was seriously handicapped by shortages of materials.

Many new services were either authorized or actually got under way during the year. Radio to supplement rural wire telephone service and for taxicabs, trucks, private autos, busses and similar vehicles, was authorized on an experimental basis. Several companies were granted authority to experiment with microwave radio relay systems. The Commission began issuing experimental licenses for radar on merchant ships to test its value in promoting the safety of life and navigation at sea. To meet the demands of sharply expanded air traffic, the entire domestic aviation communication system is being revised. The railroad radio service, after several years of experimentation, and after a comprehensive investigation by the Commission, was authorized as a regular service. Most of these new services were made possible by wartime technical developments which permit use of the shorter waves in the radio spectrum.

The Nation's 60,000 amateurs, who had been silenced during the war, were permitted to return to the air.

An all-time peak of 8,000 merchant ships were licensed. The number of police radio stations, some having as many as 200 transmitters, rose to 2,800.

As one step in its effort to provide standard broadcast service to some 21,000,000 Americans who are not now being satisfactorily served, the Commission began a series of hearings to determine what changes if any should be made in the present policies on allocation of clear channels.

On March 7, 1946, the Commission issued a report, "Public Service Responsibility of Broadcast Licensees," which dealt with the problem

of improving broadcast service. It announced that thereafter, in issuing and renewing licenses of broadcast stations, the Commission proposed to give particular consideration to four program service factors relevant to the public interest. These are: (1) the carrying of sustaining programs, including network sustaining programs with particular reference to the retention by the licensees of a proper discretion and responsibility for maintaining a balanced program structure; (2) the carrying of local live programs; (3) the carrying of programs devoted to discussions of public issues; and (4) the elimination of advertising excesses.

After granting Western Union a 1-year rate increase to offset an anticipated loss of about \$12,000,000 in 1946, the Commission concluded that the company would need substantially more revenue "if it is to continue in operation as a solvent enterprise and provide satisfactory service on a comprehensive Nation-wide basis."

#### HIGHLIGHTS OF ACTIVITIES JUNE 30, 1946, TO JANUARY 1, 1947

A public utility radio service was authorized August 12 for power, transit, and petroleum pipe-line companies. As of December 9, reinsurance was given that taxicab and truck radio services will be established after further experimentation. Proposed rules and regulations governing diathermy and industrial heating equipment were the subject of a hearing which began December 18 and, on December 26, a frequency was assigned for the immediate use of these devices.

A revised part 1 of the Commission's Rules and Regulations relating to organization, practice, and procedure was published September 4.

Beginning August 16, when it outlined procedure in processing broadcast applications, the Commission at intervals published status lists of pending AM, FM, and television cases.

An order of July 18 withholds until June 30, 1947, assignment of one out of every five Class B, FM channels, and a tentative allocation plan was announced September 3.

On December 9 the United States Supreme Court upheld the right of the Commission to deny renewal of license to WOKO, Albany, N. Y. (mentioned elsewhere in this report).

Petition of the Columbia Broadcasting System seeking authorization of commercial color television was heard by the Commission en banc throughout the week of December 9, and continued into the new year.

An order of December 27 granted Western Union a supplemental rate increase of slightly more than 9 percent. This was accomplished by replacing the 10-percent increase of June 12 with a 20-percent increase. Meanwhile, on September 25, the Commission suspended, until additional funds are obtainable, its special telegraph investigation ordered June 4.

On November 27, a hearing was ordered in the matter of service and frequencies used in radiotelegraph communication between the United States and foreign points.

Acting Chairman Charles R. Denny was appointed Chairman by the President on December 4.

The period since the close of the last fiscal year saw intensive effort to reduce paper work and simplify procedures wherever possible. Forms have been shortened and, in some cases, applications are repro-

duced as part of the license. Also, arrangements were made to issue aviation radio licenses at airports. Other short cuts include renewing special temporary authorizations without issuing new documents, accepting single application where the licensee holds several non-broadcast licenses, eliminating oath requirements for some reports and forms, abandoning fingerprints and proof of citizenship for operators, relinquishing permit requirements for operators of some classes of mobile transmitters, and authorizing use of mobile transmitters in specified numbers instead of individually.

Since the close of the war, more than 200,000 applications covering 40 categories of radio service have been received, and nearly 200,000 authorizations issued. The result is that, at the close of the calendar year 1946, the total number of licensees and permittees was nearing 530,000. During the same period, more than 27,000 pages of tariff filings were received.

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## CHAPTER I

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### General

1. ADMINISTRATION
  2. COMMISSION MEMBERSHIP
  3. STAFF ORGANIZATION
  4. PERSONNEL
  5. APPROPRIATIONS
  6. LEGISLATION
  7. LITIGATION
  8. PUBLIC SERVICE RESPONSIBILITY OF BROADCAST LICENSEES
  9. MONOPOLY
  10. FREQUENCY SERVICE-ALLOCATIONS
  11. INTERNATIONAL
  12. INTERDEPARTMENT RADIO ADVISORY COMMITTEE
  13. FIELD ACTIVITIES
  14. BOARD OF WAR COMMUNICATIONS
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## CHAPTER I—GENERAL

### 1. ADMINISTRATION

The Commission continued to function as a unit, directly supervising all activities, with delegations of responsibility to committees of Commissioners, individual Commissioners, and the Administrative Board. The Commission itself made all policy determinations.

### 2. COMMISSION MEMBERSHIP

Paul A. Porter relinquished the chairmanship of the Commission on February 28, 1946, to accept Presidential appointment as Administrator of the Office of Price Administration. On the following day the President designated Charles R. Denny as Acting Chairman. Commissioner William H. Wills died on March 6 of that year and, on April 17, Rosel H. Hyde, then General Counsel of the Commission, was sworn in as his successor. On June 15, 1946, the Senate confirmed the renomination of Commissioner Paul A. Walker for another 7-year term.

### 3. STAFF ORGANIZATION

The Commission's operating organization consists of four departments—Engineering Department, Accounting Department, Law Department, and Secretary's Department (formerly the Office of the Secretary) augmented by four staff service units—a Rules Committee, a Personnel Division, a Budget and Planning Division, and an Office of Information. The Administrative Board, consisting of the General Counsel, Chief Engineer, Chief Accountant, and Secretary of the Commission, was scheduled to be deactivated and its powers delegated to the heads of the respective departments subject to Commission supervision.

Reorganization of the Engineering Department in November-December of 1945, created four branches—Broadcast, Safety and Special Services, and Field and Research. Two new divisions were added to the last mentioned. One, the Frequency Service Allocations Division, makes service allocation of radio frequencies. The Chief of this division represents the Commission on the Interdepartment Radio Advisory Committee, and his division is responsible for maintaining the IRAC secretariat. The other addition is the Laboratory Division, which investigates civilian uses of new devices, conducts wave propagation and allocation studies, develops new monitoring equipment, and tests transmitters for type approval.

### 4. PERSONNEL

At the close of the fiscal year, the Commission personnel totaled 1,345, of whom 853 were in Washington and 492 in the field. The Engineering Department numbered 727 employees, Accounting 163, Law 111, and 344 were engaged in administrative duties. The Foreign Broadcast Intelligence Service, which numbered 219 employees, was discontinued as a Commission activity on December 30, 1945.

### 5. APPROPRIATIONS

The Commission received appropriations totaling \$5,489,900 during the fiscal year. Of this amount, \$662,421 was for the Foreign Broadcast Intelligence Service.

### 6. LEGISLATION

The only amendment to the Communications Act during the fiscal year was enactment of the Lea-Petrillo bill (Public No. 344, 79th Cong.) which added a new section (506) to title 5 entitled "Coercive Practices Affecting Broadcasting." It prohibits anyone from forcing broadcast stations to add unnecessary employees to pay multiple compensation, to refrain from broadcasting noncommercial or foreign-origin programs, and to pay tribute for or interfere with their use of recordings and transcriptions. Penalties are provided.

### 7. LITIGATION

Three cases involving the Commission were before the United States Supreme Court during the fiscal year. In one case the Commission was reversed, and its decision was sustained in another. The third case was still pending.

Five cases were before the Court of Appeals for the District of Columbia. One was dismissed on motion of the appellee after the Supreme Court reversed the lower court decision and upheld the Commission, and Commission action was reversed in another. The other three cases were pending.

Of three cases filed in Federal district courts, judgment for the Commission was rendered in one case and the other two were awaiting decision.

Of particular interest were the following Supreme Court cases:

*United States et al. v. New York Telephone Co.*—The Commission appealed from dismissal of its motion for summary judgment and issuance of an injunction setting aside the Commission's order by the statutory three-judge court convened pursuant to section 402 of the Communications Act. (*New York Telephone Co. v. United States et al.*, 56 F. Supp. 932.) The Supreme Court affirmed the Commission's order of December 14, 1943, which required the New York Telephone Company to make certain adjustments in its accounts. These adjustments related to certain transactions under which the New York Telephone Co. acquired from the American Telephone & Telegraph Co. properties at a price in excess of original cost less accrued depreciation. The New York Telephone Co. entered in its books the prices charged to it by the present corporation. The Commission disapproved this accounting, holding that in transfers of property between parent and affiliate, the book figures of the former should have been used by the affiliate. The Supreme Court, in reversing the lower court decision, upheld this position of the Commission. (*United States et al. v. New York Telephone Co.*, 326 U. S. 638).

*Ashbacker Radio Corp. v. United States.*—The Supreme Court reversed an action by the Court of Appeals for the District of Columbia dismissing an appeal by the Ashbacker Radio Corp. under section 402 (b) (2) of the Communications Act because of an alleged lack of jurisdiction. Ashbacker had appealed denial of its petition for hearing, rehearing and other relief directed against the grant without hearing of an application filed by the Fetzer Broadcasting Co. for authority to construct a new standard broadcast station, mutually exclusive with an application filed by Ashbacker to change the operating frequency of its existing station. The Commission, after comparative consideration of both applications, had granted the Fetzer application and on the same day had designated the Ashbacker application for future hearing. The Supreme Court held that under the facts in the case and the applicable provisions of the Communications Act the Fetzer application could not properly be granted without first having afforded Ashbacker an opportunity for hearing upon its pending application. (*Ashbacker Radio Corp. v. United States*, 326 U. S. 327.)

*WOKO, Inc. v. Federal Communications Commission.*—This action involved an appeal by the licensee to set aside an order of the Commission denying renewal of its broadcast station license. The Commission based its decision on the licensee's failure to furnish true information concerning the ownership of 24 percent of the stock in the licensee corporation and its falsification of information submitted to the Commission concerning the ownership of such stock. The licensee's course of misrepresentation and concealment for a period of

approximately 18 years evidenced to the Commission a lack of the qualifications required of a licensee to operate a station in the public interest. The Circuit Court of Appeals for the District of Columbia reversed the Commission primarily on the ground that such action, without a consideration of other factors such as the need for the broadcast service and loss of invested capital which the licensee might incur, was beyond the scope of Commission authority. The Commission's petition for a writ of certiorari to review the lower court decision was granted by the Supreme Court on April 22, 1946. (*WOKO, Inc. v. Federal Communications Commission*, 153 F. 2d 623.)

#### 8. PUBLIC SERVICE RESPONSIBILITY OF BROADCAST LICENSEES

On April 10, 1945, the Commission announced a policy of "a more detailed review of broadcast station performance when passing upon applications for license renewals." At the same time, it instituted a study of the subject which culminated in its unanimous adoption, on March 7, 1946, of a report on "Public Service Responsibility of Broadcast Licensees," in which the Commission observed:

Primary responsibility for the American system of broadcasting rests with the licensee of broadcast stations, including the network organizations. It is to the stations and networks rather than to Federal regulation that listeners must primarily turn for improved standards of program service. The Commission, as the licensing agency established by Congress, has responsibility to consider over-all program service in its public interest determinations, but affirmative improvement of program service must be the result primarily of other forces.

However, the Commission concluded:

While much of the responsibility for improved program service lies with the broadcasting industry and with the public, the Commission has a statutory responsibility for the public interest, of which it cannot divest itself. The Commission's experience with the detailed review of broadcast renewal applications since April 1945, together with the facts set forth in this report, indicate some current trends in broadcasting which, with reference to licensing procedure, required its particular attention.

Therefore, in issuing and renewing the licenses of broadcast stations of all types, the Commission proposed to give particular consideration to four program factors: (1) The carrying of sustaining programs, including network sustaining programs, with particular reference to the retention by licensees of a proper discretion and responsibility for maintaining a well-balanced program structure; (2) the carrying of local live programs; (3) the carrying of programs devoted to the discussion of public issues, and (4) the elimination of advertising excesses.

#### 9. MONOPOLY

Following public hearings, the Commission ordered reservation, until June 30, 1947, of one out of every five Class B (metropolitan, to the inclusion of rural) FM channels tentatively allocated for various areas throughout the United States. Besides insuring an equitable distribution of FM frequencies and offering opportunity for late comers to enter the field, this policy is in line with recommendations of the Senate Small Business Committee to preclude monopolistic tendencies in this new type of broadcast.



The Commission's multiple ownership regulations, which stem largely from the 1940 report on its chain-broadcasting inquiry, remained unchanged in their effect on standard, FM and television commercial program service. In general, there is a ban on operation of more than one station in either category by the same interest or group in the same area, except under unusual circumstances. There is no set maximum for the number of standard stations operated by the same interest in the country as a whole. However, because of the competitive factor and other considerations, the Commission has denied a network authority to acquire another station to an already considerable list. The maximum number of FM stations which can be operated in the country as a whole by the same individual or concern is six, and for television stations, five. In developing FM, the Commission started off with a "one-to-a-customer" policy but, as more applications were received, this was increased to two, then three, particularly when it meant bringing FM to communities not previously served.

#### 10. FREQUENCY SERVICE-ALLOCATIONS

Before the war, the usable portion of the radio spectrum extended from 10 kilocycles to about 300 megacycles. As a result, there was congestion in bands assigned to certain services. However, the war's electronic and other developments not only made higher frequencies potentially useful but also evolved apparatus to use them. Consequently, in 1945 it was considered practicable to extend the radio "ceiling" to 30,000 megacycles (30,000,000 kilocycles).

The Commission has since made allocations throughout this augmented radio spectrum to enable established services to expand and to accommodate new services. For more effective use of the lower part of the spectrum, encouragement was given to transfer of services from medium and high frequencies to the "very high" (30 to 300 megacycles), the "ultra-high" (300 to 3000 megacycles), or "super-high" (3000 to 30,000 megacycles), with suitable provision for postwar application of radar.

Standard (AM) broadcasting, having developed between 550 and 1600 kilocycles, continues in that band, with proposal to add the 540 kilocycle channel if possible. Above 30 megacycles, television broadcasting is provided between 44 and 216 megacycles, together with an experimental allocation for this service between 480 and 920 megacycles; frequency modulation (FM) broadcasting is allocated between 88 and 108 megacycles, while experimental facsimile broadcasting uses 106-108 and 470-480 megacycles, the former being shared with FM.

The other spectrum between 30 and 30,000 megacycles is divided between Government and non-Government services and labeled "fixed and mobile" so as to provide flexibility in effecting future frequency assignments.

The Commission's proposal of May 21, 1945, for frequency service-allocations below 25,000 kilocycles was the subject of oral argument on the following June 22. During the fiscal year the evidence presented in this docket case (No. 6651) was studied and the Commission, in collaboration with the Interdepartment Radio Advisory Committee, reviewed particular problems in this portion of the radio spectrum.

Implementation of the Commission's report of frequency service-allocations above 25,000 kilocycles proceeded as quickly as possible, consistent with the availability of radio equipment capable of civil use and standardization of devices likely to be used on a world-wide basis, such as altimeters, distance indicators and instrument landing equipment for airplanes flying international air routes, radar beacons and other radio aids to air and marine navigation. The nonavailability of suitable equipment has delayed utilization of some of the bands provided for the non-government services.

#### 11. INTERNATIONAL

An agreement between the United States and the United Kingdom permits the interim use of the 200 megacycle British distance indicator at United States gateways until January 1, 1949. Thereafter, the use of this device will no longer be permitted in this country. The agreement was effected in order to preserve our important frequency allocations which conflict with those required by the British distance indicator. As a further result of this agreement, a program with the objective of developing a 1,000-megacycle distance indicator for aircraft was agreed upon, and several manufacturing concerns are engaged in producing it.

The Commission was represented at the Third Inter-American Radio Conference at Rio de Janeiro, Brazil, in September 1945, which drafted a new Inter-American Telecommunications Convention. This session studied various technical proposals for the next World Telecommunications Conference, including United States proposal for revision of the international frequency service-allocation table. General reaction to it by the participating governments was favorable.

Commission representatives served as United States delegates to an International Meeting on Radio Aids to Marine Navigation (IMRAMN) at London during May 1946, convened for studying electronic devices developed for this purpose in the United Kingdom and other countries. This meeting disclosed that most of the marine radio navigational aids which appear likely to be standardized internationally are provided for in the Commission's frequency service-allocation proposals. The actual choice of particular competitive devices has not been determined finally at the international level, but the United States frequency service-allocation proposals provide for medium frequency loran (long range navigation) as an aid to long-distance navigation, a system of radio beacons in the medium frequency range used in conjunction with shipboard direction finders as a medium distance aid, and shipboard radar with its associated shore beacons for short distance assistance. The shore facilities in the case of all three of these aids are operated by the United States Coast Guard.

In preparation for the World Telecommunications Conference, the Commission not only arranged to provide delegates to that session, and to the preliminary technical conference, but undertook a comprehensive study of records of frequencies transmitted and received by radio stations in the United States and its possessions. The latter undertaking is expected to result in a system which will more adequately meet the requirements imposed upon the Commission by the occupancy of the heretofore little used portion of the spectrum above

40 megacycles, and to also furnish these conferences appropriate frequency data on United States stations.

## 12. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The IRAC approved 2,738 new regular frequency assignments and 1,904 deletions of regular assignments, bringing the total number of assignments recommended since its establishment to 43,101. Outstanding regular assignments now total 34,674. During the year the Committee approved 302 changes in assignments, 3,629 temporary assignments, and 350 deletions of temporary assignments, which are not included in the above figures. A total of 9,230 applications and requests was processed by the Committee.

## 13. FIELD ACTIVITIES

### RECONVERSION FROM WAR TO PEACE

As previously reported, a Foreign Broadcast Intelligence Service, created by the Commission for emergency purposes, monitored and analyzed foreign broadcasts for military and other Government agencies while the Radio Intelligence Division guarded against enemy transmission in this country and helped furnish bearings to our aircraft. The FBIS was absorbed by the War Department in December of 1945, but the RID continued to monitor the ether for illegal transmission.

### RADIO INTELLIGENCE DIVISION

The Radio Intelligence Division closed the fiscal year with 11 primary monitoring stations and 25 secondary monitoring stations in operation. In maintaining surveillance over the channels of radio communications, it located 117 illegal radio stations. In addition, it aided both Government and industry in tracing sources of interference to radio transmission. Emergency direction finding service was rendered both military and civilian aircraft, and 137 "fixes" supplied to planes requiring such assistance.

Plans were in progress at the end of the fiscal year to merge Radio Intelligence Division and the Field Division into a Field Engineering and Monitoring Division for peacetime functioning.

### FIELD DIVISION

Strategically located throughout the United States, including Alaska, Honolulu, and Puerto Rico, the Field Division had 25 district offices, 2 ship offices, 8 primary monitoring stations, 1 field engineering laboratory, and 2 mobile laboratories. Their duties included inspection of radio stations, giving radio operator examinations, making various radio measurements and field-intensity recordings, and conducting related investigations.

## 14. BOARD OF WAR COMMUNICATIONS

The Board of War Communications (formerly the Defense Communications Board) coordinated plans for the most efficient operation of the country's radio, wire and cable facilities during the national emergency. The Acting Chairman of the Commission is also Acting Chairman of the Board which is representative of public and private interests in that field.

In addition to assisting in the preparation of orders issued by the Board looking toward the removal or adjustment of wartime restrictions, the Commission also cooperated with the Board in resolving particular problems arising from cessation of hostilities. Various complaints relating to telephone and telegraph priorities were investigated.

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## CHAPTER II

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### Standard Broadcast

1. POSTWAR EXPANSION
  2. APPLICATIONS
  3. CLEAR CHANNEL HEARING
  4. CHANGES IN BROADCAST POLICY
  5. INTERNATIONAL
  6. FINANCIAL DATA
  7. STATISTICS
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### CHAPTER II—STANDARD BROADCAST

#### 1. POSTWAR EXPANSION

The first postwar year found the broadcast industry, in common with other business, faced with innumerable reconversion problems. The increased demand for standard broadcast facilities on the part of present and prospective licensees taxed the ability of the Commission's limited staff.

An additional workload was imposed by the necessity for carrying on extensive engineering investigations required in connection with the clear channel hearing. The monumental task of collecting and analyzing data needed for the revision of allocation standards would have been impossible without the extensive cooperation of the industry itself, but in spite of the work by engineers furnished by the industry, it has been necessary to keep a Commission staff devoted exclusively to work on matters pertaining to that hearing.

The expiration of the North American Regional Broadcasting Agreement (NARBA), in March of 1946, required investigation of an interim arrangement for cooperation between the North American countries, and such an agreement was consummated at Washington after a conference with members of the State Department, industry engineers, and attorneys and representatives of the foreign governments concerned.

#### 2. APPLICATIONS

On August 7, 1945, the Commission removed wartime restrictions on the use of material and equipment for broadcast station construction and announced that, beginning October 7, it would resume normal

consideration of applications for new stations and changes in existing stations. This action prompted an unprecedented number of requests for construction permits.

At the end of the war there were approximately 319 applications pending for new standard broadcast stations or for major alterations in existing stations. At the time of the August 7, 1945, announcement it was thought that, after a peak in the number of requests by those who had deferred filing applications because of the wartime restrictions had been reached, a subsequent decline would follow. On the contrary, the demand for standard broadcast facilities has remained at approximately the same level and, if anything, has increased from month to month. The increased workload is reflected in the following table:

	Licensed stations	Outstanding construction permits for new stations	Total stations authorized
June 30, 1945.....	931	24	955
Aug. 7, 1945.....	936	25	961
June 30, 1946.....	961	254	1, 215

At the close of the fiscal year, applications for a new stations or major changes in existing stations were being handled at the rate of approximately 100 a month. Applications continued to be filed at approximately the same pace. In addition to the work in processing applications, the duties of the Hearing Section have been amplified to a corresponding degree. Approximately 529 applications in hearing status remained to be disposed of.

### 3. CLEAR CHANNEL HEARING

The general public hearing to determine what changes, if any, should be made in present policies on allocation of clear channels in the standard broadcast band was in progress during the fiscal year, the first session being held for 2 weeks beginning January 14, 1946, with another session in April, and a third session in July.

More than 4,000 pages of testimony and over 300 exhibits are involved. Extensive cooperation with industry engineers was obtained in research and analysis leading to new knowledge of the signal intensities required and obtainable for service. In addition, information as to the present coverage of all standard broadcast stations, which was considered fundamental to a proper decision on the issues of the hearing, was prepared with industry engineers, and freely exchanged between the interested parties to the hearings. Approximately 600 man-days were spent by industry engineers working in the Commission's offices, at no expense to the Government, in preparation of part of this basic study, and at least as much time was spent by industry engineers in their own offices on the remainder of the project.

#### 4. CHANGES IN STANDARD BROADCAST POLICY

Significant changes during the year in Commission policy affecting standard broadcast may be summarized as follows:

(1) Order 107, requiring the operation of standard broadcast stations with reduced power in order to conserve tubes and other equipment, rescinded August 1, 1945.

(2) Order 94-A, providing for relaxation of the minimum operating schedule, rescinded May 9, 1946.

(3) Order 91-C, relaxing operating requirements, rescinded effective August 1, 1946.

(4) Policy statement of February 1, 1946, dismissing applications in direct conflict with sections 3.2, 3.22, and 3.25 (a) of Commission's rules.

(5) Policy statement of June 21, 1946, placing certain class of applications for operation on clear channels, in pending file and deferring action thereon until close of clear channel hearing.

(6) Policy statement of August 9, 1946, placing all applications involving use of 770 and 1030 kilocycles, in pending file and deferring action thereon until the close of clear channel hearing.

#### 5. INTERNATIONAL

Study was continued by industry, the Department of State and the Commission on United States' proposals for a revision of the International Telecommunications Convention, as well as the annexed General Radio Regulations. Proposed revision of article 7 of the General Radio Regulations to enlarge the standard broadcast band to include 540 kilocycles will be considered at the world conference, on which a preliminary five-power meeting in Moscow was scheduled in the fall of 1946.

The third Inter-American Radio Conference at Rio de Janeiro in September 1945 included proposal to allocate frequency bands of 535 to 1605 kilocycles for broadcasting only.

On January 4, 1946, a public meeting was held looking toward a North American Regional Broadcasting Engineering Conference to continue the terms of NARBA, which expired March 29, 1946, and to consider certain Cuban demands for additional broadcast facilities, made at the Rio de Janeiro Conference, affecting nine United States Class I-A channels. On February 4, 1946, the North American Regional Broadcasting Engineering Conference was convened in Washington. On motion of Cuba, the name was changed to the Second North American Regional Broadcasting Conference.

During this session, Cuba made demands on United States clear channels which provoked considerable discussion. The matter was resolved when the Bahama Islands relinquished their use of 640 kilocycles in Cuba in exchange for 1540 kilocycles on which the United States obtained Class I-A privilege but which was, in turn, granted to the Bahamas subject to certain experimentations and the possible use of another frequency to be suggested by the United States.

The final agreement, signed on February 25, 1946, is known as the Interim-Agreement (*Modus Vivendi*). It extended for a period of 3 years the provisions of the NARBA except as modified; outlined procedures for the exchange of proposals looking toward a new NARBA; set the date of September 15, 1947, for a third conference to be convened in Canada; established a North American Regional Broadcasting Engineering Committee which, for the first known time in radio history, authorizes engineers of one country to make engineering investigations of the facilities of another country; and granted eight special Class II assignments on Class I-A clear channels.

The eight special Class II assignments given Cuba on regional channels were made within the existing provisions of the NARBA. Of the 10 assignments on Class I-A channels, five United States frequencies were affected— 850 kilocycles, which had been broken down by the Bahamas; 670 and 890 kilocycles, which had not previously been used by any other nighttime stations; and 830 kilocycles on which there is a Mexican nighttime assignment previously made at the Washington Engineering Meeting, January 1941. Haiti was not represented at this conference nor did it sign the final agreement.

Following the Second NARBA Conference, Mexico and Cuba undertook to modify or enlarge their agencies concerned with standard broadcast as evidenced by their increased interest in United States assignment affecting these two countries. Mexico deleted outstanding notifications not in operation and removed two high power stations (XERP and XEAW) from the Mexican-United States border.

Canada, prior to the lifting of the freeze order on United States applications, made assignments for 30 odd new or increased facilities.

In general, the trend of foreign assignments was to increase existing facilities and where possible, with the exception of Canada, to make new assignments not requiring directional antennas.

## 6. FINANCIAL DATA

Standard broadcast income figures for the calendar year 1945, while showing larger gross revenues, indicated that increased expenses had reduced the net income of networks and station groups below that of 1944.

The following comparison is based upon reports by 4 major and 6 regional networks and 901 stations in 1945 and 4 major and 5 regional networks and 875 stations the year previous:

### *Standard broadcast*

Item	1945	1944	Percent increase or (decrease), 1945 over 1944
Networks and standard stations:			
Investment in tangible broadcast property:			
Original cost.....	\$88, 101, 940	\$82, 997, 650	6. 15
Depreciation to date under present owner.....	46, 506, 921	42, 445, 377	9. 57
Depreciated cost.....	41, 595, 019	40, 552, 273	2. 57
Revenues from sale of network time.....	133, 973, 536	129, 369, 501	3. 56
Revenues from sale of nonnetwork time.....	176, 510, 510	156, 273, 246	11. 52
Commission's paid representatives, etc.....	43, 923, 466	41, 303, 215	6. 34
Revenues from sale of talent, etc.....	32, 777, 553	28, 959, 079	13. 19
Total broadcast revenues.....	299, 336, 133	275, 298, 611	8. 73
Total broadcast expenses.....	215, 753, 845	185, 025, 760	16. 61
Broadcast service income.....	83, 584, 288	90, 272, 851	(7. 41)

See footnote at end of table.



## Standard broadcast—Continued

Item	1945	1944	Percent increase or (decrease), 1945 over 1944
<b>Newworks and their 10 key stations:</b>			
Revenues from time sales.....	\$68,669,076	\$63,656,065	7.88
Revenues from sale of talent, etc.....	16,482,799	15,374,364	7.21
Total broadcast revenues.....	85,151,875	79,030,449	7.75
Total broadcast expenses.....	67,001,351	58,746,703	14.06
Broadcast service income <sup>1</sup> .....	18,150,524	20,283,746	(10.52)
<b>Standard stations, excluding 10 key stations of networks:</b>			
<b>Clear channel 50 kilowatts:</b>			
Total broadcast revenues.....	1,219,715	1,157,770	5.35
Total broadcast expenses.....	761,385	661,523	15.10
Broadcast service income <sup>1</sup> .....	458,330	496,247	(7.64)
<b>Clear channel 5 to 20 kilowatts:</b>			
Total broadcast revenues.....	438,564	421,903	3.97
Total broadcast expenses.....	336,618	292,269	15.17
Broadcast service income <sup>1</sup> .....	101,946	129,634	(21.30)
<b>Regional:</b>			
Total broadcast revenues.....	328,594	307,493	6.86
Total broadcast expenses.....	221,651	193,113	14.78
Broadcast service income <sup>1</sup> .....	106,943	114,380	(6.50)
<b>Local:</b>			
Total broadcast revenues.....	94,374	84,282	11.97
Total broadcast expenses.....	71,818	60,861	18.00
Broadcast service income <sup>1</sup> .....	22,556	23,421	(3.69)
Number of employees of networks and standard stations (as of Dec. 31).....	37,757	34,281	10.14
<b>Total compensation for the year.....</b>	<b>116,267,274</b>	<b>90,773,425</b>	<b>16.53</b>

<sup>1</sup> Broadcast revenues less broadcast expenses before Federal income tax.

## 7. STATISTICS

As of June 30, 1946, there were 961 regularly licensed standard broadcast stations, or 30 more than reported in 1945. However, outstanding construction permits for new stations numbered 254, and 680 applications were pending. Only 4 standard broadcast stations were deleted during the year.

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## CHAPTER III

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# Nonstandard Broadcast

### CHAPTER III—NONSTANDARD BROADCAST

1. FREQUENCY MODULATION (FM) BROADCAST SERVICE
  2. TELEVISION BROADCAST SERVICE
  3. INTERNATIONAL BROADCAST SERVICE
  4. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE
  5. FACSIMILE BROADCAST SERVICE
  6. REMOTE PICK-UP BROADCAST SERVICE
  7. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE
  8. DEVELOPMENTAL BROADCAST SERVICE
  9. STATISTICS
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### CHAPTER III—NONSTANDARD BROADCAST

#### 1. FREQUENCY MODULATION (FM) BROADCAST

Rapid postwar expansion of FM broadcasting is indicated in the mounting number of authorizations and applications for this new medium of program service.

Removal of the wartime "freeze" on construction enabled the Commission to consider an accumulation of about 600 applications for commercial FM stations. Since most of these had been filed under the old rules and needed additional information, the Commission expedited matters by making conditional grants subject to later approval of engineering and other details. The first group of FM grants on this basis was announced in October of 1945.

The result was that the 43 FM broadcast stations functioning at the close of the war began to be augmented as quickly as materials and personnel could be obtained. At the close of the fiscal year, 55 FM stations were serving 32 cities and surrounding rural areas, 456 new stations had received initial authorizations, and some 250 applications were pending.

Because of reconversion problems, the Commission permitted low-power units to be used by stations while new equipment was being manufactured. At the request of the Senate Small Business Committee, the Commission made a survey of probable prices and delivery

dates for principal items of equipment for FM stations. The results were summarized in a Commission release in December 1945 and later appeared in a booklet issued by the Committee as an aid to those interested in entering this field.

During frequency allocation hearings in the previous fiscal year, FM received important consideration. This service had started on the 42-50 megacycle band, but troublesome sky-wave interference developed. "Public interest," pointed out the Commission, "requires that FM be established in a permanent place in the radio spectrum before a considerable investment is made by the listening public in receiving sets and by the broadcasters in transmitting equipment." Accordingly, in June of 1945, the Commission allocated the band 88 to 106 megacycles for FM, including 70 channels for commercial FM service and 20 channels for noncommercial educational FM broadcast. In addition, the band 106-108 megacycles (10 channels) was made available to facsimile with provision that it might later be utilized by FM.

In January of 1946, the Commission heard a petition requesting restoration of the old FM band. Upon analyzing the testimony and data, the Commission concluded that the use of two bands for FM broadcasting was undesirable, that interference would continue to be a serious problem on the old band, and that an excellent FM service would be provided in the high band. Accordingly, stations on the 42-44 megacycle band were given until January 1, 1947, to make the transition.

During the summer of 1945, the Commission held conferences and hearings to determine what changes were desirable for FM, and these were incorporated in new rules and engineering standards adopted the following August and September. Channel and power assignments were made in the new band, with provision for use of interim equipment until full construction authorized by the new assignment could be completed. Having thus encouraged early commencement of this new service, the Commission in July of 1946 warned that if grantees and permittees were not diligent in getting started they would be subject to hearing to determine whether their grants should be cancelled.

At the beginning of 1946 it was estimated that about half a million FM receivers (most of them capable of receiving standard broadcast) were in use. A Commission survey in February indicated that only 9 percent (1,800,000 sets) of the contemplated 1946 receiver production would include FM. Accordingly, manufacturers were urged to provide a greater percentage of sets capable of receiving the new service.

Equitable distribution of FM facilities was provided in a tentative Nation-wide allocation plan for the 60 metropolitan and rural channels. This was used as a basis in making assignments and in designating for hearing applications for areas where the number of requests exceeded the number of available channels.

In May 1946 the Commission announced proposed rules reducing the then three classes of FM stations to two, to be termed Class A (formerly community) and Class B (formerly metropolitan and rural), which were adopted in July.

Following a hearing in July 1946 on requests for reservation of FM channels, the Commission announced that it would reserve, until June 30, 1947, every fifth channel in cities or areas where five or more Class

B channels were tentatively allocated. No allocation plan or reservation policy applies to the 20 Class A channels, and it is expected that these channels will be available indefinitely for all but the most congested areas.

## 2. TELEVISION BROADCAST SERVICE

When the return of peace permitted consideration of new radio station construction, 158 requests for commercial television facilities awaited Commission action. Most of these applications were incomplete and none could be processed until new rules and regulations and engineering standards had been formulated and adopted.

Between V-J-day and December of 1945, the Commission's staff and representatives of the television industry cooperated in providing a television station assignment plan which, through equitable distribution of facilities throughout the country, assures the most efficient use of the 13 channels between 44 and 216 megacycles allocated to this type of broadcast. This joint effort culminated in the adoption, in November and December 1945, of new rules and engineering standards calculated to aid the development of commercial television service.

There was some difference of opinion in the industry as to whether postwar television emphasis should be placed on experimentation in the higher frequencies above 480 megacycles, where wider channels are available for color and for black-and-white pictures of greater detail, or whether television should proceed with monochrome in the lower frequencies (44-216 megacycles).

The industry had urged that television channels be shared with several low-power services in the special and emergency fields. In the early months of 1946 considerable attention was given to a plan for the shared use of television channels by other services. However, due to the incomplete information available on the needs and character of the proposed sharing services, a satisfactory arrangement had not been evolved by the end of the fiscal year.

Six television stations were on the air during the war. Between December 1945 and March 1946, they changed channels to conform with the allocations set forth in the Commission's new rules and regulations.

Of the 158 applications for new television stations on file at the end of the war, approximately 80 were subsequently withdrawn. The reasons given were either a desire to wait for color television or that television required a greater capital outlay than the applicants had anticipated.

Sixty-five other applications were for facilities in 11 metropolitan districts where the number of requests exceeded the channels allocated. These were designated for hearing. By the end of the fiscal year substantially all such hearings had been concluded, or hearings were made unnecessary by application withdrawals or by reason of channels being found to accommodate the remaining applicants.

By May of 1946, a considerable number of applications not subject to hearing had been brought into conformity with the new rules and engineering standards so that by the end of the fiscal year there were 24 construction permits outstanding and 40 more applications were being processed.

Television development was aided during the year by further extension of the coaxial cable system of the American Telephone & Telegraph Co. A network video program on Lincoln's Birthday in 1946 was made possible by completion of the New York-Washington section of this cable. New radio relay devices also offer possibility of carrying television programs far from their place of origin. Meanwhile, attention is being given to the possibility that television, as well as facsimile, may some day be linked with telephony so that parties to telephone conversations may see as well as hear.

### 3. INTERNATIONAL BROADCAST SERVICE

During the fiscal year all international broadcast stations continued to be programmed and operated by the Federal Government. This direction was assumed by the Office of International Information and Cultural Affairs of the Department of State when it absorbed elements of the Office of War Information and the Office of Inter-American Affairs which controlled these stations during the war.

Cessation of hostilities enabled six transmitters leased from common carriers to be returned to their former uses. Simultaneously, program hours were reduced on the remaining 37 transmitters and the program emphasis shifted from psychological warfare to troop entertainment and news. Even with the reduced number of transmitters an acute shortage of frequencies still exists in this service, requiring the continuation of broadcasting on frequencies formerly assigned to other services.

In the closing months of the year, meetings of the Security Council, the Economic and Social Council, the Atomic Energy Commission, and the Health Commission of the United Nations were broadcast, as well as commentary and summaries of United Nations proceedings in French and English. Three transmitters were devoted to speeding this material to listeners in many nations, and the programs were rebroadcast by several domestic standard broadcast stations.

### 4. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

Noncommercial educational broadcast stations are licensed principally to school systems and universities for furnishing educational programs to units in a school system, as well as educational and entertainment programs to the public. Twenty channels have been allocated for this service (88-92 megacycles) as a part of the FM broadcast band.

The 6 licensed stations are presently employing equipment in the old noncommercial educational band of 42 to 43 megacycles preparatory to moving to the new band. A total of 24 stations had been authorized in this service by the end of the fiscal year.

Since 18 applications were pending, it appears that a much larger number will come into being next year as postwar plans of schools and universities develop. Present information indicates that most states have plans for operation of statewide FM educational networks, some of which will link state, county, and municipally operated stations to obtain wide coverage for educational FM programs.

Because noncommercial educational FM broadcast stations employ the same type of transmitting equipment used by commercial FM

stations, and since FM receivers sold to the public include both the noncommercial educational and regular commercial FM channels, equipment may be obtained more economically and the two FM services grow mutually.

#### 5. FACSIMILE BROADCAST SERVICE

Facsimile provides for the reception of printed matter and pictures by the use of specially designed radio receivers. Operation continued on an experimental basis during the past year, and it appears that equipment and reproduction have been considerably improved. The technique has been developed to a point where print approximating the size of newspaper type can be reproduced with clarity.

Frequency allocations provide that facsimile broadcasting may be authorized on any channel within the 88-108 megacycle band as a service separate from aural broadcasting. FM stations may, of course, be authorized to transmit facsimile.

During the year three stations continued facsimile experimentation in the 25 megacycle band formerly allocated for this purpose, and several FM stations were authorized to conduct experimental facsimile transmissions on their regularly assigned FM channels. Although the band of 470 to 480 megacycles has also been set aside for experimental facsimile, no stations have as yet been authorized for this range.

No rules or engineering standards have been adopted for operation of facsimile on a regular or commercial basis, but manufacturers of facsimile equipment are now preparing recommended standards for consideration by the industry and the Commission. Uniform standards must, of course, be provided so that all facsimile broadcast stations will transmit a signal which is capable of operating facsimile reproducing equipment of any make. Upon such standardization and the promulgation of rules for this service, it is expected that facsimile broadcasting will become a very useful public service.

#### 6. REMOTE PICK-UP BROADCAST SERVICE

Remote pick-up [formerly known as relay] broadcast stations are employed for furnishing a program circuit from pick-up points to the main station when wire circuits are not available. During the war years such equipment had limited use, but interest and activity in this service are now increasing. During the fiscal year 27 applications for such stations were granted, bringing the total number of stations authorized to 573. In July 1946 the frequency allocations for the 152-162 megacycle band were proposed, including 14 channels of 60 kilocycle width for relay broadcast use.

#### 7. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

To provide large service areas, some FM broadcast transmitters are located on mountain tops because of the importance of antenna height to coverage. Telephone lines are not always available or adequate for program circuits, and ST broadcast stations are used for transmitting the programs from the studio to the transmitter. No new

ST stations were authorized during the year, due principally to delayed FM broadcast station construction at such locations.

Following the frequency allocation hearing, the band of 940 to 960 megacycles was allocated for this service, which subsequently was modified to 940-952 megacycles. No ST broadcast stations have as yet been constructed for use of this new band, but it is expected that a considerable number will be employed as soon as additional FM broadcast stations are placed in operation.

### 8. DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are useful in connection with equipment development, propagation tests, and other experimentation requiring radio transmission. For example, FM broadcast transmitters and antennas are tested to compare operating characteristics with theoretical predictions. During the year some developmental broadcast stations have conducted measurements of radio wave propagation in the new FM band, employing various types of transmitting antennas. At the end of the fiscal year 34 developmental stations were authorized.

### 9. STATISTICS

At the close of the fiscal year there were 825 nonstandard broadcast stations, an increase of 65 over the previous year. A total of 89 new stations were added as compared with 24 deleted. The following tabulation shows these licensed stations by classes:

	As of June 30, 1945	Added	Deleted	As of June 30, 1946
High frequency (FM—commercial).....	53	9	0	62
High frequency (experimental).....	2	0	1	1
Television (commercial).....	9	18	2	25
Television (experimental).....	47	11	0	58
International.....	38	0	1	24
Noncommercial educational.....	12	12	0	37
Facsimile.....	3	0	0	3
Relay (high-frequency).....	299	18	9	308
Relay (low-frequency).....	261	9	5	265
Studio transmitter (ST).....	8	0	1	7
Developmental.....	27	12	5	34
Class II (experimental).....	1	0	0	1

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## CHAPTER IV

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### Common Carriers

1. TELEPHONE (WIRE AND RADIO)
  2. TELEGRAPH (WIRE, CABLE, AND RADIO)
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#### CHAPTER IV—COMMON CARRIERS

##### 1. TELEPHONE (WIRE AND RADIO)

###### SERVICE AND FACILITIES

*Construction of wire facilities.*—An extensive construction program was necessary during the year to meet increasing public demand for telephone service. In addition to 16 applications on hand from the preceding year, the Commission received 253 new requests for wireline construction, acquisition, extension, and leased projects. Of this number, 249 were approved, including 239 construction applications. The increase in wire construction is indicated in these figures for the past 3 years:

Fiscal year	Projects	Cost	Miles of cable	Miles of coaxial units	Miles of open wire
1944.....	121	\$9,582,239	574.8	0	7,968
1945.....	210	70,091,140	2,378.3	7,902	2,963
1946.....	239	78,896,450	3,193.8	16,590	12,261

The Bell System added approximately 2,478,000 miles of toll message channels, which increased its previous total by 22.7 percent. About 90 percent of the new channels were provided with carrier systems. The emergency type "EB" carrier systems were used to provide 800,000 channel miles.

*Planned wire projects.*—The American Telephone & Telegraph Co.'s program for installing 6,000 to 7,000 miles of coaxial facilities was mentioned in previous annual reports. During the year the Commission authorized construction of 2,150 route miles of coaxial cable carrying 16,780 coaxial cable miles and involving an expenditure of \$41,624,000. Coaxial cables are designed for the transmission of high frequencies suitable for telephone, telegraph, radio broadcasting and television transmission.



*Volume and speed of toll service.*—Telephone toll traffic continued to grow to new peak levels. During the year the Bell System handled 850,000,000 toll-board calls and 669,000,000 short-haul calls. These figures represent increases over the preceding year of 16.4 and 7.7 percent, respectively. The average time required to complete toll-board calls in June 1946 was 3.2 minutes, a decrease of 0.2 of a minute compared with a year ago.

*Use of recording devices.*—On October 31, 1945, the Commission instituted an investigation into the use of recording devices in connection with interstate and foreign message toll service. As the result of public hearings held January 10–11, 1946, the Commission on August 6 of that year proposed the use of such devices under conditions which will assure that the parties concerned will have adequate notice that the conversation is being recorded; that this notice will be given by means of an automatic tone warning supplemented by a special directory listing, and that under such conditions there is no violation of section 605 of the Communications Act which prohibits the interception and divulgence of wire and radio communications. The Commission further decided that these devices should be physically connected to and form part of the equipment provided and serviced by the telephone companies.

*Interstate and foreign telephone toll service at Maryville, Mo., and surrounding rural areas.*—As the result of formation of the Nodaway Telephone Corp., which acquired properties of the Hanamo Telephone Co. and the People's Telephone Exchange, Inc., interstate and foreign telephone service is now available to the former subscribers of both companies. Consequently, the Commission dismissed its proceedings in this matter.

#### DOMESTIC RADIOTELEPHONE SERVICES

*Service to remote communities by radio and power-line carriers.*—To bring telephone service to areas where it is uneconomic or otherwise impracticable to extend wire line facilities, the Commission established, on an experimental basis, the rural radiotelephone and short distance toll radiotelephone services. The first installation in the rural service was effected by the Mountain States Telephone & Telegraph Co. at Cheyenne Wells, Colo.

Authorizations to provide experimental service in the short distance telephone service have been granted to several companies. Typically, these cover the use of radio links to supplement wire circuits through such places as Death Valley and over water areas as between Nantucket Island and the mainland.

As a further step to make telephone service available to families in rural areas, the telephone companies are testing, particularly in the area of Jonesboro, Ark., and Selma, Ala., the practicability of telephone messages "hitch hiking" over the rural electric power lines.

*Mobile radiotelephone service.*—In addition to a large number of construction permits for experimental facilities to operate in the urban and highway mobile radiotelephone service (see experimental radio services), the Commission granted the first license of this nature in June 1946 to the Southwestern Bell Telephone Co., permitting it to provide experimental service at St. Louis, Mo. Considerable expansion and development of the service is forecast by similar applications filed by telephone companies operating in many other cities.

*Point-to-point radio relay.*—The Commission authorized construction, by the American Telephone & Telegraph Co., of an experimental radio relay system between New York and Boston of a type suitable for telephone, telegraph, or television transmission. The Raytheon Manufacturing Co., International Business Machines Corp., General Electric Co., RCA Communications, Inc., and Federal Telecommunications Laboratories have been granted experimental authorizations of this type, and additional applications were pending.

*Domestic program transmission service.*—Press Wireless, Inc., which is engaged primarily in the handling of press traffic, was denied application to transmit program material by radio to broadcast stations in the United States.

#### INTERNATIONAL RADIOTELEPHONE CIRCUITS

New radiotelephone circuits were established to connect the United States with Barbados, Egypt, France, Germany, Japan, Netherlands, New Zealand, Norway, and the Philippine Islands. There was no direct radiotelephone circuit with Barbados, Egypt, New Zealand, and Norway prior to the war. New circuits were authorized between Puerto Rico and the Netherlands West Indies, and between the United States and Austria. At the close of the fiscal year, there were 9 licensed radiotelephone stations.

#### RATES AND TARIFFS

*Rate reduction.*—Following negotiations by the Commission with the American Telephone & Telegraph Co., the Bell System agreed to various rate reductions, effective February 1, 1946, which are estimated to save the public more than \$20,000,000 annually. The principal reduction was in interstate rates for distances between 340 and 2,140 miles, saving users about \$16,000,000 a year. In addition, reductions amounting to \$1,500,000 a year were made in certain short-haul interstate toll call rates for distances under 40 miles. Reduction of teletypewriter exchange message rates for distances beyond 350 miles will save TWX users \$1,000,000 annually. This reduction resulted in a transcontinental 3-minute initial period rate of \$1.75. Private line telephone, telegraph, and telephotograph rates were also cut approximately \$1,700,000 per year by a new rate plan similar to that in effect for long distance telephone service.

*Press private line teletypewriter service.*—On July 24, 1946, the Commission dismissed, without prejudice, a complaint filed in 1940 by Transradio Press, Inc., attacking the lawfulness of Bell System charges for press private line teletypewriter service. The Commission concluded that, as a result of rate reductions made since 1940, the complaint had been substantially satisfied.

*“Service charges” by hotels, etc.*—In view of the fact that the United States Supreme Court, in May of 1945, upheld the Commission’s jurisdiction over “service charges” or “surcharges” by hotels, apartment houses and clubs on interstate and foreign telephone calls, and since various hotels and hotel associations did not press their previously filed complaints, questioning prohibition of such charges, the Commission, on May 10, 1946, dismissed further proceedings.

*Reductions in overseas rates.*—As a result of negotiations by the Commission with the American Telephone and Telegraph Co., a

pattern of reduced rates for the initial 3-minute period for overseas message toll telephone rates was agreed to as follows:

Air miles	Day	Night and Sunday	Air miles	Day	Night and Sunday
0-500.....	\$4.50	\$3.00	2,001-3,000.....	\$9.00	\$7.50
501-1,000.....	6.00	4.50	Over 3,000.....	12.00	9.00
1,001-2,000.....	7.50	6.00			

Such day rates were established between the United States and 29 foreign countries: Argentina, Australia, Belgium, Brazil, Chile, Denmark, Egypt, Eire, France, Germany, Great Britain, Hawaii, Italy, Japan, Netherlands, New Zealand, Norway, Paraguay, Peru, Philippine Islands, Portugal, Puerto Rico, Salvador, Spain, Sweden, Switzerland, Union of Soviet Socialist Republics, Uruguay, and Venezuela. By the close of the year the stipulated night rates were in effect to Eire and Great Britain.

During the year, the American Telephone & Telegraph Co., RCA Communications, Inc., and Press Wireless, Inc., filed amended traffic schedules reducing their rates for program transmission services between this country and various foreign points.

*Bell System license contracts.*—As part of a broad review of factors entering into the cost of telephone service, members of the Commission's staff cooperated with a subcommittee of the Special Committee on Telephone Regulation of the National Association of Railroad and Utility Commissioners in studying the services performed by the American Telephone & Telegraph Co. for its associated companies and long lines department incident to "license" contracts.

*Division of revenue contracts.*—Inquiry into the division of interstate telephone toll revenues between the American Telephone & Telegraph Co. and its associated companies has been made, and the Commission's program calls for continuing cooperative studies with State commissions on the separation of telephone plant and expenses in this connection.

#### SUPERVISION OF ACCOUNTS

*Original cost restatements and disposition of plant acquisition adjustments.*—Application of the Commission's regulations has accomplished adjustments of net book cost of plant through charges to income, surplus or other accounts, thus reducing previously overstated costs by the carriers. These adjustments amount to more than \$12,000,000 for all telephone companies whose accounting is subject to regulation under the Communications Act. In addition, and as a result of the Supreme Court decision noted in Chapter I, the New York Telephone Co. was required to adjust its net book cost by more than \$4,000,000, principally by charges to surplus and credits to depreciation reserve. By the same token, arrangements have been made with other Bell System companies that are expected to result in similar adjustments amounting to \$16,000,000.

*Continuing property records.*—Studies are being continued jointly with the State commissions and the telephone industry with a view to developing procedures consistent with the uniform system of accounts that will (a) provide a continual and perpetual record of quantities and costs of plant as of a certain date and reflect changes subsequent

to that date, (b) provide data for determination of original cost of plant retired, (c) serve as a basis of inventories with a minimum of field work and as a basis for summarized plant records, and (d) furnish pertinent data necessary for determining plant mortality, service lives and depreciation charges.

*Relief and pensions.*—Preliminary study was made of revisions in the Bell System actuarial computations and the resultant changes in payments into pension-trust funds. The matter of additional lump-sum payments into these funds received consideration. Study was also being given to request by the Bell companies to discontinue separate accounting for service-pension payments to employees retired before the adoption of the accrual plans of accounting for pensions. Further studies were made as to the propriety of the methods used by certain carriers to determine the adequacy of their pension-trust funds, and to the practice of charging current operating expenses with the cost of pensions based on service prior to the adoption of a pension plan. Other studies involved consideration of whether pension plans contained provisions which might discriminate against certain classes of employees.

*Uniform system of accounts.*—Several amendments were made to the uniform system of accounts prescribed by the Commission. Included were provisions which simplified the accounting for large numbers of relatively low-cost items of materials. In cooperation with several State Commissions, progress was made toward a general revision for Class A and Class B telephone companies.

*Miscellaneous.*—Other activities of the Commission in this field include:

Providing for the maintenance of an index of the records of telephone companies that are required to be preserved.

Revision of the annual report form (Form M) for telephone companies to eliminate certain detailed information not deemed necessary during the continued shortage of personnel and to clarify certain requirements, particularly with respect to the reporting of Federal income taxes.

#### ECONOMICS AND STATISTICS

*Economic studies.*—In continuing study of telephone service throughout the country, data relating particularly to the availability of telephone service on farms was collected and analyzed. On several occasions, technical and economic data on this subject were made available to Congressional committees considering bills to extend telephone service to rural areas. Additional information was obtained during the year through the cooperation of the Department of Agriculture and the Bureau of the Census. These facts, together with various data prepared by the telephone industry, are currently being analyzed.

*Statistics and general studies.*—Annual reports containing financial and operating data for 1945 were filed by 153 common carriers and 36 controlling companies. Included were 125 telephone, 14 wire-telegraph and ocean cable, and 14 radio-telegraph carriers.

"Statistics of the Communications Industry in the United States," published annually by the Commission and obtainable from the Superintendent of Documents, contains detailed information on the subject. Some financial and operating highlights from annual reports of telephone carriers are here shown.

## Telephone carriers

Item	1945	1944	Percent increase or (decrease), 1945 over 1944
Investment in plant and equipment .....	\$6,060,028,722	\$5,856,316,360	3.48
Depreciation and amortization reserves .....	\$2,167,674,373	\$1,987,628,404	9.06
Net investment in plant and equipment .....	\$3,892,354,349	\$3,868,687,956	.61
Local service revenues .....	\$1,108,350,679	\$1,052,143,699	5.34
Toll service revenues .....	\$867,579,478	\$766,160,211	13.24
Total operating revenues <sup>1</sup> .....	\$2,075,410,511	\$1,904,406,470	8.98
Operating expenses <sup>1</sup> .....	\$1,380,348,934	\$1,234,521,876	11.81
Taxes, including income and excess profits .....	\$420,740,213	\$438,581,635	(4.07)
Net operating income after all taxes .....	\$274,321,589	\$231,303,259	18.60
Net income .....	\$190,157,344	\$183,740,662	3.49
Dividends paid .....	\$192,813,713	\$185,670,632	3.85
Company telephones:			
Business .....	8,723,714	8,339,007	4.61
Residential .....	15,598,560	15,044,664	3.68
Average number of calls originating per month:			
Local <sup>2</sup> .....	3,405,052,934	3,225,654,898	5.56
Toll <sup>2</sup> .....	147,612,394	132,586,772	11.33
Number of employees at end of October: .....	398,665	365,308	9.13
Male .....	109,775	102,230	7.38
Female .....	288,887	263,078	9.81
Total pay roll for the year .....	\$936,689,151	\$807,110,401	16.05

<sup>1</sup> Intercompany general service and license fees and rents, amounting to approximately \$37,000,000 for 1945, and \$35,000,000 for 1944 have not been eliminated.

<sup>2</sup> Partly estimated by the reporting carriers.

## 2. TELEGRAPH (WIRE, CABLE, RADIO)

## SERVICE AND FACILITIES

*Construction of wire facilities.*—During the year, 73 applications for wire telegraph construction certificates were filed with the Commission, which had 6 on hand from the preceding year. Of these, 75 were granted and 4 were pending. Authorizations involved the construction of 404,345 channel miles of carrier systems at an estimated cost of \$1,960,749, the leasing of 3,100 miles of telegraph channels and 7,994 miles of telephone channels at an annual rental of \$296,645, and the removal of 5,500 miles of wire and 588 miles of pole originally costing \$513,364.

*Modernization plan of Western Union.*—The Commission embarked upon an informal investigation of the \$60,000,000 modernization plan of the Western Union Telegraph Co. This program, by which Western Union expects to reduce its operating costs and to improve service, contemplates the construction of 2,700,000 miles of telegraph radio-relay systems and the leasing of some 1,000,000 telegraph channel miles from the Bell System, which would permit it to dispose of the greater part of its extensive pole and wire lines. In addition, provision is made for establishing 30 large message centers equipped with reperforator-switching systems, where the relaying of messages will be largely automatic, and for the improvement of methods of terminal handling. The program calls for completion by the end of 1949. Under its order of June 4, 1946, the Commission is inquiring into the progress being made in this program and the specific benefits which may be expected to accrue to the public and to Western Union. (See also "Rates and Tariffs.")

*Investigation of interstate telegraph service.*—In approving Western Union's petition for a rate increase (see "Rates and Tariffs"), the Commission regarded such relief as a "temporary expedient" which would not of itself solve the company's basic difficulties and felt it necessary to take stock of the domestic telegraph problem so that appropriate measures may be invoked. Accordingly, the Commission ordered a comprehensive investigation into all phases of Western Union's present and future operations. In so doing, the Commission pointed out that such an exhaustive inquiry could not be conducted under current limitations on Commission funds and personnel, hence it would have to seek additional money.

*Speed of service.*—The quality of service provided by Western Union declined somewhat during the year. The average time required in a message center to relay the fastest 95 percent of ordinary full-rate messages was 9.4 minutes in 1946 as compared with 8.7 minutes in 1945. The average percent of such messages completed in 15 minutes was 84.3 and 88.1, respectively. The average time required by the Bell Telephone System to establish teletypewriter exchange connections between subscribers remained at 1.6 minutes.

*Domestic radiotelegraph.*—Paralleling activities in the development of radiotelephony, the Western Union Telegraph Co., American Telephone & Telegraph Co. and certain organizations which are not communications common carriers have been granted experimental authorizations looking to the development of microwave radio relay systems capable of handling telegraphic as well as other types of communications. (See also "Experimental Radio Services.")

Western Union is testing an experimental microwave chain between New York and Philadelphia solely for the purpose of accumulating technical data. Insofar as commercial operation of a microwave relay system is involved, Western Union's planned first step is the development of a triangular system connecting those two cities and Pittsburgh and Washington. Necessary sites have been acquired and installation is progressing as rapidly as equipment is made available, with the expectation that the system may be ready for service in March 1947. Additional microwave expansion is later contemplated between Pittsburgh, Cleveland, Chicago, and Cincinnati.

*Discontinuance, reduction or impairment of service.*—On July 18, 1945, an informal conference was held on proposed rules to implement an amendment to section 214 of the Communications Act, which provides that no carrier (telegraph or telephone) subject to the act shall discontinue, reduce or impair service to any community without first obtaining authority from the Commission.

During the year, 329 applications of this nature were received in addition to the 47 then pending. Of this number, 276 were granted. In most cases where service was terminated, alternate service was available.

*Delivery of telegrams.*—Upon consideration of complaints that telegrams were being delivered in New York City by mail, and by telephone to unauthorized third persons, the Commission on February 7, 1946, instituted investigation into Western Union's delivery practices. Eight days thereafter the Commission amended its order to investigate the methods used by all telegraph carriers subject to the act in delivering telegrams by means other than messenger or tie-line,

and forwarding telegrams between cities by mail and special messengers. On May 29 the proceedings were broadened to include a general investigation of the lawfulness of charges, classification, regulations and practices in connection with the pick-up and delivery of telegrams.

#### RATES AND TARIFFS

*Western Union rate increase.*—Following public hearings, the Commission allowed Western Union, effective June 12, 1946, a flat over-all increase of 10 percent in its domestic interstate rates but denied Western Union's request to eliminate the 20 percent rate differential on Government messages. It found that Western Union was currently operating at a deficit and anticipated a loss of about \$12,000,000 in 1946 if its rates were not raised. The Commission concluded that Western Union would need substantially more revenue than it requested "if it is to continue in operation as a solvent enterprise and provide satisfactory service on a comprehensive Nation-wide basis." It pointed out, in particular, that Western Union was faced with increasing competition from telephone and teletypewriter exchange services and air-mail services, besides being affected by increased wage costs and reductions in international telegraph rates. The Commission is not satisfied that the modernization program is the answer to Western Union's problems. However, in view of prevailing economic conditions and Western Union's dire need for additional revenue, the Commission granted the rate increase for 1 year pending developments.

#### SUPERVISION OF ACCOUNTS

*Original cost restatement of plant accounts and establishment and maintenance of continuing property records.*—Adjustments made since 1938 have reduced Western Union's net book cost by approximately \$77,000,000 (exclusive of about \$43,000,000 pertaining to former Postal Telegraph plant). Further adjustments were deferred pending the effects of the modernization program on the adequacy of the company's depreciation reserves.

*Uniform system of accounts.*—Chief among amendments affecting domestic telegraph carriers was elimination of the requirement for detailed statements of traffic damage claims. Compilation of a list of retirement units, now in progress, will simplify property retirement accounting procedure of wire-telegraph and ocean-cable carriers.

*Depreciation.*—This subject received particular attention in view of the prospective premature retirements of Western Union plant under its modernization program, for which only partial depreciation has been provided. Preliminary studies have been made of the company's proposal to amortize the unprovided for loss in service value of plant to be retired.

*Relief and pensions.*—Studies were continued with respect to the propriety of the methods and accounting pursued by certain carriers in determining and recording the cost of maintaining pension and other benefit plans.

*Miscellaneous.*—The annual report form (Form O) was modified to eliminate about 30 pages of detailed data not now deemed sufficiently important to warrant reporting to the Commission.

The period of 6 months required for retention by domestic telegraph carriers of copies of telegraph messages was continued. Such carriers are required to retain these messages for an additional six months upon request by persons having bona fide interest in them.

Regulations governing the preservation of records were amended to require the maintenance of an index by the domestic telegraph carriers of records which must be preserved under the rules of the Commission.

#### STATISTICS

Annual reports were filed by 28 wire-telegraph, ocean-cable and radiotelegraph carriers. Certain selected financial and operating items, compiled from the Western Union report, are shown in the succeeding table. Adequate data was not filed by that company to permit segregation of its ocean-cable and wire-telegraph operations. Statistical data relating to ocean-cable carriers will be found under the succeeding "International" section of this chapter.

#### *The Western Union Telegraph Co.*

Item	1945	1944	Percent increase or (decrease), 1945 over 1944
Investment in plant and equipment	\$387,956,082	\$389,128,095	(0.30)
Depreciation and amortization reserves	\$169,983,442	\$165,010,802	3.01
Net investment in plant and equipment	\$217,972,640	\$224,117,493	(2.74)
Domestic service revenues	\$166,544,597	\$158,032,270	5.39
Foreign service revenues	\$10,183,208	\$12,199,047	(16.52)
Total operating revenues	\$192,892,138	\$185,903,644	3.76
Operating expenses, depreciation, and other operating revenue deductions	\$181,410,369	\$166,277,089	9.10
Net operating revenues	\$11,481,769	\$19,626,555	(41.50)
Income and excess profits taxes	\$140,000	\$3,831,000	(96.35)
Net income	\$5,148,533	\$8,316,229	
Dividends declared	\$2,432,594	\$2,166,747	12.27
Revenue messages transmitted:			
Domestic	245,157,962	233,188,694	5.13
Foreign	4,935,657	5,515,588	(10.51)
Number of employees at end of June	61,956	63,818	(2.92)
Total pay roll for the year	\$130,654,745	\$116,130,330	12.51

<sup>1</sup> Deficit.

#### INTERNATIONAL

#### International Conferences

*Third Inter-American Radio Conference, Rio de Janeiro, September 1945.*—Most of the work here involved revisions to the International Telecommunication Convention and the General Radio Regulations, the latter including allocations and registration of frequencies for submission at the World Telecommunications Conference scheduled for 1947. Adopted was a new international mechanism for frequency registration, proposals for study of very-high-frequency broadcast, establishment of an inter-American network of monitoring stations, and principles favoring fair, reasonable, and equitable rates.

*Bermuda Telecommunications Conference, November-December 1945.*—The resultant Bermuda Agreement provided for augmenting radiotelegraph circuits between the United States and certain British points. Division of tolls was fixed on a 50-50 basis over direct circuits after deduction of terminal charges. It was also agreed that



tariffs and accounts would be on a dollar-sterling basis, instead of the former gold-franc basis.

*World Telecommunications Conference.*—Preparations for revisions to the International Telecommunication Convention (Madrid, 1932) and to the General Radio Regulations (Cairo, 1938), to which the United States is a party, and study of the General Telegraph Regulations (Cairo, 1938), to which the United States has not adhered, covered proposals for reorganizing the International Telecommunications Union by setting up permanent committees and boards to deal with such matters as frequency registrations, collection and dissemination of information on rates and traffic, and study of technical phases of radio, telegraph, and telephone. Proposed revisions of the Radio Regulations provide for a new frequency allocation table and changes governing operations. Analysis of the Telegraph Regulations is directed toward the question of whether the United States can adhere to any international regulations which would affect private carriers and, if so, what revisions in existing regulations should be proposed.

#### Service and Facilities

*General.*—The Commission participated in the work of the Telecommunications Coordinating Committee, which is made up of representatives of Government departments and private agencies and acts in an advisory capacity for the coordination of United States policy in the field of international communications.

*Radiotelegraph circuits.*—War-disrupted radiotelegraph communication was reestablished between this country and Austria, Czechoslovakia, Germany, Hungary, Poland, and Japan; new circuits were opened to Bulgaria, Korea, Tangier, and Yugoslavia; and circuits were authorized to French IndoChina and Java. Some circuits which served China during the war were closed and most of the traffic to that country is now handled over three competitive circuits to Shanghai. Globe Wireless, Ltd., reestablished former circuits to Hawaii and the Philippines.

To enable it to review the postwar needs of radiotelegraph circuits to overseas points, the Commission on March 7, 1946, invited carriers to file applications for regular authority to communicate with foreign points as of December 1, 1946.

#### Ocean Cables

*Cable facilities.*—Cable communication with continental Europe was restored in 1945, at which time direct facilities were made available to France and Italy, service to the latter country being provided over a former enemy-owned cable between Italy and the Azores. Service to the United Kingdom, Eire, and the Azores had not been interrupted. Operation of a major portion of the trans-Pacific cable was resumed to bring regular commercial service to the Philippines via Midway and Guam.

*Divestment of Western Union cables.*—On September 18, 1945, the Commission granted Western Union's petition for an extension of 1 year in which to divest itself of international telegraph operations, which had been provided for in the merger of Western Union and Postal in 1943.

## Rates and Tariffs

*Telegraph rates to foreign countries.*—Effective May 1, 1946, ceiling rates of 30 cents a word for full rate messages and 6½ cents a word for ordinary press messages were established by the principal international radiotelegraph and cable carriers to more than 80 foreign countries, outside of the British Empire. Previous rates ranged from 33 cents to \$1.15 per full-rate word. On June 1, 1946, pursuant to the Bermuda Agreement, rates to the British Empire were similarly reduced. Ceiling rates for other classifications of messages were established as follows: code, 20 cents a word; deferred, 15 cents, and letter, 10 cents.

On the same dates, "country-to-country" rates from the United States were established so that the rate from gateway cities applied to traffic from any place in the United States. Previously, users in the United States outside of the gateway cities were generally required to pay from 2 to 4 cents a word more than users in the gateway cities.

In consequence, the charges for full-rate telegrams from any place in the United States to any place in the world now do not exceed 30 cents a word. Rates of 20 cents a word apply to full-rate messages to countries in Europe, Central and South America, the West Indies, Japan, Korea, and the principal commercial centers of China and the Philippines. Approximately 90 percent of the total outbound traffic is destined to countries to which the 20-cent rate applies.

With respect to rates for messages from foreign countries to the United States, maximum rates of 30 cents a word for full-rate messages and 6½ cents a word for ordinary press messages were reciprocally placed in effect by the British Empire. At the same time, rates from the British West Indies, Bermuda, and British Honduras were reduced to 20 cents a full-rate word. Effort is being made to obtain reductions to a maximum rate of 30 cents per full rate word from other places in the world where higher rates prevail.

At various times during the year, reduced rates of 3, 4, and 5 cents a word were established for ordinary press messages from United States gateways to various countries. The new 3-cent rate applies to Great Britain, Ireland, and the Virgin Islands; the 4-cent rate, to Austria, Czechoslovakia, Estonia, France, Germany, Holland, Hungary, Latvia, Lithuania, Poland, Switzerland, U. S. S. R., Yugoslavia, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dutch West Indies, Ecuador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru, Salvador, Uruguay, and Venezuela; and the 5-cent rate to Bulgaria, Italy, Norway, Sweden, Korea, and Japan. Reductions in in-bound press rates from most of these countries were also effected during the year and many of them now approximate the out-bound rates to these countries.

The over-all matter of international telegraph rates is still under Commission investigation in Docket 6569.

## Supervision of Accounts

*Original cost restatements and disposition of plant acquisition adjustment.*—Studies to determine proper original cost adjustments were continued by the international carriers with review by the Commission. Most of the carriers completed reclassification of their plant accounts in accordance with the prescribed system.

*Uniform system of accounts.*—Several amendments were made to simplify requirements without sacrificing the records of essential information.

*Depreciation.*—Studies of the changes in, and the propriety of, the depreciation rates and the adequacy of the depreciation reserves of the international telegraph carriers were continued.

*Relief and pensions.*—Past-service pension costs were excluded from the operating expenses of Radiomarine Corp. of America and RCA Communications, Inc. Pension costs in excess of normal accruals on the full-service basis were excluded from the current operating expenses of All America Cables & Radio, Inc., and the Commercial Cable Co.

*Commercial Cable Co. accounting.*—The Commission ordered this company to suspend all charges and credits with respect to its plan for accounting for the reduction of its capital surplus accounts. Progress was made toward a final determination of the accounting performed by this company with respect to its surplus accounts.

*Miscellaneous.*—Annual report forms (Form O, applicable to ocean-cable carriers, and Form R, applicable to radiotelegraph carriers) were revised to reflect changes in the methods of classifying employees.

The time international telegraph carriers are required to retain copies of messages was reduced to a period of 6 months, subject to an additional 6 months upon request of persons having a legitimate interest in them.

Regulations were amended to require maintenance by international telegraph companies of an index of records they must preserve.

### Statistics

Some selected financial and operating data compiled from the annual reports filed by principal international carriers are set forth in the following tables:

#### *Radiotelegraph carriers*

Item	1945	1944	Percent increase (or decrease), 1945 over 1944
Investment in plant and equipment .....	\$28,306,309	\$26,836,664	5.48
Depreciation and amortization reserves .....	\$16,474,588	\$16,066,358	2.54
Net investment in plant and equipment .....	\$11,831,721	\$10,770,306	9.86
Continental and insular fixed revenues .....	\$1,009,337	\$876,240	15.19
Foreign fixed service revenues .....	\$16,569,471	\$11,713,889	41.45
Marine service revenues .....	\$84,646	\$25,087	237.41
Total operating revenues .....	\$22,456,125	\$16,784,362	33.79
Operating expenses, depreciation, and other operating revenue deductions .....	\$15,638,109	\$12,682,967	23.30
Net operating revenues .....	\$6,818,016	\$4,101,375	66.24
In come and excess profits taxes .....	\$6,299,881	\$4,934,666	27.67
Net income .....	\$2,383,450	\$1,664,327	43.21
Dividends declared .....	\$850,000	\$1,555,000	(45.34)
R revenue messages transmitted:			
Continental and insular fixed .....	673,504	518,314	29.94
Foreign fixed .....	9,776,611	6,351,607	53.92
Marine .....	65,705	10,120	549.26
Number of employees at end of year .....	4,617	3,359	37.45
Total pay roll for the year .....	\$14,170,688	\$10,244,629	38.32

<sup>1</sup> Includes \$246,420 charged to capital surplus.

*Ocean cable carriers*

Item	1945	1944	Percent increase or (decrease), 1945 over 1944
Investment in plant and equipment.....	\$78,464,039	\$78,566,248	(0.13)
Depreciation and amortization reserves.....	\$56,718,975	\$56,017,268	1.25
Net investment in plant and equipment.....	\$21,745,064	\$22,548,980	(3.57)
Domestic services revenues.....	\$825,348	\$682,846	20.87
Foreign service revenues.....	\$14,175,518	\$15,494,684	(8.51)
Total operating revenues.....	\$15,802,177	\$16,908,473	(6.54)
Operating expenses, depreciation and other operating revenue deductions.....	\$13,146,794	\$12,308,622	6.81
Net operating revenues.....	\$2,655,383	\$4,599,851	(42.27)
Income and excess profits taxes.....	\$1,346,403	\$1,977,032	(31.90)
Net income.....	\$2,839,175	\$2,591,056	9.58
Dividends declared.....	\$20,141	\$5,491,093	(99.63)
Revenue messages transmitted:			
Domestic.....	648,310	527,633	22.87
Foreign.....	4,947,349	4,343,052	13.91
Number of employees at end of year.....	3,456	3,200	8.00
Total pay roll for the year.....	\$6,990,632	\$6,179,706	13.12

<sup>1</sup> Includes \$3,535,926 charged to capital surplus.

Cable operations of Western Union are not adequately segregated in its annual report. Hence, such data are not included in the above figures. Number of messages and amounts of revenues obtained from its cable operations for the past 2 years were as follows:

Item	1945	1944	Percent increase or (decrease), 1945 over 1944
Foreign service revenues.....	\$10,183,208	\$12,199,047	(16.52)
Foreign revenue messages transmitted.....	4,935,657	5,515,588	(10.51)

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## CHAPTER V

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# Safety and Special Services

1. MARINE SERVICES
  2. AVIATION RADIO SERVICES
  3. EMERGENCY RADIO SERVICE
  4. RAILROAD RADIO SERVICE
  5. EXPERIMENTAL RADIO SERVICES
  6. STATE GUARD RADIO STATIONS
  7. MISCELLANEOUS RADIO SERVICES
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- 
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## CHAPTER V—SAFETY AND SPECIAL SERVICES

### 1. MARINE SERVICES

#### GENERAL

The past year saw wartime restrictions on the use of marine radio communication removed through cancellation by the Board of War Communications of its Orders Nos. 1 and 2 which, for security reasons, controlled the ship, coastal and marine relay radio services throughout the emergency. As a result, many stations are again rendering public service.

A tremendous advance was made in the electronic art during the war especially in the development of aids to navigation which are now available for experimental use. Because of the responsibility placed upon the Commission to obtain maximum effectiveness from the use of radio communications, these developments are being studied with a view to their peacetime application.

#### NEW RADIO DEVICES

To expedite determination of their value in promoting safety and navigation at sea, and at the same time encourage developmental progress, the Commission granted a number of experimental licenses for radar stations on merchant ships. Six manufacturers have produced radar equipment for use in the merchant marine service. The Commission will collect, analyze, interpret, and translate into action the facts now being discovered through operational research. It was rep-

resented at an informal international meeting at London from May 7 to 22, 1946, which discussed collaboration and standardization of new radio navigation aids.

#### EQUIPMENT TRENDS AND DEVELOPMENTS

The trend in commercial marine radiotelegraph communications equipment has continued in the direction of "unit" type installations. These combine the ship radio equipment into a single cabinet permitting convenience and flexibility in operation and maintenance. Generally, the newer equipment shows substantial improvement over prewar equipment, particularly with respect to over-all efficiency, the use of modern electron tubes and the degree of frequency stability of the radio transmitters. Ship radiotelephone equipment used primarily by small vessels for ship-to-ship and ship-to-shore communication has changed very little in over-all design for several years. However, some improvement in frequency stability has been noted.

#### EQUIPMENT TYPE APPROVAL

The Commission approved two new types of ship radiotelegraph transmitters, two receivers and one automatic alarm signal keying device. This equipment was designed primarily for ship use.

#### FREQUENCY ASSIGNMENTS

During the war, a majority of the commercial coastal telegraph stations serving ships at sea were temporarily taken over by the Government. A number of these stations have been reactivated and in each case an attempt was made to provide the frequencies held prior to the war. This has been difficult and in many cases practically impossible since many of the frequencies involved were still in Government use. The problem is further complicated by the scarcity of frequencies below 23,000 kilocycles. Consequently, restoration of service has necessitated coordination of each proposed frequency assignment with interested Federal agencies through the IRAC (Interdepartment Radio Advisory Committee). This factor also enters into consideration of applications for new coastal stations.

The Commission obtained informal agreement concerning the use of 7 frequencies in the Newfoundland area and 10 frequencies in the Bahamas area for short-distance maritime radiotelephone service. The frequencies involved represent some duplication of channels used in the United States for the same type of service. However, little interference is expected due to flexibility in permitting small vessels, including pleasure craft, to communicate with Bahamas area coastal harbor stations with the same type equipment used for communication with United States coastal harbor stations.

One effect of the Commission's general frequency allocation on the maritime mobile service has been to provide a substantial increase in frequencies above 25 megacycles, both for communication services and for aids to navigation. A final report on frequencies below 25 megacycles was in preparation at the close of the fiscal year.

#### SHIP STATIONS

An all-time peak of 8,028 merchant ship radio stations were licensed during the year. In peacetime the Commission is charged

with enforcement and administration of regulatory statutes and treaties governing radio on board merchant vessels, including the Communications Act of 1934, the International Convention for the Safety of Life at Sea, the General Radio Regulations annexed to the International Telecommunications Convention, the Ship Act which is applicable only to certain steamers plying the Great Lakes, and rules and regulations, implemented by the Commission's Rules Governing Ship Service. During the war, the Commission cooperated with the military not only in enforcing these safety provisions but also in giving technical and administrative aid in furtherance of the safety of life at sea under war conditions.

#### DISTRESS

With the lifting of emergency restrictions, studies of marine disasters have been resumed in accordance with the Commission's responsibility pursuant to section 4 (o) of the Communications Act. There was but one major marine disaster during the last fiscal year.

On February 4, 1946, the S. S. *Yukon*, with 386 passengers and a crew of 120, struck a rock at Cape Fairfield, Alaska. The radio operator on watch, who was 18 years of age, immediately started his main radio transmitter and had it warmed up and ready upon the order of the master to transmit the distress message, which was received by the coastal telegraph station at Victoria, B. C. The ship's main transmitter functioned less than 8 minutes when power failed. It took approximately 2½ hours to clear and rig an emergency antenna and put the emergency transmitter on the air. Direction finder bearings were obtained from the transmissions which aided the Coast Guard cutters, Navy tugboats, and Army planes and barges dispatched to the scene. The vessel broke in two approximately 8 hours after the vessel struck and the after section, on which was located the radio room and the ship's auxiliary electric generator, sank. Eleven lives were lost, but the prompt use of radio in summoning assistance was largely responsible for saving the lives of several hundred people.

#### EXEMPTIONS

The Commission is authorized by the International Convention for the Safety of Life at Sea and the Communications Act to grant exemptions from prescribed radio requirements when the vessels concerned are navigated within certain specified limits and provided the Commission considers that the route and conditions of the voyage or other circumstances are such as to render compliance unreasonable or unnecessary. During the fiscal year 1937 such applications were received of which 18 were granted, including a renewal for 1 year of the exemption previously granted all United States passenger vessels up to and including 15 gross tons.

#### WAIVERS

In order to facilitate the temporary conversion of ships from cargo to passenger status, the Commission permitted the use of portable lifeboat radio installations on a number of ships in lieu of permanently installed motor lifeboat radio installations. Twenty-three such authorizations were granted on a temporary basis for periods ranging from 30 days to 3 months and usually covering in each case one voyage made to expedite the movement of passengers in the national interest.

#### RULE CHANGE

The Commission examined its Rules Governing Ship Service with a view to eliminating wartime provisions and to making the rules more closely reflect peacetime requirements without sacrificing safety considerations. To this end the Commission deleted subsection 8.115 (1) which had been promulgated as a means for radio operators to test the ship's emergency transmitter. A new subsection was added to section 8.81 which allocates the frequency 37,580 kilocycles to ship telephone stations for communication with coastal harbor stations and with other ship stations.

#### COASTAL STATIONS

At the close of the year, 45 coastal telegraph stations were licensed, exclusive of those in Alaska. Three of these were for limited (governmental) coastal telegraph service and the remaining 42 stations for public coastal telegraph service. Thirteen coastal telegraph stations, relieved from Navy restrictions, were relicensed for public service.

During the same period, 37 coastal harbor stations were authorized, exclusive of those in Alaska. Two were for limited (governmental) coastal harbor service and the remaining 35 for public coastal harbor service. New public coastal harbor stations were established near Quantico, Va., and Pittsburgh, Pa. Some expansion in the use of very high frequencies took place on the Great Lakes. Approximately 40 Great Lakes ships may now communicate on an experimental basis. Four coastal telephone stations were licensed for public service, representing no change in the number of stations of this class.

#### MARINE RELAY STATIONS

Twenty-nine marine relay stations were licensed. Of the 13 coastal telegraph stations reactivated, all were authorized to render marine relay service except station WNW at Philadelphia, Pa.

#### ALASKAN POINT-TO-POINT AND COASTAL STATIONS

Nearly 760 applications were received for the construction or operation of stations in Alaskan point-to-point and coastal stations. The following stations were authorized in the fixed public and public coastal services in that territory: Coastal harbor, 157; coastal telegraph, 26; point-to-point telegraph, 82; point-to-point telephone, 265.

#### MOBILE PRESS STATIONS

There were three licensed mobile press stations, representing no change from the previous year.

#### SHIP INSPECTIONS

The Commission's field staff has the responsibility for making detailed inspections of the radio installations aboard cargo and passenger vessels. During the fiscal year 13,788 separate ship inspections were conducted. Of these, 12,765 were domestic vessels, 1,023 were foreign, resulting in the serving of 8,769 violation notices of which 6,296 were cleared. In addition, 6,959 minor discrepancies were cleared during inspection.



## 2. AVIATION RADIO SERVICES

Termination of the war created an immediate demand for air transportation far in excess of the capacity of existing facilities. To meet the situation, airlines took advantage of available surplus military cargo aircraft to supplement aircraft then in operation. In addition to the regularly scheduled airlines, a great many corporations have been formed for nonscheduled freight and passenger charter operations. The air traffic situation is further complicated by an increase in private flying invited by removal of restrictions on the use of gasoline and the availability of new and war surplus aircraft.

The increased volume of aircraft operations is already taxing radio facilities to the limit and, in order to accommodate future expansion, the entire domestic aviation communication system is being revised. Very-high frequencies are being placed into service, new communication and traffic control procedures are being adopted, and every effort is being made to bring domestic aviation communications to the maximum of engineering efficiency.

### NEW TELECOMMUNICATION AIDS

During the war many new telecommunication aids to aviation were developed primarily for military application. Some of these have already been adapted to commercial operation and many others offer attractive possibilities. Radio altimeters have been licensed by the Commission on an experimental basis for use aboard scheduled aircraft including those flying the North Atlantic. Also, "loran," a long-range radio navigation system, is now in use in commercial United States transoceanic aircraft. Other potentialities are anticollision devices, storm-area indicators, and many short-range navigation devices.

The Radio Technical Commission for Aeronautics, of which the Commission is a member, is taking the lead in guiding the activities of the industry and Government research laboratories in the study of radio operation problems of air operation and the application of wartime developments. It is expected that a coordinated telecommunication system will be developed which will provide the maximum of communications and control and a minimum of equipment weight and occupancy of scarce communication frequencies.

### INTERNATIONAL AVIATION SERVICE

International air traffic has rapidly expanded as a result of the ending of hostilities and the availability of new and surplus aircraft. Fifteen new international aeronautical routes have been opened by 10 United States airlines, and there is an almost daily increase in the number of new companies organized to begin international operations on a nonscheduled basis. Air carriers in the international field have increased the number of aircraft station licenses from 90 to 150. In addition, 85 aircraft radio station licenses have been issued to organizations new to this field. Eight new gateway aerodromes have been approved by the Civil Aeronautics Board to handle international air traffic.

The Provisional International Civil Aviation Organization (PICA0) has published communications and other standards to serve as the basis for a standard world-wide aviation operation. These are

to be supplemented by standards having regional application. At the close of the fiscal year, the North Atlantic and European-Mediterranean regions were the only two that had been organized. The organization of the Caribbean area was scheduled for August of 1946, the African-Middle East for October, and additional regions of the world will be organized shortly. The aim of this organization is to achieve maximum standardization in communications and operating procedures with a minimum of regulation. The ultimate aim is to insure uniformity of world-wide operation so that an aircraft of any nation may fly anywhere and receive the same grade of service. United States participation in this organization is committed to an ultimate system which will permit American flag aircraft to meet foreign competition for world business.

The increased demand upon the already inadequate number of frequencies available to international air routes will require regrouping of the present assignments and precise re-engineering of the communication facilities of the air lines in order to get utmost performance out of that portion of the spectrum used for international aviation.

Plans for the International Telecommunications Union meeting indicate that the aviation industry will be allocated sufficient frequencies to make possible safe aircraft operation on a world-wide basis. Another objective is to insure that the radio regulations promulgated by the Union will provide maximum flexibility not only within the aviation service but in inter-service communications such as occur in air-sea-rescue operations.

#### DOMESTIC AVIATION SERVICE

It was necessary for the domestic aviation industry to revise its thinking in order to meet the communication needs of the rapidly growing number of aircraft. The Commission, on its part, has revised its operating practices in order that licenses may be issued promptly and in a manner that will result in advantageous use of frequencies. Although the full effects remain to be felt, major changes have been made which will result in simplification of the licensing procedure and better service to the public.

The Commission is making every effort to keep its rules abreast of the rapidly growing industry, and frequent changes will be necessary to meet new and unforeseen conditions. Its effort is directed toward a common target; namely, a complete radio navigation and communication equipment in an integrated unit properly coordinated so that aircraft may find safe and adequate communications and navigation aids wherever they fly.

The handling of applications is in many respects a minor activity in the aviation service since, as the adequacy of planning and regulation increases, the number of applications increase. Hence, the number of applications filed does not give a good index of activity in the aviation service. During this fiscal year a total of 6,205 aviation authorizations were issued, which represents more than a 20 percent increase over the 5,089 authorizations issued during the previous fiscal year and there is every indication that the peak has not been reached. The various classes of aviation authorizations are discussed in more detail below.

**AIRCRAFT RADIO STATIONS**

There were 3,763 itinerant aircraft radio stations licensed at the end of the year, and applications were being received at the rate of nearly one thousand a month. In order to handle this volume and at the same time fulfill its obligation of maintaining a high standard of safety, the Commission inaugurated a number of streamlined procedures. Among these was adoption of a simplified application form from which a license may be mechanically reproduced, thus opening the way to ultimately providing 1-day license service to private planes but, due to the more complex and varied licenses used for passenger aircraft, more time will be required to fully implement the procedure.

In addition, 1,292 radio stations were licensed for use aboard air carriers and 146 Alaskan aircraft radio stations, making a total of 5,201 aircraft radio station authorizations outstanding at the close of the fiscal year.

**AERONAUTICAL RADIO STATIONS**

Aeronautical radio stations provide the non-Government ground radio facilities which permit air-to-ground and ground-to-air communications with aircraft in flight within the United States, its territories and possessions, and between the United States and Canada. Aeronautical radio stations are primarily used by scheduled aircraft for the safety of life and property in the air; however, these stations, under the Commission's regulations, also must serve itinerant aircraft upon request. While other individuals or organizations may be eligible for aeronautical radio station licenses, at this writing nearly all existing stations are licensed to Aeronautical Radio, Inc., a nonprofit organization comprised of all United States scheduled and many nonscheduled air carriers as well as international air carriers. Aeronautical radio stations located in our territories and possessions are operated by the scheduled or nonscheduled airlines in the area involved.

There were 697 aeronautical stations in the United States at the end of the fiscal year, and 64 in Alaska.

**AERONAUTICAL FIXED RADIO STATIONS**

Aeronautical fixed radio stations handle ground point-to-point communications in connection with and relating solely to the actual aviation needs of the licensees. Substantially all aeronautical fixed radio stations serving the domestic commercial airlines in the United States are licensed to Aeronautical Radio, Inc.

As of June 30, 1946, there were 91 such stations in the United States and 59 in Alaska—a decrease of 7 stations in the United States and no change in Alaska. This decrease is due to the greater use of wire lines for communications. In the early days of aviation, the airlines placed major dependence upon point-to-point radio circuits in handling messages with respect to aircraft movement, to spot weather, etc. From the point of view of conservation of frequencies, this was undesirable because wire circuits could achieve the same end. However, the airlines at that time could not economically support leased wire services and a wire communication service rendered on a basis of a message system did not offer adequate speed. With increasing volume of aircraft operation and with adequate revenue, the airlines are now in

a position to afford wire service. As this condition developed, the volume of radio transmission exceeded the capacity of the frequencies available. Aeronautical fixed services were replaced by wire lines and the frequencies formerly used by aeronautical fixed communication were transferred to the more important air-ground communication service for which there is no wire substitute.

#### AIRPORT CONTROL RADIO STATIONS

The airport control station is the communications medium between an airport control tower and aircraft in the immediate vicinity for the purpose of controlling air traffic.

While the Civil Aeronautics Administration operates a majority of these stations, the development of the community "airpark" type of airport and the transfer of military fields to the public has resulted in a substantial increase in the number of such stations operated privately or by municipal or state governments. Forty-five airport control stations were licensed by the Commission by the close of the fiscal year.

During the year, very-high frequencies were placed into service for airport control purposes at many locations. The control of taxiing aircraft and airport utility vehicles has in the past been conducted by airport control stations on the same frequencies used for the control of aircraft taking off and landing. To relieve traffic congestion in this service and in the interest of safety, two separate channels in the very-high frequency band have been set aside for this purpose.

Special equipment for instrument flight and landing is normally installed and operated by the Civil Aeronautics Administration. However, these facilities have been augmented by two airport control stations operated by domestic airlines for the purpose of pilot training.

#### RADIO MARKER STATIONS

Radio marker stations aid air navigation by marking a definite point or obstruction on the ground. For the most part, stations of this type are associated with the airways and airports and are operated by the Civil Aeronautics Administration. In certain instances, private licensees have considered it advantageous to mark local navigational points, and four radio marker stations were licensed by the Commission.

#### FLYING SCHOOL RADIO STATIONS

Flying school radio stations communicate with students and pilots during flight training. Such stations are licensed only to bona fide flying schools and soaring societies and their use other than for instructional purposes and the promotion of safety of life and property is prohibited. Five flying school stations held licenses at the close of the fiscal year. This small number may be attributed to the closing of flying schools used to train military pilots. It is expected that this number will increase, since many air-minded veterans are resuming activity.

#### FLIGHT-TEST RADIO STATIONS

Flight-test stations aboard aircraft undergoing test and flight-test stations on the ground are used for essential communications in connection with the testing of aircraft. Such stations are licensed only to manufacturers of aircraft and major aircraft components.

The 37 flight-test stations licensed at the end of the fiscal year mostly operate on specially assigned frequencies made available through the cooperation of the War and Navy Departments.

### 3. EMERGENCY RADIO SERVICE

The emergency radio service, which was established to provide emergency radiotelephone communications involving the protection of life and property, includes seven classes of stations: municipal police, State police, zone police, interzone police, municipal fire, forestry, and special emergency. The first four classes are licensed to instrumentalities of government and primarily serve the emergency communication needs of the police departments.

#### POLICE RADIO STATIONS

The usual municipal police radio station consists of a land transmitter and a group of mobile transmitters installed in vehicles operated by the police system. The State police radio station is similar except that more than one fixed transmitter is required to provide reliable communication over the entire State.

In order to link the municipal and State police stations, zone and interzone stations, using radiotelegraphy, are used. The country has been divided into zones, with the zone boundaries usually coinciding with the State boundaries. Zone stations communicate with each other and with their interzone station which, in turn, can communicate with other interzone stations. The message traffic usually relates to stolen cars, missing persons, arrests and identification. The growth of police radio stations is indicated in the following tabulation for the last five years:

	1942	1943	1944	1945	1946
Municipal police.....	1,672	1,708	1,906	2,051	2,243
State police.....	378	431	452	477	507
Zone police.....	85	94	88	85	88
Interzone police.....	33	30	31	30	30

Some licensees operate as many as 200 or more mobile transmitter and receiver units under one license. It is estimated that approximately 23,000 mobile units are authorized for operation in this service. The increase in State police stations is due to expansion of existing facilities and installation of several new State communications systems. The increase of 198 stations in the municipal police class represents additional cities and counties which have installed their own communications systems. A large number of these new stations are authorized to use frequencies in the 152-162 megacycle band which have recently become available on a regular basis.

The number of frequencies allocated for police radio stations in that part of the spectrum above 25 megacycles has been increased from 29 to 132. In addition to the previously listed figures, municipal and State police departments are authorized to operate approximately 125 radio control and automatic repeater stations on an experimental basis. Additional channels have been allocated for this purpose on frequencies above 900 megacycles.

#### MUNICIPAL FIRE RADIO STATIONS

Though municipal fire radio stations numbered only 25 at the end of the fiscal year, this number is expected to increase considerably. In consideration of the testimony presented at the allocation hearing and in view of the radio's contribution to increasing efficiency in fire fighting, the number of frequencies available for assignment to this class of station was increased from 3 to 40 channels. Until recently, authorizations have been limited to cities with populations of 150,000 or more, while fire departments in smaller cities have used police radio facilities where available.

Radio communication can be utilized between the central fire station and the mobile fire-fighting units in the same manner as police radio systems. A new development is the use of the portable pack, or "walkie-talkie," which enables a squad chief at the scene of a fire to direct his men within or around a building. New York City, for example, already has 22 such fire-fighting units.

#### FORESTRY RADIO STATIONS

Forestry radio stations are authorized to Government and private instrumentalities responsible for the protection of forest areas. A total of 1,018 stations held licenses at the end of the fiscal year. These stations are operated by the State forestry or conservation departments to detect and control forest fires, protect watersheds, and conserve wildlife and natural resources in the forests. At the present time only slightly more than one-half of the States have forestry radio facilities.

Radio affords a more reliable communication circuit between fire towers than land lines which are subject to damage by storms, falling limbs, fire and many other causes. This service should benefit from recent improvements in low power mobile transmitting and receiving equipment and the very lightweight "handie-talkie" equipment.

#### SPECIAL EMERGENCY RADIO STATIONS

Special emergency radio stations are utilized principally by public utilities such as electric power and urban transit systems. These organizations operate over 80 percent of the authorizations of this class. Such stations may communicate in emergencies jeopardizing life, public safety, and property. However, rules and regulations were being drafted to establish a regular service for public utilities. Among organizations which have indicated interest are Rural Electrification Cooperatives, private gas and electric-power companies, oil pipeline operators, and petroleum companies. In the case of urban transit companies, bus, street railway, and interurban systems, radio tests show definite value for supervision, repair and traffic control. Direction of maintenance vehicles and restoring service disrupted by storm are two principal applications of this type of station. Both the Bell System and Western Union utilize trailers equipped with portable power units and antennas to bridge gaps in their systems while repairs are being made. The range of such operations may extend 20 miles but usually cover a distance of 3 or 4 miles to serve a particular project. A few special emergency stations have been operated by relief agencies such as the Red Cross during times of flood or other large scale emergencies.

#### 4. RAILROAD RADIO SERVICE

The railroad radio service, which started operation on December 31, 1945, is a new radiocommunication service to increase the safety and efficiency of railroad operations. Railroad radio has been experimented with for several years, but decision to establish the service on a regular basis was not made until a comprehensive investigation, which culminated in a public hearing in May 1944, demonstrated both its need and general practicability.

Rules and regulations to govern the railroad radio service became effective on December 31, 1945, after a series of conferences with the industry and a further public hearing. Sixty frequency channels were provided for exclusive railroad use, with additional channels available on a shared basis with other services.

Since establishment of this service, many railroads have requested reclassification of their previous experimental authorizations. New applicants are undertaking extensive installation programs which will require several years to complete. The growth of this service has been impeded somewhat by the lack of suitable radio equipment for use on railroad rolling stock.

The most popular use for railroad radio at this time is in yard and terminal areas. Direct radio links between the dispatcher's office and switch engines are increasing the speed with which operations may be completed, thereby improving both freight and passenger service and reducing costs. This type of operation requires relatively little administrative change, and can be effected as quickly as equipment becomes available.

Systems along the rights-of-way are more expensive to install and maintain, and their use must be coordinated with the manual or automatic block signal systems existing on slightly more than half of the main line trackage of the nation. However, it is this latter type of train radio service which, due to the increased element of safety, is expected to become the most important use of radio by the railroad industry. Accordingly, this class of station has been given priority in frequency assignment, a decision which has the concurrence of the Association of American Railroads.

There are approximately 124 authorizations for railroad radio systems in the experimental service in addition to 32 authorizations in the regular railroad service. Since each authorization may represent from 1 to 100 or more units, the actual number of transmitters authorized is much greater than these figures indicate.

Wartime developments in the basic principles of very high frequency radio transmission are reflected in the design of specialized equipment with sufficient mechanical strength and freedom from electrical failure to withstand the rigorous demands of railroad service.

#### 5. EXPERIMENTAL RADIO SERVICES

##### GENERAL

The experimental radio services are divided into three classes of stations, each of which is designed to provide facilities for specific types of experimentation. Class 1 stations are primarily for development of equipment such as antenna, tubes, methods of transmission,

and to study phenomena directed to the general advancement of radio. Class 2 stations are authorized for the initial development of a new service, or a new method of operation within an established service. Stations in both classes are licensed to individuals or to corporations desiring to follow a prescribed program of research which shows possibilities of improving some phase of radio or of the existing services. Class 3 stations are open to persons interested in radio technique to the extent of conducting experiments on their own behalf.

The experimental service is a proving ground for new or proposed services. When sufficient information has been secured from experimental operation, the Commission formulates rules and policies necessary to place the service on a regular basis.

#### WARTIME DEVELOPMENTS

During the war substantially all developments were directed toward meeting the needs of the military and, as a result, practically no equipment was developed for commercial use. Commercial and military needs differ widely although the principles in the design of equipment are similar. Also, much of the surplus equipment does not operate on the frequency bands available for commercial operation nor can it be converted readily. Examples are the magnetron and klystron tubes developed for particular frequency ranges for radar and super high frequency transmissions. However, the knowledge and techniques developed during the design of such military equipment are being applied to producing equipment to meet commercial needs.

There is a wide field for experimentation in frequencies above 30,000 megacycles, but exploration has been delayed by lack of proper equipment. As a result, most of the experimentation has been confined to frequencies below 10,000 megacycles, and experimentation above 300 megacycles already far exceeds the spectrum space available.

On the premise that equipment for operation in the higher bands will soon be available, many new services have been proposed. Included are the general mobile service, the industrial service, the rural radiotelephone service, the short distance toll telephone service, the citizens' radiocommunication service, and low-power provisional stations in the intermittent service. All these are presently being operated as parts of the experimental services.

#### RADAR

One of the most valuable technical developments of the war is radar. Since being released from a confidential status, it has attracted much interest from ship owners, aircraft-operating companies and geological-exploration companies. One of the principal uses of radar is as an anticollision device for use by ships and aircraft. It also gives exact position fixing. Due to changes in frequency allocations and the differing needs of commercial users, much of the military radar is not satisfactory for commercial use. New models and types are being developed and designations by the manufacturers indicate, to some extent, specific uses such as: teleran, radiovisor, navar, naviglobe, navaglide, navascreen, and fathometer. This is one of the larger fields of electronic equipment and research at present.



## MICROWAVE RELAY

Microwave transmissions showed great expansion during the past year. As new tubes and circuits are developed it is expected that a still greater increase in experimentation and application will ensue. In particular, the microwave frequencies provide an economical means of transmitting wide bands of frequencies over great distances by means of intermediate repeater stations. It will be possible to transmit high quality FM and television programs for rebroadcast by local outlets. In addition to transmitting commercial radio programs, these microwave stations can be used to carry many telephone, telegraph, and special news transmissions now carried by wire lines. One of the factors weighing heavily in favor of the microwave circuits is their ability to transmit much wider bands of frequencies than can be accommodated by existing wire facilities.

Many applications evince interest in microwave circuits. Among these are the existing communications common carriers, television stations and networks, the aviation, railroad, and petroleum-pipeline industries, and law enforcement agencies. Each group proposes different methods of using the available frequencies. The request for assignment in the microwave bands has already indicated that this portion of the radio spectrum will be crowded. In addition to persons proposing to install microwave relay systems, various applicants look to operating facilities on a common carrier basis in competition with existing communications common carriers.

The rapid expansion of microwave systems raises many questions of policy which must be resolved before the service can be established on a regular basis. Studies are being made to determine the practicability of replacing all heavily loaded long distance wire and telegraph lines with microwave relay stations. Sufficient information on costs of installation of microwave relay chains versus the comparative costs for the maintenance and replacement of wire and cable lines is not yet available.

## GENERAL MOBILE SERVICE

Need for a communication service for trucks and busses in urban areas and along the nation's major highways has existed for many years. The Commission has allocated frequencies in the 30-44 megacycle band for the highway stations and frequencies in the 152-162 megacycle band for the urban stations in this potential service. At the same time it indicated that rural radiotelephone service and the short distance toll telephone service would also secure frequencies in the 152-162 megacycle band. Since the general mobile service is still in the experimental stage, no determination of policy has been made as to the final form it will take.

Using assigned frequencies, the telephone companies are testing service in urban areas and along highways. They propose service to individuals and groups on a common carrier basis at published charges. In addition to authorizations issued to numerous telephone companies for installations in a large number of cities to provide urban mobile service, grants have been made for service on highways between major cities.

In a similar manner, individuals and organizations contemplate furnishing radio service to their own mobile units. The associations generally comprise groups having similar service requirements. For example, the National Bus Communications, Inc., requested that frequencies assigned for intercity passenger bus use in the 30-44 megacycle band in the general mobile (highway) service be made available for the intercity passenger bus industry directly or through its communication organization formed for that purpose. The Commission held a hearing in this matter on June 6, 1946, but had not issued a decision by the end of the fiscal year. Intercity truck organizations have indicated that they need an industry system patterned after that proposed by the bus organization.

Other firms propose to use radio for communicating with their mobile units engaged in such enterprises as hauling ready mixed cement, delivering merchandise, doctors' communication systems, armored cars, taxicabs, river and harbor boats, and other miscellaneous uses.

The taxicab industry has received many grants to operate in the urban mobile service. They were among the first to recognize the advantages and claim that the saving in "dead" mileage and resultant increase in efficiency may permit a reduction in fares.

Organizations proposing to establish highway mobile systems have indicated a need for wire lines or microwave radio relay circuits to effectively operate radio systems over the intercity highways. Equipment is now being produced which should speed this development.

#### RURAL RADIOTELEPHONE SERVICE

Considerable progress is being made in using radio to bring telephone service to isolated places. Previously, it was impossible, because of economic or technical reasons, to extend wire lines to remote hamlets. To fill this void, the Commission recognized a new type of radio service designated as the rural radiotelephone service. It should find its greatest application in connecting individual subscribers with a central telephone exchange, thus making it possible to link rural areas with the telephone system.

Since this service is to enable individual subscribers to tie in with existing wire-line facilities, it is anticipated that substantially all of these installations will be made by the telephone company operating in the areas concerned. A pioneer service was when the Mountain States Telephone Co. made an installation at Cheyenne Wells, Colo., to serve isolated ranches in that vicinity.

Parallel with the rural radiotelephone service, the Commission has tentatively recognized a new type of service designated as short-distance toll telephone service to connect isolated communities by radio in lieu of wire lines. As in the case of rural radiotelephone service, these facilities will normally be made available through the existing telephone companies. Authorizations have been granted to the Southern California Telephone Co. to conduct experiments to determine the feasibility of establishing this type of service at Death Valley, Calif. While provisions were made to operate this service on the frequencies allocated to the general mobile service, recent tests indicate that the microwave frequencies may prove more suitable; so the Southern California Telephone Co. has installed a microwave system between Santa Catalina Island and Avalon, Calif.

### CITIZENS' RADIOCOMMUNICATION SERVICE

A proposed citizens' radio communication service is intended primarily to provide facilities for personal utilization of radio. Hunters, fishermen, farmers, amateur sportsmen, yachtsmen, surveyors, doctors, and many others will find such a service adaptable to their needs. However, some commercial enterprises may derive benefit.

While the Commission has not yet prescribed the types of uses which may be permitted, it is contemplated that in addition to two-way voice communication these facilities may be used for signaling and control devices such as burglar and fire alarms, model aircraft, garage doors, boats, lights, etc. Field strengths in excess of that permitted under the Commission's rules regarding the operation of low-power radio frequency devices will be employed, thereby enabling control of objects at greater distances.

A number of authorizations have been issued for the development of equipment to operate in the citizens' radio communication service. No applications, however, have been filed proposing to operate stations under actual service conditions. It is expected that this service will expand rapidly when appropriate equipment is available.

### INDUSTRIAL RADIO SERVICE

Meanwhile, the Commission appreciates the need for short-distance radio communication in many businesses and industries such as construction, manufacturing, mining, agriculture, and related activities. In these fields there are many unexploited uses of radiocommunication which will reduce operating costs or provide increased protection of life and property. Several experimental authorizations have been issued proposing to explore the merits of radio in this connection and more are anticipated. The frequencies provided for the industrial service are primarily for short-distance reception on portable receivers and are limited to the approximate line-of-sight.

### LOW-POWER PROVISIONAL RADIO STATIONS

Another class of station to provide radiocommunication over very short distances for business and industry was discussed in the Commission's allocations report (Docket 6651). Known as the low-power provisional station, it would be limited to a peak power of 5 watts and use frequencies in the bands between 30 and 40 megacycles. This potential service should be welcome in meeting particular requirements.

### 6. STATE GUARD RADIO STATIONS

The War Emergency Service, which was composed of three classes of stations, civilian defense, civil air patrol, and State guard, was proposed to be discontinued November 15, 1945. However, on recommendation by the War Department that State guard stations be permitted to continue operation for proper training and functioning pending reactivation of the National Guard, the Commission issued Orders Nos. 127-A and 127-B to retain the rules and regulations applicable to State guard radio stations and operators until July 1, 1947. Twenty-eight States hold State guard radio station licenses at the present time. Each of these licenses authorizes the operation, by State guard personnel only, of from 40 to 200 or more low-power portable or mobile stations.

## 7. MISCELLANEOUS RADIO SERVICES

The miscellaneous radio services embrace the geophysical, special press, and intermittent radio services which, in turn, cover five classes of stations, each of which provides a separate and distinct radiocommunication service: geological, mobile press, relay press, motion picture, and provisional. Approximately 97 percent of the stations authorized in the miscellaneous radio services are classed as geological and provisional.

### GEOLOGICAL RADIO STATIONS

The number of geological stations increased from 411 to 485. As in the case of other mobile communication systems, a "station" includes several mobile or portable transmitter and receiver units. Practically all of the geological stations are licensed to oil companies and geophysical-exploration companies. Such stations are operated for communication and special emissions in connection with the investigation of the earth's surface and the physical characteristics of the underlying strata.

Geological stations are becoming more important to the petroleum industry in operations leading up to the initial drilling of wells. As the more obvious and easily discovered petroleum sources are exhausted, the producers must resort to more scientific and complicated methods of ascertaining the presence of oil pools. In prospecting for oil, the geological class of station is also being used for communication by work crews.

### PROVISIONAL RADIO STATIONS

Provisional radio stations afford communication relative to the safety of life or property or other matters of practical public necessity. Initially, this class of station was used experimentally on large construction jobs such as bridges and dams. Their use has expanded to include essential communications in connection with operations of oil companies engaged in drilling operations in isolated areas and other locations such as in the water-covered section of Louisiana and off the coast in the Gulf of Mexico.

The number of provisional stations increased during the year from 142 to 189. Approximately 750 separate radio transmitter-receiver units operate under these authorizations.

### RELAY PRESS RADIO STATIONS

The relay press class of station provides a service to newspapers and press associations paralleling the service rendered broadcast stations by the remote broadcast pick-up stations. They furnish news gathering agencies with a means of transmitting news reports and releases from remote or isolated locations where no other communication facilities are available.

During the past few years only a limited activity has been evident in the operation of the small number of licensed relay press stations. However, some additional authorizations have been issued and correspondence with news associations indicates further interest.

### MOTION-PICTURE RADIO STATIONS

Motion-picture radio stations are used for communicating on location in areas where no other facilities are available and for essential

local communications incidental to the actual filming. These stations also offer communications pertaining to the safety of life and property. As in the case of relay press stations, motion picture stations have been used very little during the past year. However, applications have been received from one of the major film studios for several additional stations.

8. STATISTICS

Exclusive of the broadcast services and amateur and commercial operator licensing noted elsewhere in this report, the Commission received more than 36,000 applications during the fiscal year and authorized more than 5,700 stations of various types, bringing the total number of stations (with the exceptions noted) to nearly 22,000. A breakdown of these stations follows:

Class of station	Applications	New stations	Total stations
Aircraft.....	10,255	2,111	5,201
Aviation ground.....	1,446	301	1,004
Police.....	5,471	225	2,868
Fire.....	71	13	25
Forestry.....	1,365	69	1,018
Special emergency.....	959	255	821
Experimental.....	3,092	344	956
General mobile (experimental).....	612	418	418
Fixed public telephone.....	101	5	23
Fixed public telegraph.....	680	12	54
Wire service extensions.....	363		
Wire service reductions.....	292		
Railroad.....	158	156	156
Coastal and marine relay.....	109	14	118
Alaska coastal.....	267	26	183
Alaska fixed public.....	487	74	347
Geological.....	282	74	485
Provisional.....	380	47	189
Miscellaneous.....	79	5	28
State guard.....	27	9	28
Ship.....	10,019	1,565	8,028
<b>Total.....</b>	<b>36,546</b>	<b>5,723</b>	<b>21,950</b>

In addition to the 13,788 separate ship inspections previously noted, 7,017 other radio inspections were made. Of this number, 3,690 were emergency stations, 1,683 aircraft and aeronautical stations, 1,361 broadcast stations, and 283 miscellaneous stations. As a result, 1,890 violation notices were served.

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## CHAPTER VI

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### Radio Operators

1. COMMERCIAL OPERATORS
  2. AMATEUR RADIO SERVICE
  3. EXAMINATIONS
- 
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## CHAPTER VI—RADIO OPERATORS

### 1. COMMERCIAL OPERATORS

In conformity with section 303 (1) of the Communications Act of 1934, as amended, the Commission established six classes of commercial operator licenses. To alleviate the wartime shortage of radiotelegraph operators, the Commission established by Order 97 the temporary limited radiotelegraph second-class operator license and by Order 123 the temporary emergency radiotelegraph second-class operator license. When peace relieved this shortage, Commission Order 136, dated June 20, 1946, suspended issuance of these temporary licenses but continued outstanding licenses of both classes until their date of expiration.

Under the provisions of section 353 (b) of the act, the holder of a radiotelegraph first- or second-class license may not act as chief or sole operator on a cargo vessel until he has had at least 6 months of satisfactory service as a qualified ship radiotelegraph operator. The Commission, through Order 83 and subsequent extensions including Order 83-H, suspended this requirement until December 31, 1945. However, a survey of the availability of radiotelegraph operators indicated that this suspension was no longer necessary and, effective January 1, 1946, radiotelegraph operators acting as chief or sole operators must comply with the provisions of section 353 (b) of the act.

Unavailability of first-class commercial radiotelephone operators invited Commission Order 91-C of January 19, 1943, which permitted broadcast stations under certain conditions to employ commercial radio operators of any class. When radiotelephone first-class operators again became available, the Commission on April 26, 1946, promulgated Order 91-D, which canceled Order 91-C, effective August 1, 1946.

The Commission's rules require commercial and amateur radio operators to show actual operation of licensed radio stations before li-

censes can be renewed. Because of the difficulties in meeting this requirement during the war, the Commission, through its Order 77 dated December 7, 1940, suspended this provision. Further extensions were given, the last of which was to expire on December 31, 1946.

Radio operators are required to file applications for renewal of licenses prior to expiration date. Because many licensed radio operators were either in the military service or engaged in war activities, considerable difficulty was experienced in determining the expiration date of their licenses. Accordingly, the Commission on January 2, 1945, adopted Order 124 which provided for the renewal of commercial radio operator licenses other than temporary emergency radiotelegraph second-class licenses upon filing a proper application with the Commission prior to December 31, 1945, and within a period of 1 year from the date of expiration. Subsequently, the Commission Order 128 extended these provisions to cover the renewal of numerous expired commercial radio operator licenses held by persons serving or who have served in the armed forces or the merchant marine or have been employed outside of the United States. This order, dated August 28, 1945, permitted such licensees to obtain renewals of their expired licenses provided the latter were valid on December 7, 1941, and that application for renewal was filed on or before June 30, 1946; later extended to December 31, 1946, by Order 128-A of June 20, 1946.

To obviate conducting examinations and issuing licenses to approximately 500,000 railroad employees in connection with the new railroad radio service, the Commission, by Order 126 of August 21, 1945, waived the commercial radio operator requirements for the operation of railroad radio stations. However, commercial radio operator licenses were still required for adjustments to railroad transmitting apparatus which might affect its proper operation.

After studying operator requirements for all classes of radio stations, it was decided that in view of the relatively low-power and improved stability characteristics of present radio equipment used in the portable and mobile units in the experimental, emergency, miscellaneous, and railroad services, it would be possible to dispense with the need for licensed operators in portable and mobile stations without detrimental effect on these services. So, on May 10, 1946, Commission Order 133 dispensed with requirements for commercial radio operator licenses for the operation of such stations.

Commission Order 75-D of January 23, 1946, eliminated the requirement of proof of citizenship as a prerequisite to issuance of a commercial radio operator's license as originally required by Order 75.

During the fiscal year the Commission conducted an extensive survey to determine the possible further simplification of its commercial radio operator requirements, the results of which are being analyzed with a view to possible revision of its rules and regulations.

At the close of the fiscal year, the six categories of commercial radio operators represented approximately 314,000 outstanding licenses and permits, broken down as follows:

Radiotelephone licenses first and second class)-----	41, 434
Restricted radiotelephone permits-----	248, 465
Radiotelegraph licenses (first and second class) and restricted radiotelegraph permits, but not including special wartime authorizations-----	24, 476
Total -----	314, 375

## 2. AMATEUR RADIO SERVICE

Operation of amateur radio stations, suspended as a wartime measure, was resumed as quickly as the military released frequencies borrowed from the amateurs during the emergency. The first band to be restored was 112 to 115.5 megacycles, reactivated for amateur use by Commission Order 127 of August 21, 1945. It was made available to all amateur stations whose licenses were valid at any time during the period of December 7, 1941, to September 15, 1942.

Other frequencies were returned by Commission Orders 130 to 130-G inclusive. Order 130-H, which became effective July 1, 1946, made the following frequency bands available for amateur use: 3500 to 4000 kc., 7150 to 7300 kc., 14100 to 14300 kc., 27.185 to 27.455 mc., 28.0 to 29.7 mc., 50.0 to 54.0 mc., 144 to 148 mc., 235 to 240 mc., 420 to 430 mc., 1215 to 1295 mc., 2300 to 2450 mc., 5250 to 5650 mc., 10,000 to 10,500 mc., 21,000 to 22,000 mc., and any frequencies above 30,000 megacycles.

Order 130, approved November 9, 1945, extended the validity of amateur station licenses affected by Order 127 for an additional period ending May 15, 1946, and added six additional frequency bands. This order also canceled Order 72 of June 5, 1940, prohibiting amateur radio stations from communicating with operators of foreign radio stations; Order 73 dated June 7, 1940, and amendments, prohibiting operation of amateur portable and mobile stations on frequencies below 56 megacycles; Order 87-A, dated January 9, 1942, which prohibited all amateur operation, and Order 87-B dated September 15, 1942, suspending the issuance of renewed or modified amateur station licenses.

Order 130-F, adopted April 17, 1946, provided that the term of each amateur station license, which was valid between December 7, 1941, and September 15, 1942, should run concurrently with the term of the amateur operator license held by the licensee of the station.

Amateur licensees have long been required to file with the Commission an application for modification of license to change the permanent location of a station. Due to the transitory conditions brought about by the war, many amateurs were at locations other than that specified in the station licenses at the time the Commission reactivated the amateur radio service. This resulted in the filing of a large number of applications which, because of its limited staff, the Commission was unable to process. For administrative expediency, the Commission on April 10, 1946, adopted Order 132 which authorized amateur station licensees (whose station license terms were extended by Order 130-F and earlier orders) to operate at locations other than those specified on the license, provided advance written notice was given to the FCC engineer in charge of the district for which the station license was issued and to the engineer in charge of the district in which operation was intended.

Because many amateurs were either in the military service or engaged in war activities, difficulty was experienced in determining the expiration date of their operator licenses and the timely filing of application for renewals. To meet this problem, the Commission adopted Order 115 on May 25, 1943, and Order 115-A on November 28, 1944, which extended the license term. Subsequently, the Commission clarified and extended these provisions by Order 115-B, dated



November 28, 1945, which provided that amateur operator licenses which, either by their own terms or as extended by Orders 115 and 115-A, would expire during the period December 7, 1945, to December 7, 1946, be continued for a period of 1 year from the date on which they would otherwise expire.

On November 28, 1945, the Commission issued Order 131 canceling its Orders 99 dated June 8, 1942; 99-A dated June 27, 1942; 99-B dated October 5, 1943; and 101 dated June 19, 1942, which required registration of unlicensed inoperative transmitters.

Studies and conferences resulted in revising the Rules Governing Amateur Service, effective April 1, 1946. These rules increased the normal license period from 3 to 5 years from the date of issuance of a new, renewed or modified license thereafter. They also established a new system of assigning identifying call letters, prefixed by K or W, to amateur stations in order to make available thousands of additional calls without exceeding five symbols. To help accomplish this, the number of amateur call letters areas was increased from 9 to 10.

At the close of the fiscal year the number of amateur licenses was approaching the 70,000 mark.

### 3. EXAMINATIONS

Examinations were given to an unprecedented number of applicants for all classes of commercial licenses. A total of 76,629 applicants were examined (exclusive of class C amateur) as compared to 64,260 for the previous year. Of these, 69,706 were applicants for commercial licenses including 64,893 radiotelephone and 4,813 radiotelegraph. Applicants for amateur class A and B radio operator licenses totaled 6,923. As a result of the examinations 63,106 commercial operator licenses were issued, 59,711 telephone and 3,395 telegraph.

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## CHAPTER VII

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### Technical Studies

1. TECHNICAL INFORMATION DIVISION
  2. LABORATORY DIVISION
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#### CHAPTER VII—TECHNICAL STUDIES

##### 1. TECHNICAL INFORMATION DIVISION

The Technical Information Division continued to initiate studies of radio wave propagation and of atmospheric and man-made electrical noises as an essential aid in allocating frequencies in the best interests of radio services and the general public. It also furnished technical information necessary in effecting improvements in radio and wire communications generally.

##### SUNSPOT AND NOISE MEASUREMENTS

During the fiscal year, field intensity measurements had progressed only through the first stages of summarizing. However, data obtained has made it possible to describe the nature and extent of broadcast service in greater detail than heretofore. The most conspicuous application was in preparing exhibits for the clear channel hearing (Docket 6741). Maps were introduced to show the extents and grades of broadcast service from all domestic stations as limited by sky wave, ground wave and self-interference (distortion and fading), and atmospheric and man-made noises. An additional application of these materials was reflected in a critical and theoretical essay of the extent to which engineers can define grades of service and the accuracy with which these grades can be predicted. When additional personnel became available, work was begun on a revision of the United States Ground Conductivity Map.

##### LOW-FREQUENCY RECORDING

This program was not expanded during the year because of more urgent problems involving standard and very-high frequency broadcasting. The 200-kilocycle noise recorder at Grand Island, Nebr., has been in continuous operation since October 1943. Consideration is now being given to combining this project with the sunspot cycle

study so as to have a single comprehensive noise recording program embracing the entire range of the spectrum in which experienced. The insufficiency of the data taken to date as a measure of the geographic distribution of atmospheric noise and difficulty of correlating noise measurements with thunderstorm data indicate the need for wider distribution of measuring locations. Similarly, it is proposed to incorporate measurements of the field intensities of aeronautical beacon stations and other available stations in the low-frequency range.

#### VERY-HIGH FREQUENCY RECORDING

Measurement continued of the field intensities of selected FM broadcast stations and some very-high frequency experimental stations. Recordings of bursts and sporadic E-layer transmissions from FM station WGTR, Paxton, Mass., have been made continuously at the Commission's field office at Laurel, Md., since February 1943, and at the field offices at Allegan, Mich., Atlanta, Ga., and Grand Island, Nebr., since September 1943.

#### TROPOSPHERIC EFFECTS

To serve allocation hearing and for the preparation of engineering standards of coverage and interference for FM and television stations, it was necessary during the summer of 1945 to expand the recording program, particularly as to the effects at locations nearer to the transmitter than provided originally. Station WGTR at Paxton and stations WABC-FM and WABD at New York City were operated 18 hours daily, and two experimental stations, W2XRA and W2XRY, were constructed at New York City by the Raytheon Co. Recorders were operated at Princeton, N. J., by the RCA Laboratories and facilities for recording were provided at Iowa City by the University of Iowa. Additional recorders were set up at Commission field stations at Andalusia, Pa., Roanoke, Va., Atlanta, Ga., Montgomery, Ala., New Orleans, La., Cleveland, Ohio, and Grand Island, Nebr. Further tests will include the measurement at Princeton, N. J., Southampton, Pa., Laurel, Md., and Atlanta, Ga., of 47 and 106 megacycle transmissions provided by the Bamberger Broadcasting Co. at New York. Simultaneously, continuous measurements are being made at the same points of 700 megacycle transmissions from the Columbia Broadcasting System in New York City.

#### MOBILE SURVEYS

One of the difficulties which attended analysis of this study was to determine the effects of tall buildings and structures near the transmitter. A mobile survey made along the ground in cars indicated that some effect was present, but the variations of the measurements due to terrain and structures near the receiving point made it impossible to evaluate the effect. An aircraft survey, made on the present transmitters in New York City, in conjunction with the Army Air Forces at Wright Field gave much better results and permitted a reasonable estimate of this effect.

#### SPORADIC E-LAYER REFLECTIONS

The continuous recording of FM station WGTR, previously referred to, provided an opportunity to compare the occurrence of spo-

radic E reflections at 44 megacycles during the period September 1943 through August 1944, the latter year showing about a 20 percent decrease in occurrence. Under the expanded program, no sporadic E reflections were obtained at 107 megacycles and but one brief period of 10 minutes at low intensity was experienced at one recording site at 84 megacycles as compared to several hours of occurrence at comparable intensity at 44 megacycles. The expanded program also verified, in general, the expected variations in occurrence and intensity with distance from the transmitter. Some differences in occurrences were noted for different recorder locations at comparable distances from the transmitter, which may be due to differences in reflection at various latitudes. This is not definitely known, however, as there are other possible explanations for the effect.

#### BURST PHENOMENA

As already reported, "burst" signals continue to appear on recordings made of distance stations for the purpose of detecting sporadic E and tropospheric effects. The rates and intensities of the occurrences of bursts are not being analyzed at present because of their purely academic interest and lack of bearing upon FM and television allocations. However, they have aroused considerable interest in scientific circles and many requests have been received for past or future analyses. Correlation between audible bursts and visible meteors is still being undertaken, but no coincidences in addition to the 13 previously reported have been observed.

## 2. LABORATORY DIVISION

The Laboratory Division was organized in March 1946 to study civilian uses of radar and other war-born developments as they affect frequency allocations, to study wave propagation, to develop new monitoring equipment and to test all types of radio apparatus, including diathermy and industrial heating equipment requiring type approval.

During its 4 months of operation this division tested 15 models of diathermy machines, conducted 7 field intensity surveys on high-powered industrial RF heater installations for the purpose of establishing effectiveness of shielding to prevent interfering radiations, made 4 field intensity surveys of experimental FM stations to determine the limits of the good service area, and made 2 type-approval tests on modulation monitors.

Extensive studies on the interference possibilities of diathermy and industrial heating equipment resulted in standards being recommended. Three radar sets received from the armed services are being tested to determine their utility for civilian use and the possibility of interference to other services.

At the end of the fiscal year 16 projects required laboratory study and development. They include study of image response and blanketing in typical FM receivers, study of the suitability of 21 and 26 megacycles for transmitting time signals, study to determine the feasibility of "stratovision" broadcasting and broadcast relaying, propagation and equipment study of the limitations applying to the citizens' radio service looking towards the establishment of rules and standards for this service, development of equipment for the field intensity re-

cording at Southampton, Pa., determination of the errors for indicating instruments used at very high frequencies, study of the band width occupancy in the radio spectrum of loran signals, determination of the accuracy of a type of portable heterodyne frequency meter considered for purchase by the Commission, and measuring characteristics of radar type antennas to determine their suitability for field intensity measurement purposes.

## APPENDIX

### PUBLICATIONS

Following is a list of Federal Communications Commission publications which may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., unless otherwise indicated:

<i>Title</i>	<i>Price</i>
Communications Act of 1934 with amendments and index, revised to June 14, 1945.....	\$0.15
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 2—July 1935—June 1936.....	2.00
Volume 3—July 1936—February 1937.....	2.00
Volume 4—March 1937—November 15, 1937.....	1.50
Volume 5—November 16, 1937—June 30, 1938.....	1.50
Volume 6—July 1, 1938—February 28, 1939.....	1.50
Volume 7—March 1, 1939—February 29, 1940.....	1.50
Volume 8—March 1, 1940—August 1, 1941.....	1.50
Volume 9—August 1, 1941—April 1, 1943.....	1.25
Volume 10—April 1, 1943—June 30, 1945.....	(1)
Annual reports of the Commission:	
First Annual Report—Fiscal year 1935.....	0.15
Third Annual Report—Fiscal year 1937.....	0.30
Fifth Annual Report—Fiscal year 1939.....	0.30
Twelfth Annual Report—Fiscal year 1946.....	(1)
Statistics of the communications industry:	
For the year 1939.....	0.25
For the year 1940.....	0.20
For the year 1942.....	0.35
For the year 1943.....	0.30
For the year 1944.....	0.40
Report on Chain Broadcasting.....	0.30
Report on "Public Service Responsibility of Broadcast Licensees".....	0.25
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to June 1, 1944.....	0.65
Concerning FM Broadcast Stations, revised to January 9, 1946.....	0.10
Concerning Television Broadcast Stations, revised to December 19, 1945.....	0.10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	0.15
Rules and regulations:	
Part 1, Rules Relating to Organization and Practice and Procedure, effective September 11, 1946.....	(1)
Part 2, General Rules and Regulations, revised to December 19, 1944.....	0.10
Part 3, Rules Governing Standard and High-Frequency Broadcast Stations, revised to October 5, 1940.....	0.10
Part 4, Rules Governing Experimental and Auxiliary Broadcast Stations, effective September 10, 1946.....	(2)
Part 5, Rules Governing Experimental Radio Services, revised to October 28, 1943.....	(2)
Part 6, Rules Governing Fixed Public Radio Services, revised February 20, 1943.....	0.05
Part 7, Rules Governing Coastal and Marine Relay Services, revised April 5, 1941.....	(2)

For footnotes see page 62.

Rules and regulations—Continued	<i>Title</i>	<i>Price</i>
Part 8, Rules Governing Ship Service, revised to May 31, 1943.....		\$0. 15
Part 9, Rules Governing Aviation Radio Services, revised to November 1, 1942.....		. 05
Part 10, Rules Governing Emergency Radio Services, revised to October 16, 1944.....		(¹)
Part 11, Rules Governing Miscellaneous Radio Services, effective January 1, 1939.....		. 05
Part 12, Rules Governing Amateur Radio Service, revised to May 9, 1946.....		. 10
Part 13, Rules Governing Commercial Radio Operators, effective July 1, 1939.....		. 05
Part 14, Rules Governing Radio Stations in Alaska (other than Amateur and Broadcast), revised to April 2, 1942.....		. 05
Part 15, Rules and Regulations Governing All Radio Stations in the War Emergency Service, revised to April 2, 1942.....		. 05
Part 16, Rules and Regulations Governing Railroad Radio Service, effective December 31, 1945.....		(²)
Part 17, Rules Governing Stations in the Utility Radio Service, effective September 12, 1946.....		(²)
Part 31-32, Uniform System of Accounts for Class A and Class B Telephone Companies—Units of Property Class A and Class B Telephone Companies, revised to August 1, 1946.....		(¹)
Part 33, Uniform System of Accounts for Class C Telephone Companies, effective January 1, 1939.....		. 15
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, effective January 1, 1940.....		. 25
Part 35, Uniform System of Accounts for Wire-Telegraph and Ocean-Cable Carriers, effective January 1, 1943.....		. 35
Part 41, Telegraph and Telephone Franks, effective August 11, 1939.....		. 05
Part 42, Rules Governing the Preservation of Records, revised to May 27, 1943.....		. 10
Part 43, Rules Governing the Filing of Information, Contracts, etc., of Telecommunications Carriers, revised to September 29, 1943.....		. 05
Part 51, Classification of Telegraph Employees, effective July 25, 1944.....		. 05
Part 52, Classification of Wire-Telegraph Employees, effective July 11, 1944.....		. 05
Part 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to September 29, 1943.....		(¹)
Part 62, Rules Governing Applications under Section 212 of the Act to Hold Interlocking Directorates, effective September 1, 1939.....		. 05
Part 63, Extension of Lines and Discontinuance of Service by Carriers effective March 18, 1944.....		. 05
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to September 19, 1946.....		(²)

<sup>1</sup> In the process of printing—available at Government Printing Office at a later date.

<sup>2</sup> Obtainable from the Federal Communications Commission, Washington 25, D. C., without charge.

THIRTEENTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1947  
(With Notation of Subsequent Important Developments)



## COMMISSIONERS

### MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

[As of October 1, 1947]

#### CHAIRMAN

**CHARLES R. DENNY**<sup>1</sup>  
(Term expires June 30, 1951)

**PAUL A. WALKER**<sup>2</sup>  
(Term expires June 30, 1953)

**CLIFFORD J. DURR**  
(Term expires June 30, 1948)

**EWELL K. JETT**  
(Term expires June 30, 1950)

**ROSEL H. HYDE**  
(Term expires June 30, 1952)

**EDWARD M. WEBSTER**  
(Term expires June 30, 1949)

**ROBERT F. JONES**  
(Term expires June 30, 1954)

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<sup>1</sup> Resigned as of Oct. 31, 1947.

<sup>2</sup> Designated Acting Chairman Nov. 3, 1947.

## LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
*Washington 25, D. C., December 31, 1947.*

*To the Congress of the United States:*

Pursuant to section 4 (k) of the Communications Act, there is submitted herewith the Thirteenth Annual Report of the Federal Communications Commission, covering the fiscal year 1947.

This report reflects the mounting volume of work and complexities involved in regulating postwar advances in the field of electrical communications. Electronic and other developments are so fast moving that situations and statistics as of June 30, 1947, have altered considerably in the ensuing 6 months. For that reason, there is included a summary of the more important of these subsequent events.

Respectfully,

PAUL A. WALKER, *Acting Chairman.*

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## REPORT SUMMARY

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1. HIGHLIGHTS OF THE FISCAL YEAR
  2. SUBSEQUENT EVENTS
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### 1. HIGHLIGHTS OF THE FISCAL YEAR

The fiscal year 1947 was notable for its domestic and international developments of vital concern to radio. Commission activities reflected an increasing demand for radio facilities of all types, and world conferences met in this country to modernize international radio regulations.

The Commission played an active role in preparing for and participating in the sessions of the International Telecommunications Conferences at Atlantic City, over which its Chairman presided. This meeting was called to rewrite prewar radio regulations in the light of subsequent events and the need for world agreement on allocations and standards of operation to insure the most economical and practical use of the limited radio frequencies.

As far as this country is concerned, the Commission had the task of regulating nearly 40 different radio services and seeking spectrum space for more. The number of outstanding radio authorizations of all kinds (stations and operators) rose to nearly 550,000.

Broadcast stations of 11 types reached a new peak of 3,551 authorized as compared with 2,439 the year previous. More than two-thirds of these were commercial standard (AM) and frequency modulation (FM) outlets.

While demand for AM stations continued to increase, engineering and other problems presented by congestion in that field required many applications to be set for hearing. In consequence, most of the 580 new AM grants were to small communities, many without previous local service. For the first time the number of licensed AM stations passed the one-thousandth mark and, on June 30 last, 1,795 AM stations had licenses or construction grants. A 12-week expediting procedure, which ended May 1, 1947 enabled the Commission to catch up with a backlog of AM applications.

FM showed its biggest and most material gain. Authorized stations doubled—from 456 to 918—and the number on the air increased from 55 to 238. This activity forecasts FM service to more than 500 communities and adjacent rural areas extending through all States except



Montana. There were six times as many FM applications for large-area coverage as for purely local service. Some interference to FM reception caused by operation on alternate channels was corrected by exchanging frequencies. Previously reserved FM channels were released as of July 1, 1947. Manufacturers reported an increasing production of sets capable of receiving FM. The first large-scale FM network operation started in March 1947.

Television broadcast authorizations also more than doubled—from 30 to 66. These stations proposed to serve 33 metropolitan areas and three individual cities. In March the Commission removed an uncertainty in the industry by deciding, after extensive hearing, that color television requires further experimentation before being given commercial status. Eighty-one experimental television stations are working on this and other improvements in television techniques and apparatus. Development of microwave relay systems and extension of coaxial cable lines hold prospect of regular television network operation. Sharing of television frequencies by other services was found impracticable and a new allocation plan was in preparation.

Facsimile broadcast continued on an experimental basis while industry resolves some differences of opinion on technical problems to enable standards to be set up for commercial operation.

Noncommercial educational station authorizations increased to 38, which is half again the number in 1946. State-wide educational networks were in prospect.

Thirty-seven international broadcast stations continued to be programmed and operated by the Department of State.

The increasing use of radio for other than broadcast purposes was evinced by the growth of 25 services devoted to safety of life and property and public and business benefit. The number of authorized stations in this category (exclusive of amateurs) increased to 37,137, which is almost double the 1946 total.

Aeronautical had the largest number—15,843; followed by 10,989 ship stations. Mobile and other experimental operations accounted for 3,450, not including 10 times that number of associated mobile units. A total of 4,130 authorizations were for police, fire, and forest protection.

One new service was established. In August 1946, the utility radio service became available to power, transit, and petroleum pipe-line operation, and by the close of the fiscal year numbered 1,136 stations. Railroads were utilizing 109 radio stations, chiefly in connection with terminal operation. One hundred and four geological stations participated in exploring for new sources of oil.

Frequencies were provided for operation of medical diathermy and industrial heating equipment which, otherwise, would interfere with radio communication. About 25,000 vehicles were testing mobile two-

way radiotelephone service for trucks, taxicabs, and other vehicles. Other proposed services contemplate radio systems for lumbering and other business enterprises, highway departments and, ultimately, for individual citizens.

Meanwhile, radio was employed to bring telephone service to isolated communities by spanning terrain or water where it is uneconomical or impossible to string wire lines. In some rural localities telephone messages were being "hitch-hiked" over electric power lines. Air lines were offering telegraph facilities or experimenting with two-way telephone service in flight, and telephone communication with moving trains was under way.

More telephones were installed in fiscal 1947 than in any previous 12 months. In March 1947 the Commission proposed to authorize the use of telephone recording devices under certain conditions, but final order was delayed pending working out technical details.

New and reestablished circuits brought to 63 the number of countries with which the United States has radiotelephone contact. Overseas radiotelephone rates were reduced in some instances. There was no major change in domestic interstate telephone rates.

The telephone and telegraph industries were developing microwave relay systems to supplant or replace wire circuits. Western Union was operating an experimental chain between New York and Philadelphia, and links with Pittsburgh and Washington were under construction. Western Union was also testing radio facsimile for telegram delivery.

In December 1946 the Commission granted Western Union a 9.1 percent rate increase over the temporary 10 percent increase authorized previously. At the same time inquiry was begun into Western Union's plans to close or reduce hours at about 1,000 public offices. A survey of overseas radiotelegraph rates was also under way. Nearly 700,000,000 words were handled by international telegraph (radio and cable) carriers in the calendar year 1946.

The year saw ship radar emerge from experimental to regular use. Other war developments were being adapted to peacetime pursuits.

Technical investigations by the Commission were directed to stratosphere (television and FM relay broadcasts from planes), interference to radio reception from natural or man-made causes, use of low-power devices, testing of receivers and other equipment, and production of special apparatus to the inclusion of a model diathermy machine.

Field activities, in which about one-fourth of the Commission's total personnel of 1,328 were engaged, were largely devoted to engineering matters such as monitoring, investigation, inspection, and examination. One hundred and twenty-one illegal radio stations were located. The field staff also traced 6,843 sources of interference. In-

spection was made of 13,948 ship stations and 9,546 land stations. Examinations were given 80,395 applicants for operator licenses.

The ranks of licensed commercial radio operators increased to 325,000 and the amateur radio service grew to 80,000 licensed operators and 75,000 licensed stations. Amateurs had recovered practically all their prewar frequencies, with additions.

## 2. SUBSEQUENT EVENTS

Of world importance was the signing, on October 3, 1947, of a new treaty regulating all phases of international radiocommunication. Representatives of 78 nations in attendance at the International Telecommunications Conferences at Atlantic City (mentioned elsewhere in this report) affixed their signatures to this latest step toward worldwide cooperation in the communications field.

Of particular interest and concern to domestic broadcasting is a hearing, announced September 8, 1947, and scheduled for March 1, 1948, to determine whether broadcast stations should editorialize on matters of public interest and controversy and, if so, to what extent they are obligated to provide time for divergent opinion. This hearing was prompted by questions raised concerning policy laid down in the *Mayflower* decision of 1941 which, in effect, requires broadcast licensees to maintain a neutral attitude.

On August 11 the Commission, having received reports that some advertising arrangements had the effect of depriving licensees of direct control of programs, warned broadcasters generally against surrendering their responsibilities through time contracts.

Indications that some groups and individuals contemplated broadcast service over electric power lines caused the Commission, on July 28, to point out that this service was neither envisioned nor provided for in the broadcast picture and, hence, necessary action under its jurisdiction was being studied.

The Commission's economic study of standard broadcasting (noted under "Standard broadcast service") was made public on November 4.

Fall estimates by radio manufacturers indicated a total of 73,000,000 broadcast receiving sets in this country by the close of the calendar year 1947, or 12,000,000 more than at the start of the year. Of the anticipated new sets, nearly 2,600,000 would be FM and 300,000 television.

On July 30 United States international telegraph carriers were authorized to make a general increase in rates to meet a decline in net earnings. It was estimated that this would bring them \$5,500,000 additional annual revenue on out-bound traffic. After public hearings, Western Union was permitted to eliminate the rate differential favoring United States Government telegrams, and priority on such tele-

grams was limited to full rate and serial messages for which the sender specifically requested priority.

Final report and order in the matter of radiotelegraph circuits between the United States and British points (Dockets 7094 and 7412) were issued December 5, effective January 10, 1948.

An order, adopted November 26, authorized the use of telephone recording devices, beginning January 15, 1948, in interstate and foreign message toll service, subject to automatic tone warning that such conversations are being recorded.

Radiotelephone service with certain moving trains was authorized August 15 and November 21. On September 25, highway telephone service was made available to radio-equipped vehicles between Boston and Washington. On the same day a new coaxial cable, capable of handling 1,500 simultaneous telephone calls, began operating between New York and Philadelphia. Interim arrangements between this country and Canada made it possible for automobiles equipped with transmitters to cross the border under seal, effective in September.

Widespread sale of surplus radar and other electronic equipment caused a warning to be issued on July 9 that purchasers must obtain authorization from the Commission before attempting to operate such apparatus. In early December the Commission advised on the use of radar and other radiocommunication equipment for school and other training purposes.

In September the Commission authorized emergency communication by amateurs and otherwise cooperated in communication relief in connection with the hurricane which swept portions of Florida and Louisiana. On December 3 the Commission proposed to extend to domestic amateur communication the existing international ban on the use of unauthorized codes and ciphers in overseas "ham" transmissions.

Simplification of forms and procedures continued. On October 23 the Commission announced adoption of new broadcast application forms. Seven unified and compacted forms will replace 20 different forms used for the services affected. Effective October 6, the Commission shortened the employee data form for annual reports by small broadcast stations. On August 1 it proposed revising the radio operator licensing procedure in the light of changed conditions in that field.

On August 7 the Commission extended to November 1, 1948, the term of all general mobile class 2 experimental licenses pending hearing looking towards the establishment of a mobile service. On August 26 it extended to May 1, 1948, the license term of all experimental class 2 ship radar stations. On September 19 it reinstated or extended all temporary limited second class radiotelephone operator licenses, but not beyond June 30, 1948.

The proposed citizens radio service moved a step nearer when the Commission, the same day, promulgated rules and regulations prescribing technical requirements and established a procedure for obtaining type approval for radio equipment to be so used.

To solve the problem of interference to commercial television (noted elsewhere in this report), the Commission on August 14 proposed to abolish sharing of such channels and assign television channel No. 1 to nongovernment fixed and mobile services. Hearing began November 17.

The Supreme Court on October 13 upheld the Commission's refusal to approve transfer of control of radio broadcast station WOV, New York City. (See "Litigation.")

Chairman Charles R. Denny resigned from the Commission as of October 31 to accept a post in private industry. On November 3 the President designated Commissioner Walker as Acting Chairman.

At the close of the calendar year the Commission had approximately 580,000 outstanding licenses and other authorizations in the radio field. This figure included 120,000 radio stations, of which number 4,000 were broadcast, 40,000 nonbroadcast, and 80,000 amateur. In addition, there were 340,000 commercial radio operators, 85,000 amateur operators, and 35,000 special aircraft authorizations.

## CHAPTER I.—GENERAL

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1. ADMINISTRATION
  2. COMMISSIONERS
  3. STAFF ORGANIZATION
  4. PERSONNEL
  5. APPROPRIATIONS
  6. LEGISLATION
  7. LITIGATION
  8. STATISTICS
  9. BOARD OF WAR COMMUNICATIONS
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### 1. ADMINISTRATION

In regulating interstate and foreign communication by radio and wire under the provisions of the Communications Act of 1934, as amended, the Federal Communications Commission continued to function as a unit, directly supervising all activities, with delegations of responsibility to boards and committees of Commissioners, individual Commissioners, and the staff. All policy determinations were made by the Commission as a whole.

### 2. COMMISSIONERS

The President, on December 4, 1946, designated Acting Chairman Charles R. Denny as Chairman. On March 7, 1947, the President nominated Edward M. Webster to fill the unexpired term, ending June 30, 1949, of Paul A. Porter, resigned. Confirmed by the Senate on March 18, 1947, Commissioner Webster took office on April 10 following. Robert F. Jones was nominated on June 18 of the same year to succeed Commissioner Ray C. Wakefield for a seven-year term to expire June 30, 1954. Senate confirmation followed on July 11 and Commissioner Jones was sworn in September 5.

### 3. STAFF ORGANIZATION

The Commission operates with four departments—Engineering, Accounting, Law, and Secretary's Departments—augmented by five staff service units—an Executive Officer, a Rules Committee, a Budget and Planning Division, a Personnel Division, and an Office of Information. In general, each department is broken down into broadcast, common carrier, safety and special services and other comparable units to handle those respective phases of licensing and regulation.

Pursuant to the Administrative Procedure Act, the Commission on August 27, 1946, delegated to the Secretary, Chief Engineer, Chief Accountant, and General Counsel (individually and collectively) authority to act on all the matters previously delegated to an Administrative Board, along with other routine jurisdiction, effective September 11. At the same time, Boards of Commissioners were authorized to act in the absence of a quorum of the Commission. As of May 28, 1947, the Commission established an independent Hearing Division to carry out other provisions of the Administrative Procedure Act.

Reorganization of the Engineering Department, announced July 18, 1947, enabled that department to meet changed conditions and, at the same time, permitted utilizing the services of Assistant Chief Engineers for special assignments. Engineering branch chief positions were abolished. All common carrier radio services, in addition to international point-to-point services, were placed under the Radio Section of the Common Carrier Division. Certain treaty functions of the former International Division were transferred to the Frequency Service-Allocation Division. The Marine Division was renamed the Marine Radio and Safety Division. The Emergency and Miscellaneous Division became the Public Safety and Special Services Division, with sections devoted to public safety, land transportation, industrial, and experimental and miscellaneous. A new Radio Operator and Amateur Division was made responsible for all commercial and amateur radio operator matters as well as the proposed citizens radio service. Previously, on June 6, the Commission had created an Industrial Heating, Scientific, and Medical Services Section in the Engineering Department's Emergency and Miscellaneous Division.

On May 9, 1947, the position of Executive Officer was created for the purpose of reviewing the Commission's program and procedures with a view to recommending adjustments for more effective administration of the Communications Act in the public interest, at the least cost to the Government and with a minimum burden on industry; also to coordinate and direct planning, budget, and personnel activities.

#### 4. PERSONNEL

At the close of the fiscal year, the Commission employed 1,328 persons. Of this number, 840 were in Washington and 488 in the field. Engineering Department personnel totaled 717, Accounting 161, Law 100, Secretary 248, and 102 others were engaged in administrative duties.

#### 5. APPROPRIATIONS

Total appropriations received by the Commission for the fiscal year amounted to \$6,236,900, including \$25,000 for printing and binding.

## 6. LEGISLATION

There were no amendments to the Communications Act during the fiscal year. However, there was pending before Congress the White-Wolverton bill (S. 1333) to amend the act. This bill, which would make major changes affecting both the organization and functions of the Commission, required careful study and analysis. This included a detailed review of not only provisions of the bill itself, but also of similar bills previously introduced and of the legislative and judicial history of present law which would be affected. The Commission also had before it for consideration and comment a number of additional legislative proposals referred to it by Congress and other Government agencies which would either amend provisions of the Communications Act or would to some extent have a possible bearing upon the performance by the Commission of its functions. These proposals, too, received extensive study and analysis as a basis for appropriate comment.

## 7. LITIGATION

Twenty-two cases involving the Commission were in the courts during the fiscal year. Two of these were before the Supreme Court; 16 were before the Court of Appeals for the District of Columbia; and 4 were before various district courts.

In one of the Supreme Court cases the Commission's decision was affirmed and the other was pending. The Court of Appeals sustained the Commission's decision in one case; in another case the Commission's decision was sustained in part and reversed in part; one was dismissed by order of the court on motion by the Commission; five cases were dismissed by agreement of the parties, and eight were pending. Of the four cases before various district courts the Commission's position was sustained in two, one was dismissed on motion of the court, and one was pending.

The following cases were of particular interest:

*WOKO, Inc. v. Federal Communications Commission.*—This action involved an appeal by the licensee to set aside a Commission order denying renewal of WOKO's license. The Commission's decision was based on the licensee's failure to furnish true information concerning the ownership of 24 percent of the stock in the licensee corporation and its falsification of information submitted to the Commission concerning the ownership of such stock. The licensee's course of misrepresentation and concealment for a period of approximately 18 years evidenced to the Commission a lack of the qualifications required of a licensee to operate a broadcast station in the public interest. The Circuit Court of Appeals for the District of Columbia reversed the Commission primarily on the ground that such action, without a



consideration of other factors such as the need for the broadcast service and loss of invested capital which the licensee might incur, was beyond the scope of Commission authority. The Commission's petition for a writ of certiorari to review the lower court decision was granted by the Supreme Court on April 22, 1946 (*WOKO, Inc. v. Federal Communications Commission*, 153 F. 2d 623), and in December of 1946 the Supreme Court reversed the Court of Appeals and sustained the Commission's decision.

*Murray and Meyer Mester v. Federal Communications Commission.*—This case arose upon the application of Wodaam Corp. licensee of radio station WOV, for permission to transfer control of the corporation to Murray and Meyer Mester. The application was designated for hearing to obtain, among other things, "full information with reference to the qualifications of the proposed transferees." Upon the basis of the hearing record, which included evidence that the proposed transferees had been involved in several actions by various regulatory bodies of the Federal Government for violations of Federal law in the conduct of their edible oil business and which reflected an extreme evasiveness and lack of candor in furnishing required information, the Commission found that it would not be in the public interest to approve the transfer of control. The proposed transferees appealed to the District Court for the Eastern District of New York and the matter was heard before a special three-judge court as provided in section 402 (a) of the Communications Act. The court granted the Commission's motion for summary judgment February 4, 1947 in an opinion which held that the Commission was authorized to make a full inquiry into the character of a proposed transferee, including involvement in civil litigation and his disposition to be truthful, and to refuse an application for transfer of control if in the light of such inquiry it appears that such transfer would not be in the public interest. (*Mester et al. v. United States*, 70 F. Supp. 118.) This decision was appealed to the Supreme Court May 27, 1947.

*Churchill Tabernacle v. Federal Communications Commission.*—This case involved the Commission's refusal to renew a radio station license until a contract between the licensee and Churchill Tabernacle was abrogated. This contract was entered into at the time the licensee acquired the station from Churchill Tabernacle. It provides for certain cash payments each week, reverter of the physical property, reverter of the station license and a reservation of 17½ hours of broadcast time every Sunday to Churchill Tabernacle for a period of 99 years. The Court affirmed the Commission decision with respect to the reverter of the license and the reservation of time, and reversed the Commission with respect to the weekly cash payments and the reverter of physical property. The case was remanded to the Commission to consider possibilities for modification of the agreement in a

manner which would be consistent with the Communications Act. (*Churchill Tabernacle v. Federal Communications Commission*, 160 F. 2d 244.)

*Calumet Broadcasting Co. v. Federal Communications Commission*.—This case arose upon the Commission's refusal to grant an application for a new radio station license when it found, after hearing, that the applicant was evasive and deceptive with respect to the company's financial arrangements. The Commission's decision was sustained by the Court of Appeals for the District of Columbia March 10, 1947. (*Calumet Broadcasting Co. v. Federal Communications Commission*, 160 F. 2d 285.)

*Skywave cases*.—These eight cases are discussed as a group since they are all appeals taken by the licensees of class I stations on clear channels who alleged that their stations would suffer daytime skywave interference by reason of the assignment of new stations operating daytime only on the same channel. In the first case it was also contended that the Commission's assignment of a station operating daytime only on the channel presently assigned to station WJR prior to the determination of the clear channel hearing was improper in that it prejudiced WJR's desire to apply for permission to operate with increased power. Oral arguments on three cases was held in which the Commission contended that under its existing Rules and Standards of Good Engineering Practice appellants were not entitled to protection against daytime skywave interference and had not been deprived of a right to hearing contrary to constitutional or any other legal requirements. All of these cases were pending in the United States Court of Appeals for the District of Columbia at the close of the fiscal year. (*Wilson, Inc. v. F. C. C.*, No. 9434, U. S. Ct. of Appeals, D. C.; *Courier Journal & Louisville Times Co., Inc. v. F. C. C.*, No. 9502, U. S. Ct. of Appeals, D. C.; *National Life and Accident Insurance Co. v. F. C. C.*, Nos. 9510 and 9511, U. S. Ct. of Appeals, D. C.; *WGN, Inc. v. F. C. C.*, No. 9497, U. S. Ct. of Appeals, D. C.; *Crosley Broadcasting Corp. v. F. C. C.*, No. 9501, U. S. Ct. of Appeals, D. C.; *WJR The Goodwill Station, Inc. v. F. C. C.*, Nos. 9495 and 9464, U. S. Ct. of Appeals, D. C.)

*Hearst Radio, Inc. v. F. C. C.*—This action involved a suit by Hearst Radio, Inc., licensee of radio station WBAL, in the District Court for the District of Columbia for a declaratory judgment to have certain allegedly libelous matter deleted from the Commission's report of March 7, 1946, entitled "Public Service Responsibility of Broadcast Licensees." Plaintiff requested a preliminary injunction pending a determination of this case, prohibiting the Commission from proceeding with the processing of Hearst's application for renewal of WBAL's license which had been set for consolidated hearing with a mutually exclusive application for the frequency upon which that

station has been licensed to operate. On February 19, 1947, the district court denied the Commission's motion to convene a three-judge court to hear the matter and granted the preliminary injunction sought by Hearst. On April 21, 1947, argument was held before the district court on a motion by the Commission to convene a three-judge court to hear the action or, in the alternative, to dismiss the action for want of jurisdiction. Court decision on these motions was pending on June 30, 1947.

## 8. STATISTICS

During the fiscal year the Commission received 114,437 applications of all types, not including 27,000 tariff filings and petitions and other papers relating to docket cases. In the same period it disposed of 126,588 applications. On June 30 a total of 6,105 applications were pending as compared with 18,256 on the same date the year previous.

By far the greater number of applications and actions concerned the safety and special radio services (including amateur), for which 106,641 applications were received, 118,311 were disposed of, and 3,595 pending. In the broadcast, 5,336 applications (1,268 for new stations) were received, 5,700 (including 1,619 for new stations) disposed of, and 2,209 (1,146 new stations) pending. In the common carrier field, 2,460 applications were received, 2,507 disposed of, and 301 pending.

Docket statistics show 892 cases designated for hearing, 891 disposed of, and 734 pending. Hearings completed during the year numbered 315.

Field engineering activities located 121 illegal radio operations, traced 6,843 sources of interference, inspected 23,494 ship and land radio stations, examined 80,395 applicants for operator licenses, and conducted technical studies of interference and other problems.

## 9. BOARD OF WAR COMMUNICATIONS

Having completed its task of coordinating the Nation's radio and wire facilities for war purposes, the Board of War Communications ceased operation on February 25, 1947, by Executive order of the President. At the same time, its few orders and instructions remaining in effect were canceled.

This board, which reported to the President, had no paid personnel or appropriations. The Chairman of the Federal Communications Commission served as its chairman. Approximately 100 different organizations representing Government, industry, labor, and civilian groups were on its various committees. Originally created as the Defense Communications Board on September 24, 1940, the board issued 37 orders in harnessing communications to the war effort.

## CHAPTER II.—RADIO FREQUENCIES

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1. RADIO SPECTRUM
  2. FREQUENCY SERVICE—ALLOCATIONS
  3. GOVERNMENT FREQUENCIES
  4. NONGOVERNMENT FREQUENCIES
  5. INTERNATIONAL
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### 1. RADIO SPECTRUM

The boundaries of the radio spectrum are determined by the progress of radio. Wartime development of new techniques and apparatus made it possible, in 1945, to raise the radio ceiling from about 300 megacycles to 30,000 megacycles (30,000,000 kilocycles). While all of the frequencies in the extended radio spectrum have present or potential value for communication purposes, the present "top" for practical commercial use is around 10,000 megacycles. In consequence, radio spectrum space is still quite limited.

### 2. FREQUENCY SERVICE—ALLOCATIONS

A major task of the Commission is to allocate frequencies to meet the increasing demand. There were 39 different radio services in 1947, and this number is growing. It would be wasteful and chaotic to operate one kind of a station on one frequency and another type of service on an adjoining frequency. Sharing of frequencies is often impractical. So, generally speaking, each service has a particular band in which to operate.

The spectrum space between 10 and 530 kilocycles is used largely by radiotelegraph stations and stations which serve as radio beacons for aircraft and ships. The section between 550 and 1600 kilocycles is the familiar broadcast band. Between 1,600 and 25,000 kilocycles are groups of frequencies employed for various experimental, developmental and other special services; and long-distance radiotelephone and radiotelegraph communication between various countries of the world, ships at sea, and planes in the air. Portions of the spectrum between 30 and 30,000 megacycles, besides providing for FM and television broadcasting, are divided between Government and non-Government fixed and mobile services for flexibility in making future frequency assignments.

### 3. GOVERNMENT FREQUENCIES

Radio stations operated by the Federal Government receive their frequency assignments by Executive order of the President upon the

advice of the Interdepartment Radio Advisory Committee, representing various Government departments and agencies including the Federal Communications Commission.

This committee approved 5,100 new regular assignments and 1,855 deletions of regular assignments in 1946, bringing the total number of assignments recommended by the committee since its establishment to 48,201. Outstanding regular assignments totaled 46,346.

During the year the committee approved 276 changes in assignments, 3,430 temporary assignments and 1,256 deletions of temporary assignments, which are not included in the above figures. A total of 12,466 applications and requests were processed. This work involved Commission personnel serving on the secretariat of the committee.

#### 4. NONGOVERNMENT FREQUENCIES

In the matter of frequency service-allocations to nongovernment radio services, a number of proposed and final allocations were published by the Commission during the year. Some of these required the holding of hearings and oral arguments and, in some instances, informal engineering conferences preceded promulgation of the proposals.

Final service-allocations were made in the following fixed and mobile bands: 30 to 40, 42 to 44, 72 to 76, 152 to 162, and 920 to 960 megacycles. Final allocations were also made for the operation of industrial, scientific and medical devices on seven frequencies between 25 and 20,000 megacycles.

In May 1947, a hearing was held on proposed reallocation of frequencies between 960 and 1600 megacycles to provide adequate spectrum space for an integrated aeronautical navigational system.

#### 5. INTERNATIONAL

Dividing the radio spectrum into bands of frequencies to accommodate the growing number of radio services is not only a difficult domestic problem, but it is also an international problem. Radio waves cross international borders and, therefore, there must be coordination and agreement on a world use.

When there is international agreement as to what the bands for the various services shall be, there must be a division of the assignments within those bands. For example, the bands set aside for radiotelephone and radiotelegraph must be shared by the stations of the United States with the stations of other countries. And the ship bands must be shared, and so must the aviation bands, and the international broadcast bands.

#### INTERNATIONAL TELECOMMUNICATIONS CONFERENCES

A forward step toward international agreement on such problem was undertaken by the International Telecommunications Conferences,

which opened at Atlantic City, N. J., on May 16, 1947. The United States, as one of the principal users of radio communications and as the host to the delegates from 78 nations attending the conferences, played a leading part in bringing about universal agreement on revisions to international communications regulations made necessary by radio's phenomenal developments.

Considerable time and effort was spent by the Commission in preparing for these conferences, which were called to rewrite the Madrid Convention of 1932 and the Cairo regulations of 1938. This mass of international law which regulates the use of communications on a global basis has largely been made obsolete by subsequent developments.

The Atlantic City session actually consisted of three conferences—the International Radio Conference, the International Telecommunications Conference (also called the Plenipotentiary Conference), and the International High Frequency Broadcast Conference. The Chairman of the Commission was chairman of the conferences, and other Commission representatives served as United States delegates and in other capacities.

The first session, that of the International Radio Conference, opened in May and its task was to completely revise the international technical regulations covering standards, licensing requirements and procedures, operating practices, call signals, matters relating to safety and distress, and a host of other detail.

The second session in chronological order was the Plenipotentiary Conference, which convened July 1. Its agenda called for revising the Madrid Convention, the basic treaty which lays down the principles on which the technical regulations are founded. The International High Frequency Broadcast Conference, the third session, was to consider the matters indicated in its title.

The United States frequency allocation proposal to the Atlantic City session was published in February. One subject which invited high priority at the conferences is high-frequency broadcasting. The number of HF broadcasting transmitters in the world has increased at an unforeseen rate since the Cairo conference. This increase, due to expanded wartime use of broadcasting, came at a time when other radio services also were expanding. The amount of frequency space allocated for this service in no way provided for the increased number of transmitters in use. As a result, numerous countries were operating these stations out of the high-frequency broadcast bands, with resultant interference to other services and other countries. The state of confusion was at its peak during the past fiscal year.

This one problem is enormous, entailing a complete revisal of the Cairo bands, the preparation of numerous plans concerning some type of sharing on a world scale, the establishment of minimum standards of good engineering practice for this service, and an enumeration of

the needs and desires of the nations of the world as regards high frequency broadcasting.

The Commission, together with representatives of the radio industry, the Department of State and other Government agencies concerned, was actively engaged in this work for the entire year. Many allocation plans were drawn up consisting of various methods of frequency time sharing based on such features as the best listening hours in the different countries, geographic separation of the transmitters, and the needs of the countries as evidenced by the number of existing transmitters. These plans had to be many and varied so as to fit into the bands allocated by the International Radio Administrative Conference, and to satisfy any compromise agreement among the nations involved. The bulk of this work formed the basis of recommendations of the United States delegation to the High Frequency Broadcasting Administrative Conference.

Of particular interest to common carriers was consideration at the Atlantic City sessions of matters having to do with priorities for Government international telephone and telegraph messages, provisions dealing with setting up international traffic accounts and settling balances, and tariff and rate aspects of radiotelegraph service with aircraft and ships at sea.

#### OTHER INTERNATIONAL CONFERENCES

The Commission participated in the Five-Power Telecommunications Conference in Moscow which exchanged ideas between Russia, the United Kingdom, China, France, and the United States preliminary to the Atlantic City sessions.

Commission representatives served as United States delegates and spokesmen to the first session of the Special Radio Technical Division of the Provisional International Civil Aviation Organization held in Montreal in October and November of 1946. This conference was called to consider international standardization of air navigational aids; the accomplishments consisted largely of adoption of functional requirements and technical standards for both equipment and operation. Frequency requirements for civil aviation were studied, and it appeared that the allocation table which the Commission was proposing at that time provided ample spectrum space to meet the requirements of international operations. The conference considered the method to be used in transmitting the statement of frequency needs of international civil aviation to the International Telecommunications Union. It was decided that PICAO should make known its frequency needs only through its member states, and not transmit this information directly to the ITU.

It was revealed that an agreement negotiated between the United States and the United Kingdom in February of 1946 relating to the

operation of distance indicator equipment had not been officially ratified by the United Kingdom. This agreement had provided for the interim use of the 200-megacycle British distance indicator at specified United States gateways until January 1, 1949. The agreement included the state objective of a development program for the 1000-megacycle distance measuring equipment to be participated in by both countries. Since the signing of the agreement, considerable progress has been made in this country in the development of this indicator, and such equipment is now being manufactured under commercial contract.

To clarify this situation, a meeting was held in Washington, April 24 to 29, 1947, attended by representatives of the United States and the United Kingdom and an observer from Canada, for the purpose of working out a mutually satisfactory arrangement for the temporary use of the 200 megacycle British distance indicator in the United States. The new agreement reaffirms the temporary nature of the 200-megacycle distance indicator and provides that it shall not be used in the United States or within interference range of the United States border after January 1, 1954, and that the United States and the United Kingdom are agreed on the use of the 100-megacycle band for the standardization of aeronautical distance indicating equipment.

An International Meeting on Marine Radio Aids to Navigation, likewise participated in by the Commission, was held in New York City and New London, Conn., from April 28 to May 9, 1947, to exchange views on navigational radio aid development and take steps looking toward their standardization throughout the world. Agreements were reached on requirements for radar and position fixing systems. This meeting also recommended very high frequencies for at least one two-way international circuit for radiotelephone communication between ships and for safety and distress purposes.

The Commission was also represented at the meeting of the Eighth Committee of Reporters of the International Telegraph Consulting Committee (CCIT) in London in November 1946, to discuss proposals for revising the International Telegraph Regulations (Cairo 1938) for submission at the International Telegraph Conference, scheduled for 1949.



## CHAPTER III.—RADIO BROADCAST SERVICES

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1. BROADCAST STATIONS SOAR IN NUMBER
  2. MULTIPLE OWNERSHIP
  3. BLUE BOOK CHANGES
  4. STANDARD BROADCAST SERVICE
  5. FREQUENCY MODULATION (FM) BROADCAST SERVICE
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### 1. BROADCAST STATIONS SOAR IN NUMBER

At the close of the fiscal year the number of authorized stations in the standard and nonstandard broadcast services had reached a new peak of 3,551 as compared with 2,439 the year previous. This despite the fact that 123 stations were deleted during the year. Most of the 1,112 stations added in these two general categories were commercial standard and FM (frequency modulation) broadcast stations.

The collective number of standard, FM and television stations slated to render commercial broadcast service increased about 60 percent from 1,701 in 1946 to 2,779 in 1947.

Though standard broadcast stations established a numerical record with 1,795 stations licensed or authorized as of June 30 last, FM grants had jumped to 918. It is noteworthy that new FM station authorizations for the year nearly equalled the number of AM grants.

Authorized commercial television stations increased from 30 to 66, and experimental television stations from 58 to 81. Noncommercial educational station authorizations rose from 24 to 38. International broadcast stations remained at 37.

In the nonstandard broadcast field as a whole there were 1,756 authorized stations of various types, an increase of 532 over the previous year. They were primarily for FM transmission.

## 2. MULTIPLE OWNERSHIP

Following oral argument in February 1947 on rules and regulations concerning multiple ownership of broadcast stations (Docket 8050), the Commission on April 11, 1947, decided that "public interest would not be served by adoption of an iron-clad rule defining the extent of overlap of service areas or the degree of common ownership, operation or control that would be deemed to be in contravention" to its rules covering standard broadcast, FM and television stations. The Commission announced that it will continue to decide each such case on its own merits.

The rule banning operation of more than one station of the same class in the same area by the same interest or group remained unchanged, also the maximum of six FM and five television stations which can be operated in the country as a whole.

## 3. BLUE BOOK CHANGES

Pursuant to suggestions made by interested parties, the Commission on July 2, 1946 announced several changes in the definitions of terms used in its report of March 7, 1946 entitled "Public Service Responsibility of Broadcast Licensees." These changes clarified the meaning of types of programs referred to in that so-called Blue Book.

## 4. STANDARD BROADCAST SERVICE

### DEMAND FOR FACILITIES CONTINUES

The fiscal year saw a continued, and unprecedented, demand for standard broadcast facilities. Engineering considerations involved in these applications grow increasingly complex as more assignments are made and more applications are filed. The ingenuity of applicants and their engineers has been taxed to the utmost in their attempts to squeeze into the congested standard broadcast band. The Commission, on its part, has streamlined and expedited procedures in every way possible consistent with essential engineering, legal and other requirements to keep up with the requests for new or increased facilities.

### LICENSED STATIONS PASS ONE-THOUSANDTH MARK

In line with the demand for standard broadcast facilities, the Commission made a record-breaking number of grants. New stations licensed during the fiscal year totaled 366. Only 29 were deleted. Thus, the number of licensed standard broadcast stations rose from 961 in June 1946 to 1,298 in June 1947. The one-thousandth license was issued to WIRA, Fort Pierce, Fla., on September 25, 1946.

However, construction permits outstanding at the close of the fiscal year numbered 497, which brought the total number of station grants at that time to 1,795, as compared with 1,215 in 1946. The net result was that nearly 600 new stations were authorized during fiscal 1947, or more than twice the number for the previous year. In addition, 666 applications for new stations were pending.

#### MORE SMALL LOCAL OUTLETS

Of significance in connection with standard broadcast station grants and applications is the fact that the smaller towns and communities have become increasingly interested in establishing small local outlets. In consequence, a large portion of the new stations are in towns with populations under 5,000.

#### DAYTIME STATIONS INCREASE

The Commission's rules have always provided for the operation of daytime stations and, from an engineering point of view, a large number of such assignments are still available. Applicants in the past, however, have felt that unlimited time operation was more economic and have accordingly not been particularly interested in daytime stations. But the greatly increased interference problems involved in nighttime operation have resulted in a trend which indicates willingness on the part of applicants to accept daytime facilities when nighttime operation is not feasible. So a large percentage of the new stations have been for day operation only.

#### TEMPORARY EXPEDITING PROCEDURE

During the 6-month period from July 1946 until December 1946 applications for new stations or major changes in existing facilities were being received at an average of about 140 per month and grants were being made at an average rate of about 50 per month.

In January 1947 the Commission announced the adoption of a temporary expediting procedure for processing an accumulation of complicated applications. It had become almost impossible to make detailed engineering analysis of this group because of the continuous filing of new applications and changes in those pending. It was finally decided that the only method by which these applications could be examined in detail was to provide for the so-called "freeze" period for a 12-week period ending May 1, during which no new applications or new amendments would be given consideration and time would thus be afforded to make up complicated channel studies showing inter-

relationship between stations and applicants on the same and adjacent channels. In setting up this procedure the Commission provided a means whereby the engineering consultants of broadcast applicants cooperated on channel studies reflecting the interference problems involved with their applications, after which it was possible for the Commission's engineers to prepare reports and make recommendations. Announcement of this policy resulted in a last-minute flood of applications which complicated the procedure. The rate at which applications were received rose from the December figure of 140 to 200 in January and reached a record high of 362 prior to the "freeze" period. The rate of filing of applications dropped to 60 during March and about 35 in April but was up approximately 60 for May and June. The peak in handling applications was reached in April, the last month of the freeze period, when a total of 180 applications were granted.

An all-time high of 1,227 applications pending was reached during February 1947 but, as a result of the processing procedure, was reduced to about 925 in April.

#### HEARINGS

From September 1946 to February 1947 between 35 to 70 applications were designated for hearing per month. Here again the peak during the temporary expediting procedure was reflected in the total of 220 designated for hearing during March and April.

Applications granted as a result of hearings remained at a fairly constant level of about 20 per month from September 1946 to June 1947. The level of applications in hearing remained at about 500 up until March 1947 and on June 30 had risen to about 600.

#### CLEAR CHANNEL STUDY

The clear channel hearing, begun in January 1946, was scheduled to resume in October 1947. The involved technical studies and other engineering work connected with the hearing were completed and it remained to make an analysis of the service and interference problems involved on the basis of the established standards.

Some of the determinations of interference and service requirements were incorporated as amendments to the Commission's Standards of Good Engineering Practice just before the temporary expediting procedure. Significant changes involve the adoption of new curves for estimating the nighttime propagation characteristics of radio waves in the standard broadcast band. These curves are based on the analysis of data accumulated over the past 10 years. They provide a more accurate way of determining service areas and interference. Other

changes include the adoption of less stringent standards with respect to interference from and between stations on adjacent channels.

#### NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

The North American Regional Broadcasting Agreement, which expired in March 1946, was superseded by a temporary arrangement among the signatory countries to continue certain revisions of the entire treaty until a new one could be effected. A conference of the signatories will commence work on drafting a new agreement. The Commission plans to incorporate these changes in its own standards as part of its proposal for revision of the treaty. If a decision in the clear channel hearing affects clear channel allocations such changes will have to be provided for in the new treaty.

#### GENERAL INTERFERENCE CONSIDERATION

In granting applications, particularly for nighttime operation, the Commission has inclined to authorize stations where little or no interference is occasioned to already existing stations even though the proposed station is subject to interference well over the recommended values of the allocation standards. The view is taken that as long as an applicant is aware of the restrictions that will be placed on his operation because of interference from existing stations, and can install a station without materially increasing interference to other stations, that service should be permitted if the applicant feels that it is feasible from an economic viewpoint.

#### SKYWAVE INTERFERENCE

A large percentage of daytime stations have been authorized to operate on clear channels. Heretofore the matter of daytime skywave interference has been of no particular significance in that there were so few daytime stations and they were generally so far removed from the dominant clear channel stations that no interference was involved. As a result of the large number of daytime stations now in operation, however, interference to the dominant stations during the so-called transition period from nighttime to daytime and from daytime to nighttime has become a problem necessitating consideration.

For the purpose of obtaining data on the subject, the Commission in June 1947 conducted a hearing in the matter of promulgating rules, regulations and standards concerning daytime skywave transmissions of standard broadcast stations (Docket 8333) which may necessitate further amendments and changes in the engineering standards to take

care of interference of this nature. A decision with respect to recommended amendments had not been made at the close of the fiscal year.

#### ECONOMIC STUDY OF STANDARD BROADCASTING

The unprecedented increase in the number of standard broadcast stations caused the Commission in March 1947 to initiate an economic study of that field, which was still in progress at the close of the fiscal year. Its purpose is to provide the industry, licensees and applicants with economic information on postwar conditions. To this end, the report proposes to include consideration of changing conditions; the financial experience of all stations since 1939 as well as the financial experience of new stations; the possible "problem areas"; construction costs and operating expenses of new stations; the relation of broadcast advertising to the total volume of advertising; and, finally, industry trends which may affect the competitive position of broadcast and other media.

#### STANDARD BROADCAST FINANCIAL DATA

The following table shows comparative calendar 1945-46 financial and employee data for the standard broadcast industry as a whole:

Networks and standard stations	1945-10 networks, 901 stations	1946-8 networks, 1,025 stations	Percent increase or (decrease)
Investment in tangible broadcast property (as of Dec. 31):			
Cost to respondent .....	\$88, 101, 940	\$107, 790, 819	22.35
Depreciation to date under present owner.....	\$46, 606, 921	\$51, 365, 253	10.45
Depreciated cost .....	\$41, 595, 019	\$56, 425, 566	35.65
Revenues from sale of network time.....	\$133, 973, 636	\$134, 781, 108	.60
Revenues from sale of nonnetwork time.....	\$176, 510, 510	\$199, 297, 806	12.91
Commissions paid representatives, etc.....	\$43, 923, 466	\$45, 469, 650	3.52
Revenues from sale of talent, etc.....	\$32, 777, 553	\$33, 943, 507	3.56
Total broadcast revenues .....	\$299, 338, 133	\$322, 552, 771	7.76
Total broadcast expenses .....	\$215, 753, 845	\$246, 086, 525	14.06
Broadcast income <sup>1</sup> .....	\$83, 584, 288	\$76, 466, 246	(8.52)
Number of employees of networks and standard stations (as of Dec. 31) .....	37, 757	40, 026	6.01
Total compensation for the year .....	\$116, 267, 274	\$137, 720, 367	18.45

<sup>1</sup> Before Federal income taxes.

Because a substantial number of new stations in their early and less profitable months of operation are included in 1946, trends in the foregoing data may not correspond to the experience of "old" stations. For this reason, comparative data for the 2 years follow for identical stations, i. e., stations which were in operation in both years and which did not change their status during the period with respect to class, time, and whether or not affiliated with a network. The data are shown in terms of averages per station of broadcast revenues, expenses, and income for each class of station, excluding the Nation-wide networks and their 10 key stations.

Standard broadcast stations (excluding 10 key stations of Nation-wide networks)	1945	1946	Percent increase or (decrease)
<b>Averages per station:</b>			
Clear channel 50 kilowatts unlimited:			
Number of stations, 40.			
Total broadcast revenues.....	\$1, 238, 880	\$1, 245, 496	0. 5
Total broadcast expenses.....	769, 706	830, 900	9. 1
Broadcast income.....	469, 174	405, 587	(13. 6)
Clear channel 50 kilowatt part time:			
Number of stations, 4.			
Total broadcast revenues.....	743, 289	809, 665	8. 9
Total broadcast expenses.....	549, 657	626, 728	14. 0
Broadcast income.....	193, 632	182, 937	(5. 5)
Clear channel 5-20 kilowatts unlimited:			
Number of stations, 26.			
Total broadcast revenues.....	441, 597	472, 027	6. 9
Total broadcast expenses.....	338, 130	397, 236	17. 5
Broadcast income.....	103, 468	74, 791	(27. 7)
Clear channel 5-20 kilowatts part time:			
Number of stations, 2.			
Total broadcast revenues.....	392, 789	393, 202	. 1
Total broadcast expenses.....	282, 722	314, 552	11. 3
Broadcast income.....	110, 067	78, 650	(28. 5)
Regional unlimited:			
Number of stations, 278.			
Total broadcast revenues.....	332, 820	354, 678	6. 6
Total broadcast expenses.....	223, 924	251, 502	12. 3
Broadcast income.....	108, 897	103, 176	(5. 2)
Regional part time:			
Number of stations, 47.			
Total broadcast revenues.....	179, 890	191, 641	6. 5
Total broadcast expenses.....	139, 843	156, 424	11. 9
Broadcast income.....	40, 056	35, 217	(12. 1)
Local unlimited:			
Number of stations, 416.			
Total broadcast revenues.....	96, 735	115, 794	19. 7
Total broadcast expenses.....	73, 361	88, 569	20. 7
Broadcast income.....	23, 374	27, 225	16. 5
Local part time:			
Number of stations, 18.			
Total broadcast revenues.....	55, 404	72, 106	30. 2
Total broadcast expenses.....	45, 013	56, 658	25. 9
Broadcast income.....	10, 391	15, 446	48. 7
<b>All stations:</b>			
Number of stations, 831.			
Total broadcast revenues.....	249, 114	268, 564	7. 8
Total broadcast expenses.....	171, 482	196, 179	13. 8
Broadcast income.....	77, 633	73, 404	(5. 5)

All broadcast income shown is before Federal income taxes.

The following table compares the 1945-46 broadcast revenues, expenses, and income of the four Nation-wide networks and their key stations:

4 Nation-wide networks and their 10 key stations	1945	1946	Percent increase or (decrease)
Total broadcast revenues.....	\$85, 151, 875	\$86, 494, 599	1. 56
Total broadcast expenses.....	67, 001, 351	71, 708, 921	7. 03
Broadcast income (before Federal income taxes).....	18, 150, 524	14, 785, 678	(18. 54)

The distribution of the 1946 broadcast revenues and broadcast income as between networks and stations is here shown:

*Distribution of total broadcast revenues*

	Amount	Percent
Networks, including 29 owned and operated stations.....	\$101,968,989	31.6
Networks, including 10 key stations.....	88,010,128	27.3
19 other network owned and operated stations.....	13,958,861	4.3
996 other stations.....	220,583,782	68.4
801 stations serving as network outlets.....	189,236,437	58.7
195 stations not serving as network outlets.....	31,347,345	9.7
Total broadcast revenues.....	322,552,711	100.0

*Distribution of broadcast income (before Federal income taxes)*

	Amount	Percent
Networks, including 29 owned and operated stations.....	\$19,344,123	25.3
Networks, including 10 key stations.....	14,837,877	19.4
19 other network owned and operated stations.....	4,506,246	5.9
996 other stations.....	57,122,123	74.7
801 stations serving as network outlets.....	53,185,098	69.6
195 stations not serving as network outlets.....	3,937,025	5.1
Total broadcast income.....	76,466,246	100.0

## 5. FREQUENCY MODULATION (FM) BROADCAST SERVICE

### GROWTH OF FM BROADCASTING

The fiscal year witnessed a tremendous spurt of activity in FM broadcasting, further demonstrating the important role this new and superior broadcast service is assuming in the postwar era.

The number of FM stations on the air rose from 55 on July 1, 1946, to 238 a year later. Total authorizations doubled—from 456 to 918, indicating that a thousand FM stations may soon be in operation. Those already authorized or applied for will provide FM program service to more than 500 communities and surrounding rural areas, including every State except Montana.

Although the workload in this field has increased proportionately, the Commission has endeavored to process FM applications as promptly as possible and otherwise assist in getting FM service established throughout the Nation. Under the Commission's conditional grant policy, FM stations can go on the air as quickly as they can get their transmitters up.

### FM APPLICANTS

As of March 1, 1947, three-fourths of all FM applications were from standard broadcast interests, and one-third were from newspapers,



23 percent of which were in the standard broadcast field. These groups are in a position to support the new industry until it reaches profitability. Standard broadcasters have an advantage in being permitted, thus far, to transmit their programs over their FM facilities. Since FM channels can accommodate more stations than are available in the AM band—50 to 100 percent more per city—there is little danger of AM interests monopolizing FM, but certain regulations have been adopted to encourage new entries in the FM field.

#### FM CONSTRUCTION

Production of FM transmitting equipment increased rapidly during the year, but most FM stations on the air have not completed construction and are employing low-powered equipment on a temporary basis. FM transmitters are generally built so that higher power amplifiers may be added as desired or as equipment becomes available. The Commission has encouraged interim operation with available equipment in order that FM service may be provided in as many areas as possible.

Because of the difficulty in getting equipment and due to other construction delays, several hundred requests for extension of construction time were granted. Many of these were in connection with modifications. Under Commission regulations, permits for all types of broadcast stations call for construction starting within 2 months and completion within 8 months. The Commission sent inquiries to FM permittees on their construction status, and has not granted the full extension of time requested in all cases.

#### FM FREQUENCIES, CHANNELS, AND STATIONS

FM broadcast is between 88 and 108 megacycles. FM standards adopted in 1945 provided for the assignment of alternate channels with a 400-kilocycle separation of stations in the same area. Separate blocks of frequencies were allocated for community (now class A) and metropolitan-rural (now class B) stations.

In June 1947 changes were made in the assignment of frequencies to provide for a class B station in every fourth instead of every other channel—in other words, for an 800-kilocycle instead of 400-kilocycle separation for stations in the same area. Class A and class B stations are now interspersed, and the former are allocated in the same manner as class B stations by interference contours rather than by mileage separation.

This revision was adopted after it was found that operation on alternate channels produced some interference in receivers then being produced. It was accomplished by trading channels within one area for those in other areas. No city lost channels, and some evincing need

actually gained. Transmitters in use required no change except re-adjustment and retuning.

The great bulk of FM applications thus far have been for the higher-powered class B stations which are designed to render service primarily to a metropolitan district or principal city and the surrounding rural area, or to a rural area removed from large centers of population. At the end of May 1947, applications for class B stations outnumbered those for class A by almost 6 to 1 (898 class B to 154 class A).

While linking of FM stations through rebroadcasts is not new, the first large scale regional operation was launched by the Continental Network on March 26, 1947. Its operation subsequently embraced 27 stations in the northeastern part of the country.

Following a hearing, the Commission in July 1946 reserved until June 30, 1947, every fifth channel in cities or areas which had been allocated five or more channels. In March 1947 this policy was extended to include 4 out of the 20 channels designed to serve communities and adjacent areas. This reservation plan was to permit late-comers to receive consideration with other applicants for channels in areas where the demand exceeds the supply.

#### FM RECEIVERS

FM receiver production in 1946 was limited, due principally to the large production of table model standard sets. As a result, only 181,000 FM receivers were manufactured during that calendar year, or 1.4 percent of the total of all sets made. During the first half of 1947, however, FM set production was intensified, and the industry estimated that approximately 2,000,000 would be manufactured in 1947. Indications were that FM would be included in nearly all future console models, as well as in an increasing proportion of table models.

It is important to the full development and utilization of FM broadcasting that receiving sets be available at the lowest possible cost. The appearance of reasonably priced combination AM-FM sets gives promise that the benefits of FM reception will soon be available in varied price brackets. Meanwhile, converters have appeared which make it possible for AM sets to receive FM programs.

Since FM service under the station allocation and assignment system depends, to a large extent, on the selectivity of FM receivers, the Commission is sample testing the latter as they are manufactured in order to have information on this subject.

## 6. TELEVISION BROADCAST SERVICE

### TELEVISION STATIONS

Six television stations held licenses at the close of the fiscal year, with 60 construction permits outstanding and 9 applications pending.

In addition to the six licensees, six newly constructed stations were also furnishing program service. Thirty-three large metropolitan areas and three smaller cities either had or will have service from the television stations licensed or building. The Commission continued to relax its requirement of a minimum of 28 hours of program service by each station per week.

#### TELEVISION DEVELOPMENTS

Of interest to the industry was the expansion of the coaxial cable system, the development of microwave equipment for relay pick-up and studio-to-transmitter links, improvement in tubes, and the increasing number of technicians trained in television and related work. Television demonstrations during the year included its use as an instructional aid in schools and hospitals, televising pictures in art galleries, on-the-spot news shots, and large screen theater television.

#### TELEVISION RECEIVERS

During the war there were only about 10,000 television receivers on the market, about one-half of these being in the New York area. At the close of fiscal 1947 an estimated 50,000 sets were in the hands of the public, with the bulk in cities having television broadcast service. The television audience was estimated at 300,000. Receivers varied in price from about \$250 for table models to \$2,500 for the large floor models. Their viewing screens ranged from 5 to 24 inches in size.

#### COLOR TELEVISION HEARING

This proceeding arose from a petition of the Columbia Broadcasting System, filed September 27, 1946, seeking operation of its (Columbia's) particular color television system in the ultra-high frequencies of 480 to 920 megacycles, currently employed for television experimentation.

Hearing was held in Washington, New York, and Princeton, N. J., at intervals between December 9, 1946, and February 13, 1947. During its course, the Radio Corporation of America demonstrated another color television system still in the laboratory stage but for which it claimed certain advantages.

The CBS petition was denied on March 18. While recognizing the advances that have been made in color television development, the Commission concluded that further experimentation is needed. It was also of the opinion that there may be other systems which offer the possibility of cheaper receivers and use of narrower band widths.

Before a new system of television is established it must be given adequate field testing. There is a great difference between laboratory performance with trained personnel and home operation by the average citizen. Also, decision must be made on standards. Otherwise the public could not purchase receivers with any assurance that they

would be able to receive programs from all television stations, or that their sets would not become useless if the existing station should change any of the fundamentals. So, before approving proposed standards, the Commission must be satisfied not only that the system proposed will work but also that it is as good as can be expected within a reasonable time to come.

The method of transmitting color is only one of the many principles that must be fixed. Additional considerations cover number of lines, frame rate, type of sound system, etc. In all of these things the receiver must be constructed to "key" with the transmitter in order to receive the program. If at any time a broadcast company should change these standards, the receivers it previously served would become useless. Unlike the automobile or vacuum cleaner, which remains capable of operation long after a new model is brought out, a basic change in the television system would immediately render obsolete all receivers built for the old standards.

Because of these and other considerations, the Commission was of the view that the standards proposed by CBS should not be adopted. The evidence did not show that they represented the optimum performance which may be expected of a color television system within a reasonable time. In addition to the need for adequate field testing, the Commission judged Columbia's color system deficient in picture brightness, flicker, frame rate, color break-up, and receiver design. It also pointed out that, because of the nature of color television, there are not enough frequencies available in the 480 to 920 megacycle band for more than one color television system.

The Commission's decision served as a go-ahead signal for expansion of black and white television service on the basis of present rules and standards in the 13 channels between 44 and 216 megacycles now allocated for commercial television. This should encourage manufacturers of monochrome equipment to proceed at full pace and, at the same time, enable the public to buy receivers with confidence that they will continue to give service. Meanwhile, the door is left open for further color television experimentation and development.

#### TELEVISION FREQUENCY SHARING

The Commission's report of May 1945 on frequency allocations provided for sharing of 10 of the 13 television broadcasting channels between 44 and 216 megacycles with non-Government fixed and mobile services, and two others with Government services. This plan was adopted on the recommendation of the radio industry, as represented by the Radio Technical Planning Board, in the allocations hearings of 1944-45. Services to share with television included police control and relay circuits, point-to-point, marine control circuits, forestry fixed circuits, rural telephone, and railroad terminal and

yard operations. In addition, adjacent channel assignments went to such services as amateur, urban transit, and power and petroleum.

Subsequent experience indicated that this sharing is impractical. As more and more services moved into the space set aside for them, it became increasingly evident that interferences of many sorts would occur. The problems involved amateur interference to television receivers, harmonic interference to and from television stations, co-channel interference from sharing services, receiver interference due to receiver oscillation, etc.

On June 10 and 11, 1947, an informal conference discussed interference in connection with television sharing and allied problems. The Commission furnished evidence of the seriousness of the situation. Motion pictures were shown of the deterioration to the television picture under shared and adjacent channel operations, using such services as a mobile transmitter, diathermy machines, etc. The amateur interference and television harmonic interference to air navigation aids also received attention.

Industry representatives offered testimony, exhibits, and suggestions as to possible solutions. Several plans for reallocation of the spectrum portion in question were discussed but all had fundamental weaknesses. The conference ended with the conclusions that (1) interference to television was serious, and (2) channel sharing was impracticable. It was recommended that the Radio Technical Planning Board's television panel work jointly with the Commission's Engineering Department in preparing an allocation plan for later submission to the Commission.

#### EXPERIMENTAL TELEVISION SERVICE

Television experimentation and research was at an accelerated pace. This included work on propagation studies, development of transmitters, receivers, antennas, and allied equipment, new and simpler circuits, utilization of techniques developed during the war, such as pulse modulation, color transmission by various systems, stratovision (relay broadcast from planes), and the study of shadow and multipath effects. Interests involved in this work ranged from individual radio engineers to large manufacturing companies.

At the end of the fiscal year there were 64 experimental television stations licensed and 17 outstanding construction permits. Included in these figures were 53 relay stations used primarily as remote pick-up, studio-to-transmitter links, and multiple-hop relay transmitters.

#### TELEVISION REMOTE PICK-UP BROADCAST STATIONS

Progress in television has spelled the need for a system of relaying programs from remote points to the transmitter, and from the studio to the transmitter if the two were not at the same location. Wired services, if available, would result in a loss of picture definition since

they cannot pass the wide band of frequencies necessary in television. Consequently, the Commission tentatively set aside the frequencies of 1295 to 1425, 6875 to 7125, and 12,700 to 13,200 megacycles for such services. Subsequently, the aviation interests requested the use of the first-named band for air navigation aids.

Transmitters have been produced for use in the 7000-megacycle region using the klystron principle and are now available for relay work. At the end of the fiscal year there were 16 such stations operated by television broadcasters. Since the allocation of these frequencies is not final and since no rules or standards have as yet been adopted, these stations are experimental until such time as a regular service of this nature is authorized.

#### TELEVISION NETWORK OPERATION

One problem facing television is the lack of intercity relay facilities for network operation. In television, even more so than in standard and FM broadcast, there is urgent need for such a service for economic reasons. Ordinary wire services are not satisfactory; television relay requires a coaxial cable or a microwave system. The American Telephone & Telegraph Co. has a coaxial cable link operating experimentally between New York and Washington as part of a proposed national system.

Many broadcasters wanted to know when they could expect cable links to important sources of programs, such as New York and Hollywood. Others expressed dissatisfaction with proposed coaxial cable rates. Consequently, the Commission called an informal engineering conference on June 9, 1947, to enable common carriers to indicate when they would be able to supply coaxial cable or microwave relay service and television broadcasters and construction permit holders, on their part, to forecast the time they would desire network facilities.

Some broadcasters expressed a desire to build their own networks because of the unavailability of relay service or what they deemed to be excessive coaxial cable rates. The Philco Corp. had an experimental relay link between New York and Philadelphia. During the fiscal year, this company and the General Electric Co. obtained authority to operate other links between New York and Washington, and between New York and Schenectady. They propose to use ultra-high frequency transmitters, directional antennas, and several hops or relay points.

#### 7. INTERNATIONAL BROADCAST SERVICE

The 37 international broadcast stations continued to be programmed and operated by the Office of International Information and Cultural Affairs of the Department of State. This control was limited by the Seventy-ninth Congress to provide in part that "funds herein appro-

priated shall not be used to purchase more than 75 per centum of the effective daily broadcasting time from any person or corporation holding an international shortwave broadcasting license from the Federal Communications Commission without the consent of such licensee \* \* \*

On the basis of this limitation, the World Wide Broadcasting Corp. operated two stations, WRUL and WRUW, on a private basis for about 3 hours per day. Program hours were slightly reduced on the 35 other stations operated by 7 broadcasting companies.

The shortage of frequencies continued to exist in this service, requiring continuation of broadcasting on frequencies formerly assigned to other services. However, many frequencies were returned to former users, notably the common carriers. This forced the use of frequencies not assigned to international broadcasting in this country yet permitted by the Cairo Conference of 1938.

Among the activities of this service were the broadcasting of meetings of the Security Council, the Economic and Social Council, the Atomic Energy Commission, and the Health Commission of the United Nations, broadcasts of the Armed Forces Radio Service and the Bikini bombing test, the inauguration of broadcasts to Soviet Russia via Munich relay stations, and the operation in regular service of two 200-kilowatt stations on the west coast. Many international programs were rebroadcast by several domestic standard broadcast stations.

#### 8. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

Stations in this service are licensed primarily to school systems and universities for the purpose of providing educational programs to school systems, but are also used to furnish educational and entertainment programs to the public.

The 20 channels between 88 and 92 megacycles allocated for this service are a part of the FM broadcast band, and FM sets used by the public and by school systems will, therefore, receive both regular commercial FM and noncommercial educational FM broadcast. The rapid growth of commercial FM broadcasting should provide an impetus to the greater use of FM in serving the needs of education.

Eight noncommercial educational FM stations were in operation at the close of the year and construction permits for 30 additional stations were outstanding. In addition, seven applications were pending. Fifteen new stations were authorized during the year.

A number of State-wide FM educational networks were planned, including both State-owned and municipally-owned stations. Establishment of many educational FM stations has been delayed by lack of appropriations for actual construction.

### 9. FACSIMILE BROADCAST SERVICE

Printed matter and pictures may be received by using facsimile receivers and recorders within the service areas of facsimile broadcast stations, and equipment now developed permits excellent quality and speed of reproduction.

Since facsimile transmitters and receivers have a "lock-and-key" relationship, as in television, transmission standards must be established so that any receiver will operate from any station in its area. A number of industry meetings were held during the year, and in June 1947 the Radio Technical Planning Board submitted proposed standards to the Commission. These standards would provide for facsimile transmission by FM stations in the 88- to 108-megacycle band during hours not used for aural broadcasting. The Commission requested that further experimental operation and demonstrations be conducted, however, since there was a difference of opinion as to whether both 8.2" and 4.1" images should be provided with the same line rate of 105 lines per inch, and since only a limited amount of experimental operation had been conducted to determine public preference on this subject.

Pending the establishment of standards, facsimile broadcasting continued on an experimental basis. In addition to three prewar experimental facsimile stations operating in the 25-megacycle band formerly allocated to this service, several FM broadcast stations have from time to time experimented with facsimile. These transmissions have been correlated with facsimile receivers set up in various public places, and a considerable amount of interest has been evinced.

Provision has also been made for experimental facsimile operation in the 470 megacycle range but no activity therein has been indicated.

### 10. REMOTE PICK-UP BROADCAST SERVICE

Broadcast stations in this service are usually low-powered mobile units, used to provide a program circuit between points of temporary program origination and the main broadcast transmitter. For example, remote pick-up transmitters are often employed for reporting golf tournaments, auto and boat races, street broadcasts, and similar events. During the fiscal year 46 applications for new stations were granted, bringing the total number authorized to 583. Frequencies are allocated for these stations in several parts of the spectrum. These assignments are currently under revision as a part of the over-all allocation studies.

### 11. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

ST broadcast stations are required in some instances to provide program circuits between the studio and the transmitter of an FM broad-



cast station, since FM transmitters are sometimes located where telephone wires are not available or adequate for program transmission. ST stations are also authorized for use with international broadcast stations. The band of 940 to 952 megacycles is allocated for this purpose, and equipment is now under development. Until such equipment is available, a number of FM stations have been authorized to use temporary equipment on other frequencies. ST stations previously authorized in the 530-megacycle range are continuing to operate there pending their conversion to the new ST band.

## 12. DEVELOPMENTAL BROADCAST SERVICE

Development broadcast stations are authorized when experimentation with broadcast equipment requires radio transmission. These stations are also used in connection with the testing of antennas and in the conduct of radio propagation measurements and studies. Activity in this service fluctuates. There were 24 such stations at the close of the year.

## 13. STATISTICS

The following tabulation shows authorized stations (licensed or holding construction permits) by various classes in the broadcast service for the last 2 fiscal years:

	1946	1947	Increase
Standard (commercial).....	1,215	1,795	580
FM (commercial).....	456	918	1,462
FM (experimental).....	1	0	(-1)
Television (commercial).....	30	66	36
Television (experimental).....	58	81	23
Noncommercial educational.....	24	38	14
International.....	37	37	0
Facsimile (experimental).....	3	3	0
Remote pick-up (formerly relay).....	573	563	10
Studio transmitter (ST).....	7	5	(-2)
Developmental.....	34	24	(-10)
Class II (experimental).....	1	1	0
Total.....	2,439	3,551	1,112

<sup>1</sup> Includes 280 conditional grants.

## CHAPTER IV.—SAFETY AND SPECIAL RADIO SERVICES

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1. GENERAL
  2. AERONAUTICAL RADIO SERVICES
  3. MARINE RADIO SERVICES
  4. EMERGENCY RADIO SERVICE
  5. UTILITY RADIO SERVICE
  6. RAILROAD RADIO SERVICE
  7. MISCELLANEOUS RADIO SERVICES
  8. EXPERIMENTAL RADIO SERVICES
  9. STATISTICS
- 
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### 1. GENERAL

In addition to broadcast, radio is now used for an increasing number of other purposes. This is reflected in the safety and special services. The majority of stations in this category operate as direct and vital aids in safeguarding lives and property in conjunction with air, sea, and land transportation, and in police, fire, and forest protection. Other stations function in established or proposed services for industrial and general public benefit. Still others are concerned with the development of new equipment and new uses for radio.

One of the Commission's most challenging tasks is faced in finding spectrum space for new services as well as accommodating the expansion of existing services.

### 2. AERONAUTICAL RADIO SERVICES

The fiscal year witnessed the greatest annual increase in civilian aviation activities as far as the Commission is concerned. The total number of applications in the various types of aeronautical radio services increased from 11,672 in 1946 to 24,280 in 1947. Aircraft and ground radio stations together numbered 15,843.

This brought many new problems and, among other things, made necessary a complete revision of the Rules and Regulations Governing the Aeronautical Radio Services, effective May 1, 1947. An informal conference in this connection provided the first opportunity for a discussion of postwar civil aviation radio needs with a representative group of aviation interests.

Another major and continuing activity involves conferences with the International Civil Aviation Organization (ICAO). These have been directed toward the best utilization of frequencies, new aids to air

navigation, search and rescue, and radio equipment and licensing standards. This was a forward step in the direction of world agreement of frequencies, standardization of equipment, and uniform procedural practices.

#### AIRCRAFT RADIO

The largest increase in the aeronautical radio services was that of private aircraft. There were 14,627 authorized radio stations on planes at the close of the fiscal year as compared with 5,200 in 1946, and of the former 13,011 were private aircraft.

The growth of air traffic and associated communications created a need for additional spectrum space on the very high frequencies. This problem was referred to the Radio Technical Committee for Aeronautics. After numerous conferences, the RTCA recommended an allocation plan for the frequency band 108 to 132 megacycles which, after due consideration, was adopted by the Commission on October 25, 1946.

Much of the military surplus radio equipment was not applicable to civilian aviation. Consequently, it was necessary to assist the flying public in determining what apparatus would suit its needs. Study and tests indicated that no transmitters of this class, except that employing crystal frequency control, would meet requirements. In view of this, the Commission on April 28, 1947, announced a policy on non-crystal controlled equipment.

Purchasers of new aircraft with factory-installed radio equipment were formerly inconvenienced by delay in procuring a license from the Commission. To remedy this, the Commission on October 10, 1946, inaugurated a plan by which the manufacturers, dealers, or distributors of new radio-equipped aircraft could issue at the time and place of sale a 30-day special temporary authorization for flight use while a license was being obtained.

Methods of expediting action in aviation radio matters during 1947 included the simplification of procedures for obtaining aircraft operators' permits, easing the licensing procedure for scheduled aircraft equipment by reclassifying transmitters of the same type to permit interchange of equipment, and issuance of identical licenses to all aircraft operated by the same air line. This streamlining is largely responsible for the fact that only about 17 percent of all aviation applications now require attention at professional level. The remaining 83 percent can be processed by the clerical staff. This is in marked contrast to the situation at the beginning of the year when approximately 77 percent required detailed attention.

Expansion of air traffic in the international field caused the Commission to authorize blanket use by United States planes of frequen-

cies assigned to foreign aeronautical stations, if certain conditions are met.

Due to the shortage of available call letters, a plan was tentatively adopted on January 30, 1947, which, when necessary rule changes are made, will, among other things, no longer assign call letters from the international series to private aircraft stations; instead, they will be identified more simply and conveniently by the aircraft registration number.

For private communication between individuals aboard planes in flight and persons on the ground, the "public service" type of station has been provided to connect with the land-line telephone or telegraph system.

Public service aircraft stations on transport planes engaged in overseas flight have been authorized to operate on the frequencies available to ship-telephone and ship-telegraph stations. One air line is experimenting with two-way telephone service. Another is offering telegraph facilities. Since the first application in the air carrier public service was granted June 20, 1946, a score of stations have been licensed.

#### AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

These stations provide nongovernment ground-to-air and point-to-point communication relating solely to actual flight needs. Also, domestic scheduled air carriers are required to maintain two-way ground-to-aircraft radiotelephone communication at terminals and other points necessary to insure contact over the entire route. These are independent of radio facilities provided by Government agencies.

There were 1,435 aeronautical land and aeronautical fixed radio stations at the close of fiscal 1947, an increase of 524 since the same period in 1946.

Attention is being given to the frequencies employed for this type of service. It must resolve the "chain" versus the "area" concept of assignments, or perhaps a combination of both, as well as better utilization of frequency characteristics.

Conferences between Aeronautical Radio, Inc., and the Civil Aeronautics Administration resulted in agreement to dismiss the applications of the former (Docket 6988) for aeronautical ground radio facilities to serve overseas flights at New York City. This case raised the broad question of whether radio facilities at aviation gateways in this country employed for the operational control of aircraft on international flights should be operated privately or by the Government. The applications were granted in part subject to consideration of services with higher priority and without prejudice to future applications by nongovernment agencies for like facilities at other points.

#### AIRDROME CONTROL RADIO STATIONS

As the name implies, these stations are concerned with regulating the movement of aircraft within the control area of the airport involved and in providing ground communication for final approach and landing. Since many aircraft may be in the air at various altitudes in approaching or leaving the airport from different directions, the process of directing each plane to a common landing point is essential to safeguarding life and property.

The frequency band 118.1 to 121.3 megacycles was made available for such stations. Since the CAA uses these frequencies for the same purpose, a plan of allocation and coordination was prepared and is now in effect.

At the close of the fiscal year 58 of these air traffic control stations held licenses. This compared with 45 stations for 1946.

#### AERONAUTICAL MOBILE UTILITY RADIO STATIONS

These are mobile stations used at airdromes for communicating with the control tower, ground vehicles and aircraft on the ground. They are necessary in insuring the safe, coordinated movement of surface vehicles on the field. The first application for this type of station was granted on February 26, 1947, and 18 stations were so licensed by the close of the fiscal year.

#### AERONAUTICAL NAVIGATION RADIO STATIONS

Operation of these stations involves the transmission of special radio signals to assist in determining aircraft position with particular reference to collision hazards. Included are radio beacons, radio direction finders, radio ranges, localizers, glide paths, markers, and ground control approach stations.

Although most such stations are operated by the Federal Government, the Commission had licensed 19 navigational nongovernment stations by the end of the fiscal year. These stations are installed at places not served by Government stations or airline flying schools. In 1947 the airlines had in operation two instructional "instrument landing systems" and one "ground controlled approach station". The latter is licensed experimentally to determine the most effective method of operation. However, the CAA has approved navigational use of this installation by airlines.

An immediate objective of American aviation is to provide safe and efficient air travel under all weather conditions. There is need for a standard integrated system of electronic aids to air navigation and traffic control. At the present time no single integrated system, either proposed or in development, is capable of fulfilling all of the required functions. In May 1947 the Commission held a public hearing on the question of revising the existing frequency service allocations to make

the entire band 960 to 1600 megacycles available to the aeronautical navigational service. This band is considered by avia-tional development agencies to be the most suitable for the purpose. Since it must ultimately be integrated into a world-wide system of frequency allocations, final decision awaited international coordination.

#### FLYING SCHOOL RADIO STATIONS

Due to the increased interest in aviation and since many veterans are taking flying instructions under the G. I. Bill of Rights, flying schools and soaring societies have multiplied since the close of the war. There were 15 licensed flying school radio stations in 1947 as compared with five the year previous.

#### FLIGHT TEST RADIO STATIONS

There is rapid development of aircraft and associated equipment which must be tested extensively under flight conditions to determine suitability for aviation needs. For final flight testing, communication with the ground is required to impart instructions and to log pertinent data. Frequencies have been provided for this purpose. Eighty-two such stations were licensed as of June 30, 1947.

### 3. MARINE RADIO SERVICES

#### FREQUENCY ASSIGNMENTS

The scarcity of radio channels is still a serious problem in the marine field which depends upon a variety of services utilizing radiotelephony and radiotelegraphy for communication between ships and between ship and shore stations.

It is becoming increasingly difficult to make coastal station frequency assignments which will permit interference-free contact with ships. Frequency allocation proposals of the United States to the International Telecommunications Conference may alleviate this situation somewhat, since they are designed to provide for a more effective utilization of maritime mobile frequencies through the use of exclusive bands. Supplemental proposals aim to more evenly distribute message traffic through the available frequency space between 2 and 25 megacycles.

Development of nine very high frequency channels in the 152 to 162 megacycle band is progressing, and it is believed that more extensive use of this band will relieve congestion between 2 to 3 megacycles where approximately 9,000 radiotelephone-equipped vessels now operate. A number of problems are involved in the full development of this band, such as determination of its functions, procedures to be used, and the most efficient frequency assignment plan consistent with the availability of equipment. Another problem is whether private or common

carrier operation is to be preferred. Many of these questions are raised in pending applications which were designated for a consolidated hearing, the outcome of which should provide the basis of future policy.

During the year an additional medium-high frequency used extensively in ship-to-shore radiotelephone service was also made available to ships operating in Alaskan waters for communication with coastal stations. This action benefited Alaskan fishing craft and the Army's Alaska Communication System.

#### NEW MARINE RADIO DEVICES

The Commission is continuing study of the value and application of new marine radio aids, particularly those developed during the war, to determine whether their use should be required in furthering safety of life and property. In this connection the Commission considers the technical characteristics and operational performance of equipment, its value to navigation, and the economic factors of installation, such as weighing costs against benefits.

One result of these studies was to remove ship radar from experimental to regularly established use. Indications are that considerable time has been saved in ship operation by the ability of radar-equipped vessels to navigate under conditions of low visibility. Six manufacturers were producing commercial type marine radar sets and approximately 200 licenses were granted to use such devices on shipboard.

A number of United States vessels employ special receiving equipment for loran (long-range aid to navigation). Also a war development, this system has its greatest value in accurately navigating vessels during overcast when celestial observations cannot be made. No transmitting equipment is needed on board ships for this purpose.

#### RADIO TECHNICAL COMMISSION FOR MARINE SERVICES

The Commission participated in the establishment of a Radio Technical Commission for Marine Services. Comprised of Government and industry representatives, this organization is an advisory body for coordinated study of problems covering all phases of marine communications and electronic navigation systems and to foster radio developments to meet marine operating requirements. During the fiscal year the RTCMS completed a study of modulation systems for very high frequency marine radiotelephony and recommended that FM be adopted for the maritime mobile service within the frequency range of 30 to 300 megacycles.

#### MARINE RADIO INTERFERENCE

Several cases of radio interference involving the marine services were investigated and appropriate steps were taken looking toward

their elimination. Examples are coastal stations transmitting on frequencies which interfere with broadcast reception due primarily to poorly designed receivers operating near the coastal station, as well as cases of unauthorized harmonic radiations of ship stations. The latter, which normally interfere with other communication services, is sometimes caused by faulty transmitting equipment and at other times is due to the close proximity of operation of the two services.

#### MARINE RADIO EQUIPMENT DEVELOPMENT

One improved commercial type of automatic alarm receiver designed for use on ocean vessels was being tested by the Commission. Devices of this nature are normally operated on cargo ships while the radio operators are off duty, for alerting the latter whenever distress signals are received.

Type approval was granted to one new ship radio receiver.

#### RADIO AID IN SEA DISASTERS

The year witnessed many instances in which aid was summoned by radio for vessels in distress. In addition, numerous urgent messages were sent relative to the safety of a vessel or persons on board. Among the cases in which radio was of direct importance in the saving of life and property were disasters involving the steamship *Oakey L. Alexander*, off Cape Elizabeth, Maine, on March 3, 1947, the steamship *Fort Dearborn*, in the West Pacific, on March 12, 1947, and the schooner *Catherine L. Brown*, off the Virginia Capes on February 27, 1947.

#### EXEMPTIONS

The Commission is empowered to exempt vessels from prescribed radio requirements under certain conditions. Many of these are small boats without adequate facilities for radiotelegraph installations. Applications for exemption during the year numbered 41, of which 35 were granted. This was 122 percent more than in 1946. Two area exemptions covered vessels of less than 100 gross tons navigating waters between Indian River Inlet, Del., and New York harbor, and between Naples, Fla., and New Orleans. Exemption previously granted all vessels up to and including 15 gross tons was renewed for 1 year.

#### WAIVERS

To facilitate the temporary use of cargo ships to carry passengers in the national interest, the Commission permitted portable in lieu of permanently installed motor lifeboat equipment in 119 instances for periods ranging from 30 to 90 days. Most of these covered single voyages when permanent equipment was not available. Authorizations of this kind represented a 240 percent increase over the year previous.



#### RULE CHANGES

Rules governing ship and coastal services were revised to more closely reflect peacetime needs and advancements in the radio art. The Commission abolished the requirements that ships carry emergency antennas but retained provision that ships have "safety links" to protect their main antennas. Another rule change permits ships auto-alarms to be connected to the emergency transmitter power supply, thus eliminating the need of a storage battery for this purpose.

Several rule sections were modified to implement the establishment of 8280 kilocycles as an interim long-range distress frequency pending adoption of a suitable international distress channel in the high frequency band. This should facilitate distant reception and increase the likelihood that signals from survival craft will be heard.

#### SHIP RADIO STATIONS

An all-time peak of 10,989 ship radio stations were licensed as of June 30, 1947, an increase of 37 percent over 1946. About one-fourth of this number fell within the "compulsory" classification (ships compelled by law to carry radio for safety purposes), and the remainder represented voluntary installations on yachts, fishing boats, tugs, towboats, dredges, etc. The number of vessels in the latter category, which normally employ radiotelephone, is increasing at an unprecedented rate.

Photostatic procedure was established for the expeditious handling of ship radiotelephone applications and licenses, resulting in substantial savings of clerical time and effort.

#### COASTAL RADIO STATIONS

Coastal stations are normally located near the sea, the Great Lakes or other waterways to communicate with ships. At the close of the fiscal year there were 47 such radiotelegraph stations, exclusive of those in Alaska. Forty-four of these rendered public service.

In addition, there were 38 coastal-harbor radiotelephone stations, exclusive of those in Alaska, of which number 33 offered public service. New coastal-harbor stations were established at The Dalles and Umatilla, Oreg., to augment service on the Columbia River. Experimental stations were authorized at Mobile and New York City to use very high frequencies. Very high frequency telephone service is also being developed for the Great Lakes. Four stations connecting with the public land lines communicate with ocean-going vessels.

#### MARINE RADIO RELAY SERVICE

Thirty-six of the coastal radiotelegraph stations engaged in public service were authorized to operate in the marine relay service, an increase of 25 percent over the preceding year. This point-to-point

type of radio service implements the coastal telegraph service by forwarding shore-to-ship messages from one coastal station to another such station better located with regard to the ship for which the message is intended.

#### ALASKAN POINT-TO-POINT AND COASTAL RADIO STATIONS

In Alaska, due to the scarcity of wire facilities, much of the communication between communities is carried on by radiotelephone and radiotelegraph. There were 403 point-to-point radio stations for this purpose at the close of the fiscal year, exclusive of Government stations. This is an increase of 16 percent over 1946. In addition, 232 coastal stations were authorized, an increase of 27 percent.

#### 4. EMERGENCY RADIO SERVICE

This service embraces seven classes of stations operated by instrumentalities of Government to promote phases of public safety or welfare. In addition to four types of police radio operation, there are municipal fire, forestry, and special emergency stations.

The Commission's frequency allocations hearings developed considerable data concerning the operation of stations in this service. On the basis of this information, and in light of the technical advances in radio, it was necessary and desirable to undertake, with the cooperation of representatives of various classes of licensees, a proposed revision of the existing rules. This task was completed by the close of the fiscal year.

One of its major proposals is the establishment of a highway maintenance class of radio station for State and local governments. Other contemplated revisions would enable forestry radio stations to include essential conservation activities, and eliminate population requirements for eligibility of municipal fire radio stations.

Study of frequency allocations to the emergency service resulted in a reallocation of channels by blocks instead of on an interspersed basis. This will not only permit assignments by geological areas, but will mean a saving in spectrum space and economy in equipment costs.

#### POLICE RADIO STATIONS

The police radio service has four classes of stations—municipal, State, zone, and interzone. Municipal and State police radio stations employ voice transmission and, generally, are used in matters of immediate concern, such as dispatching patrol cars. Zone and interzone stations use radiotelegraphy and serve to join the various municipalities, counties and States into a single network for expediting reports of stolen automobiles and missing or wanted persons, and identification of suspected criminals.

The growth of the police radio service is indicated in the following tabulation for the past 3 years (as of June 30 respectively) :

	1945	1946	1947
Municipal police.....	2,051	2,243	2,657
State.....	477	507	669
Zone.....	85	88	87
Interzone.....	30	30	29
Total.....	2,643	2,868	3,442

Due to the Commission's practice of listing all mobile units under a single license, the above figures do not represent the actual number of transmitters operated. The latter exceed 25,000.

Reallocation of frequencies to police stations in accordance with the new frequency allocation plan has been delayed by many technical, manufacturing, and economic considerations. Therefore, the Commission has permitted licensees until July 1, 1950, to make the necessary shifts. To reduce the expense involved, the Commission has authorized licensees in many instances to complete the conversion in stages. Under this plan, licensees install a portion of the new equipment but meanwhile continue to use their present apparatus.

Frequency allocation committees of the police communication organizations, the Radio Technical Planning Board and the Commission are cooperatively engaged in frequency studies. Problems concerning the use of adjacent channels on a 40-kilocycle spacing as well as the adoption of a 20-kilocycle channeling system in lieu of the present 40-kilocycle system are receiving like attention, to the inclusion of manufacturers.

In view of the limited number of frequencies available for police communications, it is necessary to insist on a high degree of technical performance to accommodate the increasing number of applicants. The Commission has proposed an amendment to its rules which would incorporate basic technical requirements.

There is also a complexity of engineering problems arising from applications which involve interference to established stations. The rules were revised to eliminate the requirement that specific authorizations be obtained by police licensees to operate mobile units other than official cars, or to render cooperative service to adjacent municipalities. This has lightened the burden of licensees and reduced Commission paper work.

#### MUNICIPAL FIRE RADIO STATIONS

Municipal fire radio stations furnish emergency and mobile communications to fire departments in the same manner that police radio stations serve police agencies. The number of fire stations doubled in

the past year, from 25 to 50, and include approximately 500 mobile units.

The comparatively small number of stations in this category is due to the fact that licenses have been normally issued only to municipalities serving areas containing a population in excess of 150,000 persons. The extensive interest shown by volunteer fire departments and smaller municipalities resulted in proposed amendments to the rules that would extend eligibility to fire departments in small communities.

#### FORESTRY RADIO STATIONS

Forestry radio station licenses are issued to governmental agencies responsible for the protection of forest areas, and to a few private organizations having that same objective.

The usual forestry communication system employs one or more land stations with portable stations installed in fire observation towers. It is not unusual to use aircraft equipped with mobile transmitters to drop men and material to combat the blaze. By means of lightweight pack sets, the fire fighters are able to communicate with the plane or a portable station set up nearby.

Although the number of these stations shows a decrease in the year from 1,018 to 638, this is not due to any actual reduction in the number of transmitters in use but to a new procedure which consolidates mobile and portable transmitters into a single license.

Representatives of State conservation agencies have requested that frequencies be made available for their use. Their activities include game law enforcement, protection of forests from insect pests and disease, reforestation, flood and erosion control, etc. Although not of the same emergency nature as police, fire, and forestry, conservation work is chiefly in remote areas where other methods of communication are not available. The Commission is, accordingly, proposing to make a limited number of forestry frequencies available to conservation agencies.

#### SPECIAL EMERGENCY RADIO STATIONS

The special emergency class of radio station is used for communication in emergencies jeopardizing life, public safety or important property, and for emergency transmission from one point to another where other communication facilities do not exist or are temporarily disrupted.

Until September 1946, when a utility radio service was created, most of the special emergency stations were used by the power industry. About 80 percent of them were transferred to that new service. In consequence, the number of special emergency stations decreased from 821 in 1946 to 127 in 1947.

The remaining emergency stations are licensed mainly to communication common carriers and are used to restore service when land line

failures occur. Some licenses are held by organized relief agencies, such as the American Red Cross, for communication in event of a major disaster. An example was in connection with the explosion and fires which devastated Texas City, Tex., in April 1947.

#### PROPOSED HIGHWAY MAINTENANCE RADIO STATIONS

During the year the Commission was petitioned by various State highway departments and highway organizations to establish a new class of station to provide for radiocommunication systems operated by highway departments.

Under existing rules, highway departments are eligible for the special emergency class of station but, like the power utilities, were hesitant about investing large sums of money in radio equipment which could be used only in emergencies involving the safety of life and property. The highway interests stressed that radio is also essential in dispatching emergency vehicles and work crews, and is needed by supervisors patrolling highways to report weather and road conditions.

In response to this appeal, the Commission has drafted proposed rules for projected highway maintenance stations which would be similar to State police stations. Until such time as this class of service is permitted, highway departments may operate class 2 experimental (highway maintenance) stations in the experimental radio service.

#### 5. UTILITY RADIO SERVICE

This class of radio service provides radio communication for three general types of public utilities—power, transit, and petroleum pipe lines. The first named serves electric, gas, water, and steam utilities. The transit utility station is used by bus, street cars, subway and other passenger-transportation lines in metropolitan areas. Petroleum pipe line stations communicate with pipe line operators engaged in cross-country distribution of crude petroleum, petroleum products, and natural gas.

Established in August 1946, the utility radio service permits licensees to transmit messages relating not only to safety of life and property, but also those in connection with essential operations, such as dispatching of maintenance crews and trucks. The advantages of this type of service are commanding increasing attention from eligible utilities. As of June 1946 utilities were operating 600 special emergency stations. In the same period of 1947 there were 1,136 stations in the new utility radio service. Each of these stations may include from one to 150 transmitters.

The Commission during the past year devoted considerable attention to the allocation of channels to various industries requiring radio services. This study, still in process, is coordinated with panels of the Radio Technical Planning Board. The power and petroleum indus-

tries have collectively organized regional frequency coordinating committees throughout the United States to assist the Commission in allocating appropriate frequency assignments in critical areas.

## 6. RAILROAD RADIO SERVICE

Established in December 1945, this service adds to railroad safety and facilitates the movement of rolling stock with a resultant increase in efficiency and economy.

Railroads employ radio for several purposes. A train station provides communication between locomotive and caboose, from train to train, or from train to wayside station. A yard and terminal station expedites switching and "humping" operations. A utility station aids railroad operation and maintenance through contact with track patrols, road repair gangs, etc.

There still remains considerable work on the part of manufacturers to develop and produce equipment sturdy enough to withstand the rigors of railroad use. On the other hand, some railroad management considers railroad radio still in the developmental stage and its unwillingness or inability to make substantial installations denies manufacturers the incentive to go into quantity production for this type of equipment. This situation contributes to the continued expensiveness of stations on board trains where the cost is approximately four times that of a mobile station in other services.

On June 30 there were 109 railroad radio licensees, authorized to use some 900 transmitters.

A study has been conducted in collaboration with the Association of American Railroads looking to the preparation of a geographical frequency assignment plan for railroad use. This would insure economical utilization of available frequencies and limit interference by preventing duplication of assignments.

## 7. MISCELLANEOUS RADIO SERVICES

These services cover provisional, geological, motion picture, relay press, and mobile press radio stations. The two first named comprise the greater portion of licensees.

Provisional stations are authorized to transmit messages relative to safety of life and property, or other matters of public necessity in areas not served by other forms of communication. Geological stations are used extensively in oil and gas well-drilling operations and, in a more limited way, by construction and logging companies, irrigation projects and large-scale farming operations.

Due to the new policy of blanketing mobile and portable transmitters into a single license, the total number of stations in the miscellaneous services was reduced from 1,228 to 437 in the course of the

year, although there was a significant increase both in the number of licensees and transmitters.

Because of the interest shown by many types of industries, the Commission is considering a plan to reorganize and expand the provisional class station into a new service which is tentatively referred to as the industrial radiocommunication service. A number of frequency channels have been allocated for this purpose.

#### GEOLOGICAL RADIO STATIONS

This term applies to stations used in connection with investigating the earth's surface and underlying strata for new and needed oil deposits. Practically all of the 104 licensed geological stations, which represent more than 500 mobile units, are operated by oil and geophysical exploration companies.

Of low power, these stations transmit signals and impulses to seismic recording instruments from various pick-up points located at distances up to 15 miles from a centrally located recording truck or boat. They are also utilized for communication by crews at work in isolated areas. Many geological stations operate in the tidelands along the Gulf of Mexico, often miles offshore.

#### MOTION PICTURE RADIO STATIONS

Stations in this class provide communication for film crews on location in places where other facilities are not available, and aid in protecting life and property in that connection. Being mobile, they are particularly advantageous for coordinating and directing "mob" scenes and the activities of various units engaged in the actual filming.

Motion-picture stations were little used during the past year. However, correspondence and inquiries from the industry indicated that activities of this class of station will increase now that new and improved equipment has become available.

#### RELAY PRESS RADIO STATIONS

Newspapers and press associations use these stations to transmit messages from locations remote from wire facilities. A number of requests have been received for authority to permit installation of land stations at the newspaper's main office for the purpose of maintaining communication with reporters and other staff members at the scene of a news event or traveling in the vicinity. To obtain more information concerning this type of service, the Commission has authorized a number of class 2 experimental (relay press) stations to operate accordingly.

#### STATE GUARD RADIO STATIONS

At the request of the War Department, the Commission extended the licenses of 27 State guard radio stations until July 1, 1948, or until

such time as the National Guard reorganization is completed. These are a hold-over from the War Emergency Radio Service, an emergency defense set-up that was terminated in other respects at the close of the war.

## 8. EXPERIMENTAL RADIO SERVICES

### GENERAL

The Communications Act requires the Commission to "study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest."

In the past year the industry has been active in developing equipment and techniques looking toward new services and improvement of old services. The Commission kept abreast of and encouraged these developments through its experimental radio services.

Experimental radio stations fall into two broad classes. Class 1 stations are used in connection with research projects for the general advancement of radio. Such activities include development and testing of new or improved transmitter and receiver designs, antennas, and equipment components; field strength surveys; and radio propagation studies of various kinds. Class 2 stations are authorized for the initial development of a new radio service, or for the further development of an established service requiring new methods and materials. Stations in both classes are licensed to individuals or corporations desiring to follow a specific research or development program.

The experimental services are radio's proving ground. When sufficient information has been secured from an experimental operation, the project may be abandoned as impracticable or steps taken to place the service on a regular basis.

The most fundamental and far-reaching development in the field of electronics in the past few years is the extension of the usable radio frequency spectrum almost a hundredfold. Although there still is not enough spectrum space for all persons desiring to make use of radio, provision can be made to accommodate a great many more than heretofore.

Since knowledge of how to utilize the higher frequencies was applied almost entirely during the war years to development of military equipment, the past year witnessed new applications to commercial use as wartime equipment was redesigned for peacetime needs and materials for mass production became available.

In taking advantage of the added spectrum space, nearly all existing radio services have been expanded, as described elsewhere in this report, and a number of new devices and new radiocommunication services have been proposed for extensive experimental development



as a necessary preliminary to regular operation. Included in this list are radar stations, microwave relay chains, telecar service, a general mobile radio service, a group of industrial radio services, and a citizens radio service.

#### RADAR

One of the most revolutionary and valuable technical developments of the war is radar (radio direction and ranging). Due to changes in frequency allocations and the differing needs of commercial users, much of the military radar equipment is unsuitable for commercial use. So new equipment has been and is being developed to meet the demands of ship operators, commercial aviation, and geological exploration companies, although the total of peacetime uses so far developed is greatly outweighed by the number of military uses.

All signs point to rapid adoption of radar in transoceanic marine passenger service. For example, in one crossing of the Atlantic, the steamship *Queen Elizabeth* proceeded by radar for 720 miles through dense fog at full speed, thereby saving twice the cost of her radar set in a single day. In passenger service it appears that economic as well as safety factors may force general acceptance of radar navigation. In cargo service, adoption of radar navigation may not be so universal, particularly on smaller vessels where the first cost and maintenance charges are appreciable factors. The number of shipboard radar installations has increased approximately 1,000 percent during the past year.

Radar navigation for commercial aircraft operating in domestic service has little appeal due to the well-developed system of other aids already established, the high cost of the equipment, the special skills involved, and the decreased payload due to the very considerable weight of the installation. However, a large number of relatively lightweight radar altimeters and anticollision devices have been installed.

A number of other adaptations of radar techniques are in various stages of laboratory development, with coined names suggestive of the functions involved. Included are teloran, radiovision, navar, nava-globe, navaglide, and fathometer.

#### MICROWAVE RELAY

The field of point-to-point microwave transmission (frequencies on the order of 1000 megacycles and higher) showed great expansion during the year.

Studies made by the telephone companies and Western Union Telegraph Co. indicate that it may be practicable to replace, or at least parallel, heavily used long-distance wire circuits with chains of microwave relay stations spaced 30 to 50 miles apart. A single microwave system can be used to carry hundreds of telephone conversations and

telegraph messages simultaneously, or several high-fidelity FM and television programs for rebroadcast by local outlets. One of the factors weighing heavily in favor of the microwave circuits is their ability to transmit much wider bands of frequencies than can be accommodated by existing wire or cable facilities.

Many groups have evinced interest in microwave communication circuits. In addition to the present communications common carriers, and others proposing to enter into competition with them, interested parties include television and FM station licensees, the broadcast networks, the aviation, railroad, petroleum and power industries, and law enforcement agencies. Each group proposes a different method of allocating the available frequencies, and the number of requests for assignment in the microwave bands already indicates that expressed needs cannot be met in full. This situation raises many questions of policy which will take time to resolve, particularly since the full potentialities of the equipment now under development cannot be predicted with certainty. For example, sufficient information on costs of installation and maintenance of microwave relay chains versus similar costs for wire and cable lines is not yet available. This information is essential to proper rate-making.

The American Telephone & Telegraph Co. has allocated \$7,000,000 for construction of a relay chain between New York and Chicago, and is currently installing a shorter experimental chain between New York and Boston.

Western Union Telegraph Co. has installed a relay chain between New York and Philadelphia which is now in service on an experimental basis. A new chain is being constructed by Western Union in the triangle formed by New York, Pittsburgh and Washington.

#### TELECAR SERVICE

Telecar is a mobile telegram pick-up and delivery service now under development by Western Union as part of its modernization program. The system consists of a fixed radio station at the central telegraph office (plans call for institution of the service in 64 cities) and a number of mobile units. When the main office receives a message destined to a point within the area served by a particular automobile, a picture of the message is transmitted to the car by radio facsimile methods. This facsimile message is then delivered by the "telecar" to the addressee. Looking further into the future, this system may be extended to inter-city operation over the microwave relay chains so that a picture of any message may be sent to other cities and delivered in the original handwriting.

#### GENERAL MOBILE RADIO SERVICE

In its report on the allocation of frequencies in the extended radio spectrum, the Commission recognized the need for a radio service

to provide communication between vehicles and fixed points. Frequencies were, therefore, provided in the 30 to 44 megacycle band for stations serving vehicles operating over highways, and frequencies in the 152 to 162 megacycle band for urban stations serving taxicab operators, doctors' cars, delivery trucks, towing services, etc.

At the time these allocations were made certain questions of policy existed, including whether the service should be made available for common carrier operation, noncommon carrier operation, or both; and whether restrictions would be placed on the kind of communications to be handled, and the type of emission and amount of power used. Pending final determination of these and other problems, experimental authorizations for general mobile systems have been issued for the purpose of acquiring data on which to formulate rules for governing the service on a regular basis.

The service has grown rapidly from 279 authorizations in fiscal 1946 to more than 1,700 in June 1947. The latter permit operation of 22,000 radio-equipped vehicles. Its mushrooming has raised administrative, developmental, and regulatory problems, the solution of which has required careful study and coordination with licensees and manufacturers of equipment during the past year. Moreover, a frequency assignment plan in the 152 to 162 megacycle band was found necessary in order to promote an orderly experimental program affording all interested parties equal opportunity to explore their operational requirements. A temporary allocation plan provides for one pair of frequencies to taxicab operators; one pair to operators of miscellaneous vehicles, such as department stores, towing services, doctors' cars, etc.; three pairs to existing general communication common carriers; and one pair to applicants who are not existing communication common carriers but propose a common carrier type of communication service for specialized purposes.

Processing the many applications for mobile stations required determination of the eligibility of the wide variety of applicants to hold radio station authorizations and the capability of the proposed systems to meet the Commission's requirements. During the year the Commission also issued decisions relative to this service on petitions submitted by representatives of the intercity bus, taxicab, and trucking industries.

National Bus Communications, Inc., requested the Commission to make available a certain number of the frequencies allocated to the general mobile service for the exclusive use of the intercity bus industry, directly or through an organization formed for the purpose of rendering radio communication service exclusively to the bus industry. In its report granting this petition to a limited extent, the Commission announced that the intercity bus industry would not be required to obtain its mobile radio communications service from an existing gen-

eral communications common carrier or to share with others the frequencies assigned for use of the bus industry. However, a further hearing is to be held in order to determine the exact number of frequencies to be assigned to this use.

The Commission denied a petition by representatives of the taxicab industry requesting a 5-year experimental license period, and the assignment of at least four and preferably six channels to taxicab dispatching systems. In so doing, the Commission reiterated its recognition of the need for such a service and gave assurance that it would make every effort to establish one on a permanent basis at an early date. The Commission recognizes that at least two channels will be required. Whether additional channels can be assigned will depend upon other demands for urban mobile service, and no determination in this respect can be made until after a general hearing has been held to consider frequency and regulatory problems.

At the same time, the Commission advised the trucking industry that highway mobile experimental radiotelephone licenses could not be extended for 5 years. The Commission pointed out that it has heretofore announced that there will be a highway service and that a specific number of channels will be assigned for truck use pending a final determination of the best method of operation for this service. The Commission indicated that it could give the trucking interests no further assurance in this matter until a program of experimentation has been under way or at least a plan has been worked out for a Nation-wide coordinated use of the frequencies temporarily assigned for trucks.

In the latter part of the fiscal year it appeared that the development of the general mobile service had progressed to the extent that sufficient experimental data was available to serve as a basis for determining issues relating to the establishment of this type of operation on a regular basis. The Commission, therefore, scheduled a hearing on this matter for late 1947. Questionnaires designed to secure information which will be of assistance to the hearing were distributed to all general mobile licensees. These questionnaires will also serve to eliminate the need for licensees to prepare experimental reports in connection with applications for renewal of experimental licenses in this service.

#### INDUSTRIAL RADIO SERVICE

A service is being developed for limited use by agricultural, lumbering, manufacturing, merchandising, mining, petroleum, and other miscellaneous business enterprises for which special provision is not made elsewhere in the Commission's rules. The service is in the early experimental stage, and its final form has not yet been determined. The frequencies available for assignment have approximately line-

of-sight transmission characteristics in common with those very high frequency channels available for most of the other radio services being developed.

The need which this new service is designed to meet is illustrated in the communication requirements of the petroleum industry. In the case of this industry, oil and gas are frequently sought and found in areas remote from existing communications facilities. During the drilling operations it is essential that communication be established between the well site and the field headquarters in order to maintain proper supervision. Break-down of equipment, accidents, and other emergencies, such as a blow-out, fire, or explosion, not only present hazards to life and property, but also involve loss of productive time.

After a field is proven and steady production is begun, the need for communication facilities continues. The prompt and uninterrupted movement of equipment and supplies, transmission of operating instructions and reports, direction of well-servicing crews, repair crews, and other routine operations in the producing field are dependent upon the instant and reliable means of communication which radio affords when no other means is available.

In addition to portable "walkie-talkie" types of equipment, miscellaneous low-power devices using radio, and radio-equipped supervisor's cars and repair trucks operating in a mobile service, the industry can make good use of various types of fixed radio service installations wherever frequencies can be made available. Those which involve only line-of-sight distances are: radio control and repeater stations, generally used as mobile service auxiliaries to complete or extend the area of coverage of a mobile service radio system; radio telemetering stations, used to transmit data which is determined by mechanical or electrical means; fixed point-to-point radio communication circuits, used in conjunction with an established mobile service system; and fixed point-to-point radiocommunication circuits unassociated with a mobile service installation. The point-to-point circuits in general would be used for either radiotelephone or facsimile transmissions.

The existing classes of radio stations available for licensing by the petroleum industry and other industries meet only a small fraction of the total potential demand for radiocommunication facilities. It is the purpose of the proposed new service to fill the additional requirements as they occur.

#### INDUSTRIAL, SCIENTIFIC, AND MEDICAL RADIO SERVICE

Another result of the frequency allocation hearings was the promulgation of proposed rules and regulations to govern the use of radio equipment which, although not used for communications, is capable

of causing extensive interference to radio communication services. Of particular concern are diathermy and industrial heating units, and miscellaneous electronic devices.

Public hearings on these proposed regulations, participated in by medical, industrial, and other interested parties, were held in December 1946. The resultant rules were adopted May 8, 1947, and became effective June 30 following. These rules provide specific frequency bands in which such equipment may be operated and prescribe limits for radiation when used on other frequencies. Prior to the enactment of these regulations, diathermy and industrial heating apparatus had operated without specific limitation as to power or radiation and caused problems of interference to many established radio services.

The regulations also require submission of diathermy equipment for type approval by the Commission. As approval indicates that the Commission has found that operation would either take place within one of the frequency bands assigned to the service, or would be sufficiently shielded as to eliminate objectionable interference, such approved equipment is permitted to operate without a license. The regulations also provide for a period wherein equipment manufactured prior to the effective date of the regulations may be used without license if no interference is caused to existing services.

#### CITIZENS RADIO SERVICE

The frequency allocations hearings likewise proposed a citizens radio service, to which the frequencies 460 to 470 megacycles were allocated. The potentialities of this service are unlimited since possible uses range from small private communications systems to low powered control devices. These frequencies are peculiarly adapted to very small transmitters and receivers employing tubes and printed circuits similar to those used during the war in proximity fuzes for artillery shells.

During the year extensive studies of design problems were made by the Commission and resulted in June 1947 in proposed technical requirements and procedure for obtaining type approval equipment to be used in the contemplated service. This proposal will serve as a guide for prospective manufacturers of such equipment. The comments of the industry and interested parties will be received in the coming year and will form a basis for drafting acceptable standards and rules.

During fiscal 1947 this service was on an experimental basis and one of the principal problems was the development of suitable small transmitting units which could be safely placed in the hands of non-technical persons yet come within the price range of those interested. Although such equipment was not available at the end of the fiscal year, except for experimental use, progress was noted in its development.

## RURAL AND SHORT-DISTANCE TOLL RADIOTELEPHONE SERVICE

Rapid advancement is being made in using radio to bring telephone service to isolated places. Previously, it was often impossible, because of economic or technical reasons, to extend wire lines to remote hamlets. To fill this void, the Commission recognized a new type of radio service designated as the rural radiotelephone service. It finds its greatest application in connecting individual subscribers with a central telephone exchange, thus making it possible to link rural areas with the telephone system. A pioneer installation was that of the Mountain States Telephone and Telegraph Co. at Cheyenne Wells, Colo., to serve a group of isolated ranches. It is anticipated that substantially all such installations will be made by the telephone companies operating in the areas concerned.

Parallel with the rural radiotelephone service, the Commission has tentatively recognized a short-distance toll telephone service to connect isolated communities by radio in lieu of wire lines. As in the case of rural radiotelephone service, these facilities will normally be made available through existing telephone companies. Authorizations have been granted to the Southern California Telephone Co. to conduct experiments to determine the feasibility of establishing such service in Death Valley, Calif. While provisions were made to operate this service on the frequencies allocated to the general mobile service, recent tests indicate that the microwave frequencies may prove suitable. Accordingly, the Southern California Telephone Co. has installed a microwave system between Santa Catalina Island and Avalon, Calif.

These services are in addition to carrier-current systems in which the signal travels along rural power lines.

## 9. STATISTICS

Exclusive of the broadcast services and amateur and commercial operator licensing noted elsewhere in this report, the Commission received more than 55,000 applications and authorized more than 15,000 stations of various types during the fiscal year, bringing the total number of stations (with the exceptions noted) to over 37,000. A break-down of these stations follows:

Class of station	Applications	New stations	Total stations
Aircraft.....	22,047	9,428	14,627
Aviation ground.....	2,233	212	1,216
Ship.....	14,042	3,111	10,989
Police.....	3,733	574	3,442
Fire.....	119	25	50
Forestry.....	426	-390	688
Special emergency.....	441	-604	127
Experimental <sup>1</sup> .....	3,162	811	1,767
General mobile (experimental) <sup>1</sup> .....	3,255	1,265	1,663
Fixed public telephone <sup>2</sup> .....	143	0	28
Fixed public telegraph <sup>3</sup> .....	627	-4	50
Wire service extensions <sup>4</sup> .....	412		
Wire service reductions <sup>4</sup> .....	743		
Utility <sup>5</sup> .....	1,763	1,136	1,136
Railroad.....	193	-47	109
Coastal marine relay.....	274	13	131
Alaska coastal.....	406	49	232
Alaska fixed public.....	586	56	403
Geological.....	560	-381	104
Provisional.....	515	142	331
Miscellaneous.....	79	24	52
State guard.....	0	1	27
<b>Total.....</b>	<b>55,761</b>	<b>15,337</b>	<b>37,137</b>

<sup>1</sup> Separated under Common carrier and safety and special services Dec. 1, 1946. Of the figures shown above, 66 applications and 81 total stations are common carrier.

<sup>2</sup> Separated under Common carrier and safety and special services Dec. 1, 1946. Of the figures shown above 469 applications and 427 total stations are common carrier.

<sup>3</sup> Fixed public telephone and telegraph stations are now considered common carrier.

<sup>4</sup> Wire service extensions and reductions are now considered common carrier.

<sup>5</sup> New service originated August 1946.

- Indicates decrease.



## CHAPTER V—COMMON CARRIERS

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1. TELEPHONE (WIRE AND RADIO)
  2. TELEGRAPH (WIRE, CABLE, AND RADIO)
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### 1. TELEPHONE (WIRE AND RADIO)

#### GENERAL

Besides expanding its regular facilities, the telephone industry manifested increasing interest and activity in radio developments and utilizations during fiscal 1947.

All-time highs were set in fiscal 1947 in the number of telephones in service and in telephone service revenues. However, the increase in operating revenues were more than offset by increased operating expenses, resulting in declines in net income. This led to telephone companies in most States applying to their local regulatory bodies for authority to increase rates for intrastate toll and exchange telephone service. Net income from interstate telephone service has suffered less decline than is reflected in intrastate results, and there have been requests for increases in interstate rates.

More telephones were installed in fiscal 1947 than in any prior 12 months. More than 36 billion local and short-haul toll and 1.7 billion long-distance toll calls were handled by the Bell system. With increased traffic amounting to about 10 percent, the industry had to expand greatly its exchange and toll facilities. At the same time, it augmented private line, teletypewriter exchange, rural, and other land-line services.

The over-all telephone activity increase was reflected in established services employing or dealing with radio, such as international and ship-to-shore telephone and channel service for radio broadcast, and in new services involving microwave relay, television transmission by coaxial cable, and mobile telephone.

#### DOMESTIC TELEPHONE SERVICES

*Construction of wire facilities.*—Continued public demand for telephone service, together with overloaded facilities at the beginning of the fiscal year, resulted in a period of enormous construction activity. In addition to 20 applications on hand from the preceding year, the Commission received 305 new requests for wire line construction, acquisition, extension or leasing. Of this number, 309 were approved,

including 289 construction projects. A comparison of this authorized wire construction with that of the previous year follows:

Fiscal year	Projects	Cost	Cable-miles	Coaxial-miles	Open-wire-miles
1946.....	239	\$78,896,450	3,193.8	16,580	12,261
1947.....	289	126,325,771	5,587.7	23,490	15,976

The Bell system added about 1,600,000 miles of toll message channels, which increased its previous total by 11.9 percent. Carrier systems continued to provide about 90 percent of the new channels. Coaxial cables are discussed elsewhere in this report.

*Speed of toll service.*—The Bell system was able to install new equipment and secure additional operators which reduced the average speed of service for completing toll-board calls to 2.3 minutes in March 1947, a decrease of 0.4 of a minute compared with the year previous.

*Telephone recording devices.*—On March 24, 1947, the Commission issued a final report on the use of recording devices in connection with interstate and foreign telephone service. It concluded that a real need exists for this adjunct but held that its use should be under conditions which will give adequate notice to parties that their conversation is being recorded. The Commission decided, among other things, that this should be accomplished by an automatic tone warning signal repeated at regular intervals during the conversation. However, it deferred issuance of a final order pending resolution of various engineering questions considered at an engineering conference on April 29.

*Rural telephone service.*—At the close of fiscal 1947, some 330,000 additional rural families were receiving telephone service. This increase was about three times that of any previous year. About 18,000 miles of pole line were constructed in rural areas. Also, some subscribers were receiving service over electric power lines or by means of radiotelephone.

*Power line telephone service.*—Initial installations were made of a new carrier system modified for short-haul toll operation. It was developed in connection with "hitch-hiking" telephone messages over rural electric power lines in some southern areas and has proved economical in cases where wire construction would otherwise be necessary. Known as the M1A in its modified form, five or six channels can ordinarily be operated on a power line.

*Short distance radiotelephone service.*—Telephone companies have shown an increasing interest in harnessing radio to expand short distance service. They were working toward the use of radio to bring

service to isolated ranches in the West, small rural communities at a distance from large cities, and as a replacement for wire lines where construction and maintenance costs are prohibitive. Preliminary studies indicate that, under geographical conditions favorable for wire lines. (See also "Rural and Short-distance Radio telephone Service".)

*Coaxial cable service.*—Coaxial cable installations are designed for radio broadcast and television transmission as well as for telephone and telegraph traffic. In the fall of 1946 rates were instituted by eight Bell telephone companies for the use of local channels in connection with television operation. Since then, extension of the coaxial cable system has taken on a new importance in the light of the need for inter-city exchange of television programs. The American Telephone & Telegraph Co. continued to make its coaxial link between New York and Washington available without charge for television tests. This was the only section open for this purpose in fiscal 1947. However, a national coaxial system of 12,000 miles is expected to be in operation by 1950.

On June 2, the A. T. & T. filed coaxial cable rates for television service, but they were withdrawn for further study before they became operative.

*Microwave relay service.*—Microwave radio relay development (more fully described under "Experimental radio services") received considerable impetus through the grant of a construction permit to the American Telephone & Telegraph Co. for an experimental system to link New York and Chicago, and similar authorizations to the Raytheon Manufacturing Co. for connecting New York and Chicago, and Los Angeles and San Francisco. These are in addition to previous authorizations to the American Telephone & Telegraph Co. and the Western Union Telegraph Co. for systems between New York and Boston and a triangular system linking New York, Philadelphia, Washington, and Pittsburgh, respectively. The New York-Boston chain was expected to be in service in the fall of 1947, offering telephone, teletype, broadcast, and other communication services.

*Mobile radiotelephone service.*—Bell system and independent telephone companies are continuing experimental development of mobile radiotelephone service. The first urban mobile system went into operation in St. Louis on June 17, 1946, and at the end of fiscal 1947 commercial service was being afforded in 42 cities in 26 States, with prospect of 19 more cities being added at an early date.

The first highway mobile system started operation in the vicinity of Green Bay, Wis., on August 28, 1946. Highway service on a commercial basis is now available in 19 areas, and installations in 78 more are nearing completion. Plans call for such service along approximately 5,000 miles of the Nation's trunk highways.

The general mobile service is being extended to ships and aircraft operating in the vicinity of land service facilities. Various persons who never before rendered communication service for hire have also obtained experimental authorizations.

The rate of expansion of this service indicates that, within a few years, it will be possible to communicate with radio-equipped vehicles in many parts of the country. The present rates for urban and highway service vary from 30 to 40 cents for a three-minute call within a local telephone exchange area, with long distance calls charged for at the person-to-person daytime rate.

In view of the mounting demand for mobile service, the Commission ordered a public hearing for late 1947, to consider the establishment of this service on a regular basis. Problems to be considered were the types of mobile service which should be authorized, the frequencies which can be allocated for the service and the manner in which they can be apportioned among the different classes of users, the extent to which service shall be afforded by common carriers or private carriers, and other information necessary to drafting proposed rules and regulations. (Further reference to mobile service will be found under "Experimental radio services.")

*Coastal and Alaskan services.*—Coastal harbor, coastal telephone, and Alaskan radio communications services are discussed in the chapter on Safety and Special Services because of their relationship to radio aids to the safety of life and property. During the year public radiotelephone service was inaugurated between various coastal harbor stations and aircraft at rates generally the same as for coastal harbor communication with ships. In Alaska the communications picture is peculiar in that the nature of the terrain and population distribution make radio an almost exclusive medium for communication. Accordingly, virtually all the coastal and point-to-point services there furnish public service. Independent stations throughout the territory are interconnected in a network operated by the Alaska Communication System, an agency of the United States Army Signal Corps.

#### INTERNATIONAL RADIOTELEPHONE SERVICES

During the year radiotelephone service was reestablished with 16 countries to which it had been suspended during the war, and became available for the first time to four other countries. Some 90 overseas points in 63 foreign countries and United States possessions are now served by 6 companies in the United States and 3 in its Territories. One other company furnished an interisland service in Hawaii.

*Overseas private line service.*—Private line service was established for the first time to Norway, Puerto Rico, Spain, and Great Britain.

*Overseas program transmission service.*—This broadcast relay serv-

ice was reestablished to 9 countries, making a total of 54 to which such service is available.

#### RATES AND TARIFFS

During the fiscal year, overseas message toll telephone rates were reduced between the United States and five foreign countries. Rates for overseas private line telephone service were reduced between the United States and Great Britain, France, and Switzerland, as were program transmission rates from Hawaii to the United States.

There were no major changes in interstate telephone rates during the year.

*Rate schedules.*—Approximately 27,000 tariff publications were filed with the Commission. Of this total, 19,400 related to telephone and 7,800 to telegraph services. At the close of the year, 365 carriers had tariffs on file with the Commission.

*Special permissions.*—During the year, 276 applications for special permission to make tariff changes or to file new schedules with less than the required notice were received. Of these, 266 were granted, 8 denied, and 2 withdrawn.

*Washington metropolitan area.*—In early 1947 the Chesapeake & Potomac Telephone Cos. of Virginia and Baltimore City filed revised tariff schedules increasing the charges for certain interstate telephone calls between points in Virginia and Maryland within the Washington metropolitan area. The Commission suspended the proposed rates for a period of 3 months pending a hearing as to their lawfulness. The telephone companies have challenged the Commission's jurisdiction in this matter.

*"Other line" charges.*—Bell system companies continued to establish direct rates for interstate message telephone and telegraph traffic interchanged with independent companies on an "other line" charge basis. As of January 1, 1947, only 11 independent companies applied "other line" charges on 393 telephone and 454 telegraph routes.

#### COOPERATION WITH REGULATORY BODIES

*Separation of property, revenues, and expenses.*—The Commission cooperated with the National Association of Railroad and Utilities Commissioners in a review of procedures employed by Bell system companies to separate telephone property, revenues, and expenses among exchange and interstate and intrastate toll services. The study included an appraisal of the results developed by the procedure for the division of interstate message toll revenue and for the establishment of the level of intrastate earnings now under consideration by various State commissions. Data to be obtained by Bell system companies through incorporating revised procedures in their division of toll revenue contracts will be examined by the Commission in con-

nection with its general investigation of telephone separation methods (Docket 6328).

*Bell system license contracts.*—The Commission also cooperated with the NARUC in continued study of services performed by the American Telephone & Telegraph Co. associated companies for its long-lines department and of the methods employed in allocating the costs of furnishing those services.

*State rate cases.*—Under its policy of cooperation with State utility commissions in related regulatory problems, the Commission furnished information and other assistance in intrastate rate proceedings before those State bodies.

#### ACCOUNTING REGULATIONS

*Uniform system of accounts.*—In addition to issuing instructions and interpretations on specific problems submitted by individual companies, the Commission amended the uniform system of accounts for class A and class B telephone companies to provide, principally, (1) accounting for write-ups of plant and other plant adjustments not arising from acquisitions of plant and (2) accounting for capital surplus as distinguished from earned surplus. Further amendments are under consideration, particularly with respect to improved classification of income items which will tend to make the accounts more informative. Studies were continued to determine the extent to which the carriers were complying with the accounting regulations prescribed by the Commission.

*Financing and refinancing.*—Due to postwar construction, there was heavy issuance of new securities, both stocks and bonds, by telephone companies. Many of these issues gave rise to special accounting problems. Special studies of prospectus uses were made in collaboration with the Securities and Exchange Commission and the accounting data included therein were checked against data on file with the Commission. There was also increased activity in refunding of old issues of bonds. This activity required extensive research into (1) the reasons for refunding, (2) current interest rates, (3) the accounting for call premium, bond expense and bond discount, and (4) the most desirable method of disposing of unamortized bond discount.

*Pensions and relief.*—Increased wages and liberalization of pension benefits were responsible for pension costs of communication carriers being larger than ever before, reaching approximately \$85,000,000 for the Bell system alone. Problems of pension accounting, therefore, became of greater significance, particularly in regard to (1) the propriety and reasonableness of pension costs, (2) the methods of determining the costs, and (3) the accounting for these costs. Continuing studies were pursued in regard to all companies, but an extended study was initiated with respect to Bell system actuarial methods. The

Commission granted Bell system companies' request for limited reporting of changes in their practices regarding payment of termination allowances to employees. Further consideration was given to the matter of additional lump-sum payments into the pension-trust funds of certain companies. Continued attention was given to charging current operating expenses with the cost of pensions based on service prior to the adoption of a pension plan. Other studies were made of data submitted by carriers regarding their pension plans. Another consideration was excluding from the current operating expenses of certain carriers all pension costs in excess of normal accruals on the full-service basis (that is, the respective annual amounts that would be paid into a pension-trust fund if the company had established such a fund during the employees' successive periods of service).

*Preservation of records.*—In cooperation with technical consultants, industry representatives and regulatory agencies, extensive inquiry was made into the feasibility of microfilming carriers' records. Tentative rules were prepared and submitted to interested parties for comment. Substantial progress was made toward attaining uniformity in rules governing preservation of records. Regulations were revised to relieve telephone companies of the burden of maintaining a prescribed index of records in certain instances.

*New types of plant and services.*—Special studies were initiated to ascertain the applicability of existing accounting rules to new services furnished by telephone companies, such as police and other emergency telephone services, commercial mobile radiotelephone services, and rural telephone services by radio or power-line carrier.

*Restatement of plant on basis of original cost.*—General agreement was reached with most Bell system companies on the nature of the original cost adjustments to be made with respect to acquisitions of plant made prior to the present system of accounts. Accordingly, these companies are completing restatement of plant accounts on an original cost basis and are disposing of the amounts set aside and recorded in the plant acquisition adjustment accounts either directly to surplus or through appropriate amortization over future periods. During the year adjustments made by telephone companies reduced the net book cost of plant through charges to income or surplus of over \$19,000,000, thereby increasing the accumulated adjustments to over \$35,000,000.

*Original cost schedules in annual reports.*—In order to furnish the Commission with systematic and periodic data, new schedules were designed and incorporated in the annual report (Form M) giving analyses of the carriers' accounting for plant acquisitions and adjustments therefor.

*Continuing property records.*—Accounting and engineering studies were continued jointly with State commissions and representatives of

the telephone industry with the view of developing continuing property record procedures that will (a) provide a continued and perpetual record of quantities and costs of plant as of a certain date and reflect changes subsequent to the date, (b) provide data for determination of original cost of plant retired, (c) serve as a basis of inventories with a minimum of field work and as a basis for summarized plant records, and (d) furnish pertinent data necessary for determining plant mortality, service lives, and depreciation charges. Emphasis was given to improving the accuracy of the estimated average unit costs used in retiring mass quantities of plant, thereby reducing to a minimum the distortion in plant accounts.

*New plant accounting.*—Telephone companies have developed procedures to account for new plant used in mobile radiotelephone service, rural radiotelephone service, and power-carrier service. These procedures, many of them preliminary and experimental in nature, will require further study to determine whether the new plant can be properly classified into present accounts and subaccounts or whether new accounting classifications must be provided.

*Increase in depreciation charges.*—The depreciation problem assumed far greater importance in the fiscal year than ever before. This was largely due to (1) the shortening of the life of present plant by improvements in the art of communication, and (2) the increased costs of construction. The depreciation expense for the Bell system companies alone aggregated \$200,000,000 in 1946. In determining the reasonableness of rates for telephone service, depreciation plays an important part as an annual operating charge representing cost of plant expired in service, and as a deduction to an equitable degree from the cost of plant in service in determining the residual investment on which a fair return should be earned. The factors that produce annual depreciation expense also produce accrued depreciation. It is essential, therefore, that there be consistency in determining the two elements.

*Depreciation methods.*—Because of the vital importance of depreciation to the regulatory duties of the Commission, joint engineering and accounting studies continued in regard to changes in depreciation rates. Particular study was made of the methods applied by Bell system carriers in estimating the service lives, salvage factors and the resulting depreciation rates with respect to plant in service. Field studies were conducted in the offices of four of the principal Bell system companies to determine the reasonableness of increased rates for certain classes of plant.

*Filing of depreciation data.*—Revisions were made of the requirements that carriers report currently their proposed changes in de-



preciation rates. These revisions will require the submittal of more useful data to be used by the Commission in determining the reasonableness and justification of new rates, yet minimize reporting requirements regarding minor changes. Studies were continued in the matter of determining the degree of compliance of carriers with respect to their reporting proposed changes in depreciation rates, and in the reasonableness and propriety of such changes. The Commission rescinded a previous order requiring the larger carriers to segregate plant and related depreciation reserve accounts with respect to plant (constructed because of the program for national defense) classified as "emergency facilities."

## STATISTICS

Annual reports containing financial and operating data were filed by 146 common carriers and 33 controlling companies. Among the common carriers reporting annually are 118 telephone, 12 wire-telegraph and ocean-cable, and 16 radiotelegraph carriers. A few important financial and operating items for the calendar year 1946, as compared with 1945, are shown in the following table:

*Telephone carriers*

Item	1945	1946	Percent increase or (decrease), 1946 over 1945
Investment in plant and equipment.....	\$6,060,028,722	\$6,684,830,044	10.31
Depreciation and amortization reserves.....	\$2,167,674,373	\$2,350,398,973	8.43
Net investment in plant and equipment.....	\$3,892,354,349	\$4,334,431,071	11.36
Local service revenues.....	\$1,108,350,679	\$1,237,229,168	11.63
Toll service revenues.....	\$867,579,478	\$899,828,351	3.72
Total operating revenues <sup>1</sup> .....	\$2,075,410,511	\$2,251,942,629	8.51
Operating expenses <sup>1</sup> .....	\$1,380,348,934	\$1,714,901,566	24.24
Taxes, including income and excess profits.....	\$420,740,213	\$273,262,223	(35.05)
Net operating income after all taxes.....	\$274,321,589	\$263,779,140	(3.84)
Net income.....	\$190,157,344	\$226,813,615	19.28
Dividends declared.....	\$192,813,713	\$198,831,671	3.12
Company telephones:			
Business.....	8,723,714	9,594,087	9.98
Residential.....	15,598,560	18,234,914	16.90
Average number of calls originating per month:			
Local <sup>2</sup> .....	3,405,052,934	4,012,545,963	17.84
Toll <sup>2</sup> .....	147,612,394	171,322,349	16.06
Number of employees at end of October.....	398,665	525,523	31.82
Male.....	109,778	160,695	46.38
Female.....	288,887	364,828	26.29
Total pay roll for the year.....	\$936,689,151	\$1,306,053,484	39.43

<sup>1</sup> Intercompany general service and license fees and rents, amounting to approximately \$39,000,000 for 1946, and \$37,000,000 for 1945 have not been eliminated.

<sup>2</sup> Partly estimated by reporting carriers.

## 2. TELEGRAPH (WIRE, CABLE, AND RADIO)

## DOMESTIC SERVICE AND FACILITIES

*Western Union modernization program.*—Modernization of Western Union, which contemplates the construction of 2,700,000 channel-miles of telegraph microwave radio relay systems and the leasing of

approximately 1,000,000 telegraph channel miles from the Bell system, made substantial progress. Plans call for 26 large message centers equipped with reperforator-switching systems which ultimately will be connected by microwave radio relay systems supplemented by leased telegraph carrier bands. Relaying of messages through these centers will be largely automatic and is expected to result in improved terminal handling. Five such offices have been constructed and several more will be put into operation during fiscal 1948. The program calls for completion by 1949, but, due to delays in deliveries of some essential items, will probably be delayed until 1950.

In this connection, Western Union wires, poles, conduits, and cables along railroads will be sold to the railroads. Agreements have been reached with 8 railroads involving cash settlements of more than \$2,000,000, and negotiations with 24 additional railroads are continuing.

*Domestic radiotelegraph.*—Western Union's experimental microwave chain between New York and Philadelphia has been operating regularly with telegraph traffic diverted from wire facilities. Similar equipment is being installed for use in its New York-Washington-Pittsburgh triangle.

Another Western Union experiment, being conducted in Baltimore, involves the delivery of telegrams by radio facsimile. The message is transmitted to an automobile cruising in the area and the driver makes delivery at the indicated address. The speed and efficiency obtained by this method has encouraged Western Union to plan extension of the idea to practically all principal cities.

*Construction of wire facilities.*—During the year, 76 applications and requests for wire telegraph certificates were filed. Four similar applications were carried over from the preceding year, making a total of 80. Seventy-seven authorizations were granted. They covered 502,619 telegraph channel miles and 2,422 telegraph wire miles at an estimated construction cost of \$4,795,315 and annual rental of \$713,799. These facilities will replace 272,648 miles of wire and 11,038 miles of poles originally costing \$21,426,298.

*Speed of service.*—The quality of service rendered by Western Union deteriorated during the year. The time required to route messages through 25 message centers in principal cities averaged 11 minutes. This covers the interval from the time a message is received in a relay office to the time it is sent from that office. The monthly average varied from 9.8 to 12 minutes. The average time required by the Bell system to establish teletypewriter exchange connections between subscribers was 1.6 minutes.

*Discontinuance, reduction, or impairment of service.*—In December 1946 the Commission instituted an investigation and hearing of the

over-all plans of Western Union to curtail telegraph service through closure of company-operated offices and reduction of hours of other offices, the standards to be applied in carrying out such plans, and their effects on telegraph service. Western Union contemplated filing about 1,000 such applications during fiscal 1948 to effect economies in operation and because of technological improvement and normal post-war contraction. The matter was pending decision.

During the year, 682 requests for authority to close public telegraph offices or reduce hours of other offices were filed, in addition to 84 applications carried over from the preceding year. Of this number, 614 were granted. In most cases where the Commission authorized closure or reduction in hours of offices, alternate service was available to the communities affected.

#### RATES AND TARIFFS

*Western Union rate increase.*—The 1946 annual report referred to Commission proceedings which culminated in a 10-percent increase in domestic interstate telegraph rates, effective June 12, 1946, for a period of 1 year. Following further hearings, the Commission in October 1946 ordered Western Union to eliminate its so-called “exceptional” or “special” city-to-city and city-to-State rates as being unlawfully discriminatory, preferential, and advantageous. These rates were lower than Western Union’s standard rates otherwise applicable. It was estimated that raising these rates to the standard rate level would produce \$3,700,000 additional revenue from interstate service.

After public hearing on Western Union’s “first supplemental petition” for a further increase in interstate message telegraph rates, the Commission on December 27, 1946, authorized replacement of the 10 percent flat increase, allowed by the Commission in June 1946 for a period of 1 year, with a 20 percent flat increase with no time limitation. The flat increase amounted to a 9.1 percent increase over the existing rate level, as against 15 percent requested by the company. It was estimated that the December action would produce additional annual interstate revenues of \$8,500,000.

In its December report the Commission stated that rate increases are not the ultimate answer to Western Union’s situation, and that further increases will worsen its competitive position in relation to the telephone companies and the air mail. Nevertheless, because of the immediate urgency of Western Union’s financial situation, the Commission permitted the increase. Subsequently, and as part of the same proceeding, the Commission authorized the company to increase its “extra United States domestic” message rates (involving service to Canada, Newfoundland, Labrador, and St. Pierre-Miquelon) by 20 percent. It was estimated that these increases, with corresponding

increases on south-bound traffic, would provide about \$411,000 additional revenue to Western Union after divisions with foreign carriers.

*Rate structure studies.*—Studies were made of Western Union's domestic rate structure, having as objectives the equalization of charges for equal service and the supplying of the greatest amount of service at the lowest possible cost. In the present stage, attention is being directed primarily to devising a rate pattern which would provide, uniformly, like rates at like distances to replace the existing State-rate pattern in which rates for 10-word telegrams transmitted, say a thousand miles, range from as little as 72 cents to as much as \$1.44. Competitive and other aspects of the problem have made necessary the statistical analysis by Western Union of several million messages in testing numerous distinct trial rate structures.

#### SUPERVISION OF ACCOUNTS (DOMESTIC AND INTERNATIONAL)

*Depreciation.*—Detailed analysis was continued of Western Union's depreciation practices which is of particular importance in view of prospective premature retirement of plant under its modernization program for which only partial depreciation has been provided. An independent study of the company's depreciation records was undertaken to determine the reasonableness of rates, the adequacy of reserve requirement, and the propriety of the methods employed. As a result, it will be possible to recommend (1) the adoption of depreciation rates more closely conforming to probable future experience of the company than provided for by rates now in effect, and (2) an adequate depreciation reserve reflecting actual depreciation existing in plant, also (3) to outline procedures whereby the company may improve upon its present depreciation practices. Studies of the depreciation rates of international telegraph common carriers continued.

*Continuing property records.*—Western Union has made substantial progress in establishing a continuing property record. Effort continues to obtain compliance from ocean cable and radiotelegraph carriers. Companies which do not have a continuing property record plan are required to submit bimonthly reports of progress in that direction.

*Pension accounting.*—Studies of carriers' pension plans continued, including actuarial methods used by RCA Communications, Inc., Radiomarine Corporation, and Mexican Telegraph. Further consideration was given to excluding from current operating expenses of Western Union all pension costs in excess of normal accruals on the full-service basis (that is, the respective annual amounts that would be paid into a pension trust if the company had maintained such a fund during employees' service).

*Uniform system of accounts.*—A list of retirement units for outside wire-telegraph and ocean-cable plant was added. It was designed to show what units would, upon retirement, be accounted for by depreciation rather than by direct charges to expenses. Supplemental instructions included accounting for revenues for transmissions at gateway and inland points. An amendment deleted “foreign-exchange differential” accounts and permitted carriers to make entries direct to income accounts for gains or losses arising from differences in rates of exchange.

*Revision of annual reports.*—Annual report Forms O and R were revised by deleting unnecessary schedules, adding new schedules, and consolidating several others, thereby resulting in shorter reports yet providing adequate information to the Commission.

*Preservation of records.*—Regulations governing preservation of records were modified to relieve carriers from preparing a prescribed index of records in certain instances. Progress was made in drafting revisions which will reflect modern methods of record keeping, such as machine bookkeeping and microfilming.

*Reclassification of plant.*—Western Union progressed in reclassifying its plant despite the fact that introduction of radio-relay plant created many new problems. The Commission approved the company’s proposal to record the book cost of the new radio-relay plant in accordance with prescribed radiotelegraph plant classifications. Since 1938 adjustments have been made reducing Western Union’s net book cost by approximately \$77,000,000 (exclusive of about \$43,000,000 pertaining to former Postal Telegraph plant). Plant of international carriers has been reclassified in accordance with the plant accounts prescribed in the new systems of accounts.

*Original cost adjustments.*—Further progress was made in restating the plant of international carriers on the basis of original cost. In the case of one carrier, adjustment required reduction in recorded book cost of over a million dollars, with a charge to surplus created as a result of reduction of capital.

#### LAND-LINE TELEGRAPH STATISTICS

Twenty-eight annual reports were filed by wire-telegraph, ocean-cable, and radiotelegraph carriers for the calendar year of 1946. Some selected financial and operating items compiled from Western Union reports for 1946, as compared with 1945, are shown in the table below. These figures relate to land-line operations of that carrier, inasmuch as the data applicable to its cable operations are included in the table pertaining to ocean-cable carriers shown in the “International” section of this chapter.

*The Western Union Telegraph Co.*<sup>1</sup>

Item	1945	1946	Percent increase or (decrease), 1946 over 1945
Investment in plant and equipment.....	\$357, 783, 838	\$361, 618, 200	1. 07
Depreciation and amortization reserves.....	\$157, 243, 013	\$161, 825, 750	2. 91
Net investment in plant and equipment.....	\$200, 540, 825	\$199, 792, 450	(. 37)
Transmission revenues.....	\$166, 544, 597	\$160, 242, 193	(3. 78)
Total operating revenues.....	\$182, 047, 743	\$175, 535, 860	(3. 58)
Operating expenses, depreciation, and other operating revenue deductions.....	\$174, 847, 497	\$183, 365, 261	4. 87
Net operating revenues.....	\$7, 200, 246	\$7, 829, 401	(208. 74)
Net income.....	\$ 7, 832, 903	\$10, 030, 010	
Dividends declared.....	\$2, 432, 594		(100. 00)
Revenue messages handled.....	245, 157, 962	221, 243, 091	(9. 75)
Number of employees at end of October.....	63, 446	57, 644	(9. 14)
Total pay roll for the year.....	\$126, 662, 000	\$137, 292, 715	8. 39

<sup>1</sup> Represents data for land-line operations. Figures covering cable operations included in table on p. 63. Amount of dividends applicable to cable operations cannot be segregated. <sup>2</sup> Deficit.

## INTERNATIONAL

## SERVICE AND FACILITIES

*General.*—The Commission participated in the work of the Telecommunications Coordinating Committee, which is made up of representatives of Government departments and acts in an advisory capacity for coordinating United States policy in the field of international communications. The Commission likewise worked with the Interdepartmental Radio Advisory Committee which functions as a clearing house for Government frequency assignments.

Since the end of the war, all but 7 of the 100 frequency assignments borrowed by the Government for war purposes have been or are about to be reassigned to commercial carriers. This will help meet the demand for frequencies in the 2 to 20 megacycle range used for international communications. In addition, approximately 150 new frequency assignments were made during the year. The major portion was within the presently authorized bands and represent an expansion of use of licensed channels resulting from improved operating techniques and equipment, thereby promoting more efficient use in the radio spectrum.

*Radiotelegraph circuits.*—Postwar expansion of international communication saw the establishment of direct radiotelegraph service with Athens, Greece; Geneva, Switzerland; and Nanking, China; and the reestablishment of prewar circuits with Saigon, French Indochina; Batavia, Java; Manila, Philippine Islands; and Shanghai, China.

On June 26, 1947, the Commission issued a proposed decision in Dockets 7094 and 7412 looking to authorization of only one direct radiotelegraph circuit with each of the following countries with which the United States does not now have direct circuits: Jamaica, Saudi Arabia, Palestine, and the Union of South Africa. It also proposed to discontinue one of the two direct radiotelegraph circuits operating between the United States and Australia, New Zea-

land, and India, respectively, and to license a single circuit with Greece. These proceedings grew out of provisions of the Bermuda telecommunications agreement mentioned in the 1946 annual report.

*Review of radiotelegraph service.*—On November 27, 1946, the Commission instituted a general investigation of radiotelegraph service between the United States and foreign points to determine whether the present disposition of radiotelegraph circuits and frequencies among the radiotelegraph carriers serves public interest. Hearing in this matter was scheduled for the fall.

*International Telegraph Regulations.*—The Commission, together with other interested Government agencies, undertook a thorough study of the International Telegraph Regulations in preparation for the forthcoming Paris administrative conference. Although the United States has not formally adhered to these regulations, they constitute basic tariff and operating rules under which nearly all international telegraph communications are carried on.

#### RATES AND TARIFFS

*Rate increases.*—Despite traffic volumes more than double those of previous years, mounting operating expenses and declining operating revenues in the later months of the calendar year 1946, due in part to rate decreases in May and June, produced an unhealthy financial condition in the international field. It was estimated on the basis of the latter months of 1946 and early 1947 that two international telegraph carriers, All America and Tropical Radio, would operate in the black to the extent of \$750,000 in 1947, while other carriers would suffer substantial operating losses of \$4,650,000. By order of March 12, 1947, the Commission instituted a general investigation, and public hearings were held in April and May at which the carriers urged substantial rate increases as a solution to their difficulties. Decision was pending at the close of the fiscal year.

*Rate reductions.*—International radio and cable carriers substantially reduced rates for message telegraph service from the Dutch East Indies, French Indochina, the United Kingdom and Ireland, China, Sweden, French Guiana, and Macao, to the United States and its possessions. Special reduced rates for official messages of the United Nations, International Bank for Reconstruction and Development and International Monetary Fund between the United States and most foreign countries were established by the carriers. The rates for such messages are generally one-half of the commercial rates.

#### STATISTICS

Cable and radiotelegraph carriers engaged in international traffic handled 697,449,196 paid words in the calendar year 1946. Out-bound words totaled 342,975,144, in-bound 354,474,052. The extent of

this traffic with the principal countries is shown in the accompanying tabulation:

*International telegraph (radio and cable) traffic, 1946*

Country	Number of words	
	Out-bound from the United States	In-bound to the United States
<b>Europe, Africa, and the Near East:</b>		
Belgium.....	5,284,500	4,634,998
Denmark.....	2,089,382	1,825,262
Finland.....	727,564	746,381
France.....	21,758,801	21,012,136
Germany.....	6,666,010	21,584,940
Hungary.....	1,293,562	704,186
Italy.....	11,749,097	9,481,245
Netherlands.....	5,483,924	5,127,945
Norway.....	3,547,898	2,418,601
Portugal.....	3,139,623	2,463,875
Spain.....	4,513,319	3,463,759
Sweden.....	7,911,114	7,176,416
Switzerland.....	8,882,531	6,644,078
Union of South Africa.....	4,093,661	4,432,267
U. S. S. R.....	10,752,595	17,028,685
United Kingdom and Eire.....	69,204,606	66,246,149
All other countries.....	28,375,104	26,292,304
<b>Total.....</b>	<b>195,473,291</b>	<b>201,283,227</b>
<b>West Indies, Central, North and South America:</b>		
Argentina.....	12,292,138	11,092,693
Bolivia.....	922,707	630,576
Brazil.....	13,690,858	13,318,847
British West Indies.....	2,580,901	2,299,446
Canada.....	8,490,892	10,750,206
Central America.....	6,496,635	6,249,883
Chile.....	3,518,063	2,846,143
Colombia.....	5,256,708	4,033,229
Cuba.....	10,835,438	10,621,872
Dominican Republic.....	1,059,476	990,056
Ecuador.....	1,373,078	1,076,835
Haiti.....	573,823	539,008
Mexico.....	4,093,905	2,989,876
Neth. West Indies.....	1,006,184	1,223,294
Peru.....	2,574,883	1,885,492
Puerto Rico.....	3,111,026	2,837,883
Uruguay.....	3,163,795	1,826,673
Venezuela.....	4,944,583	4,713,897
Virgin Islands.....	179,404	156,358
All other countries.....	949,412	711,798
<b>Total.....</b>	<b>87,113,929</b>	<b>80,893,963</b>
<b>Asia and Oceania:</b>		
Australia.....	5,454,364	5,474,286
China.....	15,773,549	13,943,862
Hawaii.....	13,015,443	10,715,788
India.....	5,481,372	5,202,767
Japan.....	2,650,680	8,772,456
Philippines.....	12,476,706	17,498,697
All other countries.....	4,885,701	7,231,989
<b>Total.....</b>	<b>59,717,815</b>	<b>68,839,845</b>
Miscellaneous.....	670,109	3,457,017
<b>Grand total.....</b>	<b>342,976,144</b>	<b>354,474,052</b>



Selected financial and operating data compiled from annual reports filed by international telegraph (radio and cable) carriers for the calendar year 1946, as compared with 1945, appear in the following tables:

*Radiotelegraph carriers*

Item	1945	1946	Percent increase or (decrease), 1946 over 1945
Investment in plant and equipment (as of Dec. 31) .....	\$28,571,927	\$34,015,568	19.05
Depreciation and amortization reserves .....	\$16,588,106	\$16,676,631	.53
Net investment in plant and equipment .....	\$11,983,821	\$17,338,937	44.69
Message and other transmission revenues .....	\$20,660,835	\$20,601,801	(.29)
Total operating revenues .....	\$22,469,735	\$21,775,900	(3.04)
Operating expenses, depreciation, and other operating revenue deductions .....	\$15,756,732	\$21,550,904	36.78
Net operating revenues .....	\$6,704,003	\$224,996	(96.64)
Income and excess profits taxes .....	\$6,299,881	\$200,454	(96.82)
Net income .....	\$2,268,174	\$313,034	(86.20)
Dividends declared .....	\$850,000	\$672,000	2.59
Revenue messages handled: <sup>1</sup>			
Domestic service classification <sup>2</sup> .....	75,434	96,871	28.42
Foreign service classification <sup>3</sup> .....	9,374,597	10,476,469	11.75
Marine .....	52,795	629,953	1,093.26
Number of employees at end of October .....	<sup>1</sup> 4,662	5,969	28.04
Total pay roll for the year .....	\$14,216,543	\$17,832,605	25.44

<sup>1</sup> Excludes domestic haul of foreign, insular, and marine messages to avoid duplication.

<sup>2</sup> International messages (primarily Canadian and Mexican) transmitted in accordance with carriers' rules governing domestic traffic are included under "Domestic service classification." Insular messages are included under "Foreign service classification."

<sup>3</sup> Represents number of employees at end of December.

*Ocean cable carriers*

[Including cable operations of the Western Union Telegraph Co.]

Item	1945	1946	Percent increase or (decrease), 1946 over 1945
Investment in plant and equipment (as of Dec. 31) .....	\$108,636,285	\$95,129,932	(12.43)
Depreciation and amortization reserves .....	\$69,459,405	\$60,078,811	(13.51)
Net investment in plant and equipment .....	\$39,176,880	\$35,051,121	(10.53)
Transmission revenues:			
Domestic service classification .....	\$925,348	\$844,716	2.35
Foreign service classification .....	\$24,358,725	\$20,396,545	(16.27)
Total operating revenues .....	\$26,646,572	\$22,691,417	(14.84)
Operating expenses, depreciation, and other operating revenue deductions .....	\$19,709,666	\$21,366,862	8.41
Net operating revenues .....	\$6,936,906	\$1,324,555	(76.81)
Income and excess profits taxes .....	\$1,486,403	\$344,759	(90.54)
Net income .....	\$5,523,545	\$522,784	10,565.14
Dividends declared .....	\$20,141	\$2,148,066	
Revenue messages handled:			
Domestic service classification .....	648,310	696,820	7.48
Foreign service classification .....	9,883,006	10,656,424	7.83
Number of employees at end of October .....	14,962	5,681	14.49
Total pay roll for the year .....	\$10,963,632	\$12,664,251	15.30

<sup>1</sup> Represents the number of employees at end of December.

## CHAPTER VI.—RADIO OPERATORS

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1. COMMERCIAL RADIO OPERATORS
  2. COMMERCIAL RADIO SERVICE
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### 1. COMMERCIAL RADIO OPERATORS

The Commission is charged by Congress with regulation of all persons in the United States engaged in communication or transmission of energy by radio. As part of these duties, it has established six classes of commercial radio operator licenses and an "authorization" restricted to operation of aircraft radiotelephone equipment.

With the exception of restricted radiotelephone operator permits and aircraft authorizations, commercial radio operator licenses are issued only to applicants who successfully complete prescribed examinations.

Unless excepted by the Commission's rules, personnel who operate commercial radio stations must hold valid commercial radio operator licenses of the proper grades. The term "commercial radio operator", therefore, identifies the thousands of licensed radio operators employed by broadcast stations, coastal harbor stations, coastal radiotelephone and radiotelegraph stations, ship radiotelephone and radiotelegraph stations, railroad radio stations, state and municipal police radio stations, fire department radio stations, etc.

There has been a rapid postwar increase in the ranks of commercial radio operators. More than 325,000 persons held such licenses at the close of fiscal 1947.

The resumption of peacetime pursuits by veterans and civilians who, because of experience with radio before or during the war, desired to make it their career, presented a rehabilitation problem. The Commission cooperated in establishing in the United States Employment Service a clearing house to assist radio stations obtain licensed employable personnel. To cushion the transition from war to civilian pursuits, the Commission extended, by Orders 77-G and 77-H, its temporary modification of rules permitting renewal of outstanding commercial radio operator licenses without requiring applicants to show service under their licenses. The 128 series of Commission Orders was likewise extended by Orders 128-B and 128-C to permit renewal of expired commercial radio operator licenses valid on or subsequent to December 7, 1941, the holders of which were in the military services

or the merchant marine at some time during the terms of the licenses or who, because of civilian assignments outside the United States in connection with the war effort, were unable to file timely applications for renewal.

During the fiscal year the Commission issued approximately 54,000 new and 24,000 renewed commercial licenses in connection with expanding radio services.

To facilitate licensing of the many additional radio operators in the lower grades of licenses acceptable for minimum operator requirements at new stations, the Commission established an "authorization" valid for operation of aircraft radiotelephone equipment only, and relaxed its rules to allow restricted radiotelephone operator permits to be acquired through the mail as well as by personal appearance at Commission field offices. Authorizations to operate radiotelephone equipment on aircraft may be obtained either at a Commission office or from any CAA certified pilot examiner appointed as issuing agent by the Commission. This eliminates long and arduous journeys to designated examination points. Under the new procedure, these authorizations and permits are issued without written examination, thus further simplifying the procedure for obtaining them.

At the beginning of the year, the Commission considered requests from several standard broadcast stations for temporary continuance of the relaxed radio operator standards authorized under its Order No. 91-C and subsequently withdrawn by Order No. 91-D, effective August 1, 1946. These stations have since secured radiotelephone first class operators and prewar radio operator standards again prevail throughout this branch of the industry.

It became apparent during the year that the wartime relaxation of technical requirements for operators of radiotelegraph transmitters in aeronautical and aeronautical fixed stations was no longer desirable in view of the increased availability of properly qualified operators and the decline in use of radiotelegraphy at aeronautical stations. The Commission, therefore, on March 25, 1947, by its Order 102-A canceled its Order 102 which temporarily permitted the operation of telegraph transmitters at these stations by holders of radiotelephone operator licenses endorsed to show proficiency in transmitting and receiving International Morse Code at the rate of 16 code groups per minute.

To cope with shortage of ship radiotelegraph operators arising at several ports during the past year, the Commission authorized its engineers in charge in the affected districts to waive the 6 months' experience requirement for sole or chief radiotelegraph operators of cargo ships so that operators without the requisite experience might be assigned to vessels otherwise unable to sail for lack of qualified radio personnel.

The Commission, after considering a request to modify its Order 133 to permit specially trained unlicensed installation personnel to make antenna tuning and coupling adjustments to transmitters in mobile units, concluded that the public interest might be served if such adjustments were permitted. Accordingly, on April 25, 1947, it proposed an amendment to Order 133 to permit unlicensed persons to make the adjustments requested, but under certain specified conditions. A flood of protests resulted, which were under Commission study at the year's close.

Actions of the Commission with respect to commercial radio operators have been influenced by development of standardized radio equipment that has greatly simplified technical operation and, conversely, by new developments which have increased the complexity of other equipment, thus calling for greater knowledge and skill on the part of operators. In view of this, the Commission inaugurated broad studies of the entire radio field to determine and recommend changes in the present radio operator licensing system and related rules and examinations. The Commission prepared numerous proposals relating to commercial operators for consideration by the World Telecommunications Conferences. Whether an over-all revision of the licensing system results or gradual changes are inaugurated, it can be expected matters will be brought abreast of the latest developments in the radio art.

## 2. AMATEUR RADIO SERVICE

The amateur radio service in which more than 75,000 amateur stations and more than 80,000 amateur radio operators are licensed is one of the oldest, largest, and most active radio services established by the Commission.

Through intercommunication between their stations, these self-styled "hams" conduct programs of experimentation and self-improvement while engaging in a fascinating hobby which has proved itself an asset to the national welfare. The amateur radio service has provided an invaluable reservoir of trained radio personnel in time of war, it has in many instances supplied the only means of communication when disaster has disrupted normal public and official facilities, and it has been the source of many outstanding advances in radio technique.

In furthering this important service, the Commission has, insofar as possible, assigned harmonically related groups of frequencies for the exclusive use of amateur radio stations and otherwise encouraged amateur activities.

Licensed amateur radio operators are United States citizens who have passed the required examination and were found to be otherwise quali-

fied. Operation of amateur radio stations and the conduct of amateur radio operators are required to be in accordance with prescribed rules.

The Commission during the past year, by its Orders 130-I, 130-J, 130-K, 130-L, 130-M, 130-N, and 130-O, continued its policy of assigning former amateur frequencies for use by amateurs as quickly as military relinquishment made them again available. Certain frequency band assignments were necessarily deleted or modified and others added to assure the most equitable and practical distribution among the amateur and other services. The Commission's monitoring stations maintained a close watch on amateur, as well as other frequencies, in order to observe any off-frequency operation or violations of applicable regulations. When such conditions were observed, the offending licensees were required to take corrective action without delay. In a few flagrant cases it was necessary to suspend the amateur's operator license and revoke his station license.

Resumption of postwar amateur radio activities was made easier by promulgation of Order 115-C, dated January 3, 1947, which extended and reinstated until 1948 all amateur operator licenses issued between December 7, 1938 and December 31, 1944, and provided that the terms of amateur station licenses affected by the order should run concurrently with such extended or reinstated operator licenses.

Renewal of outstanding amateur operator licenses was also facilitated when the Commission approved Orders 77-G and 77-H extending for additional periods, the last of which ends on June 30, 1948, the suspension of the terms of section 12.27 of its rules insofar as they require applicants for renewed amateur operator licenses to make a showing of use of the expiring license.

The Commission on July 11, 1946, adopted Order 132-A exempting amateur station licensees, who move their stations to a new permanent location within the same call area, from following the calling procedure referred to in section 12.93 [c] of the rules, as previously required by Order 132, pending modification of their station licenses.

The first full year of amateur operation since the end of the war saw a number of emergencies during which amateurs furnished communication facilities. The most notable of these was the Texas City, Tex., explosion and fire in April 1947. The Commission withdrew the amateur frequencies between 3860 and 3940 kilocycles and the frequency 7050 kilocycles from general use within the triangular area bounded by Beaumont, San Antonio and Corpus Christi, and assigned them for the exclusive use of amateur stations transmitting emergency traffic within the designated area pending reestablishment of regular communication services. Other emergencies caused by tornadoes, floods, and fires in various parts of the country saw amateurs fill the breach left by disrupted commercial communication lines.

Considerable interest in the use of narrow band FM has been indicated by amateurs. The rules do not authorize use of FM by amateur stations on frequencies below 27.160 megacycles. Special temporary authorizations permitting them to use narrow band FM in the lower frequency bands for periods not exceeding 90 days were approved in a number of instances where the applicants made a showing of a bona-fide program of experimentation and agreed to furnish the Commission with periodic reports of their observations. The resulting data has proved helpful in connection with laboratory and operating tests of narrow band FM by Commission engineers.

The Commission was engaged in a study of the amateur radio service throughout the year and is preparing recommended changes in the amateur rules and licensing procedures to bring them in line with recent technical developments and improved communication techniques.

## CHAPTER VII.—FIELD ENGINEERING AND MONITORING

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### 1. FIELD ENGINEERING AND MONITORING DIVISION

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#### 1. FIELD ENGINEERING AND MONITORING DIVISION

Effective July 1, 1946, the Field Division and the Radio Intelligence Division were merged to form the Field Engineering and Monitoring Division. The reorganized division consists of four sections, namely, the Inspection and Operator Examination Section, the Monitoring Section, the Technical Operations Section, and the Administrative Section.

The field service is divided along two major lines, one having to do with enforcement activities, the other with monitoring. Enforcement duties include inspections, examinations, investigations, etc., and are carried on out of 23 district offices, 6 suboffices, and 4 ship offices. Ten primary monitoring stations and 12 secondary monitoring stations engage in frequency measurements, signal recordings, long-range direction finding, interference and general illegal-operation investigation. All field activities, both enforcement and monitoring, are under the general supervision of nine regional managers.

A total of 142 field cars, of which 54 are equipped with monitoring and direction finding apparatus, were used in connection with field work. They operated a total of 1,072,894 miles in fiscal 1947.

#### EXAMINATIONS AND INSPECTIONS

*Radio operator waivers.*—Effective May 15, 1947, engineers in charge of port offices were given authority to issue waivers of section 353 (b) of the Communications Act, thus permitting operators with less than 6 months' sea experience to sail on oceangoing vessels for one voyage in cases where more experienced operators could not be obtained. Placing such determination in the hands of field engineers in close touch with conditions existing at the several ports expedited handling of such applications. Up to June 30 a total of 73 waivers were issued.

*Radio operator examinations.*—New operator code examination tapes for field office use were designed in accordance with international regulations. Examinations were given 67,401 applicants for all classes of commercial licenses as compared to 69,706 in 1946. Applicants for amateur classes A and B radio operator licenses totalling

12,994 were examined as compared to 6,923 in 1946. Total operator examinations for 1947 were 80,395, an increase of 3,766 over 1946.

*Broadcast station inspections.*—From January 1 to June 30, 1947, initial inspections were made of 252 new broadcasting stations on equipment tests preliminary to commencement of program tests. Of the first 125 stations inspected, 22 were found to be "unsatisfactory," 13 "poor," 24 "fair," and the balance "satisfactory" or "excellent." These preliminary inspections are made to insure that all new stations have been completed in accordance with the terms of their authorizations and to prevent transmissions of poor technical quality.

*Ship inspections.*—For the purpose of concentrating on compulsory and passenger ship stations, there was a reduction in the frequency with which cargo ships were inspected. However, a total of 11,717 United States ships were inspected during fiscal 1947 as compared with 12,765 the year before. Inspections of all ship stations, both United States and foreign, increased to 13,948 in 1947 from 13,788 in 1946. The number of inspections of foreign ship stations increased 169 percent over 1946. Technical deficiencies of all kinds noted by these inspections totaled 9,230 for 1947 as compared with 8,769 for the year previous. In addition, 5,128 deficiencies were corrected during inspections as compared with 6,959 for 1946.

*Inspection of other stations.*—The number of inspections of stations other than broadcast and ship increased materially. Under revised inspectional instructions, hundreds of new stations as well as previously licensed stations which had not been visited during the war were inspected to assure that their operation conformed with the terms of their licenses and the Commission's regulations. A total of 9,294 land station inspections of all classes were made as compared to 7,017 during 1946. In the course of these inspections 2,706 technical deficiencies were found during 1947 as compared to 1,890 in 1946.

#### MONITORING

*Frequency measurements.*—Activities by the 22 primary and secondary monitoring stations were reorganized on a peacetime basis during the year with emphasis directed toward the solution of technical problems and the correction of technical deficiencies and discrepancies. Frequency measurements were extended for the first time with a high degree of accuracy. Particular attention was given to the operation of radio stations engaged in FM and television broadcasting. A number of the former, which were observed operating outside of tolerance, were assisted by field monitoring stations in getting back on their assigned frequency. Other new services received like attention with the result that frequency tolerances on the part of stations and services were exceedingly good. As a result of monitoring activities, 16,483 notices were served during the year compared with 2,104 in



1946. This total was made up of 4,885 violations of treaty, 5,393 violations of the Communications Act or Commission regulations, 1,031 frequency deviations, and 5,174 minor infractions.

*Interference.*—A marked rise was noted in the number of complaints of unidentified interference. This was due largely to the increase in the number of radio stations and services. Other interference complained of resulted from radiation produced as a by-product of the operation of industrial, scientific, and medical equipment. The use of long-range direction finders and mobile units proved successful in the identification and location of both classes of interference. Much of this interference was not disruptive to radio communication and, therefore, was classified as minor in nature. There were 5,731 minor interference cases reported during the year in addition to 1,112 cases of major consequence.

*Illegal station operation.*—The number of illegal radio stations located during the year totaled 121, which represents a slight increase over the 1946 figure of 117. A large percent of this unlawful operation was found to be carried on either by minors or misinformed persons without malicious intent. In many instances it was possible to work cooperative measures to terminate such unauthorized operation without the necessity of criminal prosecution. On the other hand, 12 cases were referred to the Department of Justice for prosecution either as a result of the seriousness of the case or where knowledge of the law was apparent and where the violation was willful.

*Direction finding.*—Direction finding activities in the monitoring field continue to be an important operation. The great majority of interference cases require the use of the Commission's direction finding network. Without long range direction finders operating as a coordinated unit by means of private line teletype and radio connections, the location of the source of thousands of cases of interference and their subsequent elimination would be impossible. Although less impressive numerically, the assistance rendered through direction finding services to the safety of life and property in the air and at sea is of inestimable value. During the fiscal year monitoring stations received 124 requests for direction finding assistance to lost planes, resulting in the furnishing of 64 "fixes." While this shows a decrease over the previous fiscal year, it is expected that during fiscal 1948 this figure will materially increase due mainly to the closing of the United States Coast Guard and United States Army direction finding networks.

#### TECHNICAL OPERATIONS

*Equipment requirements.*—Movement of radio services into the higher frequencies requires the Commission's engineering staff to keep pace in the development and procurement of equipment for monitoring and supervising this portion of the band. Extension of the range

of frequency measuring equipment for primary stations was accomplished by the addition of a standard harmonic amplifier developed by A. K. Robinson of the Santa Ana monitoring station, and by certain modifications to the general radio type DS-1 heterodyne frequency meter. Additionally, a number of Hoffman meters were obtained for mobile use, which extends frequency measurements performed in the field into the very high-frequency ranges. Although procurement of new technical equipment has been difficult because of manufacturing delays, a considerable amount is either on order or has already been received. A number of new high frequency receivers are in operation at monitoring stations and in a limited number of field mobile units. To permit extending the signal and noise recording program, additional standard signal generators have been procured, also a limited number of needed field intensity sets. Frequency analysis spectroscopes designed by the Field and Laboratory Divisions have been distributed to all primary monitoring stations.

*Field projects.*—Forty-seven new field projects were assigned during the year. These included investigations of man-made noise in rural areas; studies of the nature, effect, and elimination of cross modulation interference from standard broadcast stations; design and construction of wide band radio frequency transformers for monitoring station antennas; design and construction of a fixed monopole type long range direction finder; field strength recording of very-high frequency transmissions; field intensity measurements of carrier-current systems; studies of blanketing interference from broadcast stations; field tests of auto alarms, and interference to television. A study of a variable side band frequency measuring system was completed by the Millis primary monitoring station. A new project involves a comprehensive survey of the functioning of directional antennas of standard broadcast stations.

## CHAPTER VIII.—TECHNICAL STUDIES

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1. TECHNICAL INFORMATION DIVISION
  2. LABORATORY DIVISION
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### 1. TECHNICAL INFORMATION DIVISION

In its eleventh year of operation, the Technical Information Division continued its primary long-term studies described in previous annual reports, and initiated new studies as the need for them was indicated.

It was represented at meetings of numerous groups interested in contemporary radio research problems. These included technical committees of the Institute of Radio Engineers, Radio Technical Planning Board, Aircraft Radio and Electronics Committee of the Aeronautical Board, Radio Technical Coordinating Committee on Reduction of Interference of the American Standards Association, and the joint committee of the Radio Manufacturers' Association and the Society of Automotive Engineers for the reduction of ignition interference from automobiles.

The Chief of the Technical Information Division serves as alternate for the Chief Engineer on the Executive Council of the Central Radio Propagation Laboratory (CRPL), through which research on wave propagation is coordinated among various Government agencies, and as second alternate for the Chairman of the Commission on the President's Scientific Research Board, to which several reports were furnished as requested on matters relating to developments in the national research program.

#### WAVE PROPAGATION

These studies are maintained for the determination of field intensities and of noise and interference to be expected in radio reception. The analyses are used in formulating engineering standards and regulations governing radio services. The data on which these studies are based are obtained principally from the following continuing projects, supplemented by information available from the industry and from other Government departments:

*Sunspot Cycle.*—Continuous automatic recording machines installed at the Commission's monitoring stations at Baltimore, Md.; Grand Island, Nebr.; Portland, Oreg.; and Powder Springs, Ga., are used

to make field intensity records of the signals of selected stations operating in the broadcast band. The recorder tapes are analyzed to obtain hourly median values of field intensity. Solar activity, which has a profound effect upon radio wave propagation, varies in unidentical cycles of approximately 11 years duration. Hence, this recording program must be continued over a long period of time. It was begun in 1938.

*Skywave pulse transmissions.*—Radio signals which travel from the transmitter to the receiver by way of the E or F layers of the ionosphere are characterized by multiple reflections of different relative amplitudes and phases, depending on the distance or range of reception. To determine action and effect, pulses transmitted by selected broadcast stations are received simultaneously on loran receivers at distances of 500 to 2,000 miles. The pulses appearing on the oscilloscopes of each receiver are photographed at equal intervals of time. The results are then analyzed to determine the signal intensities exceeded for various percentages of the time for the components arriving by way of one, two, three or more reflections or hops from the ionosphere. This information supplements that obtained from the sun-spot cycle recording program.

*Atmospheric noise.*—Continuous field intensity recordings are made of atmospheric noise on at least one of the three frequencies of 200, 540 and 1,600 kilocycles at each of the Commission's four monitoring stations noted previously. This information, together with that received from other sources, is analyzed and correlated with thunderstorm data supplied by the United States Weather Bureau. Atmospheric noise maps are then prepared, showing the characteristic variations and trends with the time of day and as a percentage of the time for each frequency band. These maps are used in estimating the signal level required to provide an acceptable radio service in the presence of atmospheric noise and, hence, the service ranges that are possible in the absence of interference from other radio stations.

Results of studies from the foregoing three projects were used for the preparation of Commission exhibits and testimony at the clear channel hearing (Docket 6741) and in the hearing on daytime skywaves (Docket 8333). The studies are being extended to determine the effects on service should the power of clear channel stations be increased.

*Very-high frequency recording.*—Measurements of the field intensities of FM and television stations operating between 30 to 300 megacycles were continued to obtain data needed in the preparation of standards for predicting good service and objectionable interference ranges for these classes of stations. The locations and numbers of recorders varied from time to time. On the average at least six recorders were in operation, located at Laurel, Md.; Allegan, Mich.; Port-

land, Oreg.; Powder Springs, Ga.; San Leandro, Calif.; and a temporary recording site at Southampton, Pa. In addition, the RCA Laboratories cooperated in operating two recorders at Princeton, N. J.

With increasing sunspot activity during the year, it became apparent that long distance propagation via the F2 layer of the ionosphere was to be expected in the lower ultra-high frequency bands. Some recordings were obtained at eastern locations but, since reception occurred only at great distances, the Portland and San Leandro stations proved to be the most valuable for this purpose.

A study, based on selected measurements from the above project and on mobile field surveys, was introduced into the record of the engineering conference on the sharing of television channels by mobile services. A study was in progress to correlate available data on very-high frequency propagation for the purpose of arriving at coverage and interference standards for FM and television stations operating on frequencies between 30 and 300 megacycles.

Continuous recordings were made for a period of 5 months of field intensity on the frequency 700 megacycles from a test transmitter operated in the Chrysler Building in New York City by the Columbia Broadcasting System. Measurements were made by the Commission at Laurel and Southampton and by the RCA laboratories. The data formed the basis of an exhibit relating to probable service and interference ranges for the color television hearing (Docket 7896). Supplemented by information from other surveys and sources, it was valuable in assessing the accuracy and applicability of theoretical radio propagation formulas upon which previous allocation studies had been made.

#### SPECIAL STUDIES

A study to determine satisfactory levels of broadcast signals in the presence of atmospheric noise was completed, in cooperation with the industry, for the clear channel hearing. This involved subjective listening tests on some 2,000 persons in all walks of life.

A study was instituted to reclassify and to adopt rules for each class of radio frequency generator now operating under the low power rules, such as phonograph oscillators, remote control devices, and college and utility carrier systems. The rapid increase in the number of such devices since the war, and their more varied applications, have made such action necessary.

## 2. LABORATORY DIVISION

The Laboratory Division, created in March 1946, is engaged chiefly in studying and testing new types of radio apparatus requiring type approval by the Commission, and otherwise evolving means and methods of preventing interfering radiation.

## INDUSTRIAL HEATING AND DIATHERMY

Its chief activity during 1947 was in establishing standards and procedures for reducing interference from diathermy and industrial heating equipment.

A first step consisted of gathering data as to the engineering specifications which could be met by the industries concerned and determining the amount of interference that could be tolerated by television and other affected services. The second phase was weighing the conflicting requirements of industry against the requirements of the communications services in order to effect a reasonable compromise.

In one instance the industry had proposed the joint use of frequencies by diathermy, industrial heating and radar. Field tests indicated that such operation would result in a hazardous condition, since the operation of diathermy and industrial heating equipment on the same frequency as radar equipment could blank certain sectors of the radarscope and thus endanger vessels and aircraft.

Considerable effort was also expended in establishing measurement standards for the field intensities radiated by diathermy and industrial heating equipment. The Laboratory Division was represented on two subcommittees of the American Institute of Electrical Engineers—one committee covering the general industrial heating field and the other committee studying methods for making field intensity measurements of the radiations of industrial heating apparatus. A symposium, to which representatives of the diathermy industry were invited, was conducted by the Laurel laboratory in June to acquaint the industry with the measurement methods used by the Commission.

A diathermy machine was constructed by laboratory engineers to demonstrate the feasibility of the proposed rules. The machine was tested for therapeutic effects by the American Medical Association and Council on Physical Medicine. It met the requirements of the latter and was well within the frequency and field intensity requirements of the proposed rules.

These efforts resulted in the final adoption of part 18 of the Commission's rules and regulations, effective June 30, 1947. The stimulus given the industrial heating industry by the war, together with the utilization of the higher frequency bands by FM and television broadcast and by police, radar and other safety services required such steps to protect these communication channels. The magnitude of the interference problem can be adjudged from the fact that at present more kilowatts of power are installed in industrial heating plants than in all communication industry installations.

It is realized that the present field intensities permitted in part 18 of the rules may cause some interference to television and other reception in certain restricted areas and that lower values of permissible field intensity may have to be established. It did not appear appro-

priate to recommend these lower values in fiscal 1947 since to have done so might have retarded the industrial heating and diathermy industries.

#### STRATOVISION

The Laboratory Division cooperated with the Westinghouse Electric & Manufacturing Co. in making certain measurements of the strength of signals received from aircraft flying at altitudes of 10,000 to 20,000 feet. Automatic recording equipment was set up at the Laurel laboratory and measurements made on a number of frequencies of the emissions received from radio equipment located in a plane on a number of flights over various terrain and at different altitudes.

The results indicated a method for serving much greater areas with television and FM broadcast, including the possibility of furnishing such services to wide rural areas. These stratovision tests also indicated a possible method of relaying television and other transmission over long distances without the necessity of a large number of repeater stations. It was recommended that the Commission investigate the possibilities of this method of transmission.

#### EQUIPMENT TESTING

Numerous pieces of apparatus were tested to determine whether they would meet existing Commission requirements or, if no particular requirements were specified, whether the equipment could be operated to serve the purpose for which it was intended without causing interference to other communications services. The following tabulation indicates some of these tests:

Three tests were made on broadcast frequency monitors. The equipment was found unsatisfactory on two tests, and in compliance on one.

Three modulation monitors were tested. One was found unsatisfactory and two were found in compliance (after certain minor changes were made in one instrument).

Tests were made on two types of altimeters proposed for licensing by the Commission. Both were found to require an extremely wide portion of the radio spectrum.

A war surplus type aircraft transmitter was tested and found not to have suitable frequency stability for employment in the commercial aviation service.

Tests were conducted on field intensity equipment being produced by one large manufacturer for the measurement of frequencies in the standard broadcast band. Certain errors were indicated in the measured values and the manufacturer was so advised. Subsequently, the manufacturer located faulty equipment in his calibration set-up and correction was made.

A consulting engineer making measurements in the FM broadcast

frequency band submitted a field intensity meter. Although the former had been calibrated by one of the major manufacturers of field intensity equipment, it did not agree with the equipment used at the laboratory. Subsequent tests by the manufacturer indicated difficulties in his calibration procedure and he recalled a number of instruments for recalibration.

#### TELEVISION

Certain data was obtained by the laboratory for the Commission's use in the color television hearing. Field and laboratory tests were conducted with regard to black and white television to determine the possibility of the shared use of frequencies by television and other services. Demonstrations were conducted for members of the Commission and movies were obtained of the interference produced by the sharing of television frequencies with other services.

#### FM BROADCASTING

Eight FM broadcast receivers were obtained from manufacturers to permit determination of their characteristics. Such information was needed to enable the Commission to space the stations in frequency and geographically so as to render required service and at the same time prevent interference to reception. Tests on these and other FM receivers are being continued to obtain data to permit the most effective use of the frequencies available for FM broadcasting. Several informal conferences were held with manufacturers and it is believed that certain improvements in receiver design will be made on their own initiative.

#### FIELD INTENSITY SURVEYS

A number of field intensity surveys were conducted, including surveys to determine the relative coverage obtained on the old and new FM bands and the amount of harmonic emission of existing frequency modulation and television broadcast stations.

#### IGNITION INTERFERENCE

In some areas considerable interference is suffered to the reception of television and FM broadcast signals by automobile ignition systems. A laboratory study was begun to determine the method of measuring interference levels, looking toward the establishment of standards regarding the maximum permissible interference radiation from such sources. It is hoped that sufficient information will be available during the coming year to permit protection of FM and television reception from this severe impairment.

#### PRODUCTION OF SPECIAL EQUIPMENT

The Laboratory Division constructed special spectroscopes for the Commission's monitoring stations to permit examination of the band



width (the amount of space taken on a receiver dial) of various transmitters. A device of this nature was severely needed because many stations now employ very complicated types of emission and the mere measurement of the unmodulated frequency would not tell the complete story of interference that would be caused to other stations. The spectroscope also permits the rapid measurement of frequency required in the case of certain stations operating for extremely short periods of time. This device has already resulted in adjustment of a number of FM broadcast transmitters to proper operating conditions.

#### LORAN NAVIGATION SYSTEM SHARING

A proposal was made to the Commission for shared use of the frequency employed by the loran navigational system by amateur radio stations. A laboratory study indicated that such operation would reduce the accuracy of loran. Since joint operation on these frequencies would impair the safety of life and property at sea, this proposal has been abandoned.

#### LOW POWER DEVICES

Tests were made of a proposed electric sign in which the gas supplying the illumination was excited with a radio frequency oscillator. The radiation from this sign was found to exceed the value permitted by the rules except when the device was provided with an enclosing screen. Without the screen the device was capable of interference to communications services over a wide band.

A radio-operated garage door, also submitted for test, was found to produce greater interference than is permitted by the rules.

A toy transmitter placed on the market during the Christmas season was tested and the field intensity was found to be within the requirements of the low-power rule.

## APPENDIX

### 1. FIELD OFFICES

The Commission's field offices are as follows :

#### ENGINEERING DEPARTMENT

<i>Region</i>	<i>Headquarters</i>
North Atlantic -----	506 Federal Bldg., New York 14, N. Y.
South Atlantic -----	411 Federal Annex, Atlanta 3, Ga.
Gulf States -----	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific -----	323-A Customhouse, San Francisco 26, Calif.
North Pacific -----	801 Federal Office Bldg., Seattle 4, Wash.
Central States -----	878 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes -----	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian -----	609 Stangenwald Bldg., Honolulu 1, T. H.
Alaskan -----	39 Federal Bldg., Anchorage, Alaska.

#### DISTRICT OFFICES

<i>District</i>	<i>Address</i>
1 -----	1600 Customhouse, Boston 9, Mass.
2 -----	748 Federal Bldg., New York 14, N. Y.
3 -----	1005 U. S. Customhouse, Philadelphia 6, Pa.
4 -----	508 Old Town Bank Bldg., Baltimore 2, Md.
5 -----	402 New Post Office Bldg., Norfolk 10, Va.
6 -----	411 Federal Annex, Atlanta 3, Ga. (Sub-office) 214-218 Post Office Bldg., Savannah, Ga.
7 -----	312 Federal Bldg., Miami 1, Fla. (Sub-office) 409-410 Post Office Bldg., Tampa 2, Fla.
8 -----	400 Audubon Bldg., New Orleans 10, La.
9 -----	324 U. S. Appraisers Bldg., Houston 11, Tex. (Sub- office) 329 Post Office Bldg., Beaumont, Tex.
10 -----	500 U. S. Terminal Annex Bldg., Dallas 2, Tex.
11 -----	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif. (Sub-office) 320 U. S. Customhouse, San Diego 1, Calif.
12 -----	323-A Customhouse, San Francisco 26, Calif.
13 -----	406 Central Bldg., Portland 5, Oreg.
14 -----	801 Federal Office Bldg., Seattle 4, Wash.
15 -----	521 Customhouse, Denver 2, Colo.
16 -----	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17 -----	838 U. S. Courthouse, Kansas City 6, Mo.
18 -----	246 U. S. Courthouse, Chicago 4, Ill.
19 -----	1029 New Federal Bank Bldg., Detroit 26, Mich. (Sub- office) 541 Old Post Office Bldg., Cleveland 14, Ohio.
20 -----	328 Federal Bldg., Buffalo 3, N. Y.
21 -----	609 Stangenwald Bldg., Honolulu 1, T. H.
22 -----	322-323 Federal Bldg., San Juan 13, P. R.
23 -----	7-8 Shattuck Bldg., Juneau, Alaska. (Sub-office) 39 Federal Bldg., Anchorage, Alaska.

## PRIMARY MONITORING STATIONS

Allegan, Mich.	Laurel, Md.
Grand Island, Nebr.	San Leandro, Calif.
Kingsville, Tex.	Portland, Oreg.
Millis, Mass.	Powder Springs, Ga.
Santa Ana, Calif.	Honolulu, T. H.

## SECONDARY MONITORING STATIONS

Searsport, Maine.	Lexington, Ky.
North Scituate, R. I.	Broken Arrow, Okla.
Spokane, Wash.	Bay St. Louis, Miss.
Twin Falls, Idaho.	Point Lena, Alaska.
South Miami, Fla.	Anchorage, Alaska.
Minneapolis, Minn.	San Juan, P. R.

## COMMON CARRIER FIELD DIVISION

Atlanta, Ga.—515 First National Bank Bldg.  
 New York, N. Y.—604 90 Church St.  
 San Francisco, Calif.—810 West Coast Life Bldg.

## ACCOUNTING DEPARTMENT FIELD OFFICES

Atlanta, Ga.—515 First National Bank Bldg.  
 New York, N Y—624 90 Church St  
 St Louis, Mo—Old Customhouse  
 San Francisco, Calif—316 Customhouse

## LAW DEPARTMENT FIELD OFFICES

New York, N Y—90 Church St  
 San Francisco, Calif—231 Prague Bldg

## 2. PUBLICATIONS

Following is a list of Federal Communications Commission publications which may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., unless otherwise indicated:

Title	Price
Communications Act of 1934, with amendments and index, revised to June 14, 1945.....	\$0.25
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 2—July 1935—June 1936.....	2.00
Volume 3—July 1936—February 1937.....	2.00
Volume 4—March 1937—November 15, 1937.....	1.50
Volume 5—November 16, 1937—June 30, 1938.....	1.50
Volume 6—July 1, 1938—February 28, 1939.....	1.50
Volume 7—March 1, 1939—February 29, 1940.....	1.50
Volume 8—March 1, 1940—August 1, 1941.....	1.50
Volume 9—August 1, 1941—March 31, 1943.....	1.25
Volume 10—April 1, 1943—June 30, 1945.....	2.00

Title	Price
Annual reports of the Commission :	
First Annual Report—Fiscal year 1935.....	\$0.15
Third Annual Report—Fiscal year 1937.....	.30
Fifth Annual Report—Fiscal year 1939.....	.30
Twelfth Annual Report—Fiscal year 1946.....	.20
Thirteenth Annual Report—Fiscal year 1947.....	(1)
Statistics of the Communications Industry :	
For the year 1939.....	.25
For the year 1940.....	.20
For the year 1942.....	.35
For the year 1943.....	9.30
For the year 1944.....	.40
For the year 1945.....	.50
Report on Chain Broadcasting.....	.30
Report on Public Service Responsibility of Broadcast Licensees.....	.25
An ABC of the FCC.....	.05
Radio—A Public Primer.....	.10
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	.15
Digest of Radio Regulations and Instructions for Restricted Radiotele- phone Operators.....	.05.
Standards of Good Engineering Practice :	
Concerning Standard Broadcast Stations, revised to June 1, 1944.....	.65
Concerning FM Broadcast Stations, revised to January 9, 1946.....	.10
Concerning Television Broadcast Stations, revised to December 19, 1945.....	.10
Rules and Regulations :	
Part 1, Organization and Practice and Procedure, revised to February 20, 1947.....	.30
Part 2, General Rules and Regulations, revised to December 19, 1944... Part 3, Standard and High Frequency Broadcast Stations, revised to October 5, 1940.....	.10 (2)
Part 4, Experimental and Auxillary Broadcast Stations, effective Sep- tember 10, 1946.....	(2)
Part 5, Experimental Radio Services, revised to October 28, 1943.....	(2)
Part 6, Fixed Public Radio Services, revised February 18, 1947.....	.05
Part 7, Coastal and Marine Relay Services, revised April 5, 1941.....	(2)
Part 8, Ship Service, revised to May 31, 1943.....	.15
Part 9, Aeronautical Services, revised to July 1, 1947.....	.10
Part 10, Emergency Radio Services, revised to October 16, 1944.....	(2)
Part 11, Miscellaneous Radio Services, effective January 1, 1939.....	.05
Part 12, Amateur Radio Service, revised to May 9, 1946.....	.10
Part 13, Commercial Radio Operators, revised to January 1, 1947.....	(2)
Part 14, Radio Stations in Alaska (other than Amateur and Broad- cast), revised to April 2, 1942.....	.05
Part 15, Radio Stations in the War Emergency Radio Service, revised to April 2, 1942.....	.10
Part 16, Railroad Radio Service, revised to September 1, 1947.....	.05
Part 17, Utility Radio Service, effective September 12, 1946.....	(2)
Part 18, Industrial, Scientific and Medical Service, effective June 15, 1947.....	(2)

<sup>1</sup> In the process of printing—available at Government Printing Office at a later date.

<sup>2</sup> Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

Title	Price
<b>Rules and Regulations—Continued</b>	
Part 31-32, Uniform System of Accounts for Class A and Class B Telephone Companies—Units of Property Class A and Class B Telephone Companies, revised to August 1, 1946.....	\$0.30
Part 33, Uniform System of Accounts for Class C Telephone Companies, effective January 1, 1939.....	.15
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, effective January 1, 1940.....	.25
Part 35, Uniform System of Accounts for Wire-Telegraph and Ocean-Cable Carriers, effective January 1, 1943.....	.35
Part 41, Telegraph and Telephone Franks, effective August 11, 1939..	(*)
Part 42, Preservation of Records, revised to May 27, 1943.....	.10
Part 43, Filing of Information, Contracts, etc. of Telecommunications Carriers revised to September 29, 1943.....	.05
Part 51, Classification of Telephone Employees, effective July 25, 1944..	.05
Part 52, Classification of Wire-Telegraph Employees, effective July 11, 1944.....	.05
Part 61, Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to August 1, 1946.....	.10
Part 62, Applications Under Section 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944.....	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to December 30, 1946.....	(*)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to September 19, 1946.....	(*)

\* Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.



FOURTEENTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1948  
(With Notation of Subsequent Important Developments)

## **COMMISSIONERS**

### **MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION**

(As of December 1, 1948)

**CHAIRMAN**

**WAYNE COY**

(Term expires June 30, 1951)

**PAUL A. WALKER**

(Term expires June 30, 1953)

**ROSEL H. HYDE**

(Term expires June 30, 1952)

**EDWARD M. WEBSTER**

(Term expires June 30, 1949)

**ROBERT F. JONES**

(Term expires June 30, 1954)

**GEORGE E. STERLING**

(Term expires June 30, 1950)

**FRIEDA B. HENNOCK**

(Term expires June 30, 1955)

## LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
*Washington 25, D. C., December 31, 1948.*

*To the Congress of the United States:*

The Fourteenth Annual Report of the Federal Communications Commission, for the fiscal year 1948, is submitted herewith in compliance with section 4 (k) of the Communications Act.

This report is intended to give the Congress, the industry, and the public a comprehensive word-picture of the unprecedented expansion of radio and other electrical communication media and the responsibilities and activities of the Commission in dealing with attendant problems.

Since figures and situations in this field are never static, a summary of the more important developments since the close of the fiscal year is included for convenient reference.

Respectfully,

WAYNE COY,  
*Chairman.*

III



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## INTRODUCTORY SUMMARY

1. HIGHLIGHTS OF THE FISCAL YEAR
  2. SUBSEQUENT EVENTS
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### 1. HIGHLIGHTS OF THE FISCAL YEAR

The fiscal year 1948 emphasized the acuteness of the "housing" shortage which exists in the radio spectrum. It is becoming increasingly difficult to squeeze new stations into already congested bands, and to accommodate rapidly developing services. Until methods and equipment are available to use higher portions of the spectrum, present frequencies must be employed more effectively. Accordingly, in cooperation with industry, the Commission was engaged in reviewing and revamping existing radio services, and conducting engineering, and other studies looking to future adjustments.

Since frequency allocation and use is also an international problem, the Commission is playing an increasingly active role in world conferences directed toward uniformity of practices and usages made necessary by kaleidoscopic developments in the field of electrical communications. Besides doing a large share of the preliminary work, the Commission furnished delegates or advisers to 15 such sessions held during the year, and was preparing for 20 others in prospect.

The general public is familiar with broadcasting because it enters the home. But it has little acquaintance with the more than 50 other classes of radio stations, equally important in providing more than a hundred diversified nonbroadcast services, which outnumber program stations by more than 30 to 1.

As of June 30, 1948, there were nearly 131,000 authorized radio stations of all types, not counting associated mobile stations. In addition, various radio-operator authorizations approximated 505,000. Thus the Commission had over 635,000 radio authorizations on its books, which was an increase of about 85,000 during the year and more than 3 times the prewar number.

In the same period the Commission received in excess of 200,000 applications relating to radio. This is almost double the volume before the war. In addition there were more than 3,100 applications and nearly 30,000 tariff and other filings during 1948 in connection with Commission regulation of wire, cable, and radio common carriers engaged in international and interstate service. The Commission continued to simplify its forms and other licensing procedure

insofar as legal and technical requirements permit. There is no fee or other charge in connection with its licensing or other regulatory functions.

Broadcast authorizations increased 400 over the previous year, bringing the total number of stations in 10 categories to nearly 4,000. Of this figure, 3,163 were major broadcast outlets—2,034 amplitude modulation (AM); 1,020 frequency modulation (FM); and 109 television (TV). They represented a gain of 239 AM, 102 FM, and 43 TV stations.

The last half of the year witnessed a sudden surge in TV applications and a leveling off of FM requests. Applications for new TV stations for the year almost equaled the number for new AM facilities; FM seekers were less than half the TV number. Texas and California led all States in total outstanding broadcast authorizations in these three categories.

AM broadcast income in 1947 (the most recent year for which statistics were available) was less than the year previous, though the major networks showed a gain.

Slightly more than 1,100 AM stations were affiliated with the 4 Nation-wide networks, and there were more than a score of regional AM networks. Under the impetus of rebroadcast opportunities and expanding coaxial cable and microwave relay facilities, FM and TV networks were developing. Broadcast receivers of all types were nearing the 75,000,000 mark.

Noncommercial educational broadcast stations increased from 38 to 46 and international broadcast stations remained at 37. Television experimental stations jumped from 81 to 124. Remote pick-up and developmental stations decreased slightly.

The broadcast year was marked by authorization of a new broadcast service—facsimile—which was scheduled for commercial operation over FM stations beginning July 15, 1948. Facsimile had been on an experimental basis.

Safety and special radio services, as their designation implies, are devoted largely to safeguarding life and property—on the land, sea, and in the air—but also cover utilization of radio for industrial and business purposes. These activities were under skyrocketing attention and development.

Numerically more than 10 times larger than the broadcast service, the safety and special services saw nearly 11,000 new station authorizations during the year, bringing their total to over 47,000. What is more, nearly 150,000 mobile stations were covered in these nonbroadcast services.

The largest increase was felt in the aeronautical field which added nearly 5,000 radio stations, making a total of nearly 21,000. The



marine services gained over 3,000 stations, for a total of 15,000. More than 600 ship radar installations attested to the growing use of that navigational aid.

Police radio stations increased to over 4,100, fire stations to nearly 100, forestry stations to nearly 500, and special emergency to nearly 100. There were over 200 railroad radio stations, 75 transit utility stations, 24 stations for intercity buses and trucks, and taxicab operational stations grew to nearly 3,000.

In addition, some 3,000 stations were being used by industry—1,700 by utilities, 400 by petroleum pipe lines, 32 by lumber interests, and 750 others employed in connection with probing for oil, direction of motion pictures, relaying press messages, etc. Over 600 experimental stations were testing new equipment and techniques.

The safety and special services were in a particular state of flux due to changes necessitated by domestic and international developments. A new highway maintenance service was inaugurated during the year, which on June 30 had grown to 126 stations. Two new service groups were proposed—to cover land transportation and industrial uses of radio.

More than 57,000 applications attested to the mounting interest in the safety and special services. Requests for experimental authorizations looked to specialized uses which veritably extended "from the cradle to the grave." Thus, while one Texas applicant sought radio for his baby diaper pick-up-and-delivery service, a large Chicago cemetery wanted radio to direct funeral corteges.

Common carrier services had approximately a thousand radio authorizations, covering more than 900 experimental stations (of which nearly 800 were general mobile), and 27 fixed public telephone and 56 fixed public telegraph stations.

Telephone regulation by the Commission covers interstate and international service by the Bell system and 63 independent companies. The telephone industry experienced a record business in the fiscal year. The Bell system, which owns about 85 percent of all telephones in use, handled over 36,000,000,000 conversations. New interstate wire and cable telephone construction amounted to \$127,000,000. Gross telephone investment exceeded \$8,000,000,000.

The thirtieth million Bell telephone was installed at Marshalltown, Iowa, on June 29, 1948. This increased the number of Bell and independent telephones in service to more than 36,000,000. Some 2,200,000 of these instruments were in rural service. About 40 percent of farm homes now have telephones. However, in three southern regions five out of six farms are still without this service.

More than 65 percent of all Bell telephones and 33 percent of the independent telephones had been converted to dial operation.

There were no material interstate rate reductions during the year. However, State utility commissions had granted increases of \$138,000,000 in intrastate rates in 35 States during the postwar period, and requests for increases totaling \$66,000,000 were pending before utility bodies in 15 States.

During the year the Commission authorized the use of telephone recording devices, with appropriate tone-warning signal, subject to the filing of related tariffs by August 2, 1948.

At the year's close nearly 7,700 miles of coaxial cable, representing an investment of \$170,000,000 (including 1,435 miles approved in fiscal 1948 and estimated to cost \$42,500,000) had been authorized for the Bell coaxial cable system, to accommodate many types of communication services, including television. A microwave relay system between New York and Boston was inaugurated November 11, 1947, and New York-Chicago and other links were being built. Short-distance radiotelephone service to isolated places was growing.

Tremendous expansion took place in the mobile telephone service. Telephone carriers have made such service available in 60 cities and were completing installations in 22 other cities. Highway service was operating in the vicinity of 95 communities, and construction was under way in 37 additional areas.

Overseas telephone service was reestablished with four countries and made available for the first time with seven other countries. About 575,000 overseas radiotelephone calls were handled during the year as compared with 50,000 annually before the war. Telephone service with ships and aircraft was on the increase.

Telegraph regulation dealt mainly with the Western Union Telegraph Co., which has a monopoly in the domestic field, and with international radio and cable telegraph carriers.

New domestic telegraph facilities authorized during the year included 38,200 channel miles, at an expenditure of \$260,000, and lease of 70,500 channel miles for \$350,000 annually requiring terminal equipment costing \$367,137.

Western Union was carrying out its \$72,000,000 modernization program which, in addition to mechanization features, saw the completion of a microwave triangle connecting New York, Philadelphia, Washington, and Pittsburgh. Western Union had more than \$300,000,000 invested in plant and equipment. Its revenue messages increased to more than 220,000,000 in the calendar year 1947. In February 1948 the Commission prescribed annual depreciation rates to be used by Western Union for classes of depreciable land-line plant, on the basis of a study concluded by the Commission.

Over 700 requests for reduction of office hours or closure of offices were received from Western Union. In February of 1948 the Com-

mission proposed a standard to determine the conversion of company operated offices to teleprinter offices operated by nontelegraph agencies.

Repeal, during the year, of the Post Roads Act of 1866 resulted in the Federal Government losing the benefit of special telegraph rates on its domestic traffic, though priority continued to be given particular Government messages on specific request.

Cable and radio telegraph carriers handled more than 656,000,000 paid words in the calendar year 1947, which was a slight decrease from the year previous. Of the 1947 total, over 337,000,000 words were in out-bound traffic. New radiotelegraph circuits to Israel and the Dodecanese Islands were opened during the year.

To meet the urgent revenue needs of international telegraph carriers, the Commission in July of 1947 authorized out-bound rate increases aggregating \$5,485,000. On the further plea that most of the carriers were still losing money, the Commission in April of 1948 permitted additional increases amounting to \$3,188,000. The revised rates remained not in excess of 30 cents per full rate word.

Radio operators, in the various categories, increased more than 64,000 during the year, bringing their aggregate total to more than 500,000. The largest group comprised commercial operators—347,000. Amateur operators numbered nearly 78,000, and their stations about 78,500. As a convenience to civilian flyers, special authorizations to operate radiotelephone installations in their planes were issued at airfields. Such authorizations approximated 80,000.

Field engineering and monitoring activities, conducted through 33 field offices augmented by 21 monitoring stations, dealt primarily with technical supervision of radio operations, reduction of interference, and apprehension of illegal transmitters. Nearly 30,000 inspections were made, of which number over 16,700 were land stations and 12,500 were ship stations. More than 17,000 violation, advisory, and other notices were issued. One hundred and fifty-three illicit radio operations were traced and closed, an increase of 26 percent over the previous year. Violators ranged from irresponsible youth to willful oldsters. Operator examinations, largely given in the field, approached 100,000. Aid was given in 170 cases of lost planes.

Interference complaints handled in the field jumped from about 6,800 such cases in 1947 to over 22,000 last year. Of the latter figure, nearly 1,500 were of a major nature. Some sources of interference were traced to drawbridges, medical apparatus, industrial dryers, and even miniature aquariums.

Technical studies were conducted in the interest of improving present and future radio operations. They covered possibilities in the use of higher frequencies, effects of wave propagation, skywave reflections, ground conductivity, signal intensity, harmonics, directional

antenna, etc. In addition to continuing studies, 83 new projects were initiated. Such data, besides being useful to industry in developing apparatus, are guidance for the Commission in considering rules and engineering standards for the operation of new services.

Laboratory work featured the testing of new equipment submitted by manufacturers for type approval prior to being placed on the market. Thus, many potential interference problems can be dealt with before they materialize. In this way certain difficulties in connection with medical and industrial heating appliances were ironed out at the source, before they assumed larger proportions through operation.

## 2. SUBSEQUENT EVENTS

The Commission, on August 19, 1948, proposed changes in the multiple ownership rules affecting commercial broadcast stations which would limit ownership, operation, or control by the same interest to not more than 7 AM stations in the country as a whole, and overlapping interests or connections to not more than 14 AM, 12 FM, and 10 TV stations. These would be in addition to the present rules noted under Radio Broadcast Services. Oral argument was scheduled for January 17, 1949.

The situation in television with respect to interference and insufficient spectrum space below 300 megacycles, and the possibility of operating in the 475 to 890-megacycle band, was the subject of a hearing before the Commission September 20 to 23. Pending determination of future TV channel allocations, the Commission on September 29 ordered applications for new TV stations placed in the pending file. It subsequently scheduled engineering conferences for November 30 to December 2 to consider technical data in connection with proposed rule making on tropospheric propagation. As of October 1, the number of TV receivers had increased to 612,000.

The text of a tentative TV-allocation plan between the United States and Canada was made public July 7, and an agreement between those countries respecting FM, on August 19. As a result of objections voiced by the Commission to the Department of State on May 6 and September 9, Mexico was understood to have agreed deferring its proposed use of the frequency 540 kilocycles for a standard broadcast station pending clarification of the issue at the next North American Regional Broadcasting Conference. An engineering conference was called by the FCC for December 7 to 9 to discuss NARBA matters.

Rules to permit low-powered educational FM broadcasting became effective September 27 and, on October 21, the Commission granted the first construction permit for a noncommercial educational station with power of less than 10 watts, to Syracuse University.

Special temporary authorizations for AM broadcast stations were abolished as of August 16.

The rule which requires AM and FM broadcast stations to make certain performance measurements at least once a year was postponed for 1 year from August 1.

A number of broadcast issues mentioned in this report were the subject of hearing or oral argument before the Commission subsequent to the close of the fiscal year and their determination was still pending. Oral argument in the matter of origination of AM and FM programs (main studios) was held October 15, and on promulgation of rules governing lottery programs October 19. Hearing on broadcast editorializing was held November 1. Hearing on agreements between networks and affiliates for the sale of national spot advertising, which began November 29, recessed to January 3, 1949.

In the period between January 1 and August 31 there were 112 deletions of authorizations in the three major broadcast services—36 AM (including 3 licensed stations and 2 other stations on the air); 74 FM grants (including 2 stations on the air), and 2 TV grants.

As of November, Chicago had more authorized AM, FM and TV stations collectively (33) than any other city in this country—or the world. New York City was a close second with 32, followed in turn by Los Angeles, 29; Philadelphia, 23; Washington, 21; San Francisco, 19, and Boston, 16.

On September 20 the Midwest coaxial link between Buffalo, Cleveland, Toledo, Chicago, and St. Louis was made available for television relay, with microwave connections with Detroit and Milwaukee. Connection with the eastern system was scheduled for January 12, 1949.

Hearing on charges and regulations for television transmission services and rates of the American Telephone & Telegraph Co. and the Western Union Telegraph Co. resumed on September 29. On October 18 the Commission ordered determination of the regulations and practices of interconnections of TV facilities before considering the reasonableness and lawfulness of rates.

Proceedings affecting the General and Public Mobile, Land Transportation, Industrial and Public Safety Radio Services, and frequencies for their use, resulted in oral argument from October 6 to 15. Previously, on August 19, the Commission suspended further consideration of general mobile and industrial radio applications, formerly authorized on an experimental basis, pending final action on proposed rules involved in the previously mentioned proceedings. For the same season, it extended to November 1, 1949, the term of existing general mobile class 2 experimental licenses.

Further steps looking toward the use of individual transmitter-receivers for personal and private communication were taken by the Commission on August 13 in proposing rules to govern the Citizens Radio Service, and on September 29 in proposing a simple application form in that connection. Meanwhile, no licenses were being issued in this contemplated service, except on an experimental basis, until rule making is finalized.

The Commission designated for hearing and oral argument, on November 22, proposed amendments to the Rules and Regulations Governing the Ship Service and Commercial Radio Operators with respect to installation and use of radar equipment.

Harmonic and spurious emissions from all types of radio transmitting apparatus were considered at an informal engineering conference on August 10.

A hearing, which started August 9, obtained expressions by common carriers and other users of international services preparatory to the International Telegraph and Telephone Conference to be held at Paris in May 1949.

Revenue requirements of international communications carriers and the question of whether immediate additional rate increases are warranted were heard beginning November 15.

Western Union, on September 22, was granted a further 1-year extension (to September 27, 1949) to divest itself of international telegraph operations in compliance with conditions of the merger involving Postal in 1943.

On July 22 the Commission instituted an investigation into the applicability of section 314 of the Communications Act to the organization and operations of the American Cable & Radio Corp. System. Hearing began December 7.

To relieve the work load of Commissioners, proposal was made on August 19 that initial decisions be issued by hearing examiners or Commissioners presiding at hearings, and that motions presently handled by the motion's Commissioner, with certain exceptions, be acted upon by hearing examiners.

On October 20 and November 3 the Commission amended part 1 of its rules and regulations to reflect recent changes in nomenclature and organization.

As of October 31, 1948, outstanding radio authorizations exceeded 675,000, an increase of more than 39,000 in the four months since the close of the fiscal year. The figures, for services and groups, were:

Service	June 30, 1948	Oct. 31, 1948	Increase
<b>Broadcast:</b>			
Standard (AM).....	2,034	2,103	69
Frequency modulation (FM).....	1,020	996	(-24)
Television (TV).....	109	124	15
Television (experimental).....	124	168	44
Noncommercial educational.....	46	46	0
International.....	37	37	0
Facsimile.....	2	2	0
Remote pick-up.....	571	578	7
Studio transmitter (ST).....	9	22	13
Developmental.....	15	15	0
<b>Total broadcast services.....</b>	<b>3,967</b>	<b>4,091</b>	<b>124</b>
<b>Nonbroadcast:</b>			
Aeronautical.....	20,858	24,596	3,738
Marine.....	15,024	17,172	2,148
Police.....	4,137	4,308	171
Fire.....	85	97	12
Forestry.....	461	516	55
Highway maintenance.....	126	141	15
Special emergency.....	94	92	(-2)
Utility.....	1,656	2,025	369
Petroleum.....	412	515	103
Lumber.....	32	69	37
Other industrial.....	755	822	67
Railroad.....	204	235	31
Transit utility.....	77	83	6
Intercity buses and trucks.....	24	32	8
Taxicab.....	2,817	3,188	371
Experimental.....	652	555	(-97)
<b>Total nonbroadcast services.....</b>	<b>47,414</b>	<b>54,446</b>	<b>7,032</b>
<b>Common carrier:</b>			
General mobile.....	785	855	70
Experimental.....	128	127	(-1)
Fixed public telephone.....	27	27	0
Fixed public telegraph.....	56	56	0
<b>Total common carrier.....</b>	<b>996</b>	<b>1,065</b>	<b>69</b>
<b>Operators:</b>			
Commercial operators.....	347,803	363,000	15,197
Aircraft radiotelephone.....	80,000	91,368	1,368
Amateur operators.....	77,923	80,549	2,626
Amateur stations.....	78,434	81,170	2,736
Citizens (experimental).....	48	66	18
<b>Total operators.....</b>	<b>564,208</b>	<b>616,153</b>	<b>31,945</b>
<b>Grand total.....</b>	<b>636,585</b>	<b>675,755</b>	<b>39,170</b>

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## CHAPTER I. GENERAL

1. FUNCTIONS
  2. COMMISSION
  3. STAFF ORGANIZATION
  4. PERSONNEL
  5. APPROPRIATIONS
  6. LEGISLATION
  7. LITIGATION
  8. HEARINGS
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### 1. FUNCTIONS

The Federal Communications Commission is charged by the Congress with regulating interstate and foreign communication by means of telegraph and telephone, also broadcast and other radio transmission. Its authority is derived from the Communications Act of 1934, as amended. This act created the Commission with broad supervisory powers in the field of electrical communications to the inclusion of certain functions previously exercised by various Government agencies.

These duties, in general, embrace supervision of common carrier land wire, ocean cable, and radio services; allocation of radio frequencies, and licensing of radio stations and radio operators; encouraging new uses for radio, particularly in promoting safety of life and property on the land, on the sea, and in the air; domestic administration of communication provisions of treaties and other international agreements to which the United States is a party; and, as in the recent war, coordinating the use of these communication media with the national security program.

### 2. COMMISSION

The work of the Commission is directed by seven Commissioners, appointed by the President and subject to confirmation by the Senate, who normally hold office for 7 years. The Commission functions as a unit, directly supervising all activities, with delegations of responsibility to boards and committees of Commissioners, individual Commissioners, and the staff. Policy determinations are made by the Commission as a whole.

On December 26, 1947, the President appointed Wayne Coy as chairman to complete the term of Charles R. Denny (resigned as of November 1, 1947) which expires June 30, 1951. Chairman Coy took office December 29, 1947. Commissioner Robert F. Jones was sworn



in September 5, 1947, for the term expiring June 30, 1954. He succeeded Ray C. Wakefield. On May 24, 1948, Miss Frieda B. Hennock was named to succeed Clifford J. Durr, who declined reappointment and whose term expired June 30, 1948. Taking office July 6, 1948, Miss Hennock is the first woman to serve as a member of the Commission. Her term is until June 30, 1955.

### 3. STAFF ORGANIZATION

There were no major changes in the staff organization of the Commission during the year. As of May 12, 1948, the nomenclature of administrative elements was changed to conform to the general Governmental pattern, i. e., "Department" became "Bureau," "Section" became "Branch," and "Unit" became "Section."

The Commission functions with five bureaus—Engineering, Accounting, Law, Secretary, and Administration—augmented by a Hearing Division, a Rules Committee, and an Office of Information. The Bureaus of Engineering, Accounting, and Law are, in effect, broken down into comparable divisions for coordinated operation. Organization of these bureaus is as follows:

*Bureau of Engineering.*—FM Broadcast, Television Broadcast, Standard Broadcast, Common Carrier, Aviation, Radio Operator and Amateur, Marine Radio and Safety, Field Engineering and Monitoring, Technical Information, Public Safety and Special Services, Laboratory, and Frequency Allocation and Treaty Divisions.

*Bureau of Accounting.*—Economics and Statistics Division (Common Carrier, Broadcast, and Special Studies Branches); Broadcast Division (Applications, Renewals and Annual Reports, and Hearings Branches); Rates Division (Tariffs and Telephone Rates, and Telegraph Rates Branches); Accounting Regulation Division (Development and Compliance, and Original Cost and Depreciation Branches); and Field Division.

*Bureau of Law.*—Safety and Special Services Division (Aviation and General Mobile, Marine Operation and Amateur, and Emergency, Experimental and Miscellaneous Branches); Broadcast Division (AM, FM, Renewals and Revocations, Transfer, Review, and Motions Branches); Litigation and Administration Division (Litigation and Administrative Branches); Common Carrier Division (Rate, International, Domestic Wire, and Domestic Radio Branches).

*Bureau of the Secretary.*—License, Service, and Records Divisions, and Minute and Library Branches.

*Bureau of Administration.*—Budget and Fiscal, Planning, and Personnel Divisions.

#### 4. PERSONNEL

A total of 1,380 persons were employed by the Commission as of June 30, 1948. Of this number, 907 were in Washington and 473 in the field. The bureau figures were: Engineering 734, Accounting 162, Law 105, Secretary 276, and Administrative and miscellaneous 103.

#### 5. APPROPRIATIONS

Appropriations received by the Commission for the fiscal year amounted to \$6,240,000, of which amount \$40,000 was for printing and binding.

#### 6. LEGISLATION

There were no additions of substance to the Communications Act during the fiscal year 1948. However, on July 16, 1947, the President signed Public Law 193 (S. 816, 80th Cong., 1st sess.) which repealed the Post Roads Act of 1866, pursuant to which special telegraph rates, as fixed by the Commission, had been accorded the Federal Government on domestic traffic. Public Law 239, Eightieth Congress, first session, "To terminate certain emergency and war powers," was approved July 25, 1947. It repealed section 606 (h) of the Communications Act; repealed footnote 28 to section 351; and provided that section 353 (b) should be repealed as of July 1, 1948.

Public Law 772, "To revise, codify, and enact into positive law, title 18 of the United States Code, entitled 'Crimes and Criminal Procedure,'" was approved June 25, 1948. In the interest of uniformity in codification, it repealed section 316 of the Communications Act which prohibits the broadcasting of information concerning lotteries and other similar schemes and reenacted the same prohibition, with slight changes in language, for the purpose of codification as section 1304 of title 18 of the Code. Similarly, the last sentence of section 326 of the Communications Act which prohibits the utterance of any obscene, indecent, or profane language by means of radio communication was repealed and reenacted as section 1464 of title 18 of the Code.

In addition, Congress considered numerous proposed bills which would in some way amend the Communications Act or affect the functions of the Commission. The most important were the White bill (S. 1333) which would revise a major portion of the Communications Act, the Lemke resolution (H. J. Res. 78) which would require the Commission to allocate frequencies in the 50-megacycle band for commercial FM broadcasting, and the Johnson bill (S. 2231) which would limit the maximum power of any radio station to 50 kilowatts and also limit the normally protected skywave contour. Hearings were held on these bills and the Commission appeared and presented extensive testimony. Comments were also prepared on other proposed

legislation which would have a bearing on the Commission's functions.

## 7. LITIGATION

Any final order of the Commission is subject to judicial review in accordance with the appellate provisions of the Communications Act and the Administrative Procedure Act. Most appeals are in the broadcast field.

During the fiscal year, 21 cases involving the Commission went to various Federal courts. One was before the Supreme Court, 19 were before the Court of Appeals for the District of Columbia, and 1 was before the United States District Court for the District of Columbia. The Commission's decision was affirmed in the one Supreme Court case. The court of appeals upheld the Commission in 2 cases; reversed the Commission in 1 case, 2 were dismissed by agreement of the parties, and 14 were pending at the close of the year. In the district court case, judgment was entered for the Commission. The following cases are of particular interest:

*Skywave cases.*—These eight cases are discussed as a group since they are all appeals taken by the licensees of class I stations on clear channels who alleged that their stations would suffer daytime skywave interference by reason of the assignment of new stations operating daytime only on the same channel. In the first case, it was contended that the Commission's assignment of a daytime station on the channel presently assigned to station WJR prior to the determination of the clear channel hearing was improper in that it prejudiced WJR's desire to apply for permission to operate with increased power. Oral arguments on three cases were held in which the Commission contended that under its existing Rules and Standards of Good Engineering Practice appellants were not entitled to protection against daytime skywave interference and had not been deprived of a right to hearing contrary to constitutional or any other legal requirements. All of these cases were pending in the United States Court of Appeals for the District of Columbia at the close of the fiscal year 1947: *Wilson, Inc. v. Federal Communications Commission*, No. 9434, U. S. Ct. of Appeals, D. C.; *Courier Journal & Louisville Times Co., Inc. v. Federal Communications Commission*, No. 9502, U. S. Ct. of Appeals, D. C.; *National Life & Accident Insurance Co. v. Federal Communications Commission*, Nos. 9510 and 9511, U. S. Ct. of Appeals, D. C.; *WGN, Inc. v. Federal Communications Commission*, No. 9497, U. S. Ct. of Appeals, D. C.; *Crosley Broadcasting Corp. v. Federal Communications Commission*, No. 9501, U. S. Ct. of Appeals, D. C.; *WJR the Goodwill Station, Inc. v. Federal Communications Commission*, Nos. 9495 and 9496, U. S. Ct. of Appeals, D. C. On April 12, 1948, the court issued a decision in *L. B. Wilson v. Federal Communications Commission*, No. 9434, revers-

ing the Commission and remanding the matter for further proceedings. The seven remaining skywave cases were still pending at the end of fiscal 1948.

*Hearst Radio, Inc. v. Federal Communications Commission.*—This action involved a suit by Hearst Radio, Inc., licensee of radio station WBAL, Baltimore, Md., in the District Court for the District of Columbia for a declaratory judgment to have certain allegedly libelous matter deleted from the Commission's Report of March 7, 1946, entitled "Public Service Responsibility of Broadcast Licensees." Plaintiff requested a preliminary injunction, pending a determination of this case, prohibiting the Commission from proceeding with the processing of Hearst's application for renewal of WBAL's license which had been set for consolidated hearing with a mutually exclusive application for the frequency upon which that station has been licensed to operate. On February 19, 1947, the district court denied the Commission's motion to convene a three-judge court to hear the matter and granted the preliminary injunction sought by Hearst. On April 21, 1947, argument was held before the district court on a motion by the Commission to convene a three-judge court to hear the action or, in the alternative, to dismiss the action for want of jurisdiction. On July 3, 1947, the court entered an order granting the Commission's motion to dismiss the complaint. A notice of appeal was filed July 11, 1947, and the court of appeals affirmed the decision of the lower court January 12, 1948. *Hearst Radio Inc. v. Federal Communications Commission*, 167 F. 2d 225.

*Allen T. Simmons v. Federal Communications Commission.*—This case in the Court of Appeals for the District of Columbia is an appeal from a Commission decision and order which denied the application of Allen T. Simmons to increase power of radio station WADC, Akron, Ohio, from 5 to 50 kilowatts, and to change operating frequency from 1350 to 1220 kilocycles, and granted the mutually exclusive application of WGAR Broadcasting Co. to increase the power of Station WGAR, Cleveland, from 5 to 50 kilowatts, operating on 1220 kilocycles. The Commission denied the Simmons' application primarily on the grounds that operating as proposed he would not exercise the responsibility of a licensee in a manner consistent with the requirements of the Communications Act and would not serve the needs and interests of the region to be covered by the proposed station. The court affirmed the Commission's decision. (*Allen T. Simmons v. Federal Communications Commission*, U. S. Ct. of Appeals, D. C., April 28, 1948.)

*Murray and Meyer Mester v. Federal Communications Commission.*—This case arose upon the application of Wodaam Corp., licensee of radio station WOV, New York, N. Y., for permission to transfer control of the corporation to Murray and Meyer Mester. The appli-

cation was designated for hearing to obtain, among other things, "full information with reference to the qualifications of the proposed transferees." Upon the basis of the hearing record, which included evidence that the proposed transferees had been involved in several proceedings by various regulatory bodies of the Federal Government for violations of Federal law in the conduct of their edible oil business, and which reflected an extreme evasiveness and lack of candor in furnishing requested information, the Commission found that it would not be in the public interest to approve the transfer of control. The proposed transferees appealed to the District Court for the Eastern District of New York and the matter was heard before a special three-judge court as provided in section 402 (a) of the Communications Act. The court granted the Commission's motion for summary judgment February 4, 1947, in an opinion which held that the Commission was authorized to make a full inquiry into the character of a proposed transferee, including involvement in civil litigation and his disposition to be truthful, and to refuse an application for transfer of control if in the light of such inquiry it appears that such transfer would not be in the public interest. (*Mester et al. v. United States*, 70 F. Supp. 118.) This decision was appealed to the Supreme Court May 27, 1947. That court denied the appellant's motion for rehearing November 10, 1947. (*Mester v. Federal Communications Commission*, 332 U. S. 820.)

## 8. HEARINGS

The Commission has little or no control over the number of applications that are designated for hearing. Where two or more applicants request the same frequency, or it appears that undue interference would result, or if other serious questions are involved, a hearing is usually necessary before a determination can be made. No application can be denied without the opportunity for a public hearing. As the spectrum becomes more congested, the ratio of applications that require hearing increases.

Pursuant to the Administrative Procedure Act, the Commission has since May 28, 1947, maintained a separate Hearing Division with attorneys whose sole duty is to preside at hearings and prepare initial or recommended decisions.

Docket statistics for the fiscal year follow:

	Pending July 1, 1947	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1948
Broadcast services.....	759	623	372	292	718
Safety and special services.....	17	29	15	2	29
Common carrier.....	26	20	11	14	21
Joint and general dockets.....	1	3	1	0	3
Totals.....	803	675	399	308	771

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## CHAPTER II. RADIO FREQUENCIES

1. RADIO SPECTRUM
  2. ALLOCATION OF FREQUENCIES
  3. INTERNATIONAL CONFERENCES
  4. FREQUENCY CHANGES
  5. FREQUENCY ALLOCATION AND TREATY DIVISION
  6. INTERDEPARTMENT RADIO ADVISORY COMMITTEE
  7. DOMESTIC FREQUENCY ALLOCATIONS AND RULES
  8. INTERNATIONAL TREATIES AND AGREEMENTS
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### 1. RADIO SPECTRUM

Radio, too, has its housing problem. New developments emphasize the still relatively small part of the electromagnetic spectrum which can presently be used for broadcast, common carrier, and other forms of electrical communication.

The lowest frequency now available for radio transmission is 10 kilocycles. This, then, is the bottom of the radio spectrum. Wartime research and developments have raised the usable ceiling to 30,000 megacycles (or 30,000,000 kilocycles). However, the present upper limit for commercial use is around 10,000 megacycles. This top can only be extended when new techniques and equipment are developed.

The spectrum below 30 kilocycles is known as the VLF (very-low frequency) range; from 30 to 300 kilocycles, LF (low frequency); from 300 to 3000 kilocycles, MF (medium frequency); 3000 to 30,000 kilocycles, HF (high frequency); 30,000 kilocycles to 300 megacycles, VHF (very-high frequency); 300 to 3000 megacycles, UHF (ultra-high frequency); 3000 to 30,000 megacycles, SHF (superhigh frequency), and 30,000 to 300,000 megacycles, EHF (extremely high frequency).

In a sense, the radio spectrum may be compared to a vertical ruler with fractions of inches marking off, but in irregular fashion, the relative positions of the different radio services. That portion of the spectrum between 10 and 550 kilocycles is used largely by radiotelegraph stations and stations which serve as radio beacons for aircraft and ships. The section between 550 and 1600 kilocycles is the familiar standard broadcast band. Between 1600 and 25,000 kilocycles are frequencies employed by shortwave broadcast; various special, experimental and developmental services; long-distance radiotelephone and radiotelegraph communication between various countries, ships at sea, and planes in the air. It is interesting to note that the space oc-

cupied by standard broadcasting is only one thirty-thousandth of the entire known radio spectrum.

## 2. ALLOCATION OF FREQUENCIES

The radio spectrum is one of the world's greatest natural resources. In order to insure that it will be used in an orderly manner so as to bring the maximum benefits to the greatest number of people, Congress has provided that in the United States and its territories and possessions no one may transmit interstate radio signals or energy without a Federal authorization. The Federal Communications Commission is the licensing authority for the nongovernmental radio services. The President, through the Interdepartment Radio Advisory Committee (IRAC), makes frequency assignments to United States Government radio stations.

\* A major task of the Federal Communications Commission is to allocate bands of frequencies to the various radio services. It would be wasteful and chaotic to attempt to operate a broadcast station on one frequency, a police station on the frequency immediately adjoining, an aircraft station on the frequency next to that, and a ship station on the next one. There must be appropriate bands for each of the twoscore radio services with which the Commission deals, and within these bands assignments are made to individual stations.

Thus, there must be separate bands for radio broadcasting, for aircraft radio, for ship radio, for police radio, for railroad radio, and other specialized services. Also, there must be bands for radar and other navigation aids. There must be portions of the radio spectrum in which scientific, industrial, and medical equipment can operate without interfering with communication services. There must be bands for international broadcast and bands for amateurs.

The big allocation problem today is that the demand has far outstripped the frequencies available. It is becoming increasingly difficult to squeeze new stations into existing bands. This has resulted in strong competition among the various radio services. The problem cannot be solved by creating more frequencies because all usable frequencies are assigned and most services can't move "upstairs" until new methods and equipment become available.

However, much can be done, and is being done, to use the limited available frequencies more effectively. Maximum utilization of the radio spectrum depends upon proper assignment of frequencies and upon proper use of the frequencies assigned. This entails propagation and other highly technical studies. It may even be necessary in time to use directional antennas in some services besides standard broadcast.

Assigning bands of frequencies to the different radio services is not

only a difficult problem, as far as our own country is concerned, but it is also an international problem. Radio transmissions cross international borders and, therefore, there must be coordination and agreement in their sharing. A foreign passenger plane arriving in this country must be able to talk on the same frequency band that an American carrier plane over Paris uses for communication. Likewise, British merchant ships cannot employ radar on the bands which the United States uses for television. Just as bands set aside for radiotelephone and radiotelegraph must be shared by stations of the United States with other stations throughout the world, so must ship bands, aviation bands, and international broadcasting bands also be used jointly.

### 3. INTERNATIONAL CONFERENCES

The Commission's role in international communication matters is a technical yet increasingly active one. Working through the Department of State, it is called upon to do a large share of the preparatory work for international conferences, to furnish a large proportion of the United States delegates and advisers to these conferences, and to maintain comprehensive records with respect to international treaties and other agreements which affect domestic telecommunications interests.

During the fiscal year 1948, the Commission participated in 15 international sessions here briefed:

*International Telecommunication and Radio Conference, Atlantic City, N. J., May 15 to October 2 1947.*—This, the most important session of its kind, harmonized existing world regulations with post-war developments. Representatives of 72 countries attended and the Chairman of the Federal Communications Commission presided. The revised agreements on telecommunications, replacing the Madrid Convention of 1932, and those on radio, replacing the Cairo Radio Regulations of 1938, will become effective January 1, 1949, except the allocation of frequencies below 27,500 kilocycles. The latter will not come into force until a date has been determined by a special Administrative Radio Conference which will meet to consider a new international frequency list being drafted by the Provisional Frequency Board at Geneva. However, all or any portion of the band 150 to 2,850 kilocycles may come into force in region 2, of which the United States is a part, on or after January 1, 1949, under special arrangements agreed upon by the interested countries in this region.

*Preliminary NARBA (North American Regional Broadcasting Agreement) Conference, Havana, November 1947.*—Agreement was reached on many engineering standards and technical definitions preparatory to the general NARBA conference in Canada in 1949.



*ITU (International Telecommunications Union) Provisional Frequency Board, Geneva, January 1948.*—Established by the Atlantic City meeting, this board is drafting a new international frequency list for submission to a conference March 3, 1949, at Geneva.

*ITU Planning Committee on High-Frequency Broadcasting, Geneva, March to April 1948.*—Also established by the Atlantic City conferences, this committee drafted an allocation plan for HF broadcasting. It will meet in Mexico City October 1, 1948, to consider replies to its proposals prior to the opening of a world-wide conference on October 22 following.

*Preparatory Committee for the International Administrative Aeronautical Radio Conference, Geneva, April to May 1948.*—Compiling world frequency requirements for the aeronautical mobile services in preparation for the International Administrative Conference.

*International Administrative Aeronautical Radio Conference, Geneva, May to July 1948.*—Studied the technical and operating requirements of aeronautical mobile communications on the basis of Atlantic City allocations.

*CCIT (International Telegraph Consultative Committee), Brussels, May 1948.*—A subsidiary of the International Telecommunications Union, it considered problems in the fields of telegraphy and facsimile.

*CCIF (International Telephone Consultative Committee), Stockholm, June 1948.*—Also associated with the ITU, this conference issued recommendations regarding international telephone operations.

*Regional European Maritime Radio Conference, Copenhagen, June 1948.*—Considered the needs of the maritime services in certain bands between 255 and 525 kilocycles.

*Safety of Life at Sea, Committee of Experts, London, January to February 1948.*—Considered coordination of activities in fields of aviation, shipping, and telecommunications respecting both sea and air, reporting to the United Nations and the ensuing Safety of Life at Sea Conference.

*International Conference of Safety of Life at Sea, London, April to June 1948.*—Revised the 1929 London convention.

*ICAO (International Civil Aviation Organization).*—The Commission furnished delegates or advisers to the *South Atlantic Regional Air Navigation Meeting at Rio de Janeiro in July 1947*; the *Caribbean Regional Meeting, Mexico City, in September 1947*; the *Personnel Licensing Division Meeting at Montreal in April 1948*; and the *European-Mediterranean Regional Air Navigation Meeting at Paris in May 1948*.

The Commission is also doing preliminary work for 20 other international conferences and meetings to be held in fiscal 1949:

*International Radio Consultative Committee (CCIR), Stockholm, July 1948.*

*Second Meeting of Planning Committee on HF Broadcasting, Mexico City, October 1, 1948.*

*International Conference on HF Broadcasting, Mexico City, October 22, 1948.*

*Special Administrative Radio Conference for Approval of Frequency List being drafted by Provisional Frequency Board, Geneva, March 3, 1949.*

*Fourth Inter-American Telecommunications Conference, at a place to be selected in the Americas, March 1949.*

*Committee on Revision of International Telegraph Regulations, Geneva, January 1949.*

*Technical Study Groups of CCIF, The Hague, April 1949.*

*Joint Committee of CCIF and CCIT, Paris, May 1949.*

*International Administrative Telegraph and Telephone Conference, Paris, May 1949.*

*European Conference for Study of Bands 1605 to 2850, 3155 to 3400, and 3500 to 3900 kilocycles, Oslo. June 1949.*

*CCIF Meeting, Paris, June 1949.*

*Third NARBA Conference, Canada, September 1949.* At the fiscal year's close, all countries except Cuba had agreed to extend the present agreement 2 years—to March 29, 1951.

*ICAO Africa-South African-Indian Ocean Regional Air Navigation Meeting.*

*ICAO India-Southeast Asia Regional Air Navigation Meeting, New Delhi.*

*ICAO Middle East Regional Air Navigation Meeting.*

*ICAO South American Regional Air Navigation Meeting.*

*ICAO South Atlantic Regional Air Navigation Meeting.*

*ICAO South Pacific Regional Air Navigation Meeting.*

*ICAO Communications Division Meeting, Montreal.*

*ICAO Search and Rescue Division Meeting, Montreal.*

#### 4. FREQUENCY CHANGES

The fiscal year 1948 was a transition year for international communications matters. It was marked by efforts on the part of the United States Government and domestic industry to prepare for the programs adopted at the Atlantic City sessions.

Finalizing the Atlantic City agreements will involve years of preparation, various other conferences, and extensive adjustments in the use of the radio spectrum. However, the past year saw decision in numerous instances where service-allocation of radio frequencies was under review.

The original proposal of the Radio Technical Committee for Aeronautics for more space in the vicinity of 1,000 megacycles for the aeronautical radionavigation service was adopted substantially by the ITU internationally and by the Commission and the IRAC in the United States. This new allocation preceded the program of installation of a new system of aids to air navigation and traffic control. This would not have been possible without the required spectrum space being obtained at the expense of other radio services.

The deletion of television channel No. 1 (see "Television") resulted in that space, 44 to 50 megacycles, going to non-Government fixed and mobile services. This move prompted proposed reallocation of the mobile band 152 to 162 megacycles to implement the new maritime telephone frequency, suballocation of the bands 25 to 30, 450 to 460, 940 to 952, 9,800 to 10,000 megacycles, and proposal that the new fixed band 72 to 76 megacycles be used subject to no interference to television reception.

The problem of securing frequencies to satisfy the short-wave broadcasting requirements of even the principal nations, which was already serious 10 years ago, has increased both in magnitude and complexity. Before the war less than 20 countries were engaged in international broadcasting. Today 77 nations are either actively engaged in high-frequency broadcasting or have indicated intentions to enter this field.

At Atlantic City it was recognized that if high-frequency broadcasting were to continue, the frequencies would have to be assigned in accordance with a plan which would be acceptable to a majority of the countries. The need for international frequency sharing was unanimously agreed upon, as well as the need for the adoption of sound engineering and other technical standards governing the operation of HF broadcasting.

Although it may not appear on the surface that the international short-wave broadcasting has any appreciable effect on other services operating between 3 and 35 megacycles, the world situation in this field is such that today many frequencies assigned to services other than broadcasting in this region of the spectrum are constantly being subject to interference from foreign broadcasts. If this practice continues, it could prove dangerous to essential communications involving safety of life, such as aviation. The most feasible solution is world-wide planning of broadcasting between 3 and 30 megacycles.

The United States will be expected to play a leading role at the Mexico City High Frequency Broadcasting Conference. The United States has been the principal exponent of frequency assignments on a planned basis. The International Frequency Registration Board, which was established to succeed the Berne Frequency List, is a United

States idea. The Provisional Frequency Board, which is making the new frequency assignment plan for the radio spectrum, is a United States idea. The various specialized groups and conferences concerned with frequency assignments on an international basis, such as Maritime, Aeronautical and High Frequency Broadcasting Conferences, were all suggested by the United States delegations at Atlantic City.

The United States has consistently maintained that an HF broadcasting assignment plan could be developed on a technical basis, that a set of engineering principles could be established and adhered to by a majority of the countries of the world, that frequency sharing could be accomplished both on a timesharing and geographical basis, and that, in short, in this way it is possible to bring order out of the chaos now existing in the high-frequency bands.

## 5. FREQUENCY ALLOCATION AND TREATY DIVISION

It is not possible to centralize in one organizational unit all the international functions of the Commission. Therefore, personnel in various units perform such tasks as are adjunct to their duties in such fields as marine, aeronautical, common carrier, broadcasting, etc. However, coordination is achieved through a Frequency Allocation and Treaty Division, established November 3, 1947.

This division is responsible for continuously studying the use and allocation requirements of various radio services, maintaining the master record of all Government and non-Government frequency assignments within the United States, generally coordinating the Commission's work in connection with international conferences, and maintaining records regarding such conferences and treaties.

The division is Commission contact with the International Telecommunications Union and represents the Commission on the Interdepartment Radio Advisory Committee, Interdepartmental Committee on Scientific and Cultural Cooperation, Telecommunications Coordinating Committee, Joint Aviation Telecommunications Coordinating Committee, Washington Provisional Frequency Board Liaison Committee, and the International Meteorological Organization. It furnishes the entire secretariat for the IRAC and the WPFBLC.

## 6. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The IRAC, representing various Government departments and agencies, authorized a record number of frequency assignments to Government radio stations. It processed 11,471 requests, of which number 3,988 were regular assignments, 1,533 were deletions of regular assignments, 131 were changes in assignments, 3,322 were temporary

assignments, 2,089 were deletions of temporary assignments, and 408 were telephone approvals.

#### 7. DOMESTIC FREQUENCY ALLOCATIONS AND RULES

On June 11, 1948, the Commission proposed amending part 2 of its General Rules and Regulations in conformity with the Atlantic City radio regulations and existing treaties and conventions, to define all currently recognized radio services and stations, and to list all domestic frequency allocations between 25 megacycles and 30,000 megacycles.

#### 8. INTERNATIONAL TREATIES AND AGREEMENTS

In addition to the Atlantic City agreements, the United States is signatory to the following major treaties and conventions which are still in effect: Safety of Life at Sea Convention, London, 1929; International Communications Convention, Madrid, 1932; General Radio Regulations, Cairo, 1938; North American Regional Broadcasting Agreement, Havana, 1937; Radiocommunications Agreement, Santiago, 1940; and the Interim Agreement (Modus Vivendi), Washington, 1946. In addition, this country has regional arrangements with Canada and Mexico with respect to broadcasting and aeronautical and maritime radio communication. New agreements with Canada cover FM and television broadcast assignments in both countries to prevent mutual interference, as already in effect with respect to standard broadcasting. A more detailed listing will be found in the appendix to this report.

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## CHAPTER III. RADIO BROADCAST SERVICES

1. GENERAL
2. STANDARD (AM) BROADCAST SERVICE
3. FREQUENCY MODULATION (FM) BROADCAST SERVICE
4. TELEVISION (TV) BROADCAST SERVICE
5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE
6. INTERNATIONAL BROADCAST SERVICE
7. FACSIMILE BROADCAST SERVICE
8. REMOTE PICK-UP BROADCAST SERVICE
9. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE
10. DEVELOPMENTAL BROADCAST SERVICE
11. BROADCAST STATISTICS

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### 1. GENERAL

#### BROADCAST REGULATION

Commission regulation of broadcasting may be divided into two broad phases.

The first of these deals with the allocation of spectrum space to the different kinds of broadcast services in accordance with international agreement, and the formulation of policies and promulgation of rules to carry out the intent of such treaties and the Communications Act. The latter function includes the establishment of engineering standards and regulations covering technical aspects of construction and operation.

The second phase is concerned more directly with individual stations, and embraces consideration of applications to build and operate; the assignment of specific frequencies, power, time of operation, and call letters; the periodical inspection of equipment and the technical aspects of operation; passing upon transfers and assignments of facilities, also the many varied changes in existing authorizations; modifying and renewing construction permits and licenses; reviewing the past general service of each particular broadcaster to determine whether it has been in the public interest; licensing radio operators; and otherwise discharging domestic regulatory responsibilities.

New station authorizations are also subject to Civil Aeronautics Administration approval of proposed transmitter sites and antenna systems to guard against interference to air navigation. There is collaboration with other governmental agencies, both federal and state, where their jurisdictions are involved.

Broadcast stations are not common carriers under the Communications Act. Consequently, the Commission is not empowered to pass upon charges for the use of time or for advertising, nor is it concerned

with matters of internal management. Since the Commission is charged by the act to grant renewals of licenses only if it determines that service is in the public interest, it is incumbent upon the Commission to inquire into the over-all past operation of stations in reaching such determination. This is done by inquiry, investigation, or formal hearing.

#### POSTWAR GROWTH OF BROADCASTING

The postwar growth of broadcasting is revealed in the fact that the total number of authorized AM (amplitude modulation), FM (frequency modulation) and TV (television) stations has more than tripled in the last 3 years. Figures on the number of stations licensed or initially authorized at the close of each of the past 6 fiscal years were:

	1943	1944	1945	1946	1947	1948
AM.....	912	924	955	1,215	1,795	2,034
FM.....	48	52	53	511	918	1,020
TV.....	8	9	9	30	66	109
Total.....	968	985	1,017	1,756	2,779	3,163

At the close of fiscal 1948 nearly 4,000 stations in 10 categories were authorized in connection with broadcast services (see detailed table at the conclusion of this chapter). This was an increase of more than 400 over the previous year. Most of this gain was in the major services—AM, 239; FM, 102; and TV, 43. This net gain was in spite of the fact that 47 AM and 80 FM stations and 1 TV station were deleted.

#### BROADCAST APPLICATIONS

During fiscal 1948 the Commission received a total of 7,700 broadcast applications, an increase of 2,364 over the previous year. These covered requests for new stations, changes in facilities, licenses, renewals, transfers, modifications, etc. The year closed with 2,555 such applications pending as against 2,209 on June 30, 1947. Assignment and transfer applications rose to 425, which is about 230-percent increase over the previous year. It is expected that this trend will continue because of the lack of additional frequencies for new installations. (See table at the conclusion of this chapter.)

The majority of applications involved AM, 4,033. The FM total was 2,343. The last half of the year saw a rapid rise in the number of television applications and a leveling off of FM requests. Applications for new TV stations almost equaled the number of those for new AM facilities; FM seekers were less than half the TV number.

BROADCAST HEARINGS

Most of the Commission's hearing work (see Hearings, ch. 1) is in broadcast matters—largely on AM applications. In the 27 months between the close of the war and January 1, 1948, the Commission authorized 1,054 new AM stations. Out of 1,022 of these cases, 162 or 15.9 percent were granted after hearing. Fifty-four new AM stations were granted in fiscal 1948 as the result of hearing, and 285 without hearing.

From VJ-day to June 30, 1948, a total of 1,061 FM authorizations were made. Because of the newness of this service, the general availability of frequencies and lack of interference problems usually associated with AM applications, only 80 or 7.5 percent required hearing. In the past fiscal year, 28 new FM stations were granted after hearing, and 182 without hearing.

Docket statistics involving all types of broadcast cases during fiscal 1948 follow:

	Pending July 1, 1947	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1948
AM.....	650	364	313	228	473
FM.....	98	45	32	58	53
TV.....	3	210	21	4	188
Other.....	8	4	6	2	4
Total.....	759	623	372	292	718

At the close of fiscal 1948, a total of 881 applications for new or changed AM stations were pending, of which number 401 (or 45.5 percent) were awaiting hearing. At the same time, pending FM applications of this nature aggregated 193, of which number 43 (or 23.3 percent) were in hearing. Like television applications amounted to 313, with 182 (or 57.8 percent) designated for hearing.

MULTIPLE OWNERSHIP

No change was made during the fiscal year in the existing rules which prohibit ownership operation of more than one AM, FM, or TV broadcast station in the same area, or more than six FM stations or five TV stations throughout the country as a whole. There was no over-all limitation on the number of standard broadcast stations. However, the Commission was considering substantive changes. (See Subsequent Developments.)

BROADCAST EDITORIALIZING

The Commission, in March and April of 1948, conducted an en banc hearing in the matter of editorializing by broadcast stations. It was held to determine "whether the expression of editorial opinions by



broadcast station licensees on matters of public interest and controversy is consistent with obligations to operate their stations in the public interest," also "the relationship between any such editorial expression and the affirmative obligation of the licensee to insure that a fair and equal presentation of all sides of controversial issues is made over their facilities." The hearing was ordered by the Commission on September 5, 1947, in view of "widespread discussion of the exact meaning" of its opinion of January 16, 1941, in the Mayflower Broadcasting Corp. case; "its application to particular situations, and the desirability or undesirability of having a general policy concerning editorializing by broadcast stations." Hearing was scheduled for November 1.

#### POLITICAL BROADCASTS

The legislative history of section 315 of the Communications Act "makes it abundantly clear that Congress did not intend licensees to have any right of censorship over political broadcasts," declared the Commission in a decision of June 28, 1948, relating to the Port Huron Broadcasting Co. (WHLS, Port Huron, Mich.) The particular section of that act reads:

If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station, and the Commission shall make rules and regulations to carry this provision into effect: *Provided*, That such licensee shall have no power of censorship over the material broadcast under the provisions of this section. No obligation is hereby imposed upon any licensee to allow the use of its station by any such candidate.

The Commission stated that this particular censorship prohibition by Congress "appears clearly to constitute an occupation of the field by Federal authority which, under the law, would relieve the licensee (but not the actual speaker) for any libelous matter broadcast in the course of a speech coming within section 315 irrespective of the provisions of State law."

#### LOTTERIES

In the fall of 1947 the Commission ordered an individual station licensee to show cause why a certain program, which appeared to contain elements of prize and chance, did not constitute a violation of then section 316 of the Communications Act which prohibits the broadcast of any advertisement or information concerning any lottery or gift enterprise. Hearing was held in November 1947 and decision was pending at the close of the year. (See Legislation and Subsequent Developments.)

#### OTHER BROADCAST POLICY CONSIDERATIONS

Information that several broadcast stations had contracted for the sale of time to advertising agencies, which in turn marketed this time

to sponsors who arranged their programs, caused the Commission on August 11, 1947, to point out that the act holds the licensee responsible for the management and operation of his station and he cannot delegate that responsibility to another by contract or otherwise.

Observing that a number of transfers of station control had been consummated prior to obtaining Commission consent, the Commission on May 7, 1948, reminded licensees and permittees that a transfer cannot legally take place until after the Commission has given its approval.

On February 20, 1948, the Commission proposed rules (docket 8747) which would require the main studios of AM and FM stations to be located in the city for which the station is licensed. Oral argument on request of interested parties was scheduled for October 1948.

#### NETWORKS

The Commission does not license networks as such, but issues licenses to individual stations. However, stations owned or affiliated with networks are subject to the chain broadcasting regulations promulgated by the Commission in 1940.

The close of fiscal 1948 saw 1,105 AM stations affiliated with the 4 major networks as follows: American Broadcasting Co., 262; Columbia Broadcasting System, 172; Mutual Broadcasting System, 506, and National Broadcasting Co., 165. The number of stations wholly owned by these networks remained unchanged—ABC, 5; CBS, 7; MBS, 0; and NBC, 6—a total of 18. There were more than a score of regional AM networks, and FM and TV networks were developing.

#### BROADCAST STATION CONSTRUCTION COSTS

Estimates given on applications for new commercial broadcast stations indicate average current construction costs as follows: Standard and FM broadcast, each around \$50,000, including land and buildings; and television, \$200,000, exclusive of land and buildings. For both FM and TV stations, however, the cost range varies widely, depending upon whether metropolitan or community service is proposed, whether the stations will be built as adjuncts to AM stations, as well as a number of other factors.

On November 4, 1947, the Commission made available its Economic Study of Standard Broadcasting which indicated the rapid growth in the number of AM stations since the war and analyzed certain significant factors that might affect the future economic health of the industry. It was too early in the development of FM and TV to warrant similar studies in those fields.

#### GROUP INTERESTS IN BROADCASTING

Increasing interest in broadcast operation by religious, labor, and amusement groups was noted during the year. Various denomina-

tional churches, schools, and other institutions had acquired or were seeking AM and FM stations in many sections of the country. Labor groups were holders of or applicants for AM and FM grants in New York, Boston, Philadelphia, Cleveland, Detroit, Chicago, Los Angeles, and Chattanooga. Motion-picture and theater concerns evinced particular interest in television.

Newspaper ownership or affiliation, as of January 1, 1948, was indicated in 444 out of 1,887 AM authorizations; 331 out of 1,010 FM authorizations, and 24 out of 73 TV authorizations.

#### RECEIVING SETS

The Commission does not license broadcast receivers. From 60,000 sets in 1922, the total was nearing 75,000,000. Over 94 percent (about 37,000,000) of the families of the United States are said to possess receivers. It is estimated that an average of 30,000,000 individuals listen to radio sometime during each day and that the average daily listening per family is in excess of 4 hours.

Production of FM and TV receivers was increasing. Of nearly 8,500,000 receivers the industry reported having manufactured in the first 6 months of the calendar year 1948, a total of 770,000 were capable of receiving FM, and nearly 335,000 others were for TV reception. The figures for 1947 (12 months) were 1,175,104 FM and 178,571 TV sets out of a total of 14,666,040 of all types. Many of the new TV sets contain FM or AM bands, or both.

## 2. STANDARD (AM) BROADCAST SERVICE

### GENERAL

The demand for standard broadcast facilities continued during the fiscal year, but abated somewhat from its peak in early 1947. From an engineering viewpoint, desirable AM facilities are becoming scarcer, with unlimited time facilities practically nonexistent, and daytime only facilities extremely hard to find in the more heavily populated areas of the country.

However, the number of AM stations increased 239 during the 12-month period, bringing their total as of June 30, 1948, to 2,034. Most of the 4,033 AM applications received involved changes in facilities, licenses and renewals, transfers, etc.

As of January 1, 1948, 133 communities had 4 or more AM stations.

### DEVELOPMENTS

Probably the most important developments in the standard broadcast field during the past year are associated with the clear channel allocation problem and the North American Regional Broadcasting Agreement.

The record in the long-standing clear-channel proceeding (docket 6741), begun in early 1946, was completed in October 1947. Subsequent to the adjournment of the clear-channel hearing on October 31 of that year, the matter was consolidated with docket 8333 which deals with the related problem of daytime skywave transmission. Oral arguments in both dockets were held before the Commission January 19 to 21, 1948.

#### CLEAR CHANNELS

The clear-channel principal has been inherent in the American system of broadcasting from its early beginnings. It concerns a limited number of the standard broadcast channels set apart for the operation of high-powered stations with extensive areas protected against interference.

Of the 106 available AM channels, 59 have been set apart for clear channel broadcasting in North America. A high degree of protection is afforded the United States on 46 of them, with priority for protection on the remaining 13 going to other North American countries. This allocation practice has been heretofore justified as a means of providing broadcast service to widespread sparsely populated rural areas.

Of the 46 clear channels used in this country, 24 are each occupied by only one station at night, with all foreign assignments so restricted that the interfering signal at the border does not exceed an objectionable level. The other 22 clear channels may have several stations operating at night with less extensive protected areas.

Exclusive nighttime operation versus shared nighttime operation has long been a subject of spirited controversy among and between broadcasting groups, and it is this issue around which all other issues in the clear channel proceedings revolve.

Sixteen of the 24 domestic stations with exclusive night operation have formed an association which strongly advocates Commission rules that would permit exclusive night operation with power of 750 kilowatts as a means of providing a reasonably satisfactory broadcast service to 22,000,000 rural listeners. On the other hand, an association of regional stations spearheads a group contending that the present power limitation of 50 kilowatts should be retained and protection on the 24 exclusive channels should be relaxed so as to permit operation at night by more than one station.

The consolidated dockets now contain approximately 6,700 pages of testimony, 421 exhibits and voluminous briefs. The Commission had hoped to reach a decision which could be reflected in United States proposals for a new North American Regional Broadcasting Agreement. Shortly after the close of arguments in January of 1948, the United States Senate Interstate and Foreign Commerce Committee commenced consideration of the Johnson bill (S. 2231) which pro-

posed to keep the power of standard broadcast stations to the 50-kilowatt maximum and provide for duplication of clear channels. Inasmuch as the question of power limitation is one of the basic issues in the clear-channel proceeding, the committee requested the Commission to withhold decision pending disposition of the bill.

The Commission felt that decision in the clear-channel matter is a necessary preliminary to formulating proposals for a new North American Regional Broadcasting Agreement and, therefore, in the early part of 1948 requested the Department of State to propose postponement of the scheduled Canadian conference for at least 1 year and to extend the present NARBA for 18 months. At about the same time Mexico proposed a 1-year postponement of the conference and a 2-year extension of the agreement. As a result all signatory countries have agreed to delay the conference until September 1949, and at the close of the fiscal year all except Cuba had agreed to extension of the existing agreement until March 29, 1951.

A record of the testimony and other data considered by the Senate committee in connection with the Johnson bill comprises a 1,586-page document. Although this bill was not acted upon by the Eightieth Congress, controversy over the power question continues. The Commission feels that a decision before the 1949 NARBA conference is imperative.

#### 540 KILOCYCLES

One additional repercussion from the postponement of the NARBA session concerns the use of 540-kilocycle frequency for standard broadcasting. The AM broadcast band presently employed in the United States is 550 to 1600 kilocycles. Subject to regional agreement on the details of its use, 540 kilocycles was made available for broadcasting in the North American Region at the 1947 Atlantic City radio and telecommunications conferences.

The Department of State and the Commission feel that the addition of 540 kilocycles to the United States broadcast band must necessarily be delayed until agreement is reached with the other countries of North America. Accordingly, no plans for its domestic use have yet been adopted. Mexico, however, has seen fit to make an assignment on 540 kilocycles which would severely curtail any possible use of that frequency by United States stations. The assignment has been protested by the United States Department of State.

#### SPECIAL TEMPORARY AUTHORIZATIONS

The general trend of AM stations to use special temporary authorizations to operate beyond the hours for which they are licensed caused the Commission, on June 27, 1948, to abolish such authorizations, beginning August 16 following. This decision was the result of rule-

making proceedings. There was evidence that special temporary authorizations to daytime or limited time stations had been used to such a degree that night service by full-time stations was suffering considerable degradation.

**SMALL LOCAL OUTLETS EXPAND**

One significant aspect of the postwar expansion of radio stations has been the extension of standard broadcast facilities into small- and medium-sized communities. The table below shows the number and percent of communities of specified population size having one or more authorized AM radio stations as of October 8, 1945, and as of June 30, 1948:

Population size	Total number of communities in the United States (1940 census) <sup>1</sup>	Number and percent of total communities with 1 or more authorized radio stations:			
		On Oct. 8, 1945		On June 30, 1948 <sup>2</sup>	
		Number	Percent	Number	Percent
2,500 to 5,000.....	1,134	27	2.4	<sup>3</sup> 208	18.3
5,000 to 10,000.....	678	86	12.7	306	45.1
10,000 to 25,000.....	413	204	49.5	342	82.8
25,000 to 50,000.....	122	109	89.3	122	100.0
Over 50,000.....	140	140	100.0	140	100.0
Total.....	2,487	566	22.8	1,118	45

<sup>1</sup> The number of communities in each of the population groupings under 50,000 is derived from 1940 census data, excluding communities forming part of metropolitan districts. Each metropolitan district is counted as a single-radio community for purposes of this tabulation. A metropolitan district is defined as including a central city or cities with a population of 50,000 or more and the contiguous areas having a population of 150 or more persons per square mile.

<sup>2</sup> Includes 46 communities with FM stations only; all other communities have 1 or more AM stations.

<sup>3</sup> Includes 59 communities of less than 2,500 population in 1940.

**STANDARD BROADCAST FINANCIAL DATA**

The following table shows comparative financial data for the standard broadcast networks and stations in the calendar years 1946 and 1947:

Networks and standard stations	1946, 8 networks, 1,025 stations	1947, 7 networks, 1,464 stations	Percent increase or (decrease)
Investment in tangible broadcast property:			
Cost to respondent.....	\$107,790,819	\$129,497,615	20.14
Depreciation to date under present owner.....	51,365,253	46,371,185	(9.72)
Depreciated cost.....	56,425,566	83,126,430	47.32
Revenues from sale of network time.....	134,781,108	134,726,631	(.04)
Revenues from sale of nonnetwork time.....	199,297,806	239,860,055	20.10
Commission paid representatives, etc.....	45,469,650	47,969,521	5.50
Revenues from sale of talent, etc.....	33,943,507	37,597,222	10.76
Total broadcast revenues.....	322,552,771	363,714,387	12.76
Total broadcast expenses.....	246,086,525	291,918,447	18.62
Broadcast income.....	76,466,246	71,795,940	(6.11)

The following table compares the 1946-47 broadcast revenues, expenses, and income of the four Nation-wide networks and their key stations:

Four Nation-wide networks and their key stations	1946	1947	Percent increase or (decrease)
Number of key stations.....	10	11	
Total broadcast revenues.....	\$86,494,599	\$91,232,718	5.48
Total broadcast expenses.....	71,708,921	75,091,412	4.72
Broadcast income (before Federal income taxes).....	14,785,678	16,141,306	9.17

The distribution of the 1947 broadcast revenues and broadcast income (before the Federal income taxes) as between networks and stations is shown in the following tables:

*Distribution of total broadcast revenues, 1947*

	Amount	Percent of total	Amount	Percent
Networks, including 27 owned and operated stations.....			\$104,407,721	28.7
Networks and their 11 key stations.....	\$92,670,766	25.5		
16 other network owned and operated stations.....	11,736,955	3.2		
1,437 other stations.....			259,306,666	71.3
971 stations serving as network outlets.....	208,495,683	57.3		
466 stations not serving as network outlets.....	50,810,983	14.0		
Total broadcast revenues.....			363,714,387	100.0

*Distribution of broadcast income (before Federal income taxes)*

	Amount	Percent of total	Amount	Percent
Networks, including 27 owned and operated stations.....			\$19,573,573	27.3
Networks and their 11 key stations.....	\$16,244,688	22.6		
16 other network owned and operated stations.....	3,328,885	4.7		
1,437 other stations.....			52,222,367	72.7
971 stations serving as network outlets.....	48,194,654	67.1		
466 stations not serving as network outlets.....	4,027,713	5.6		
Total broadcast income (before Federal income taxes).....			71,795,940	100.0

Because of the substantial number of new stations in their early and less profitable months of operation included in 1947, trends in the data given above may not correspond to the experience of "old" stations. For this reason, comparative data for the 2 years are presented below for identical stations, i. e., for stations which were in operation in both years and which did not change their status during the period with respect to class, time, and whether or not affiliated with a network. The data are shown in terms of averages per station of broadcast revenues, expenses and income for each class of station, excluding the Nation-wide networks and their 11 key stations.

Standard broadcast stations (excluding 11 key stations of Nation-wide networks)	1946	1947	Percent in- crease or (decrease)
<b>Averages per station:</b>			
<b>Clear channel 50-kilowatts unlimited:</b>			
Number of stations, 41			
Total broadcast revenues.....	\$1, 225, 807	\$1, 261, 878	2.94
Total broadcast expenses.....	\$829, 767	\$894, 367	7.79
Broadcast income.....	\$396, 040	\$367, 511	(7.20)
<b>Clear channel 50-kilowatts part-time:</b>			
Number of stations, 3			
Total broadcast revenues.....	\$964, 239	\$1, 092, 125	9.85
Total broadcast expenses.....	\$772, 491	\$821, 111	6.29
Broadcast income.....	\$221, 748	\$271, 014	22.22
<b>Clear channel 5- to 20-kilowatts:</b>			
Number of stations, 1 26			
Total broadcast revenues.....	\$444, 939	\$501, 004	12.60
Total broadcast expenses.....	\$374, 025	\$417, 185	11.54
Broadcast income.....	\$70, 914	\$83, 819	18.20
<b>Regional unlimited:</b>			
Number of stations, 274			
Total broadcast revenues.....	\$345, 986	\$359, 596	3.9%
Total broadcast expenses.....	\$246, 975	\$267, 019	8.12
Broadcast income.....	\$99, 011	\$92, 577	(6.50)
<b>Regional part-time:</b>			
Number of stations, 48			
Total broadcast revenues.....	\$170, 276	\$177, 845	4.45
Total broadcast expenses.....	\$139, 426	\$148, 144	6.25
Broadcast income.....	\$30, 850	\$29, 701	(3.72)
<b>Local unlimited:</b>			
Number of stations, 408			
Total broadcast revenues.....	\$113, 551	\$122, 113	7.54
Total broadcast expenses.....	\$94, 889	\$98, 408	3.26
Broadcast income.....	\$28, 662	\$23, 705	(11.00)
<b>Local part-time:</b>			
Number of stations, 12			
Total broadcast revenues.....	\$68, 305	\$79, 649	16.61
Total broadcast expenses.....	\$53, 421	\$60, 772	13.76
Broadcast income.....	\$14, 884	\$18, 877	26.83
<b>All stations:</b>			
Number of stations, 812			
Total broadcast revenues.....	\$264, 694	\$278, 181	5.10
Total broadcast expenses.....	\$192, 756	\$210, 755	9.34
Broadcast income.....	\$71, 938	\$67, 426	(6.27)

<sup>1</sup> Includes 1 part-time station.

NOTE.—All broadcast income is before Federal income taxes.

### 3. FREQUENCY MODULATION (FM) BROADCAST SERVICE

#### FM CONTINUES TO GROW

Frequency modulation (FM) broadcasting continued to expand and furnished a considerable portion of the program service available to the public. This static-free and high-fidelity type of broadcast can now be heard in most of the populous areas of the country.

During the year the number of commercial FM stations on the air increased nearly 2½ times—jumping from 238 to 587—and at its close several hundred other FM stations were in various stages of construction. The number of authorized stations rose from 918 to 1,020. Either figure exceeds the total of all AM stations before the war.

The FM band (for commercial and educational broadcast) consists of 100 channels, 200 kilocycles wide, occupying that portion of the radio spectrum from 88 to 108 megacycles.

#### FM APPLICATIONS

The rate of filing applications for new FM stations decreased from the peak reached shortly after the war, and the year closed with 90 applications pending.



Initially, the majority of FM applications were from urban places, particularly large cities where the demand for facilities exceeded the number of frequencies available. In most areas of the country, though, the number of FM channels is adequate. This has resulted in some potential FM broadcasters preferring to wait until FM receivers are more widely distributed. However, a number of new FM stations are being established to serve areas largely rural in character.

#### NETWORK OPERATION

As far as FM network operation is concerned, the Commission believes that, in general, common carrier facilities—telephone or microwave—will be used for this purpose. On May 6, 1948, it proposed to permit intercity relay of FM programs on frequencies allocated for FM studio-link-transmitter purposes (940 to 952 megacycles). At the same time, it pointed out that there is nothing in its rules to prevent FM stations from rebroadcasting the programs of other FM stations, as is being done in some regions. In 1948 most FM network broadcasting was over 5,000-cycle wire lines used for AM network operation.

Telephone rates for 15,000-cycle intercity FM transmission became effective February 18, 1948. Such relay is possible over three types of wire circuits, including coaxial cable.

About half a dozen regional FM networks were operating or proposed.

#### AM DUPLICATION OVER FM STATIONS

Of importance to the development and public acceptance of FM broadcasting was the agreement reached in January 1948, between standard broadcast networks and the musicians, under which AM musical programs may be duplicated over FM stations without extra cost or additional programming personnel. As a result, listeners found many of their favorite programs on FM for the first time. FM stations associated with AM stations may be separately programmed or not, or in any combination of hours, as desired by the licensees. Of the 1,020 FM authorizations, approximately 800 were held by AM licensees or permittees.

#### FM LICENSE PERIOD INCREASED

Effective May 1, 1948, the Commission extended the normal license period of FM stations (both commercial and noncommercial) to 3 years after an initial system of expiration dates to fit a staggered schedule for renewal of licenses. The previous FM licensing period was 1 year. This not only recognized the stature of FM but helped to reduce the Commission's work load.

#### FM CONSTRUCTION

The Commission continued its policy of encouraging FM stations to start operation with interim equipment pending completion of full

construction. This was done to foster the expansion of FM and permit FM broadcasters to begin programming while awaiting the delivery of higher-powered equipment. In consequence, about half of the FM stations on the air were using less than their full authorized power.

In some cases permittees have been dilatory in constructing stations. The Commission has granted them extensions of time on the condition that construction be completed or interim operation commenced within the additional time authorized. A few construction permits were surrendered as a result of this requirement. Some permits have been relinquished because of increased construction costs and limited initial revenue in a new service.

The production of FM transmitters, antennas, and associated equipment increased rapidly during the year. At its close, almost any equipment desired was available from stock or on short notice. FM transmitters are usually built in units so that higher-powered amplifiers may be added as desired or as they become available.

As of June 1948, the practice of making FM conditional grants preliminary to issuing construction permits was abandoned because processing procedure and other considerations no longer made this temporary expediency necessary.

#### FM RECEIVERS

Approximately 2,000,000 FM receivers were estimated to be in use as of July 1, 1948. They were becoming available in quantity in practically all price ranges. In addition, numerous tuners could be had at reasonable prices for adapting AM receivers to FM reception. The year saw the appearance of table-model combination AM-FM receivers selling for \$50 or less. While receivers in this price range do not provide the tonal quality found in more expensive console models, they do furnish FM reception that is comparatively free from static and other interference.

#### 4. TELEVISION (TV) BROADCAST SERVICE

##### SURGE IN TELEVISION APPLICATIONS AND SERVICE

As a result of television receivers, transmitters, cameras, and other associated equipment becoming plentiful, and the increased public interest in visual radio, there was an unprecedented surge in the number of applications for new TV stations.

At the end of the year 7 TV stations were licensed, 102 construction permits outstanding, and 294 applications pending. In addition to those licensed, 21 stations were operating on an interim basis. In consequence, 30 stations were bringing television broadcast service to 17 cities and metropolitan districts, as compared with 8 cities served by 12 stations the previous year. The demand for television facilities

was so much greater than the available allocated channels that 181 of the pending 294 applications had been designated for consolidated hearings at the end of the year.

The Commission continued to relax its requirement of a minimum of 28 hours of program service by each station per week. However, on June 17, 1948, it adopted a new rule which specified a graduated minimum hours of operation required of each station, ranging from 12 hours per week to 28 hours per week, depending on how long the station has been on the air.

It is interesting to note that currently there were only two television stations in operation abroad—both on an experimental basis in England where 60,000 TV receivers were reported in use. Subsequently, a French station started operating.

#### EXPERIMENTAL TELEVISION SERVICE

Television experimentation and research continued at a rapid pace. This was especially true of work in the ultrahigh and superhigh frequencies. Studies included propagation studies, development of equipment, new and more simple circuits, color transmission, and the system of relay broadcasting from planes in flight known as "stratovision." Several organizations were testing the band from 475 to 890 megacycles, which has been set aside for experimental television research and were making comparative studies in propagation, reception, reflections, and shadow effects with respect to these subjects in the "low" present black-and-white television band. One applicant was granted a construction permit for a 50-kilowatt experimental television station to be operated in this high band. Several broadcasters built and operated their own microwave relay networks so as to be able to relay events (notably sporting events) to the "mother" broadcasting station. These relay networks included intercity relay systems.

At the end of the fiscal year there were 87 experimental television stations licensed and 37 outstanding construction permits. Included in these figures were 99 relay stations used primarily as remote pick-up, studio-to-transmitter links, and intercity relay transmitters.

#### OTHER TELEVISION DEVELOPMENTS

An important stimulus to the television industry was actual or imminent extension of the coaxial cable system, and expansion of common carrier and television broadcast microwave relay systems. This is enabling more stations to carry network programs, has hastened the construction of others, and prompted more applications for television facilities.

However, television program relay was still confined to the East. The coaxial cable link between New York and Washington, the only

one presently used for TV transmission, was extended north to Albany, N. Y., and south to Richmond, Va. Microwave circuits which could be used for television existed between Boston and New York, New York and Schenectady, New York and Philadelphia, and Philadelphia and Washington. Coaxial or microwave links were in prospect for Buffalo, Toledo, Detroit, Chicago, Milwaukee, and St. Louis. (See also Coaxial Cable and Microwave Relay in chapter on Common Carriers.)

New techniques were developed in camera pick-up, especially in sporting events. The complete coverage of the political conventions and the wide relaying involved was one of the important television events of the year. These telecasts were carried into areas which did not have local TV service, such as Pittsburgh, by means of the strato-vision experiments. In a few parts of the country, motion-picture companies tried out the technique of picking up sporting and other events, relaying them by microwave relays and then showing the pictures on large screens in motion-picture theaters.

#### TELEVISION RECEIVERS

Television receiver production continued to mount to about 50,000 per month at the end of the fiscal year. Many new and low-priced models appeared on the market. It was estimated that some 460,000 TV sets had been produced since the close of the war.

#### TELEVISION CHANNEL ALLOCATIONS

With only 12 television broadcast channels presently available and the demand increasing, the whole television allocation problem had to be studied with a view of supplying an equitable distribution of service throughout the country, and also maintaining decent standards of good engineering practice.

The commercial TV band had consisted of 13 channels, each 6 megacycles wide interspersed between 44 and 216 megacycles. Part 3 of the Commission's Rules and Regulations contained a table of allocations of television channels which included only the first 140 metropolitan districts as defined by the Census Bureau. The upswing in television interest caused the Commission to call a hearing for June 14, 1948, on the matter of amending the allocation table. Over 80 appearances were filed, most of which were accompanied by petitions and engineering studies concerning additions of channels and other changes. Many supported the new allocation table proposed by the Commission. Oral argument on the above proceeding was still pending at the end of the year.

As a result of hearing and oral argument, the Commission as of June 14, 1948, made effective its proposed rule-making of August 14,

1947, which action deleted channel No. 1 (44 to 50 megacycles) from television broadcasting, abolished the sharing of television channels by certain other services, and provided the 72 to 76 megacycle band, a potential source of interference to television, to non-Government fixed and mobile services on an engineering basis of noninterference to television.

The loss of this channel to television, coupled with the mounting demand for television stations, was the basis for an over-all study by the Commission of the needs of television broadcast service for a satisfactory Nation-wide competitive coverage. Its engineering findings indicated briefly that there was insufficient spectrum space below 300 megacycles to make possible a truly Nation-wide competitive television system and that some interference to television reception would result from adjacent channel operation of other services, from harmonic radiations, and noises from other electrical devices. In view of this, the Commission on May 5, 1948, called for a hearing to obtain full information concerning interference to television reception in the present band, data concerning propagational characteristics of the 475 to 890 megacycle band, the state of development of transmitting and receiving equipment for this band, and any proposals for the commercial utilization of this band for television broadcasting. The date set for the above hearing was September 20, 1948. (See Subsequent Events.)

#### 5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

The FM broadcast band includes 20 channels (between 88 and 92 megacycles) allocated for use by noncommercial educational broadcast stations. These are licensed principally to universities and school systems for providing educational and entertainment programs to schools and to the public without profit.

Although the number of such stations on the air increased from 8 the previous year to 22 on June 30, 1948, the total number of stations authorized increased but slightly, from 38 to a total of 46. Eight additional applications for new stations were pending. While many educational institutions express interest in this service and indicate that they intend to establish stations, postwar problems facing many educators have delayed the fulfillment of these desires. Lack of sufficient appropriations by school systems has been a particular deterrent.

On June 17, 1948, the Commission issued proposed rules which would permit noncommercial educational FM stations to operate with a power of 10 watts or less, thus enabling stations to be established with a bare minimum of equipment costing only a few thousand dollars. The feasibility of low-power operation was successfully demonstrated over a period of a year by an experimental  $2\frac{1}{2}$ -watt

station at Syracuse University. The Commission believes that low-cost stations, normally covering a radius of about 2 to 5 miles, will encourage the use of FM broadcasting by educational institutions. The equipment may be supplemented with higher-power amplifiers when and if desired.

While a number of States are planning to build state-wide FM educational networks, Wisconsin leads the field in this respect. It has two stations in operation and two others under construction. When several additional proposed stations are completed, nearly all citizens in that State will be within range of one or more of its educational FM stations.

FM sets for commercial program reception can also tune in local educational FM stations.

#### 6. INTERNATIONAL BROADCAST SERVICE

International broadcast stations operating in this country are licensed by the Commission, but function under the auspices of the Department of State. Their programs are directed and supervised by the International Broadcasting Division of the Office of International Information and Educational Exchange of that Department. Programs in many languages were beamed overseas daily. The number of stations—37—remained unchanged.

#### 7. FACSIMILE BROADCAST SERVICE

An important new commercial broadcast service—facsimile—was authorized during the year.

Following hearings, the Commission in June 1948 adopted rules providing for commercial facsimile broadcasting by FM stations beginning July 15, 1948. FM stations, in consequence, may transmit printed matter and pictures for reception by anyone having a facsimile receiver and recorder within the station's service area. Limited quantities of facsimile transmitting and receiving equipment are in production and more will be available as the service develops.

Previously, all facsimile had been of an experimental nature. During the past several years facsimile apparatus and techniques improved greatly. The Commission found that the service was adequately developed to be established on a regular basis with the other commercial broadcast services. Several FM stations have already begun transmitting facsimile under the new rules and standards.

Since facsimile transmitters and receivers must be synchronized, transmission standards are necessary so that any facsimile receiver may operate from any facsimile station in its area. There was little difference of opinion in the industry concerning the standards proposed for adoption, with the exception of the recorder line length to be em-

ployed. While the majority favored the 8.2-inch paper size, there was some support for 4.1-inch paper operating at the same speed of 105 lines per inch (3.43 inches per minute).

The Commission shared the view that the larger size should be used and adopted standards accordingly. These provide for the transmission of 16 letter-size pages per hour. However, different size recorders may be employed if the number of lines per inch is made to conform proportionately. While there was suggestion for the adoption of two standards so that they could be tested more thoroughly, the Commission believes that there should be a single standard, as in television, to enable all facsimile receivers to operate from all facsimile stations within range.

The rules provide for the use of both simplex and multiplex facsimile. Simplex is employed when an FM station is not transmitting aural programs and multiplex is the transmission of both simultaneously. The Commission holds that, while multiplex facsimile has not been fully developed, its importance requires current provision for it. FM broadcasters will hesitate to interrupt aural programs for the transmission of simplex facsimile and, therefore, multiplexing must be used for the fullest development and use of FM and "Fax" together. Recent experiments indicate that multiplexing can be accomplished without perceptible degradation of the aural program.

A band of frequencies has also been provided for experimental facsimile operation, in the 470-megacycle range, but no facsimile stations have as yet been proposed for these frequencies.

#### 8. REMOTE PICK-UP BROADCAST SERVICE

Stations in this service are used to furnish temporary circuits to the main studio or transmitter of broadcast stations in connection with parades, sports events, and other programs picked up at points where wire circuits are not available or convenient. Since remote pick-up transmitters are often mounted in automobiles or light trucks, they are also useful for emergency communications when normal communication facilities are disrupted by floods or other disasters. The number of remote pick-up stations decreased from 583 to 571. This was because many applications for new stations were being held without action pending changes in frequency assignments. However, special temporary authorizations were issued during the year for operation of such equipment by some 200 stations.

#### 9. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

The principal purpose of an ST broadcast station is to provide a program circuit between the studio of an FM station and its transmitter when the latter is located at a considerable distance or at an

inaccessible point, such as a mountain top. International broadcast stations may also employ ST stations for program circuits between studios and transmitters. Following the war, the band of 940 to 952 megacycles was allocated for ST broadcasting, and during the past fiscal year several manufacturers placed ST equipment on the market. ST transmitters are now being installed by a number of permittees and, in some instances, are replacing equipment temporarily employed on other frequencies. At the close of the fiscal year nine ST stations were authorized, compared to five the previous year, and inquiries indicated more in prospect.

10. DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are employed chiefly for the testing of transmitters and antennas, for propagation studies, and for other experiments requiring radio transmission. Manufacturers test high-power FM transmitters and high-gain FM antennas for comparing actual performance with theoretical predictions. Activity in this service decreased during the year, and the number of stations declined from 24 to 15.

11. BROADCAST STATISTICS

AUTHORIZED STATIONS

The following table shows the number of stations (licensed or holding construction permits) in the various classes of broadcast service for the past 2 fiscal years:

Class of station	1947	1948	Increase
Standard (AM).....	1,795	2,034	239
Frequency modulation (FM).....	918	1,020	102
Television (TV).....	66	109	43
Television (experimental).....	81	124	43
Noncommercial educational.....	38	46	8
International.....	37	37	0
Facsimile.....	3	2	(-1)
Remote pick-up.....	583	571	(-12)
Studio transmitter (ST).....	5	9	4
Developmental.....	24	15	(-9)
Class 2 (experimental).....	1	0	(-1)
Total.....	3,551	3,967	416

In addition to the fixed stations enumerated above, 755 auxiliary mobile units were being utilized by the broadcast services as of January 1, 1948. The greater number—644—were engaged in remote pick-up; 76 were used in experimental television, 32 in developmental pursuits, and 3 in studio transmitter activities.

BROADCAST AUTHORIZATIONS BY STATES

Shortly after the close of the fiscal year a tabulation of 3,186 outstanding AM, FM, and TV broadcast authorizations collectively showed that Texas had the most of any State, closely followed by



California. Each had more than 200. Seven other States had 100 or more apiece.

Three States each held more than 100 grants in the AM field alone—Texas, California, and Pennsylvania ranking in that order. Puerto Rico had more AM authorizations than 16 States individually.

California led in FM authorizations, with New York and Pennsylvania tied for second place, followed in turn by Texas and Ohio. New Jersey, Ohio, and the District of Columbia held more FM than AM grants. Only one State—Montana—had no FM authorization.

The television listing saw California and New York tied for first place, with Ohio a close runner-up. Fifteen States were still without TV grants.

The break-down by States follows:

State	AM	FM <sup>1</sup>	TV	Total
Alabama.....	56	17	3	76
Arizona.....	25	2	1	28
Arkansas.....	28	7	0	35
California.....	130	86	12	228
Colorado.....	34	4	0	38
Connecticut.....	25	20	1	46
Delaware.....	5	4	1	10
District of Columbia.....	7	10	4	21
Florida.....	69	28	3	100
Georgia.....	70	31	3	104
Idaho.....	21	7	0	28
Illinois.....	66	50	5	121
Indiana.....	41	33	3	77
Iowa.....	45	22	2	69
Kansas.....	31	10	0	41
Kentucky.....	38	14	2	54
Louisiana.....	37	19	3	59
Maine.....	15	5	0	20
Maryland.....	22	15	3	40
Massachusetts.....	42	35	3	80
Michigan.....	59	36	3	98
Minnesota.....	38	11	3	52
Mississippi.....	35	7	0	42
Missouri.....	40	24	2	66
Montana.....	26	0	0	26
Nebraska.....	18	6	2	26
Nevada.....	12	3	0	15
New Hampshire.....	11	7	0	18
New Jersey.....	19	21	1	41
New Mexico.....	20	1	1	22
New York.....	91	78	12	179
North Carolina.....	86	44	2	132
North Dakota.....	15	2	0	17
Ohio.....	56	65	11	132
Oklahoma.....	39	15	2	56
Oregon.....	37	12	1	50
Pennsylvania.....	102	76	7	185
Rhode Island.....	8	7	1	16
South Carolina.....	37	14	0	51
South Dakota.....	15	1	0	16
Tennessee.....	54	26	1	81
Texas.....	164	69	6	239
Utah.....	18	3	1	22
Vermont.....	7	0	0	7
Virginia.....	49	28	1	78
Washington.....	45	8	1	54
West Virginia.....	33	18	0	51
Wisconsin.....	50	29	1	80
Wyoming.....	12	1	0	13
Alaska.....	8	0	0	8
Hawaii.....	9	0	0	9
Puerto Rico.....	25	4	0	29
Virgin Islands.....	0	0	0	0
Totals.....	2,045	1,033	108	3,186

<sup>1</sup> Does not include noncommercial educational broadcast stations.

BROADCAST APPLICATIONS  
AM BROADCAST APPLICATIONS

	Pending July 1, 1947	Received	Disposed of	Pending June 30, 1948
Construction permits:				
New stations.....	666	385	476	575
Change in facilities.....	254	320	268	306
Total construction permits.....	920	705	744	881
Licenses.....	113	701	620	194
Renewals.....	152	616	571	197
Transfers.....	58	271	247	82
Modification of construction permits.....	90	263	246	107
All other.....	159	1,477	1,538	98
Total AM applications.....	1,482	4,033	3,966	1,559

FM BROADCAST APPLICATIONS

	Pending July 1, 1947	Received	Disposed of	Pending June 30, 1948
Construction permits:				
New stations.....	431	167	410	1,188
Change in facilities.....	11	14	20	5
Total construction permits.....	442	181	430	193
Licenses.....	16	172	107	81
Renewals.....	9	54	46	17
Transfers.....	12	95	80	27
Modification of construction permits.....	102	373	395	80
All other.....	1	1,468	1,398	71
Total FM applications.....	582	2,343	2,456	469

† Includes 106 conditional grants.

TV BROADCAST APPLICATIONS

	Pending July 1, 1947	Received	Disposed of	Pending June 30, 1948
Construction permits:				
New stations.....	10	353	60	294
Change in facilities.....	0	27	8	19
Total construction permits.....	10	380	77	313
Licenses.....	0	3	2	1
Renewals.....	0	7	7	0
Transfers.....	0	11	11	0
Modification of construction permits.....	7	64	71	0
All other.....	1	114	105	10
Total TV applications.....	18	579	273	324

ALL OTHER BROADCAST APPLICATIONS

	Pending July 1, 1947	Received	Disposed of	Pending June 30, 1948
Construction permits:				
New stations.....	39	205	131	113
Change in facilities.....	2	27	17	12
Total construction permits.....	41	232	148	125
Licenses.....	6	102	83	25
Renewals.....	59	221	238	42
Transfers.....	0	48	46	2
Modification of construction permits.....	10	22	31	1
All other.....	1	120	113	8
Total all other applications.....	117	745	659	203

## TOTAL BROADCAST APPLICATIONS

Construction permits:				
New stations.....	1,146	1,110	1,096	1,170
Change in facilities.....	267	388	313	342
Total construction permits.....	1,413	1,498	1,399	1,512
Licenses.....	135	978	812	301
Renewals.....	220	898	862	256
Transfers.....	70	425	384	111
Modification of construction permits.....	209	722	743	188
All other.....	162	3,179	3,154	187
Total applications.....	2,209	7,700	7,354	2,555

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## CHAPTER IV. SAFETY AND SPECIAL RADIO SERVICES

1. GENERAL
  2. AERONAUTICAL RADIO SERVICES
  3. MARINE RADIO SERVICES
  4. EMERGENCY RADIO SERVICES
  5. RAILROAD RADIO SERVICE
  6. UTILITY RADIO SERVICE
  7. INDUSTRIAL, SCIENTIFIC, AND MEDICAL RADIO SERVICE
  8. MISCELLANEOUS RADIO SERVICES
  9. EXPERIMENTAL RADIO SERVICES
  10. LOW-POWER RADIO SERVICES
  11. PROPOSED LAND TRANSPORTATION RADIO SERVICES
  12. PROPOSED INDUSTRIAL RADIO SERVICES
  13. SAFETY AND SPECIAL SERVICES STATISTICS
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### 1. GENERAL

Because broadcasting commands so much attention from industry and the individual listener, it is not realized generally that the expanded use of radio is being felt more in the nonbroadcast services. For administrative purposes, the latter are grouped as safety and special services or common-carrier services, as they may require. This chapter deals with the safety and special services. As their general classification implies, they are devoted largely to the safeguarding of life and property, at the same time contributing to economies and improvements in public and private business operations. Some common-carrier communications functions have been included for convenience because they are inextricably related to safety functions, e. g., aeronautical public-service stations, various marine radio services, certain special emergency radio services, etc. The amateur and citizens services are dealt with in a separate chapter.

A myriad of specialized services are offered by stations in the safety and special services. Most of them function in connection with air, sea, and land transportation, and police, fire, and other public protection. Still others are concerned with developing new equipment and techniques suitable for public or private uses.

Such activities are in keeping with provisions of the Communications Act which, among other things, charges the Commission with "promoting the safety of life and property through the use of wire and radio communication," and requires it to "study new uses for radio, provide for experimental use of frequencies, and generally encourage the larger and more effective use of radio in the public interest."

A gain of nearly 11,000 authorizations was noted in the safety and special services last year, bringing the total to almost 47,500. Of the latter figure, nearly 21,000 were accounted for by the aeronautical services, and slightly over 15,000 by the marine services. However, there were marked and proportionate increases in the public safety and land transportation services.

Applications received by the safety and special services (exclusive of amateur) approximated 57,000 for the year, or some 4,000 more than in 1947. They covered the use of radio from the cradle to the grave, since requests ranged from a radio system for a pick-up-and-delivery baby diaper wash to radio control for funeral corteges at a large cemetery.

Most of the nonbroadcast services were in a state of flux, due to changes made necessary by developments in equipment and techniques and revision of world radio agreements. Establishment of new services increases the problem of finding frequency space and regulating operation. As each new use of radio emerges from the experimental stage, procedures must be inaugurated to handle the newcomer in the light of international as well as domestic considerations.

Of prime interest during the year was Commission proposal to establish two new general groups—land transportation and industrial—which would embrace various new or present radio services.

## 2. AERONAUTICAL RADIO SERVICES

The aeronautical radio services constitute one of the most important groups in the safety category. Radio has become invaluable in the operation of aircraft under all conditions and is used in many ways for operational purposes and to protect life and property in general. Aviation radio involves navigational aids, including fixed beacons, ranges, radar devices, direction-finding systems, etc.; traffic control operations; approach and blind-landing systems; special devices such as radio altimeters and distance measuring equipment; and public correspondence systems.

The year witnessed a continued expansion in civil-aviation activities. With the exception of the amateur service and commercial operators, the aeronautical services now constitute the largest single group licensed by the Commission. There were 20,858 authorized aircraft and ground stations at the close of fiscal 1948 as compared to 15,943 for the year previous. Applications received during the 1948 fiscal year totaled 22,324.

### AVIATION ORGANIZATIONS AND CONFERENCES

Developments in this field brought many new problems and required increasing attention by the organizations which coordinate national

and international aviation activities. The three leading groups of this character are the International Civil Aviation Organization, the Radio Technical Commission for Aeronautics, and the Air Coordinating Committee.

The International Civil Aviation Organization (ICAO) is an international organization which works toward the development of principles and techniques in air navigation and fosters the planning and development of international civil aviation throughout the world. Activities in the ICAO have centered on those phases of aviation dealing with communications, and have included, during fiscal year 1948, the preparation for and participation in three ICAO Regional Air Navigation meetings, namely, South Atlantic, European-Mediterranean, and North Atlantic; and one ICAO Divisional meeting at Montreal which concerned personnel licensing. Representation at these meetings insures that the established policies of the Commission will be reflected in the deliberations wherever applicable, and further insures that the Commission will be kept informed on current trends in international aviation telecommunications requirements which, because of the nature of aviation operations, affect and, in many instances become a part of, domestic requirements.

The Radio Technical Commission for Aeronautics (RTCA) is a cooperative association of United States Government-industry aeronautical telecommunications agencies. It conducts studies of aeronautical telecommunications problems and related matters, and its objective is the resolution of such problems by mutual agreement of its member agencies. Its findings are in the nature of recommendations to all domestic organizations concerned. One of the major and continuing activities of the FCC's Aviation Division involves participation in the Executive Committee and special technical committees of the RTCA. During the last year these activities have included studies such as:

1. Formulation of principles for a national system of all-weather air-traffic control and the development of recommendations regarding equipment and procedures required to implement these principles.
2. Image interference from FM stations to VHF localizers associated with instrument-landing systems.
3. Harmonic emissions from television stations which affect aviation radio in the 108- to 132-megacycle band.
4. Revision of United States policy for air navigation and traffic control.
5. Testing program for long-range aviation-navigation facilities.
6. Standardization of distance-measuring equipment (DME) and testing procedures.
7. Implementation of air-traffic control transponder "private line" visual communications equipment.

8. Implementation of VHF emergency and airway-station communication frequencies.

9. Power output of VHF air-borne transmitters.

Another continuing activity involves participation in the work of the Air Coordinating Committee (ACC), its divisions and subcommittees. The ACC was established for the purpose of reaching decisions which would become the position of the United States in aviation matters. The Commission has representation on the Technical Division of ACC and the following subcommittees: Aeronautical Communications and Electronic Aids; Airspace, Rules of the Air, and Air Traffic Control; Search and Rescue; Dimensional Standardization; and Airmen Qualifications.

Another committee was recently established by the ACC, entitled Air Traffic Control and Navigation Panel (NAV Panel) for the purpose of guiding the implementation of the national all-weather air-navigation and traffic-control system recommended by the RTCA.

An International Aeronautical Administrative Radio Conference, called by the Administrative Council of the International Telecommunications Union, was held beginning May 15, 1948, at Geneva. This conference had for its purpose the preparation of a world-wide plan of assignment of mobile frequencies in bands allocated exclusively to the aeronautical service. Prior to this conference the Department of State convened a preparatory committee composed of representatives from the Army, Navy, Air Force, Commerce, Treasury, FCC, the various air lines and Aeronautical Radio, Inc., to do the necessary preparatory work of outlining the United States position, performing the detailed engineering, and preparing documentation to support it, and providing the instructions to the American delegation. The Aviation Division actively participated in the preparatory work and two of its members were on the delegation to the conference. The Chief of the Aviation Division was vice chairman of the delegation, and was the United States spokesman at the conference, since the chairman of the delegation was elected conference chairman.

#### AIRCRAFT RADIO

As in past years, the largest increase in the aeronautical radio services was that of private aircraft. There were 17,736 authorized aircraft radio stations at the close of the fiscal year as compared with 14,627 in 1947, and of the former nearly 16,000 were private aircraft.

The growth of air traffic and associated radio aids created a need for a national system of all-weather air traffic control. A study of this matter was made through the medium of the RTCA, in which all interested Government agencies and private interests were represented. It resulted in the formulation of principles and the develop-

ment of recommendations regarding equipment and procedures required to implement these principles. The over-all acceptance by aviation interests of this 15-year program of development and implementation of an all-weather system of traffic control points towards the largest increase in aviation radio activities in history.

The current effects of this program, as well as the pressing needs of aviation for specialized radio equipment, is indicated by the increase in the number of aircraft installing radio altimeters, terrain clearance indicators, and distance measuring equipment. They create new problems for the Aviation Division as far as licensing procedures are concerned, so the first applications of this nature must be especially treated until new policies or rules are formulated.

#### AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

These stations provide the radio communication service necessary for the safe, expeditious, and economical operation of aircraft. Domestic air carriers are required to maintain two-way ground-to-air radiotelephone communication at terminals and at such points as may be deemed necessary by the Government to insure satisfactory communications over the entire route. Such systems shall be independent of radio facilities provided by Federal or other governmental agencies.

The revival of the Civil Air Patrol, as a civilian auxiliary of the United States Air Force, has caused a large increase in the number of aeronautical and aeronautical fixed stations authorized for its communications network throughout the Nation. It is the ultimate aim of the organization to so connect the 48 States and the District of Columbia together for national emergency or local disaster purposes. Approximately 1,000 such stations are now operated by the Civil Air Patrol.

There were 2,761 aeronautical and aeronautical fixed stations at the close of fiscal 1948 compared to 1,435 in fiscal 1947. This increase is due to the extension of air-line routes, the expanded use of very high frequencies, and the growth of the Civil Air Patrol. The Commission adopted a very high-frequency allocation plan on October 25, 1946, and many aeronautical stations utilizing VHF to supplement their high-frequency service were authorized during the year.

#### AIRDROME CONTROL STATIONS

The number of airdrome control stations licensed at the end of the fiscal year was 59, an increase of 1 since 1947. Airdrome control stations for the most part are operated by the Civil Aeronautics Administration. While there has been a great increase in the number of airports and airdrome control stations, the majority of these were inaugurated and operated by the CAA. Further implementation of



the very high frequencies has caused considerable modifications of licenses for existing airdrome control stations.

#### AERONAUTICAL MOBILE UTILITY STATIONS

This service was first implemented in February 1947, and at the end of fiscal year 1947, 18 stations were licensed. As of June 30, 1948, the Commission had on license 109 such stations. They are used aboard crash, maintenance, emergency vehicles, etc., at airdromes for communicating with control towers, ground vehicles, and aircraft on the ground. This service is used by many municipalities and individuals concerned with the care and upkeep of airports.

#### AERONAUTICAL NAVIGATION RADIO STATIONS

Aeronautical navigation radio stations are for the most part operated by the Federal Government. However, as the combined civil-military system of air navigation and air traffic control becomes implemented, those licensed by the Commission will increase sharply. Furthermore, the RTCA program has recommended the installation of a considerable number of radar and radio facilities, in addition to a large expansion in the number of present radio facilities. The Commission had authorized 66 such stations at the close of the year 1948 as compared with 19 stations in 1947.

#### FLYING SCHOOL RADIO STATIONS

A flying-school station is a station on the ground or on board aircraft used for communications pertaining to instructions to students or pilots while actually operating aircraft. There were 23 of these stations in 1948, or 8 more than the year before. This increase is largely the result of flight-training instructions under the GI bill of rights, and it is expected that this service will continue to increase.

#### FLIGHT TEST RADIO STATIONS

A flight test station is a radio station, ground or aircraft, used for the transmission of communications in connection with the test of aircraft or major components of aircraft. The steady increase in development of new types of planes for civil and military aviation has caused a marked increase in the number of flight test radio stations. At the close of the year, there were 104 flight test stations in comparison with 82 in 1947.

#### AERONAUTICAL PUBLIC SERVICE STATIONS

The public service type of station has been provided to enable individuals aboard aircraft in flight to communicate with certain land radio facilities connected with land-line telephone or telegraph systems. The frequencies available to ship telegraph and ship telephone stations are available to aeronautical public service aircraft stations for the

handling of public correspondence in the same manner and to the same extent that they are available to ships of the United States. Although an adequate public air-ground telephone communication system has not been provided for complete coverage of the United States, the service, when established in its final form, should enable the user to select at will any subscriber to the national network.

Public service aircraft radio stations have been authorized aboard private aircraft, domestic air carriers and transport planes engaged in overseas flights. Tests are being conducted to determine the feasibility of utilizing two-way telephone service on overseas flights. At the present time air carriers engaged in overseas flights use certain telegraph facilities for the handling of public correspondence. This operation provides for air-to-ground telegraph service only. This service increased steadily and the year closed with 512 authorizations.

#### AIRCRAFT RADIOTELEPHONE OPERATOR AUTHORIZATIONS

These are special authorizations for operators of radiotelephone installations on private aircraft and are treated under Radio Operators. (See ch. VI.)

### 3. MARINE RADIO SERVICES

#### GENERAL

The maritime mobile service which concerns the use of radio for marine safety, navigation, and commerce is in a period of intense activity and development. Since marine radio activity is largely international in scope, the Commission has considerable continuing responsibility in helping prepare for and participating in the involved international conferences and in implementing the resultant treaties and conventions by appropriate regulatory action.

The revised Convention for Safety of Life as Sea, London, 1948, to become effective January 1, 1951, is a marked advance in safety over the 1929 convention. Improved measures include better coverage of the 500 kilocycle distress frequency, additional radio requirements for cargo vessels of between 500 and 1,600 gross tons, the requirement for at least 2 qualified operators on a designated class of passenger vessel, stipulation of technical details for new types of auto-alarms, extension of direction-finding apparatus to all ships over 1,600 gross tons, provision of detailed technical conditions for lifeboat radio apparatus, and increased recognition of the value of radar and other electronic aids. Commissioner E. M. Webster served as chairman of the Radio Committee of the conference.

From the point of view of the maritime service, the most important accomplishments of the 1947 Atlantic City Conference were the designation of a world-wide distress frequency for ship radiotelephone

stations, a long-distance calling frequency for survival craft at sea, a very high (short-distance) frequency for world-wide ship-to-ship and ship-shore communication, and specific bands of frequencies for ship borne radar. The frequency band used for loran stations was recognized tentatively and frequencies were allocated for the maritime telegraph and telephone services. While the international marine service, in common with other radio services, did not receive all of the spectrum space it requires, the best compromise attainable was reached and, with appropriate administration by each country, the number of channels should be reasonably satisfactory.

To implement provisions of the new radiocommunication regulations, many of which will become effective January 1, 1949, the Commission must make comprehensive revisions of its rules and regulations governing the ship and coastal services. Other provisions will not become operative until a new international frequency list has been approved by a future conference. Included on the list will be new frequency assignments for all United States coastal stations licensed in the international service.

Radiotelegraphy continues to meet the needs of the large ocean-going vessels and transport aircraft. In most instances, the radiotelegraph installation on vessels for safety purposes is used also for commercial service. Supplementing the shore radio stations of the United States Coast Guard, which do not engage in commercial communication, the numerous public service coast telegraph stations render a safety service in addition to exchanging commercial message traffic with ships and aircraft.

Besides being used on most large transoceanic passenger vessels, radiotelephony has come to be regarded as a necessity by ocean fishing fleets, many coastwise cargo ships, and practically all classes of vessels navigating the inland waters. In addition, numerous aircraft now obtain radiotelephone connection with land-wire systems through the maritime coastal stations.

The need for additional radio frequencies to carry maritime radiotelephone communications without intolerable interference between stations is one of the current major regulatory problems. The Commission is studying the possibility of improving and expanding the maritime telephone frequency allocations through the medium of formal reallocation proceedings and the preparation of technical recommendations for the Fourth Inter-American Telecommunications Conference.

Radio direction-finding apparatus continues to serve as a time-tested aid to navigation in coastal waters and on the Great Lakes, and as a means of locating radio-equipped lifeboats at sea. More recently developed marine radio aids—mainly radar and loran—are meeting

wide acceptance. Since radar requires radio transmitting apparatus, it is necessary for radar installations to be licensed by the Commission. Several hundred such licenses already have been granted. The principal regulatory control over ship radar stations is administered through engineering coordination with radar manufacturers.

Interest is being shown by port authorities and shipping organizations in securing authority to operate radar stations on shore to supply information regarding the exact locations of ships in harbors, especially during periods of restricted visibility. The Commission, in consultation with the Coast Guard and other interested Federal agencies, is studying an appropriate regulatory policy.

#### SAFETY AT SEA

The radio provisions of the 1929 Safety at Sea Convention, the ship radio requirements of the Communications Act, and the provisions of the Ship Act of 1912 applicable to the Great Lakes continued to be administered by the Commission. Important elements in the requirements for ocean-going vessels are the radio operator and his hours of watch, the radiocommunication equipment, the direction-finding apparatus, and the automatic distress alarm receiver (auto-alarm).

As of June 1, 1948, the Commission's records showed that 2,402 ships of United States registry are subject to part II of title III of the Communications Act (compulsory radiotelegraph equipment and operators for voyages in the open sea, either domestic or international). Practically all United States ships subject to the radiotelegraph requirements of both the present and the new Safety Convention (international voyages) are included in this group inasmuch as the United States requirements generally are more stringent than the international radio provisions. Hence, the new convention will have practically no effect on the number and class of United States cargo ships over 1,600 gross tons and the number and class of United States passenger ships that are subject to compulsory radiotelegraph requirements and Government radio inspection.

The new convention, however, provides for compulsory radiotelephone equipment and operators on cargo vessels between 500 and 1,600 gross tons engaged on international voyages, unless exempted by the administration having jurisdiction. It is estimated that there are approximately 187 ships of United States registry to which this new requirement would apply after December 31, 1950.

While radiotelephony, in comparison to radiotelegraphy as a marine safety communication system, was not proposed nor strongly favored at London by the United States delegation, it was accepted as a progressive measure even though telephony for safety purposes at sea

has not, as yet, reached a state of efficiency satisfactory to the Commission. With the future placement in effect of the new world-wide 2,182 kilocycle telephone distress frequency adopted at Atlantic City, the value of telephony for ship safety should materially increase.

Not more than one qualified radiotelegraph operator need be carried on any ship under provisions of the 1929 convention. The 1948 convention requires at least 2 such operators on every passenger ship engaged on an international voyage exceeding 16 hours' duration between 2 consecutive ports and carrying or certified to carry more than 250 passengers.

The 1929 convention does not require an auto-alarm on any ship under 3,000 gross tons nor on a cargo ship of between 3,000 and 5,500 gross tons if on the latter an operator watch of at least 8 hours per day is maintained. This deficiency is overcome by provisions of the 1948 convention wherein all ships subject to that convention (except cargo vessels of less than 1,600 gross tons) must have continuously available a means for intercepting distress signals by either auto-alarm or listening by human operator.

The 1948 convention details technical conditions which must be met by new types of auto-alarms after January 1, 1951. However, existing approved types may continue to be installed and used for an indefinite period. There have been no basic improvements in auto-alarms since the original type approval was given by the Commission in 1937.

The Communications Act and the 1929 convention require the carrying of radio direction finders only on passenger vessels of 5,000 gross tons and above. The 1948 convention extends this requirement to all ships of 1,600 gross tonnage and upwards when engaged on international voyages. Cargo ships of the United States equipped voluntarily with direction finders number 2,244. Many of these will be subject to the new international requirement. Although direction finders are used mostly for routine navigation, they are indispensable for locating distressed vessels or survival craft at sea from which radio emissions are being sent.

With respect to radiotelegraph installation on motor lifeboats, conditions to be met are set forth in the 1948 convention in regard to the radio cabin, prevention of interference from the engine, charging of the radio battery, frequencies, class of emission, ability to receive as well as transmit, use of automatic-alarm keying device, type of antenna, and the conduct of periodic tests and inspections. Ships carrying less than 20 lifeboats must be provided with an approved portable radiotelegraph apparatus capable of placement, in the event of emergency, in any available lifeboat. The lifeboat radio requirements for receiving equipment, for the operation of the transmitter on a high frequency in addition to 500 kilocycles, and for an automatic-alarm keying device

are of special safety value and represent a distinct advance in facilitating rescue at sea.

In recognition of the problems of procurement and design regarding new equipment with which the marine radio industry and the ship-owners will be confronted, appropriate "delay clauses" are incorporated in the 1948 convention with respect to those items of equipment which may not be readily available prior to the effective date of the revised convention and regulations.

The 1948 convention liberalizes the conditions under which exemption or relaxation from normal radio requirements may be granted in behalf of individual ships. These changes should have little, if any, effect on the established policy of the Commission which never has favored general relief from ship radio requirements. During the year, however, 38 of 44 applications for exemption were granted by the Commission, mostly for small passenger vessels of less than 100 gross tons. A few grants were approved for larger vessels because of the temporary unavailability of equipment or other unusual circumstances.

#### SAFETY ON THE GREAT LAKES

Regulations annexed to the 1948 convention state that "nothing herein shall apply to ships solely navigating the Great Lakes of North America and their connecting and tributary waters as far east as the lower exit of the Lachine Canal at Montreal in the Province of Quebec, Canada." Only the Ship Act of 1912 now applies to certain large passenger steamers navigated in those waters. The Commission made a special report (dated December 16, 1940) to the Congress concerning radio requirements for ships navigating the Great Lakes (S. Doc. 318, 76th Cong., 3d sess.). Preparatory work looking to a treaty between Canada and the United States on this subject was commenced by a United States Government group in the fall of 1941. This work, interrupted by World War II, was further suspended until the conclusion of the 1948 conference. In the meantime, the voluntary use of radio-telephony and radio direction finders, including the more recent use of ship-borne radar, is widespread on the Great Lakes and provides a considerable safeguard.

#### COMMERCIAL COMMUNICATION

With respect to ship and coast stations and aircraft stations communicating with these stations, the Commission enforces the international general radiocommunications regulations. They were adopted by the Cairo conference in 1938. The superseding regulations, adopted at Atlantic City, reflect two highly significant changes. One of these will allow aircraft to use designated high frequencies of the maritime radiotelegraph service for public correspondence. The second of

these changes includes a plurality of calling frequencies, specific channeling, and complete harmonic relationship of ship telegraph frequencies throughout the HF spectrum. Of special importance is the comparative freedom from interference which will be afforded large passenger vessels and provision for the use of adjuncts such as teleprinter and facsimile.

In further recognition of long-distance ship-shore public telephone service in connection with land-wire systems, nine series of radiotelephone communication "channels" (two high frequencies per channel) were designated by the conference for use by ships and coastal stations on a world-wide basis.

It was generally agreed that the success of the world plan depends on the orderly distribution of the world's ship stations throughout the designated frequency bands. The Commission, accordingly, is confronted with a license modification proceeding of substantial scope which will need to be coordinated with the shipping industry, radio manufacturers and installers, and interested Federal agencies.

Two new public coastal telegraph stations were authorized, one at Beaumont, Tex., and the other at Norfolk, Va. The Commission, in cooperation with the Interdepartment Radio Advisory Committee, endeavors to provide satisfactory frequency assignments for each new coastal telegraph station. This is a difficult problem, however, in view of the decrease in spectrum space assignable to this class of station which has resulted from the new frequency allocations table adopted at Atlantic City.

The city of Baltimore, Md., was authorized to establish a new land radiotelephone station relative to the operation of ice breakers and handling occasional emergencies involving shipping in the harbor and upper Chesapeake Bay. To facilitate operation of State-owned ferry boats plying across the Chesapeake Bay between Sandy Point and Matapeake, the State of Maryland was licensed to use radiotelephone stations at those shore points and on board the ferries.

The trend toward telephony was exemplified further by the establishment of additional public service radiotelephone shore stations at Jacksonville, Fla., and Hilo, Hawaii, by petitions from two public service licensees requesting permission to discontinue operation of their Great Lakes radiotelegraph shore stations and by proposals from others to establish new land radiotelephone stations at Chicago and Milwaukee. At Kahuku, Hawaii, additional facilities were installed to improve long-distance public telephone service to vessels navigating trans-Pacific routes.

Approximately 11,000 ship stations are now licensed by the Commission for radiotelephony. In addition to ship-shore service, there is a very large amount of ship-to-ship telephone communication. The

two frequencies normally available for this service are inadequate to carry this message traffic. Further, some 300,000 additional vessels of United States documentation must be considered as potential users of radiotelephony. Hope exists for accommodating all present and future users of this service through the accelerated development and practical application of very high frequencies. The use of such frequencies should provide a better short-distance service and allow the more conventional frequencies (below 3,000 kilocycles) to be used mainly for communication over longer distances. Developments in this field are mostly contingent upon the outcome of hearings conducted by the Commission and agreements to be reached at the next Inter-American Radio Conference. Meanwhile, the Commission has permitted experimental marine radiotelephone operation on certain designated very high frequencies.

In Alaska, where both radiotelegraphy and radiotelephony are widely used to exchange safety, weather and commercial messages, the number of licensed land stations increased to 412 for point-to-point communication and 277 for communication with ships. These stations normally are licensed for general public correspondence and operate in conjunction with the network of Government stations under jurisdiction of the Army Signal Corps.

After approximately 4 years of development work, a ship "call alarm" is in use on board some vessels in connection with commercial service. This device reportedly will respond to the radio call letters of the ship when they are transmitted in Morse radiotelegraph characters from a coast or ship station, whether or not a radio operator is actually on duty on the receiving ship.

#### RADIO NAVIGATIONAL AIDS

Supplementing the long-used radio direction finder (radio compass), two other navigational aids utilizing radio, namely, radar and loran, are now generally accepted in the United States as valuable additions to the mariner's equipment. The 1948 conference recognized radar's wide applicability for anticollision, pilotage, above-water obstacle detection, and general position fixing. The conference recommended that Governments encourage the development, manufacture, and installation of ship-borne radar, and the training of personnel in its use. At the same time, however, the opinion was expressed that the possession of radar in no way relieves the master of a ship from his obligations under the international regulations for preventing collisions at sea. There were instances during the year in which vessels collided with one another, even though one or both vessels were equipped with radar.

More than 600 ship radar stations are now licensed. Effective De-



ember 10, 1947, the Commission adopted rules transferring the licensing of shipboard radar from the experimental to the established ship service. On January 1, 1949, the frequency bands authorized for these stations will be recognized by world-wide international agreement.

An important issue yet to be decided by the Commission is whether or not persons making technical adjustments to radar transmitters should be licensed. The users of radar, normally deck officers, are not required to hold operators' licenses. Pending a determination of this issue, technicians who make or supervise important adjustments are required to hold a radio operator license.

Present rules applicable to radar transmitting apparatus are directed primarily toward preventing harmful interference. Several types of ship radar equipment have been examined for conformance and, pending clarification of final technical requirements, were given tentative approval.

While radar will serve to fix the position of a ship within less than 50 miles of identifiable shore line, and the direction finder is useful to obtain a "fix" up to 200 miles from radio beacons afloat and ashore, loran can provide accurate long-distance offshore position-fixing by radio. Loran is especially valuable when weather conditions make celestial observation impossible, a condition not infrequent in the North Atlantic in winter. Loran is used by transoceanic aircraft as well as by surface ships, and is of particular value to offshore fishing fleets. It is dependent upon the continuous operation of numerous loran transmitting stations on shore. The operation of the latter is an international cooperative program in that Canada, Denmark, Iceland, United Kingdom, and the United States (Coast Guard) are jointly maintaining stations to serve wide sea areas of both the Atlantic and the Pacific. Although certain European countries look with favor upon other long-range marine radio navigational aids involving land transmitters, such as "consol" and "decca," loran for general purposes appears to provide the highest accuracy of any that have been used operationally to date. While the Commission does not license loran equipment, its use is definitely related to the allocation of marine frequencies.

#### 4. EMERGENCY RADIO SERVICES

The emergency radio service provides radio communication essential to the public safety or the alleviation of an emergency endangering life or property. This service is available to States, counties, towns, and similar Government entities, also other bodies or individuals performing similar duties.

Rules governing the emergency service, in effect since 1938 with

minor modifications, have had to be rewritten completely and a final revision (pt. 10) was proposed June 11, 1948. Besides incorporating frequency allocations for each of the services covered, these rules contemplate a new service—the highway maintenance radio service—and the forestry radio service would be expanded into a forestry-conservation radio service.

Technical standards are also proposed. Their need is evidenced by the number of stations operating in these services. As of June 30, 1948, the Commission had authorized some 4,900 public safety stations of all types operating approximately 55,000 transmitter units. The contemplated standards establish, among other things, a required measurement procedure for transmitters, allowable limits for spurious or harmonic radiation and control procedure. Their adoption would bring about a better utilization of frequencies in the emergency services.

#### POLICE RADIO SERVICE

The police radio service embraces more than 4,000 municipal police, State police, zone police, and interzone police stations. Working in an integrated manner, these stations provide intercommunication between police fixed and mobile stations, including aircraft and ships. Even the foot patrolman is not without radio contact. Developments in printed circuit and subminiature tubes provide an extremely lightweight transmitter-receiver combination which may be carried as easily as a hearing aid set.

In addition, the various municipalities and States have been assigned frequencies for relatively long-range communication and, consequently, are continually expanding their communication networks to include entire States and adjoining States. Thus, Nation-wide police communication circuits are now available.

Generally, police radio stations use frequencies in the VHF part of the spectrum—between 30 and 300 megacycles. Transmitters operating in this range are generally limited by “line-of-sight” transmission. In order to extend coverage, it is necessary to elevate the antennas. Since it is generally not feasible to erect police antennas more than 300 feet high, some base stations are installed on mountain tops or other elevated places and are operated by remote control. This provides a large “talk-out” area. To permit a comparable range for “talk-back” from mobile units, the base station receiver is usually installed at the location of the base station transmitter. In many cases this is far from telephone lines, so the base station requires auxiliary radio circuits called “fixed control” and “fixed repeater” links. By means of such links, many State systems provide satisfactory radio coverage over large areas where it would not be possible to install manually operated stations. Most of these links are presently operating on frequencies

between 72 and 76 megacycles. It is expected that within a relatively few years these links can be moved into the microwave part of the spectrum which is admirably adapted for such operation.

#### FIRE RADIO SERVICE

The fire radio service provides radio communication in connection with public fire prevention and control. More and more of the larger municipalities have established separate facilities to furnish fire radio communication service previously provided by municipal police radio stations. This service is expected to increase under proposed rules, principally because of the extension of eligibility requirements to enable volunteer fire departments to qualify, and the general tendency of municipalities to separate their police and fire radio communication facilities. Eighty-five municipal fire stations were authorized by June 30, 1948.

Fire fighters require two distinct types of communication: namely, that between the headquarters and the fire apparatus and, secondly, between the fire chief and the individual fireman at the scene of the blaze. The first form of communication permits headquarters to maintain contact with all fire apparatus out on call. The second enables the chief in charge on the ground to control the activities of the firemen under his jurisdiction. The former involves a land station with elevated antenna and transmitters mounted on the various vehicles. "On-the-spot" communication is provided by light-weight and low-powered packsets carried or worn by firemen fighting a fire. In its proposed revision of the emergency service rules, the Commission has divided the fire service into three groups. One group is restricted to low-powered packsets, a second group is limited to mobile operation only, while the remaining group is not restricted.

The Commission has received inquiries from individuals and rural communities regarding the feasibility of setting up radio fire alarm calling and signalling systems. Such installations are intended particularly for rural areas where wire lines are not available or cannot be installed economically. The matter is under Commission study.

#### FORESTRY-CONSERVATION RADIO SERVICE

Under the Commission's present rules, forestry radio stations are operated by governmental agencies—usually States or counties—responsible for the protection of timber from fire. Individuals or private organizations owning or responsible for protecting large tracts of wood, are also eligible for forestry stations. There were more than 450 such stations.

At the request of many State conservation agencies, the Commission is proposing to expand the forestry service into a forestry-conservation radio service. This would make it possible for such radio

facilities to be used in game law enforcement, protection of forest from insects and disease, reforestation, flood and erosion control, and similar activities. It is recognized, however, that forest-fire control should take precedence over any other conservation work. Accordingly, a large number of frequencies allocated for forestry-conservation use are devoted to forest fire-fighting. Pending the adoption of the proposed new part 10, the Commission has authorized the operation of a number of forestry-conservation stations on an experimental basis.

#### HIGHWAY MAINTENANCE RADIO SERVICE

This is a new emergency service which the Commission is proposing to meet the needs of highway departments of the various States and counties for radio communication in connection with their maintenance and repair activities. Radio facilities would aid in clearing highways of snow, land slides, and other obstructions. These departments also require instantaneous communication with maintenance crews during periods of floods or other natural disasters. They estimate that by radio contact between office and work crews, large savings in the cost of maintenance can be realized or, to put it another way, considerably more maintenance can be carried on for the same expenditures. Pending the establishment of a regular service, the Commission has authorized 126 stations on an experimental basis.

#### SPECIAL EMERGENCY RADIO SERVICE

The special emergency class of station offers radio communication in emergencies affecting the general public—to bridge breaks in existing landwire systems, and to establish temporary circuits.

The majority of the nearly 100 stations in this category are licensed to communications common carriers. Various Red Cross chapters have established stations to provide communication during national emergencies. Also, a few individuals and companies operating in remote areas not served by wire lines use special emergency stations to obtain assistance in case of accident or sickness.

#### 5. RAILROAD RADIO SERVICE

Since the railroad radio service was established in 1945, authorizations have been issued to over 40 different railroads. In addition to being used on the main lines for safety purposes, radio has been found invaluable in yard and terminal switching operations. Mobile units installed in supervisors' cars help to coordinate various railroad operations. Portable units are employed by work crews during the construction and maintenance of tracks, bridges, and other railroad property along the right-of-way.

The growth of this service has been retarded somewhat by the lack

of equipment rugged enough to withstand the jolts and jars to which it is subjected. Another obstacle is lack of satisfactory power supply. Batteries and axle- and motor-driven generators have been used separately and in combination, with varying degrees of success. Problems of securing qualified personnel, and integrating a radio system with established operating and signalling practice, are other factors which have contributed to the delay.

In spite of these difficulties, the more than 200 railroad radio stations authorized by the close of the year is nearly double the 1947 total. One railroad has installed an experimental microwave relay system to determine its effectiveness as compared with the conventional wire line circuits. Since suitable equipment is now available, there is increased interest in the benefits of radio to railroad operation.

## 6. UTILITY RADIO SERVICE

Pending establishment of a new industrial radio service, the present utility radio service provides radiocommunication for three general types of public utilities—power, transit, and petroleum pipe lines. The first named serves electric, gas, water, and steam utilities. The transit utility station is used by busses, streetcars, subways, and other scheduled passenger-transportation lines in urban areas. Petroleum pipe-line stations are utilized in cross-country distribution of crude petroleum, petroleum products, and natural gas.

Established in 1946, the utility radio service permits licensees to transmit messages relating not only to safety of life and property, but also those in connection with essential operations, such as dispatching of maintenance crews and trucks. As of June 1946, utilities were operating 600 special emergency transmitters. In the same period of 1947, there were 1,136 stations in the utility service, which number practically doubled in 1948. What is more, each station included from one to 700 auxiliary transmitters.

The most important use of radio by utilities is in the maintenance or restoration of electric, gas, or water service. Other uses include coordination of construction activities, cable-pulling and wire-stringing crews, and emergency communications between load dispatchers and source of supply (generating station, gas storage area, or water reservoir).

The electric, gas, and water utilities industries (both publicly and privately owned) jointly organized regional frequency coordinating committees to assist the Commission in assigning appropriate frequencies. Each committee is made up of utility licensees in the area who desire to participate, and is generally managed by a group of local communications engineers appointed by the member companies. These advisory committees have rendered valuable assistance through their

intimate knowledge of local conditions and requirements. Without delegating administrative authority to these groups, some degree of self-regulation is achieved in a complex field where alternative solutions would require a substantial increase in Commission personnel.

There has been a similar expansion in the use of radio by petroleum and natural gas pipe lines. Several companies operating pipe lines between the Texas-Louisiana area and the eastern seaboard and the North Central States are preparing to install interlocking chains of radio stations en route.

The transit utility radio service was established for the purpose of providing radio communication to facilitate the operation of vehicles used in furnishing a passenger-transportation service over fixed routes in metropolitan areas. Mobile transmitters are installed on street-cars, busses, supervisors' cars, and repair trucks. This radio adjunct has been found to be especially effective when, due to storm damage or collision, it is necessary to reroute traffic or call for parts needed to make emergency repairs. Nearly 80 stations had been authorized for operation in this service. Although presently included with other public utilities in part 17 of the rules, it is proposed to group this service with other transportation common carriers in the land transportation radio services.

## 7. INDUSTRIAL, SCIENTIFIC, AND MEDICAL RADIO SERVICE

One of the greatest obstacles in the path of the ever-growing uses of radio is that of interference. It has been determined that the haphazard operation of medical diathermy, industrial heating, and certain other miscellaneous types of radio-frequency equipment are among primary sources of interference. In adopting part 18 of the Rules and Regulations Relating to Industrial, Scientific, and Medical Service, the Commission has taken a necessary step to provide interference-free radio operation.

Medical diathermy equipment as defined by the Commission's rules includes any apparatus (other than low power intermittent surgical diathermy equipment) which generates radio-frequency energy for therapeutic purposes. Industrial heating equipment refers to radio-frequency apparatus used for heating operations in a manufacturing or production process. Miscellaneous equipment covers apparatus in which the action of the energy emitted is directly upon the work-load and does not involve the use of associated radio receiving equipment.

Part 18 stipulates frequencies on which such equipment may operate and defines the extent to which harmonic and spurious radiations must be suppressed in order that interference to authorized radio services will be minimized. Part 18 became effective June 30, 1947, insofar as applicable to diathermy and industrial heating equipment. However, a slight change in frequencies was necessitated by the At-

lantic City conferences. These changes were made effective March 16, 1948. On April 30, 1948, the rules became effective as to miscellaneous equipment.

It is estimated that approximately 100,000 medical diathermy machines and 5,000 industrial heaters were in operation before these rules became operative. Most of this equipment was not designed to operate within the rules. However, in order to provide for depreciation of such equipment, part 18 does not become effective, insofar as applicable to equipment manufactured before the effective date of the rules, until July 1, 1952, provided operation of such equipment does not cause interference. In the event that interference is caused, necessary remedial steps must be taken immediately. Since that portion of part 18 which applies to miscellaneous equipment was not finalized until April 30, 1948, such equipment manufactured prior to that date may be operated until April 30, 1953, also subject to the non-interference condition.

To obtain uniformity in the design of industrial, scientific, and medical equipment, particularly as concerns the operating characteristics, provisions are made in the rules for type approval of such equipment by the Commission's laboratory. Since effectuating part 18, the Commission has issued certificates of type approval for 22 different models of diathermy equipment manufactured by 17 different companies.

The fact that no industrial heating equipment has been submitted to the Commission for tests is probably due to the large size of these machines and difficulties encountered in shipping them. However, part 18 provides for certification of such machines by competent engineers, in lieu of certification by the Commission's laboratory.

Because the rules pertaining to the operation of miscellaneous equipment have been in effect a relatively short time, few requests for type approval have been received for equipment in this category. However, the Commission is conducting industry conferences in an effort to eliminate severe interference from a relatively new type of arc-welder employing radio-frequency energy which is used on nonferrous metals such as aluminum. These conferences have contributed to mutual understanding of the problems involved, and the formulation of practical solutions. One interchangeable letter neon sign has been type approved. It is expected that other miscellaneous devices, such as germicidal lamps, display signs, and spectrographs, may also be approved.

#### 8. MISCELLANEOUS RADIO SERVICES

These services cover provisional, geological, motion picture, relay press, and mobile press radio stations. The first two named comprise the greater portion of licensees in this group.

Provisional stations are authorized to transmit messages relative to safety of life and property, or other matters of public necessity, in areas not served by other forms of communication. They are used extensively in oil and gas well-drilling operations and, in more limited numbers, by construction and logging companies, irrigation projects and large-scale farming operations.

If the proposed industrial radio services become fact, the miscellaneous radio services would be deleted as such, and the industries now licensed thereunder would be provided for in the new services, or elsewhere.

#### GEOLOGICAL RADIO SERVICE

This term applies to stations operating in connection with probing the earth's surface and underlying strata for new oil and mineral deposits. Practically all of the 104 licensed geological stations, which represent more than 500 mobile units, are licensed to oil and geophysical exploration companies. Using low power, these stations transmit signals and impulses to seismic recording instruments from various listening points located at distances up to 15 miles from the point where the explosive is detonated. They are also utilized for communication by crews at work in isolated areas and for special functions in connection with less common methods of geophysical investigation. In addition to land operation, many stations are used aboard ship in the Gulf of Mexico as an aid to the search for underwater oil-bearing formations along the Continental Shelf.

#### MOTION-PICTURE RADIO SERVICE

Stations in this class provide communication for film crews on location in places where other facilities are not available, and aid in protecting life and property in that connection. Being mobile, they are particularly advantageous for coordinating and directing "mob" and pastoral scenes, and coordinating the activities of various units engaged in the actual filming. Their number increased slightly during the year. Correspondence with the film industry indicates renewed interest now that improved equipment is available at moderate cost.

#### RELAY PRESS RADIO SERVICE

Newspapers and press associations use these stations to transmit messages from remote locations to the nearest telephone. A number of requests have been received for authority to install land stations at newspaper offices for maintaining contact with reporters and other staff members at the scene of a news event or traveling in the vicinity. To obtain more information concerning this type of service, the Commission has authorized a number of class 2 experimental (relay press) stations.



## 9. EXPERIMENTAL RADIO SERVICES

This category covers radio stations engaged in research and experimentation for the advancement of radio. To provide for all types of such endeavor, these services are broken down into three broad categories, namely class 1, class 2, and class 3 experimental stations. Class 1 stations are authorized primarily to persons qualified to conduct general or specific research. Class 2 stations are authorized to persons engaged in research and experimentation directed toward the development of a new or proposed radio service, or improving an established service. Class 3 stations may be authorized to citizens interested in conducting limited-time experimental programs in their own behalf.

Most class 1 experimental stations are presently operated by equipment manufacturers and research and development organizations. Their experimentation involves not only the development of new uses of radio and electronics but also betterment of existing equipment. For example, one particular need is for equipment to operate on adjacent channels so as to permit the operation of many more radio communication systems in any given area. Much effort is also being expended toward the improvement of existing equipment to diminish spurious and harmonic emissions, thereby reducing interference among various radio communication systems. Other projects call for evolving equipment for operation in the microwave regions to further point-to-point communication.

Among class 1 authorizations during the year was one to an Oklahoma concern for the development of an extremely accurate radio-location system to be used for locating oil deposits off the Gulf Coast. Another was made to a New York firm for the development of a radio-paging system for doctors. The latter contemplates the use of small compact radio receivers so that a doctor can be "paged" by means of coded transmissions from a central location to contact his office. A Connecticut company received a grant looking to development of an electronic speedmeter, operating on radar principles, for determining the speed of automobiles along highways. This information could be used to improve the "degree of slope" on curves to reduce driving hazards—also to apprehend motorists exceeding speed limits.

As a result of radar and other surplus war electronics material being made available through the War Assets Administration to various training institutions—particularly those training veterans under the GI bill of rights—the Commission received numerous requests for permission to operate this equipment. Normally the Commission does not authorize active radio stations for training purposes because, in most instances, adequate training can be given with dummy apparatus. However, adequate radar instruction cannot as yet be obtained by such means and, accordingly, the Commission has authorized many schools and colleges to use radar for training purposes.

Numerous class 1 authorizations are issued to manufacturers and sales engineers for field intensity or coverage surveys in areas where radiocommunication systems are proposed. Results of such surveys provide valuable information for choosing the proper operating frequencies, power, emission, and locations for best performance.

Applications for class 2 experimental stations usually involve proposals for establishment of new services which are not provided for in the regular services.

In view of the limited type of experimentation permitted by class 3 stations, the Commission receives few requests for such operations. Most types of experimentation permitted under the class 3 experimental rules may also be conducted under the amateur or class 1 experimental rules.

#### 10. LOW-POWER RADIO SERVICES

The Commission's low-power rules (secs. 15.1 to 15.4 of pt. 15, formerly secs. 2.101 to 2.104 of pt. 2) provide certain limitations for the intensity of radio-frequency energy which may be radiated without necessity for licensing by the Commission. The largest benefactors from these rules are the various organizations using carrier current systems such as power companies, telephone companies, and railroads.

Various schools and colleges throughout the country are installing intracampus carrier current broadcast systems and the Commission has received numerous inquiries from other institutions and private individuals regarding such systems. Because of this interest and because of the increasing number of regularly established radio services, unlicensed low-power operations are becoming a potential source of interference. Accordingly, the Commission is studying its low-power rules with the view of revising them to meet new conditions.

Inquiries have been received regarding the use of radio for controlling model aircraft. It is estimated that there are approximately 10,000 such enthusiasts in the United States. The Commission's rules provide for such operations in the amateur and the citizens services. However, most inquiries of this nature stem from those who have the operation of their models primarily in mind and the use of radio is merely an incidental matter. Thus, in most instances they do not wish to go through the process of learning radio fundamentals to obtain amateur station licenses. Equipment is not yet available for use in controlling model aircraft in the citizens service. However, the 27 megacycle diathermy band provides a present medium for such operations. The Commission also proposes to permit equipment such as garage-door-openers to operate in this band, as well as short distance radiocommunication systems not provided for in other parts of the rules.

## 11. PROPOSED LAND TRANSPORTATION RADIO SERVICES

The Commission proposes to establish a general category of land transportation radio services to cover radio's uses in promoting the safety and operating efficiency of public land transportation common carriers. Part 16 of the rules, now in effect, relates entirely to the railroad radio services. So the Commission's revision will provide for the inclusion of the transit utility radio service, an intercity bus radio service, an intercity truck radio service, and a taxicab radio service. The transit utility radio service is now licensed under part 17 of the rules, whereas authorizations for radio systems operating in conjunction with trucks, buses, and taxicabs are presently issued in the experimental service.

The new rules, if adopted, will govern the operation and licensing of radio stations used in connection with all transportation common carriers. It is felt that the grouping of these services will result in a more efficient use of available frequencies and simplify administration.

### TAXICAB RADIO SERVICE

In 1946 the Commission formulated a temporary assignment plan for the 24 frequencies in the 152- to 162-megacycle band allocated to the general mobile service, and made two of these frequencies available to the taxicab industry on an experimental basis.

Radio permits an efficient method of cab dispatching, as the necessity of having the cab driver return to the office or callbox for new assignments is eliminated. This, of course, results in a saving in time and distance traveled. At the close of the fiscal year, authorizations had been issued for approximately 30,000 mobile units subject to control from base stations. It is estimated that the taxicab industry will have invested \$10,000,000 in radiocommunication equipment during the calendar year 1948.

The use of radio for dispatching taxicabs produced such outstanding results and these systems increased at such a phenomenal rate that serious problems were presented. The chief difficulty arose from the fact that only two frequencies were available, which necessitated the sharing of airtime by all companies participating in the experimental program.

The Commission now contemplates establishing the taxicab radio service on a regular basis, with eight frequencies, as a part of the land transportation radio services.

### INTERCITY TRUCK AND BUS RADIO SERVICES

The intercity truck radio service and the intercity bus radio service have been proposed in order to provide a radiocommunication service for vehicles carrying passengers and freight over the highways on a

common-carrier basis. These systems, too, are presently being authorized on an experimental basis. One bus company is operating an extensive system between Chicago and Detroit and plans to extend the system so that eventually communication will be possible with busses on the major highways of the country.

## 12. PROPOSED INDUSTRIAL RADIO SERVICES

Postwar radio developments have spurred industry demand for two-way vehicular communications equipment and other short-range radio circuits. This has made it necessary to look to reducing the number of station and service classifications already established while simultaneously revising the eligibility requirements. A step in this direction is the proposed establishment of an industrial radio service, which would include four general groups as follows:

### POWER RADIO SERVICE

This category would cover radio facilities for persons engaged in generating, transmitting, collecting, purifying, or distributing, by means of wire or pipe lines, electrical energy, artificial and natural gas, water or steam for use by the public, or by members of a cooperative organization. At present the radio needs of this group are met partially by power utility stations which share a number of frequencies in the utility radio service.

### PETROLEUM RADIO SERVICE

This service would be open to persons engaged in searching for, producing, collecting, refining, or piping petroleum or petroleum products (including natural gas). Communications along pipe lines are now provided for in the utility radio service, and certain other limited petroleum-industry communications are covered in other parts of the rules. Coordinated industry-wide communications, however, are not now available. Accordingly, it is anticipated that the new service will provide communication for the petroleum industry on a Nation-wide basis.

### FOREST PRODUCTS RADIO SERVICE

Although much of the responsibility for the protection of a large proportion of the timber in the United States rests with private organizations, a radio service for this particular purpose has been available only to instrumentalities of Government or their direct representatives. The creation of a new forest products radio service, using frequencies shared with the petroleum industry, would make radio available to persons engaged in tree farming, logging, and related activities for the purposes of forest protection, safety of life and property, and efficiency of operations in remote areas where other means of communication are not available.

## SPECIAL INDUSTRIAL RADIO SERVICE

The fourth group would provide radiocommunication for commercial or industrial operations which are predominantly rural in nature, as, for example, persons engaged in farming, ranching, irrigation, mining, and construction activities; those engaged in commercial and industrial operations which involve an element of hazard to life and property; those engaged in industrial or commercial operations which react directly upon the public welfare or safety; and those maintenance and repair services involving public health or well-being; and, finally, for all commercial interests, irrespective of eligibility elsewhere under the proposed rules, certain low power radiocommunication systems.

## 13. SAFETY AND SPECIAL SERVICES STATISTICS

## AUTHORIZATIONS

There was a net increase of nearly 11,000 authorizations in the safety and special radio services during the last fiscal year. As of June 30, 1948, the authorized station count was 47,414 as compared with 36,529 the year previous. These figures do not include amateurs, who are covered elsewhere in this report. Following is a comparison of safety and special service authorizations for the past 2 years.

Class of station	1947	1948	Increase
<b>Aeronautical:</b>			
Aircraft.....	14,627	17,738	3,109
Ground.....	1,316	3,122	1,806
<b>Total.....</b>	<b>15,943</b>	<b>20,858</b>	<b>4,915</b>
<b>Marine:</b>			
Ship.....	10,989	13,720	2,731
Coastal and marine relay.....	131	148	17
Alaskan coastal.....	232	277	45
Alaskan fixed public.....	403	412	9
Other.....	200	467	267
<b>Total.....</b>	<b>11,955</b>	<b>15,024</b>	<b>3,069</b>
<b>Public safety:</b>			
Police.....	3,742	4,137	395
Fire.....	55	85	30
Forestry.....	668	461	(-207)
Highway maintenance.....	28	126	98
Special emergency.....	127	94	(-33)
<b>Total.....</b>	<b>4,620</b>	<b>4,903</b>	<b>283</b>
<b>Industrial:</b>			
Utility.....	1,136	1,656	520
Petroleum.....	468	412	(-56)
Lumber.....	0	32	32
Other.....	183	755	572
<b>Total.....</b>	<b>1,787</b>	<b>2,855</b>	<b>1,068</b>
<b>Land transportation:</b>			
Railroad.....	117	204	87
Transit utility.....	50	77	27
Intercity busses and trucks.....	25	24	(-1)
Taxicab.....	1,500	2,817	1,317
<b>Total.....</b>	<b>1,692</b>	<b>3,122</b>	<b>1,430</b>
<b>Experimental:</b>			
Experimental.....	500	527	27
Citizens.....	12	48	36
Miscellaneous.....	20	77	57
<b>Total.....</b>	<b>532</b>	<b>652</b>	<b>120</b>
<b>Grand total.....</b>	<b>36,529</b>	<b>47,414</b>	<b>10,915</b>

It should be pointed out that many of the foregoing authorizations covered the use of mobile units. In consequence, nearly 135,000 mobile units were associated with nonbroadcast services as of January 1, 1948. A break-down follows:

Fixed public.....	<sup>1</sup> 94	Transit utility.....	796
Aeronautical .....	20,517	Power utility.....	10,210
Marine .....	13,180	Petroleum pipe line.....	340
Police .....	32,166	Industrial .....	374
Fire .....	1,283	Experimental .....	<sup>2</sup> 46,216
Forestry .....	4,757	Miscellaneous .....	<sup>3</sup> 3,212
Special emergency.....	373		
Highway maintenance.....	345	Total.....	134,924
Railroad .....	1,056		

<sup>1</sup> Includes agriculture, point-to-point telephone and telegraph, and fixed public press.  
<sup>2</sup> Includes common carrier.  
<sup>3</sup> Includes provisional, mobile press, geological, meteorological, relay press, motion picture, and radio sounding.

APPLICATIONS

The safety and special services received 57,350 applications (exclusive of amateur) during the year. This was an increase of 4,049 over the previous year. Of the year's applications, 35,454 were disposed of. A break-down comparison for fiscal 1947 and 1948 follows:

Class of station	1947	1948	Increase
<b>Aeronautical:</b>			
Aircraft.....	22,247	19,021	(-3,226)
Ground.....	2,283	3,303	1,020
Total.....	24,530	22,324	(-2,206)
<b>Marine:</b>			
Ship.....	14,067	14,183	116
Coastal and marine relay.....	284	154	(-130)
Alaskan coastal.....	408	492	84
Alaskan fixed public.....	586	684	98
Other.....	250	812	562
Total.....	15,595	16,325	730
<b>Public safety:</b>			
Police.....	4,083	5,911	1,828
Fire.....	129	182	53
Forestry.....	451	727	276
Highway maintenance.....	25	147	122
Special emergency.....	456	58	(-398)
Total.....	5,144	7,025	1,881
<b>Industrial:</b>			
Utility.....	1,690	2,389	699
Petroleum.....	1,129	394	(-735)
Lumber.....	2	88	86
Other.....	275	1,463	1,188
Total.....	3,096	4,334	1,238
<b>Land transportation:</b>			
Railroad.....	200	296	96
Transit utility.....	73	173	100
Intercity busses and trucks.....	40	57	17
Taxicab.....	3,363	5,423	2,062
Total.....	3,676	5,951	2,275
<b>Experimental:</b>			
Experimental.....	1,000	947	(-53)
Citizens.....	20	165	145
Miscellaneous.....	240	279	39
Total.....	1,260	1,391	131
<b>Grand totals.....</b>	<b>53,301</b>	<b>57,350</b>	<b>4,049</b>

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## CHAPTER V. COMMON CARRIERS

1. COMMON CARRIER REGULATION
  2. TELEPHONE (WIRE AND RADIO)
  3. TELEGRAPH (WIRE, CABLE, AND RADIO)
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### 1. COMMON CARRIER REGULATION

A major purpose of the Communications Act is "to make available, so far as possible, to all the people of the United States, a rapid, efficient, Nation-wide and world-wide wire and radio communication service with adequate facilities at reasonable charges \* \* \* "

To that end, the Commission is charged with regulating interstate and foreign communication by telephone and telegraph. The act requires that all charges, practices, and regulations in this connection be just and reasonable and nondiscriminatory.

At the same time, the Commission regulates the adequacy and quality of these services. No carrier may construct or acquire a facility of this character without Commission approval. By the same token, a carrier must obtain Commission approval of discontinuance or curtailment of such service. The Commission also regulates the interlocking of officers and directors, it being unlawful for a person to hold office in more than one carrier unless specifically authorized to do so. The Commission likewise passes upon applications of carriers for authority to merge.

The Commission prescribes the forms of records and accounts kept by these carriers, and has established uniform systems of accounts for them to follow. Carriers file public tariff schedules with the Commission, also annual reports and copies of all contracts with other carriers relating to traffic subject to the act.

The Commission receives all applications to land or operate submarine cables connecting the United States to other countries, and advises the President with respect to the granting of such licenses after receiving the approval of the Secretary of State.

The Commission licenses common carrier radio operators under provisions of the act which require the licensing of all persons engaged in radio transmission.

The Communications Act expressly protects wire and radio messages (with the exception of broadcast, amateur, and distress communication) from interception and use by unauthorized persons.

A large share of the Commission's common carrier work relates to rates and services of the Bell Telephone System, 63 independent tele-

phone companies, the Western Union Telegraph Co., and some 15 international carriers. The public has a large stake in these communication services since it pays well over \$2,500,000,000 a year for them.

#### COMMON CARRIER RADIO STATIONS

Nearly a thousand radio stations (not counting associated mobile units) are authorized in the common carrier services. This is an increase of more than 400 since the previous year. Figures for the past 2 fiscal years follow:

	1947	1948	Increase
General mobile.....	427	785	358
Experimental.....	81	128	47
Fixed public telephone.....	23	27	4
Fixed public telegraph.....	50	56	6
Total.....	581	996	415

#### COMMON CARRIER APPLICATIONS

More than 3,000 common carrier applications of all types were received during the year. Here is a summary of the fiscal years 1947 and 1948:

	Pending July 1, 1947	Received 1948	Disposed of 1948	Pending June 30, 1948
General mobile.....	43	1,135	1,018	160
Experimental.....	2	199	180	21
Fixed public telephone.....	23	138	148	13
Fixed public telegraph.....	95	339	368	66
Wire service extensions.....	17	498	490	25
Wire service reductions.....	121	841	724	238
Total.....	301	3,150	2,928	523

## 2. TELEPHONE (WIRE AND RADIO)

### GENERAL

The telephone industry handled more business during fiscal 1948 than in any previous year. The Bell system, which owns about 85 percent of all telephones in service, handled over 34,500,000,000 exchange conversations and about 1,900,000,000 toll conversations during the year and currently is handling more than 125,000,000 conversations daily.

Industry expansion continued at the accelerated pace established following the war. The Bell system installed its 30 millionth telephone at Marshalltown, Iowa, on June 29, 1948. The General Telephone Corp. system during the year installed its millionth telephone. Telephone facilities are being added at an average rate of more than \$3,000,000 a day and the total gross investment now exceed \$8,000,000,-



000, reflecting a growth of about one-third during the past 3 years, More than 36,000,000 Bell and independent telephones were in service as of June 30, 1948, but there still remained a backlog of unfilled orders for approximately 1,500,000 instruments.

Rapid expansion was also felt in related telephone carrier activities, which include teletypewriter, private line, mobile radiotelephone, overseas radiotelephone, ship-to-shore radiotelephone, and radio broadcast and television program transmission services.

#### DOMESTIC TELEPHONE SERVICES

*Construction of wire facilities.*—The telephone industry expended about \$800,000 more in fiscal 1948 for new interstate wire and cable facilities than during the previous year. In addition to 13 applications on hand from the preceding year, the Commission received 380 new requests for wire line construction, acquisition, extensions, and leased projects. This included blanket application of American Telephone & Telegraph Co., and associated companies covering long lines construction. New construction authorized by the Commission in each of the past 5 years is indicated by the following table:

Fiscal year	Projects	Estimated cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944.....	121	\$9, 582, 239	574. 8	0	7, 968
1945.....	210	70, 091, 140	2, 378. 3	7, 902	2, 963
1946.....	239	78, 896, 450	3, 193. 8	16, 580	12, 261
1947.....	289	126, 325, 771	5, 587. 7	23, 490	15, 976
1948.....	348	127, 162, 499	2, 637. 5	46, 080	16, 373

Based upon applications received by the Commission, the Bell system added about 2,100,000 miles of toll message channels during the year, which increased its previous total by 13.8 percent. About 90 percent of the new channels were provided by carrier systems.

The American Telephone & Telegraph Co. received authority to construct additional New York-Washington television circuits, two television circuits in each of the Washington-Charlotte, New York-Albany, Philadelphia-Chicago, Chicago-St. Louis, and Cleveland-Buffalo coaxial cable routes, and to install transmitting equipment at South Bend and Danville which are on the Philadelphia-Chicago-St. Louis television circuits. These scheduled coaxial facilities, when connected to existing and proposed microwave systems, will provide a comprehensive television network.

*Coaxial cable.*—The American Telephone & Telegraph's current program calls for 12,000 route miles of coaxial cable being installed by 1950. The Commission has authorized a total of 7,697 miles of coaxial cable (including 1,435 miles authorized during the past year at an estimated cost of \$42,498,000). Coaxial facilities, supplemented by

microwave radio relay systems, are designed to transmit a broad band of frequencies suitable for all types of services, including television. The transcontinental coaxial cable between Atlanta and Los Angeles was completed in November 1947, but at the close of fiscal 1948 was not yet available for television transmission.

*Dial telephones.*—The telephone industry is fast converting from manual to dial operation to handle mounting traffic loads. The Bell system has established dial operation at most of its exchanges in the larger cities, as well as many exchanges in smaller places. Today, 65.6 percent of all Bell telephones and 33 percent of all independent telephones are of the dial type. Conversion of toll boards throughout the country to dial operation is under way. This program, which was started in 1943 at Philadelphia, will require a number of years to complete. In the near future other cities, such as New York, Chicago, Cleveland, Oakland, Boston, Albany, Los Angeles, Indianapolis, and Baltimore will be so equipped.

*Speed of service.*—The Bell system reduced the average time required to complete a toll call from 2.4 minutes in June 1947 to 2.1 minutes in June 1948. An average 2-minute speed of toll service is its objective.

*Rural telephone service.*—The Bell system, during the fiscal year, installed slightly over 350,000 telephones in rural areas, bringing the total number of such telephones in its service, as of June 30, 1948, to approximately 2,200,000. Under the rural expansion program of the telephone industry, 40 percent of the farms in the United States have telephones. In the three southern regions (South Atlantic, East South Central, and West South Central), however, five out of six farms are reported as being without telephones.

*Telephone recording devices.*—On November 26, 1947, the Commission issued its final order in the proceedings involving the use of recording devices in connection with interstate or foreign telephone service. The order authorized their use subject to adequate notice to users that recording devices are being employed, such notice to be given by an automatic tone warning device producing a distinctive signal at regular intervals during the recorded conversation. The order, as subsequently amended, became effective on June 30, 1948, and directed the telephone companies to file no later than August 2, 1948, tariff schedules governing the use of recording devices in the manner prescribed.

*Cable landing license.*—The Commission received two requests for a presidential license for telephone cable landing operations. One sought to construct a telephone line across the Rio Grande River near Presidio, Tex., and the other was for a second submarine cable between Point Roberts, Wash., and the Canadian border. Both applications were pending at the end of the fiscal year.

*Discontinuance, reduction, or impairment of service.*—Fourteen applications were received to discontinue telephone service and 3 such applications were on hand, making a total of 17. Of these, 13 were granted and 4 were pending. Eight were Western Union requests to discontinue telephone service to cities connected to its long-distance telephone facilities. There were no remaining subscribers and adequate service was available through regular telephone facilities. Five applications sought to discontinue exchange or toll service in cases where another carrier planned to provide the same service. Four others were to discontinue telephone exchanges in sparsely settled areas and substitute extended area service, rural line service, or toll station service from nearby exchanges.

*New developments.*—At Media, Pa., the Bell system installed its first No. 5 cross-bar dial central office. This equipment is designed for communities of from 3,000 to 30,000 customers to handle exchange, intertoll, and tandem toll switching and to operate in conjunction with the Nation-wide toll dialing system. The Media installation also incorporates the first automatic message-accounting equipment which provides a ticket for machine billing of each toll call.

New types of cable sheath using plastics and a thin metal covering have been tested and, as a result, Alpth cable having a sheath of aluminum and polyethalene is now being used. A new magnetic alloy known as supermalloy, which has the highest permeability of any known commercial magnetic material, has been developed for telephone equipment.

The newly announced transistor is a metal tube about the size of a shoelace tip containing two hair-thin wires touching a pinhead of a solid semiconductive material soldered to a metal base. It will serve as an amplifier or an oscillator tube using about one-tenth of the power of an ordinary flashlight bulb and amplifying about 100 times, thus tending to supplant vacuum tubes for many uses. A broad band carrier system—similar to the types J, K, and L—is being developed to operate over 2 pairs of wires in a single-cable sheath providing 12 telephone channels per system. Known as the N type carrier, it will greatly increase the capacity of the single cable routes.

*Microwave relay systems.*—The American Telephone & Telegraph Co. expanded its experimental microwave facilities. The New York to Boston microwave link, placed in service November 11, 1947, had its first commercial television use on June 9, 1948. In addition to this circuit, a New York-Chicago chain and a number of short microwave systems are planned. Two microwave systems for television programs only were scheduled for completion during the second half of 1948, linking Chicago with Milwaukee, and Detroit with Toledo. Microwave television program pick-up stations have been author-

ized for 11 Bell companies. They are concentrated in the areas of greatest television broadcast activity—New York and Los Angeles.

A regular basis of operation for microwave relay systems is contemplated in proceedings associated with certain presently experimental services. (See Safety and Special Radio Services.)

*Short distance radiotelephone service.*—Increasing interest has been shown in the use of very-high-frequency radio for short-distance telephone service, particularly in inaccessible areas where wire-line construction costs would be prohibitive. A few installations, on an experimental basis, have demonstrated that the use of radio in such places is practicable. Consequently, expansion of domestic short-distance radio telephone circuits is expected. Proposed rules to place this service on a regular basis were under consideration.

*Mobile radiotelephone service.*—Mobile radiotelephone service, whereby communications connections are offered between land-line stations and stations in vehicles, or between vehicles, has seen tremendous expansion since its introduction for public use in June 1946. The demand for this service far exceeds the capacity of facilities, with large backlogs of unfilled orders for mobile telephones in all the major cities. Installations of associated terminal facilities are approaching the point where telephone carriers will be able to furnish this service in most sections of the country.

Urban mobile service has been made available commercially by the telephone carriers in 60 cities, with installations in 22 additional cities in various stages of construction. Highway mobile commercial service has been opened in the vicinity of 95 communities, with construction under way in 37 additional areas.

Three types of communications are furnished by telephone companies: (1) general, which is the usual two-way telephone service between any telephone in the land-line system and a mobile unit via the base radiotelephone station with which the mobile unit is associated; (2) dispatching, a two-way service between wire telephones of a subscriber and specified mobile units of the same subscriber; and (3) signalling, a one-way signal from a land station to associated vehicles.

A new public telephone service which is competitive with the service of the established telephone companies is being offered in the mobile radio field by a number of nontelephone enterprises. It affords a third-party relay service which is not directly interconnected with the general land-line telephone systems. Messages between the mobile unit and the customer's land-line telephone are relayed by a dispatcher at the base station. This service was available on a commercial basis in 30 cities, with 88 additional stations under construction. The plan of operation makes its rates slightly lower than for the direct connection basis offered by the telephone carriers.

The mobile services, which have been operating under experimental authorizations, would obtain permanent status under rules proposed by the Commission. (See Safety and Special Radio Services.)

*Service in Hawaiian Islands.*—The Mutual Telephone Co. has installed and is operating nine transmitters in the 152- to 162-megacycle range in both its radiotelegraph and radiotelephone services in Hawaii (intra and interisland service). This equipment is capable of simultaneous telephone and telegraph operation and is intended to supplement Mutual's equipment now operating in the 30- to 50-megacycle range. Mutual was also authorized to operate two stations in the experimental service between 450 to 460 megacycles.

*Coastal and Alaskan service.*—Coastal harbor, coastal telephone, and Alaskan radio communications services are discussed in safety and special services because of their close relationship to radio aids to the safety of life and property. The public radiotelephone service inaugurated during the preceding year between various coastal harbor stations and aircraft expanded during 1948 and provision was made for the exchange of telegraph traffic as well.

#### INTERNATIONAL RADIOTELEPHONE SERVICE

*Message toll telephone service.*—Overseas message toll telephone service was reestablished with four countries where it had been suspended during the war and service was made available with seven countries for the first time. At the close of the year, radiotelephone service was in effect with 74 foreign countries outside North America. Negotiations were under way to reestablish service to other countries which were served before the war and to establish service to countries not previously served. In all cases where service was inaugurated or reopened, the rate pattern conformed to that outlined in the Commission's report for the fiscal year 1946. This service is now handling about 575,000 calls a year compared with around 50,000 calls annually in the pre-war period.

*Program transmission and private line services.*—Overseas broadcast program transmission service is available to 55 countries and short period private line service to 6 countries.

*Equipment.*—The American Telephone & Telegraph Co. has installed 13 additional transmitters at its fixed public radiotelephone stations in the United States to cope with the increasing demand for international telephone service. All but three of these transmitters are of the single side-band type, capable of twin- or triple-channel operation. Single side-band operation requires substantially less frequency space per channel than does the conventional double side-band system used for regular broadcast and long distance radiotelephone communication service. This is an important factor, in view of the crowded condition of the radio spectrum.

*Docket cases.*—On April 9, 1948, the Commission adopted its final report and order in docket 7555, wherein it renewed the license of RCA Communications, Inc., for its fixed public point-to-point radiotelephone station at Kahuku, Oahu, T. H., and denied the application of Mutual Telephone Co. for a new fixed public point-to-point radiotelephone station at Pupukea, Oahu, T. H.

*Frequencies.*—Almost all of the frequencies relinquished by the fixed public service to the military during the war have now been returned and, in addition, many new frequency assignments were made during the year. The Commission is participating actively in the work of the Provisional Frequency Board, created at the Atlantic City conferences, in engineering a new international frequency list which will contain all assignments for stations operating in the fixed public service.

*Interference.*—Increased use of radio for international communication and favorable conditions for high-frequency transmission caused a large number of interference complaints to be brought to the attention of the Commission. Notable among these, in view of the unusually long distance involved, were two cases concerning Mutual Telephone Co. operations in Hawaii on frequencies in the 30- and 40- megacycle range. Severe interference was experienced at several points in Texas and Oregon. It was eliminated by changing the frequencies used by Mutual.

*International Telephone Conference.*—In June 1948 the International Telephone Consultative Committee (CCIF) met at Stockholm, Sweden, to consider various technical telephone subjects, and proposals for certain changes in the International Telephone Regulations, in preparation for the Administrative Telephone and Telegraph Conference scheduled to be held in Paris in 1949. The United States was represented at the Stockholm session by an observer delegation, of which Commissioner Paul A. Walker was chairman.

#### RATES AND TARIFFS

*Rate schedules.*—At the close of the year, 227 telephone carriers had tariffs and concurrences on file with the Commission. During the year they filed a total of 23,177 tariff publications establishing or changing rates, regulations, practices, and classifications of service, including concurrences. Numerous irregularities in the rate schedules were corrected or eliminated through correspondence with the carriers.

*Special permissions.*—Forty-three applications for special permission to make changes in the tariffs or to file new tariffs to become effective on less than statutory notice or involving waiver of certain rule requirements were received. Of these, 42 were granted and 1 denied.

*Other-line charges.*—Bell system companies continued to make progress in establishing through rates for interstate message toll tele-

phone traffic interchanged with independent companies formerly handled on an other-line charge basis. As of March 1948, other-line charges applied on 320 telephone routes as compared with 393 on January 1, 1947.

*Channels for FM program transmission.*—As a result of a petition filed by the FM Association, an organization representing the FM radio broadcasting industry, an informal conference was held by the Commission in January 1948 with representatives of the association and American Telephone & Telegraph Co., regarding the availability of 15,000 cycle intercity transmission channels for FM broadcast programs, and appropriate rates therefor. Thereafter, the telephone company filed tariff schedules, effective February 18, 1948, establishing rates and regulations for intercity program transmission channels with a frequency range of approximately 50 to 15,000 cycles, suitable for use in connection with FM network broadcasting. Both the service and the rate structure involved are similar to the lower fidelity services heretofore offered for program transmission purposes, but 5,000-cycle service had been the highest grade provided previously.

*Channels for TV program transmission.*—As noted in the Commission's Thirteenth Annual Report, eight Bell companies had filed rates for local TV channels and associated station equipment. Rates for intercity TV channels, which had been filed by American Telephone & Telegraph Co. to become effective August 1, 1947, were withdrawn by the company for further study. At the close of the current fiscal year, 15 Bell system companies had filed rates for local channels. At the direction of the Commission, American Telephone & Telegraph Co. filed new tariff schedules on March 29, 1948, establishing rates and regulations for intercity TV channels and associated equipment, to become effective May 1, 1948. Since that time, 14 associated companies have also filed rates and regulations for intercity TV channels.

The basic schedules provide for the service on either a monthly basis 5 hours per day, 7 days per week, or on an occasional use basis. However, because of the shortage of intercity facilities available for this service, a separate schedule of charges based on a minimum use of 4 hours daily, 7 days per week, has been established for monthly service where allocation of usage between customers is necessary. It is expected that most of the monthly service for some time to come will be on an allocated usage basis. Another schedule of charges applies to intercity channels of less than 25 miles in length, which charges are approximately the same as those of the associated companies for local studio transmitter links.

The charges for intercity TV channel service, based on the rates filed in March 1948, would range from 23 to 39 percent lower than those provided in rates filed in August 1947. The Television Broad-

casters Association filed, on April 23, 1948, a formal petition with the Commission requesting that the intercity rates and regulations of both the Bell system companies and Western Union, which were also filed to become effective May 1, 1948, be suspended and that an investigation be made into their lawfulness. The Commission denied the request for suspension but ordered an investigation and hearing. The hearing commenced June 15, 1948, but was recessed until fall.

*Great Lakes ship-shore telephone service.*—On March 15, 1948, the Radiomarine Corp. of America filed amended tariff schedules to become effective April 19, 1948, establishing, for the first time, so-called ship station charges applicable to telephone messages to and from certain ships operating on the Great Lakes and handled through Radiomarine's coastal harbor radiotelephone station WBL. Among other things, the effect of the revised schedules was to increase substantially the charges to the public for such service. In addition to the reasonableness and lawfulness of the proposed increased rates, certain questions concerning the operations of Radiomarine were presented. Accordingly, the Commission suspended the amended tariff schedules and set the matter for investigation and hearing. At the request of Radiomarine, the scheduled midsummer hearing was postponed until fall.

*Ship and aircraft telephone service.*—The American Telephone & Telegraph Co. and Bell system companies filed amended tariff schedules, effective April 15 and May 15, 1948, respectively, revising the rate structure for telephone service between land points and ships at sea or aircraft en route, via Bell system coastal harbor and high seas radiotelephone stations. The rates for this service were formerly composed of a radio-link charge, of which one-third accrued to the ship or aircraft, plus a land-line charge. The revised rate structure is based on the air-line distance between the rate areas in which the craft and the land telephone are located. When the call to or from a ship or aircraft is via a coastal harbor station, a specific schedule of charges applies, of which no portion accrues to the ship or aircraft. For calls via a high seas coastal-telephone station, two schedules of charges have been established, one of which applies if the ship or aircraft is a carrier (one which renders communication service for hire), and a lower schedule if the ship or aircraft is noncarrier (one which does not render communication service for hire). The adoption of the new rate structure for ship telephone service has resulted generally in lower rates. Several larger passenger liners continue to render service on the radio-link basis. Rates for telephone service via coastal stations of other companies have not been changed.

*Washington metropolitan area.*—As noted in the Thirteenth Annual Report, the Chesapeake & Potomac Telephone Cos. of Virginia



and Baltimore City filed revised tariff schedules increasing the charges for certain interstate telephone calls between points in Virginia and Maryland within the Washington metropolitan area. These charges were suspended by the Commission pending a hearing as to their lawfulness and the telephone companies as well as the respective State commissions have questioned the Commission's jurisdiction in the matter. This is but one example of the jurisdictional problem that is arising frequently, where companies are converting certain short haul traffic from toll to extended area service arrangements. When such changes affect interstate toll traffic, the question arises as to whether the Commission retains jurisdiction to regulate the modified service.

#### COOPERATION WITH OTHER REGULATORY BODIES

*Western Electric cost and price review.*—Nearly all the materials and supplies purchased by the Bell companies are obtained from Western Electric Co., Inc., which is the manufacturing and supply department of the Bell system. The level of prices charged by Western Electric has an important impact on Bell telephone rates because these purchases either are charged to current expenses or are used for additions and replacements of plant which affect the investment in plant and depreciation charges. The importance of these prices is further emphasized by the fact that Western Electric sales to Bell companies amount to approximately a billion dollars a year. In many of the rate proceedings during the past year the State commissions have questioned the profits made by Western Electric on sales to affiliated telephone companies. As a result, in January 1948 a working committee representing this Commission and State commissions began a preliminary study of Western Electric prices, costs, and profits. The resulting report, issued shortly after the close of the fiscal year, is a preliminary review and summary of available data intended to assist regulatory bodies in appraising the reasonableness of Western Electric's earnings and prices and in determining the necessity for further investigation. While the study was in progress, Western Electric made two price adjustments which, according to the company's estimates, represented a net price reduction of approximately 8.6 percent on products of its manufacture, equivalent to an annual saving of approximately \$70,000,000 to Bell companies.

*State telephone rate cases.*—During the year, a large number of requests for increases in intrastate telephone rates was filed with state commissions by telephone companies. In the postwar period up to May 31, 1948, the Bell system companies applied for increases totaling \$242,000,000 in intrastate rates in 43 States and the District of Columbia. Increases aggregating \$138,000,000 were granted in 35 States and the District of Columbia and requests aggregating \$66,000,000 were pending before commissions in 15 States. Continuing its policy

of cooperation with State regulatory agencies, the Commission, to the limited extent possible, furnished information and assigned staff members at the request of State commissions. This participation consisted of conducting field studies jointly with State commission representatives and presenting testimony in several cases on matters of particular concern to this Commission in the exercise of its own regulatory functions. In addition, the Commission was consulted frequently on such regulatory matters as the Bell system license contract fees, depreciation, pension costs, and separation procedures.

*Allocation of depreciation reserves of multi-State companies.*—From time to time State public utility regulatory and tax authorities request Commission assistance in connection with determining the depreciation reserves applicable to individual States in the case of multi-State telephone companies. At the request of the Southeastern Association of Railroad & Utilities Commissioners, representing the States served by Southern Bell Telephone & Telegraph Co., joint studies were undertaken. These studies, which were nearing completion, will provide data on the service life expectancies and salvage recoveries for the various classes of plant which are necessary for allocating the company's depreciation reserve to the various States on an equitable basis.

*Separation of property, revenues, and expenses.*—Following intensive cooperative review and study during 1947, jointly with State regulatory body members and representatives of the Bell system and the non-Bell telephone industry (see Thirteenth Annual Report), a Separations Manual of Standard Procedures for Separating Telephone Property, Revenues, and Expenses was completed in October 1947. It is used by the Bell companies to allocate plant, revenues, and expenses among exchange, intrastate toll and interstate toll services for rate-making purposes, and in connection with the system's division of interstate message toll telephone revenues. The Commission, however, has not yet approved any specific method of separation, and docket 6328 (in which separation procedures are in issue) is still open. The Commission has offered no objection to the use of the separation procedures as set forth in the separations manual, for test purposes, in connection with Bell system division of revenues, pending decision in this docket.

The Commission continues to review the over-all monthly results of the division of interstate toll revenues among the Bell companies to check the accuracy of the application of the separation procedures to actual operations of the Bell system under the division of revenues contracts, and to test the reasonableness of the results obtained thereby.

*Bell system license contracts.*—Surveillance continued in regard to

the allocations of the alleged costs of the American Telephone & Telegraph Co. among the Bell companies advanced in justification of the collection from these companies of 1½ percent of their gross revenues in payment for certain services assertedly performed for their benefit by the parent company under the so-called license service contracts.

#### OTHER REGULATORY MATTERS

*Uniform system of accounts.*—Developments in public service communication indicate the need of changes in accounts or the establishment of new accounts to keep pace with new services and technical advances. Studies under way look to accounting classifications that will provide requisite information on plant investment involved and other costs of rendering service. Further improvement of the uniform system of accounts for class A and class B telephone companies with respect to income items is also under consideration. Procedures have been developed for more promptly detecting failures by carriers to comply with prescribed regulations relating to several types of accounting transactions of known recurrence.

*Financing and refinancing.*—Issuance of new securities by telephone companies continued in substantial volume. In addition to collaborating with the Securities & Exchange Commission by examining prospectuses filed with that Commission in light of accounting and financial data on file with this Commission, other matters of accounting were the subject of study after the securities had been issued. Increased activity continued with respect to the application of accounting regulations relating to refunding transactions, including the appropriate disposition of unamortized bond discount, premium, and expense.

*Pensions and relief.*—Because of the increase in wages and liberalization of benefits, relief and pension costs of communication carriers rose to a new high in 1947, reaching approximately \$118,000,000 annually for the Bell system alone, excluding social security taxes amounting to an additional \$23,500,000. Problems of pension accounting, therefore, continued to be of great significance, particularly in regard to (1) the reasonableness of costs, (2) the methods of determining the costs, and (3) the accounting for these costs. An extensive analysis of the Bell system's actuarial methods was tentatively completed, subject to further consideration and conference with the companies. In these studies attention was also directed to the question of the extent to which current payments into pension funds relate to past service of employees. Many inquiries relative to these pension problems were received from State commissions and labor groups.

*Preservation of records.*—Inquiry relating to the feasibility of microfilming carriers' records resulted in recommendation that this method of preserving records be approved for use by public utilities including communication carriers. Satisfactory standards for the use

of microfilm in the record-preservation program have been developed. A list of all records required in the exercise of regulatory functions was completed except for certain operating records that apply to particular situations.

*New types of plant and services.*—Preliminary and experimental procedures developed by telephone companies, in collaboration with the Commission, to account for plant, revenues, and expenses in connection with new communications services, including mobile and rural radiotelephone service and power-line carrier service, have been the subject of studies and conferences. It appears that continuation of the present practices of the companies with respect to maintenance of underlying records and subsequent establishment of new subaccounts may be preferable to establishment of new accounting classification. However, further observation of the development of these services is necessary before final determination can be made.

*Restatement of plant on basis of original cost.*—By general agreement, most of the Bell companies are completing restatement of their plant accounts on the basis of original cost with respect to acquisitions of plant made prior to the effective date of the present system of accounts. Disposition of amounts in excess of original cost recorded in the plant acquisition adjustment accounts are being charged directly to surplus or through appropriate amortization over reasonable future periods. During the year, adjustments made by telephone companies reduced the net book cost of plant through charges to income or surplus by more than \$2,000,000, thereby increasing the total original cost adjustments to more than \$37,000,000. Several cases involving controversial issues as to further adjustments were pending. Current acquisitions continued to be dealt with in accordance with the provisions of the uniform system of accounts.

*Continuing property records.*—Studies were continued jointly with representatives of State commissions and the telephone industry for the purpose of improving and simplifying continuing property record procedures. Field studies of a proposed method designed to improve the development of unit costs used in the retirement of certain classes of telephone plant are continuing. Further studies of the adequacy and effectiveness of continuing property record systems of certain large Bell telephone companies were undertaken during the year. Continued efforts were made to obtain full compliance by independent telephone companies with the continuing property record requirements, and negotiations were still in progress with 5 of a total of 50 such companies at the end of the year.

*Depreciation.*—With the exception of salaries and wages, depreciation expense is the largest item of annual operating costs incurred by telephone companies. For the Bell system alone, depreciation

charges for the calendar year 1947 were approximately \$245,000,000 whereas at the end of fiscal 1948 they were running at an annual level of over \$285,000,000 and were continuing upward. While the major part of this increase is directly attributable to the vast expansion in telephone plant at current high cost levels, some contribution also results from the upward trend in annual depreciation rates. This is due largely to the fact that, in efforts to reduce the backlog of unfilled orders for telephone service, the industry in many instances expanded existing facilities of old types which are scheduled for replacement as soon as modern equipment is available.

Studies were continued with respect to the propriety of proposed changes in depreciation rates. Carriers proposing substantial changes were in many instances requested to file supplementary data in support of estimated service lives and salvage values underlying the proposed changes. Investigations were conducted in the offices of some of the principal Bell companies to determine the reasonableness of rates and methods in that respect. There was also cooperation with the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners.

TELEPHONE STATISTICS

Annual reports for the calendar year 1947 were filed by 138 common carriers and 28 controlling companies. They included 111 telephone carriers. Some selected financial and operating data of these telephone carriers for the year 1947, in comparison with 1946, are shown below:

Telephone carriers

Item	1946	1947	Percent increase or (decrease), 1947 over 1946
Investment in plant and equipment (as of Dec. 31).....	\$6,684,830,044	\$7,788,162,429	16.51
Depreciation and amortization reserves.....	\$2,350,398,973	\$2,513,997,977	6.96
Net investment in plant and equipment.....	\$4,334,431,071	\$5,274,164,452	21.68
Local service revenues.....	\$1,237,229,168	\$1,354,984,904	9.52
Toll service revenues.....	\$809,828,351	\$908,363,760	.95
Total operating revenues <sup>1</sup> .....	\$2,251,942,629	\$2,398,317,627	6.50
Operating expenses <sup>1</sup> .....	\$1,714,901,566	\$1,935,995,020	12.89
Taxes.....	\$273,262,223	\$260,829,709	(4.55)
Net operating income after all taxes.....	\$263,779,140	\$201,492,613	(23.61)
Net income.....	\$226,813,615	\$170,271,710	(24.93)
Dividends declared.....	\$198,831,671	\$203,519,238	2.36
Company telephones:			
Business.....	9,594,087	10,301,919	7.38
Residential.....	18,234,914	20,499,920	12.42
Average number of calls originating per month:			
Local <sup>2</sup> .....	4,012,545,963	4,390,078,430	9.41
Toll <sup>2</sup> .....	171,322,349	180,202,249	5.18
Number of employees at end of October.....	525,523	556,887	5.97
Male.....	160,695	183,684	14.31
Female.....	364,828	373,203	2.30
Total pay roll for the year.....	\$1,366,053,484	\$1,435,902,570	9.94

<sup>1</sup> Intercompany general service and license fees and rents, amounting to approximately \$41,000,000 for 1947, and \$39,000,000 for 1946 have not been eliminated.

<sup>2</sup> Partly estimated by reporting carriers.

### 3. TELEGRAPH (WIRE, CABLE, AND RADIO)

#### DOMESTIC SERVICE AND FACILITIES

*Western Union modernization program.*—The essentials of Western Union's \$72,000,000 modernization program (see Thirteenth Annual Report) include substitution of automatic reperforator-switching for manual relay of telegrams at principal message centers and provision of telegraph channels by construction of microwave radio relay systems, leasing of facilities from the Bell system, and installation of wire carrier systems. The plan also calls for development of the use of telefax and telecars, expected to improve the speed and efficiency with which messages are handled at terminals. Substantial progress is being made in this project. Its completion, scheduled for the end of 1950, should result in an improved quality of telegraph service and operating economies estimated by the company at \$20,000,000 on an annual basis.

*Domestic radiotelegraph.*—During the year Western Union completed construction of its microwave triangle connecting New York, Philadelphia, Washington, and Pittsburgh. The New York-Washington leg is in service, with the other two legs in limited service, and full service was expected in the fall. Microwave circuits have proven satisfactory from a technical standpoint, and appear to offer advantages from the operating, maintenance, and economic standpoints, particularly on circuits carrying a very heavy traffic volume.

*Construction of wire facilities.*—The year brought 105 requests covering wire telegraph construction and extensions. Three such applications were carried over from the preceding year, making a total of 108. One hundred and four applications were granted. They covered the construction of 38,223 telegraph channel miles at a cost of \$260,365, and the lease of 70,508 telegraph channel miles at an annual rental of \$350,476 and terminal equipment at a cost of \$367,137.

*Speed of service.*—The Commission amended its rules and regulations to require Western Union, beginning June 1, 1948, to conduct and submit over-all or origin to destination speed of service studies. The first of these reports, covering the month of June 1948, shows that the average interval between the time a message is filed to the time it is delivered (or first attempt) was 43, 40, and 50 minutes when delivered by telephone, customer tie line and messenger, respectively. The time required by Western Union to relay messages through its 25 largest offices ranged between 9.4 and 12.8 minutes. The average was 10.5 minutes—an improvement of 0.5 minute when compared with the preceding 12-month period.

*Discontinuance, reduction, or impairment of telegraph service.*—During the year, 745 applications for reduction of office hours or closure of public offices were filed, in addition to 126 pending. With few

exceptions, these applications were filed by Western Union. Of this number, 598 were granted; 44 were withdrawn by applicant; 1 was withdrawn in part; 1 was denied; and 227 were pending. With respect to one of the applications granted, the Commission later requested restoration of the former hours of service. In five instances, authorized curtailments in service were not effected by the company. Service curtailed pursuant to grants of six of the applications was later restored voluntarily by applicant. In most cases where hours were reduced or offices closed, alternate service was made available.

On February 26, 1948, the Commission, by letter to Western Union, proposed the establishment of a standard to determine the maximum size of company-operated telegraph offices which, under normal circumstances, might be considered for conversion to teleprinter agency offices operated by persons engaged in nontelegraphic businesses. Need for such a standard grew out of pending and prospective applications by Western Union to effect conversions to agency operations. At the close of the year, comments from Western Union and others interested were under consideration.

After public hearings, Western Union received authority to discontinue six main telegraph offices in as many Ohio communities, and to substitute teleprinter operated agency offices to be operated by local telephone companies. In its report, the Commission concluded that the proposed changes would result in improved and additional services of value to those communities as well as to 116 other adjacent communities, with lower charges to the public in many instances.

#### RATES AND TARIFFS

*Rate schedules.*—As of June 30, 1948, 156 telegraph carriers had tariffs and concurrences on file with the Commission. They filed during the year 5,489 tariff publications establishing or changing rates, regulations, practices, and classifications of services, including concurrence. Numerous irregularities in the rate schedules were corrected or eliminated through correspondence with the carriers.

*Special permissions.*—During the year, 101 applications for special authorization to make changes in tariffs to become effective on less than statutory notice, or involving waiver of certain requirements of the Commission's rules, were received from telegraph carriers. Of these, 85 were granted, 14 denied, and 2 were not acted upon at the request of the applicants.

*Other-line charges.*—Further progress was made in the establishment of joint through rates for interstate telegraph traffic. As of March 1948, other-line charges applied on 386 routes as compared with 454 on January 1, 1947.

*Government rates.*—On the repeal of the Post Roads Act, effective July 26, 1947, pursuant to which special domestic message telegraph rates had been accorded the Federal Government, Western Union filed tariff schedules proposing the elimination of the differential between Government and commercial rates. The Commission suspended the operation of the schedules pending a hearing. Following the hearing, in which the Government opposed the abolishment of the discount, the Commission permitted the new schedules to become effective. As a result of this action, domestic Government message telegraph rates are now on the same level as commercial rates. Priority, however, is still accorded Government full rate and serial messages, if specifically requested by the sender. The repeal of the Post Roads Act did not affect international Government telegraph rates, and certain preferential Government rates are still operative in such traffic.

*Western Union rate structure.*—In spite of certain anomalies and discriminatory practices which were eliminated in 1946 and 1947, Western Union's rate structure still contains many inconsistencies, particularly with respect to the relationship between rates and distances. These deficiencies, in addition to the rate increases granted in 1946-47, have seriously weakened Western Union's competitive position in relation to the rapid communications services of the telephone companies and the United States air mail, and indicate that the rate structure should be revised so as to be better adapted to modern communication needs. In June 1947, Western Union informally submitted to the Commission a trial rate structure for domestic telegraph service which was based on extensive studies the company had been carrying on in cooperation with the Commission. It is expected that this informal submission will mature into a formal proposal for an over-all revision of the Western Union rate structure. The Commission is, therefore, maintaining detailed review of the carrier's message and rate studies as well as related operating data.

*Channels for TV program transmission.*—On March 30, 1948, Western Union filed proposed rates and regulations covering the transmission of television programs over its microwave radio relay system between New York City and Philadelphia, effective May 1, 1948. The minimum contract period is 1 year and basic service is furnished 8 hours daily, 7 days a week. The direction of transmission over these facilities may be reversed. (See also Channels for TV Program Transmission (broadcast) and Rates and Tariffs (telephone).)

#### OTHER REGULATORY MATTERS (DOMESTIC AND INTERNATIONAL)

*Depreciation.*—In 1946 the Commission undertook a study with respect to land-line plant of Western Union (exclusive of former Postal Telegraph plant) for the purpose of determining the reasonableness of



the company's depreciation rates and practices. (See Thirteenth Annual Report.) As a result, a comprehensive report was prepared, embodying determinations of appropriate service lines, salvage values, depreciation rates, and reserve requirement. In February 1948, pursuant to section 220 (b) of the Communications Act, the Commission prescribed depreciation rates applicable to the several classes of Western Union plant. Western Union also agreed to increase its depreciation reserve by an amount of approximately \$10,000,000, and to adopt certain other remedial measures as recommended in the report. In connection with its modernization program, the company is retiring much of its plant before normal life expectancy is realized and is amortizing such costs not fully provided for. The Commission is maintaining appropriate surveillance. Reviews of the depreciation practices of international telegraph common carriers continued.

*Continuing property records.*—All but three of the radiotelegraph, wire-telegraph, and ocean-cable carriers have complied fully with the Commission's Rules and Regulations with respect to continuing property record systems. Joint accounting and engineering studies have been initiated to verify the data and to determine the effectiveness of the systems.

*Pensions and relief.*—The Commission continued its study of the carriers' pension arrangement and of revisions introduced by the carriers.

*Reclassification of plant.*—Western Union, in reclassifying its plant to conform to the effective system of accounts, has progressed to a point where completion is expected prior to January 1, 1949. During fiscal 1948 an upward adjustment in the depreciation reserve of Western Union was made, thereby bringing total adjustments of net book cost of plant since 1938 to approximately \$87,000,000 (exclusive of approximately \$43,000,000 pertaining to former Postal Telegraph plant). With respect to the plant of international carriers, reclassification in accordance with the system of accounts has been substantially completed.

#### LAND-LINE TELEGRAPH STATISTICS

Twenty-eight annual reports were received from wire-telegraph, ocean-cable, and radiotelegraph carriers for the calendar year 1947. Financial and operating items tabulated from Western Union reports for 1947 in comparison with 1946 are included in the accompanying table. The figures relate to the land-line operations of that company; data applicable to its cable operations are shown in the table concerning ocean-cable carriers included in the international section of this chapter.

*The Western Union Telegraph Co.*<sup>1</sup>

Item	1946	1947	Percent increase or (decrease), 1947 over 1946
Investment in plant and equipment (as of Dec. 31).....	\$361,618,200	\$314,275,030	(13.09)
Depreciation and amortization reserves.....	\$161,825,750	\$142,664,085	(11.84)
Net investment in plant and equipment.....	\$199,792,450	\$171,610,945	(14.11)
Transmission revenues.....	\$160,242,193	\$183,834,397	14.72
Total operating revenues.....	\$175,535,860	\$199,654,193	13.74
Operating expenses, depreciation, and other operating revenue deductions.....	\$183,365,261	\$185,313,959	1.06
Net operating revenues.....	<sup>2</sup> \$7,829,401	\$14,340,234	-----
Net income.....	<sup>3</sup> \$10,030,010	\$905,970	-----
Dividends declared.....			-----
Revenue messages handled.....	<sup>2</sup> 217,665,829	<sup>3</sup> 220,154,500	1.14
Number of employees at end of October.....	57,644	53,572	(7.06)
Total pay roll for the year.....	\$137,292,715	\$138,976,008	1.23

<sup>1</sup> Represents data for land-line operations. Figures covering cable operations included in another table

<sup>2</sup> Deficit.

<sup>3</sup> Includes domestic haul of cable and radio messages (9,656,149 in 1946 and 9,851,556 in 1947).

## INTERNATIONAL TELEGRAPH

## International Conference

*CCIT Conference.*—The Commission was represented on the United States delegation to the International Telegraph Consultative Committee (CCIT), which met at Brussels in May 1948 to consider various technical subjects and proposals for certain changes in the International Telegraph Regulations, in preparation for the Administrative Telephone and Telephone Conference to be held at Paris in 1949.

## Services and facilities

*Circuits.*—Radiotelegraph circuits were established between the United States and Tel Aviv, Israel, and Rhodes, Dodecanese Islands, during the year. A direct radiotelegraph circuit between New Orleans and Rio de Janeiro was opened by Tropical Radio Telegraph Co. late in 1947 as a result of the Commission's decision in docket 7723, hereinafter noted. Tropical also established communication with Kingston, Jamaica, which was one of the points involved in dockets 7094 and 7412, referred to in the 1947 Annual Report. Use of the Tangier relay stations of Mackay Radio & Telegraph Co. and RCA Communications, Inc., was extended to include communication with Israel and Rhodes, as well as with several other countries formerly served by direct operations only. Addressed program material is also being transmitted via Tangier to many points for the United Nations and the Department of State.

*Docket cases.*—Several applications for duplicating radiotelegraph circuits were filed during the year. Among these were filings by Mackay Radio & Telegraph Co. for authority to communicate with The Netherlands, Portugal, and Surinam, to which countries RCA Communications was operating radiotelegraph circuits from the

United States. Lengthy hearings, extending from April through June 1948, were held on these applications. Other hearings involving applications for new radiotelegraph circuits are scheduled for fiscal 1949. The Commission on December 4, 1947, adopted a final report and order in the British Commonwealth Circuits case, dockets 7094 and 7412 (referred to in the 1947 Annual Report). It divided the available circuits in the following manner: To RCA Communications, Inc.—Australia, New Zealand, Greece, and Union of South Africa; to Mackay Radio & Telegraph Company, Inc.—India, Palestine, and Saudi Arabia; to Tropical Radio Telegraph Co.—Jamaica. The Commission dismissed without prejudice applications to communicate with Ceylon, Hong Kong, and the Malay States (Singapore). The application of Press Wireless, Inc., to operate a press circuit with Australia was also dismissed without prejudice. The Commission, on November 28, 1947, adopted its final report and order in docket 7510, in which it denied Press Wireless modification of licenses to permit rendition of a domestic press, Government, radiophoto and program transmission service between applicant's east and west coast stations. On the same day, the Commission adopted its report in docket 7723, in which it denied Mackay's application to construct a new point-to-point radiotelegraph station at Meraux, La., for communication between New Orleans and Rio de Janeiro, Brazil, and Lima, Peru, and ordered a modification of license to Tropical Radio to operate a direct radiotelegraph circuit between its existing station near New Orleans and Rio de Janeiro.

*New services.*—RCA Communications and Press Wireless have instituted a new type of program transmission service which is being used by the United Nations for point-to-point transmission of material of an international broadcast nature to numerous foreign points. This service is on a unilateral basis and, after receipt at foreign points, is broadcast by local broadcast stations or networks, or is recorded for later broadcast. It augments the direct short wave broadcast services of the United Nations and the Department of State. Much of the material transmitted from New York is relayed via RCAC's Tangier relay station. Authorization has been granted to the 2 companies offering this service to transmit to over 30 countries in Europe, Africa, Asia, the Near East, Latin America, and the Pacific area.

#### Rates and tariffs

*International rate case.*—In the international telegraph rate case, docket 8230 (see Thirteenth Annual Report), the Commission on July 30, 1947, to meet the urgent revenue needs of the carriers, authorized emergency out-bound rate increases calculated to produce about \$5,485,000 additional annual revenue. It was estimated that corre-

sponding increases in in-bound rates would produce about \$1,055,000 more. None of the rate increases authorized by the Commission resulted in a rate out-bound from the United States in excess of the presently effective world-wide maximum of 30 cents per full rate word, 20 cents per code word, or an ordinary press rate of more than 6½ cents per ordinary press word.

Shortly thereafter, certain of the carriers requested reconsideration and further increases, alleging that their needs had not been fully met. The Commission reopened the proceeding and held further hearings in December 1947 and January 1948. On April 22, 1948, it issued its report in which it found that, on the basis of the record made at the further hearings, several of the respondent carriers were operating at a loss, and most of the others at a profit providing little more than a nominal return, and that this situation was expected to continue. In view of the urgent need for a substantial amount of additional revenue on the part of the international telegraph carriers, the Commission permitted additional general rate increases of an emergency nature. The additional out-bound rate increases were estimated to produce about \$3,188,000 in annual revenues, while further corresponding in-bound rate increases would produce about \$295,000 more. None of the increases authorized produced a rate in excess of 30 cents per full rate word. Certain controversial questions raised by the record remain for decision.

*Multiple address press rates.*—As part of the proceedings in docket 8230, Press Wireless, Inc., complained that its competitor, Mackay Radio & Telegraph Co., was furnishing multiple address press service at discriminatory and preferential rates, in that they were below the cost to Mackay of furnishing the services and that, in effect, the multiple address press service was being subsidized by Mackay's other services. In its April 22, 1948, report (docket 8230) the Commission found that Mackay's multiple address press rates were discriminatory and ordered Mackay to eliminate the discrimination. Mackay filed revised tariff schedules intended to comply with the Commission's order. Press Wireless, however, claimed that the discrimination had not been eliminated by the tariff changes. The Commission reopened the proceeding (in June 1948) to consider the matter further, and has included in the issues of the proceeding to be heard in the fall of 1948 the rates of all carriers offering multiple address press services.

*Radiophoto service.*—Rates were established for radiophoto service by RCA Communications, Inc., between the United States and China, effective November 5, 1947; Denmark via Stockholm, effective January 10, 1948; and New Zealand, effective June 1, 1948; by Mackay Radio & Telegraph Co. between the United States and Bombay, India, effective March 2, 1948; and by Press Wireless, Inc., between the United States and China, effective November 21, 1947.

*Suspension of proposed telegraph rate changes.*—The Commission, on two occasions during the year, suspended and set down for hearing proposed changes in international rates and regulations. Western Union proposed to reduce its rates for foreign contract press service (a customer-to-customer service) between New York and London. Since the proposed rates appeared to result in unlawful discrimination, the Commission ordered that they be suspended and investigated. Subsequently, the company was granted special tariff permission to cancel the rates under suspension and to establish in lieu thereof a new schedule which eliminated the objectionable features. Accordingly, the Commission dismissed the proceedings. RCA Communications proposed to permit the insertion in telegraph messages, without charge, of the phrase "Reply via RCA." Since it appeared that discriminatory aspects were involved and that problems would arise in settlements with foreign carriers, the Commission suspended the proposed provisions. Subsequently, RCAC cancelled its proposals.

Statistics

*International telegraph (radio and cable) traffic, 1947.*—The responses from cable and radiotelegraph carriers concerning international traffic indicates that 656,275,626 paid words were handled during the calendar year 1947. The out-bound traffic amounted to 337,131,185 words, and in-bound 319,144,441 words. An analysis of the traffic with the principal countries throughout the world is shown in the following table:

Country	Number of words	
	Out-bound from the United States	In-bound to the United States
<b>Europe, Africa, and the Near East:</b>		
Belgium.....	7,167,697	6,600,809
Denmark.....	2,317,844	2,000,189
Finland.....	833,501	769,192
France.....	18,030,010	13,459,282
Germany.....	7,320,885	9,138,650
Hungary.....	947,408	768,147
Italy.....	10,372,136	8,876,493
Netherlands.....	7,262,750	6,256,341
Norway.....	3,166,911	2,363,924
Portugal.....	3,046,319	2,115,015
Spain.....	3,853,629	3,067,102
Sweden.....	7,299,876	6,507,856
Switzerland.....	9,703,308	7,375,161
Union of South Africa.....	5,179,383	5,047,929
Union of Soviet Socialist Republics.....	9,063,304	8,213,870
United Kingdom and Eire.....	61,814,856	59,577,600
All other countries.....	29,125,034	25,936,101
<b>Total.....</b>	<b>186,504,851</b>	<b>168,073,661</b>
<b>West Indies, Central, North, and South America:</b>		
Argentina.....	14,891,162	13,157,352
Bolivia.....	1,038,062	639,246
Brazil.....	13,894,662	15,126,090
British West Indies.....	3,241,627	2,994,146
Canada.....	6,580,196	9,228,745
Central America.....	7,264,975	6,442,929
Chile.....	3,131,645	2,841,470
Colombia.....	5,109,584	4,240,573

Country	Number of words	
	Out-bound from the United States	In-bound to the United States
Cuba.....	10,897,927	12,229,917
Dominican Republic.....	1,358,740	1,379,747
Ecuador.....	1,706,701	1,092,892
Haiti.....	773,071	632,302
Mexico.....	2,559,428	2,536,109
Netherlands West Indies.....	1,169,422	1,227,602
Peru.....	2,600,708	1,907,850
Puerto Rico.....	3,558,263	3,492,258
Uruguay.....	2,107,836	1,518,360
Venezuela.....	6,451,912	6,522,511
Virgin Islands.....	145,309	141,707
All other countries.....	1,067,526	748,397
<b>Total.....</b>	<b>89,548,754</b>	<b>88,100,203</b>
<b>Asia and Oceania:</b>		
Australia.....	5,343,689	5,228,848
China.....	12,788,746	10,907,557
Hawaii.....	11,914,212	8,473,094
India.....	8,735,818	8,371,001
Japan.....	2,622,259	5,388,303
Philippines.....	11,597,183	14,218,329
All other countries.....	7,646,179	9,636,928
<b>Total.....</b>	<b>60,648,087</b>	<b>62,224,060</b>
Miscellaneous.....	429,493	746,517
<b>Grand total.....</b>	<b>337,131,185</b>	<b>319,144,441</b>

*International telegraph (radio and cable) financial and operating data.*—Certain financial and operating data obtained from the annual reports filed by telegraph (radio and cable) carriers engaged in international traffic, for the calendar year 1947 in comparison with 1946, are shown in the following two tables:

*Radiotelegraph carriers*

Item	1946	1947	Percent increase or (decrease), 1947 over 1946
Investment in plant and equipment (as of Dec. 31).....	\$34,015,568	\$36,614,331	7.64
Depreciation and amortization reserves.....	\$16,676,631	\$17,828,421	6.91
Net investment in plant and equipment.....	\$17,338,937	\$18,785,910	8.35
Message and other transmission revenues.....	\$20,601,801	\$20,582,509	(.09)
Total operating revenues.....	\$21,775,900	\$21,741,440	(.16)
Operating expenses, depreciation, and other operating revenue deductions.....	\$21,550,904	\$23,611,828	9.56
Net operating revenues.....	\$224,996	\$1,870,388	(931.30)
Income taxes.....	\$200,454	\$262,494	30.95
Net income.....	\$313,034	\$1,573,781	(802.75)
Dividends declared.....	\$872,000	\$5,000	(99.43)
Revenue messages handled: <sup>1</sup>			
Domestic-service classification <sup>2</sup> .....	96,871	63,558	(34.39)
Foreign-service classification <sup>3</sup> .....	10,476,469	11,204,102	6.95
Marine.....	629,253	857,030	36.20
Number of employees at end of October.....	5,969	6,261	4.89
Total pay roll for the year.....	\$17,832,605	\$19,368,981	8.62

<sup>1</sup> Excludes domestic haul of foreign, insular, and marine messages to avoid duplication.

<sup>2</sup> International messages (primarily Canadian and Mexican) transmitted in accordance with carriers' rules governing domestic traffic are included under Domestic Service Classification. Insular messages are included under Foreign Service Classification.

<sup>3</sup> Deficit.

*Ocean cable carriers*

[Including cable operations of the Western Union Telegraph Co.]

Item	1946	1947	Percent increase or (decrease), 1947 over 1946
Investment in plant and equipment (as of Dec. 31).....	\$95, 129, 932	\$96, 061, 650	0.98
Depreciation and amortization reserves.....	\$60, 078, 811	\$61, 522, 573	2.40
Net investment in plant and equipment.....	\$35, 051, 121	\$34, 539, 077	(1.46)
Transmission revenues:			
Domestic-service classification.....	\$844, 716	\$812, 228	(3.85)
Foreign-service classification.....	\$20, 391, 963	\$20, 755, 463	1.78
Total operating revenues.....	\$22, 691, 417	\$23, 772, 389	4.76
Operating expenses, depreciation, and other operating revenue deductions.....	\$21, 366, 862	\$24, 357, 552	14.00
Net operating revenues.....	\$1, 324, 555	\$585, 163	(144.18)
Income taxes.....	\$344, 759	\$301, 933	(12.42)
Net income.....	\$522, 784	\$1, 141, 364	(318.32)
Dividends declared.....	\$2, 148, 066	\$1, 381, 005	(35.71)
Revenue messages handled:			
Domestic-service classification.....	696, 820	663, 491	(4.78)
Foreign-service classification.....	10, 645, 119	11, 511, 512	8.14
Number of employees at end of October.....	5, 681	6, 247	9.96
Total pay roll for the year.....	\$12, 664, 251	\$14, 309, 199	12.99

1 Deficit.

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## CHAPTER VI. RADIO OPERATORS, AMATEUR, AND CITIZENS RADIO SERVICE

1. GENERAL
  2. COMMERCIAL RADIO OPERATORS
  3. AMATEUR RADIO SERVICE
  4. CITIZENS RADIO SERVICE
  5. STATISTICS
- 
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### 1. GENERAL

Commercial radio operators and the amateur and citizens radio services are distinguished by the fact that they comprise individuals who personally operate radio transmitters. It is of further interest that commercial and amateur operators constitute the largest of all radio groups in number of authorizations, while the new citizens radio service holds promise of being a numerically large class. Operator authorizations collectively now exceed 504,000, which is an increase of more than 64,000 during the year.

In addition, these operators present complex problems of individual flavor, differing from considerations in other categories, since each applicant and licensee views the situation on the basis of his own needs and circumstances. Increased activity in these fields caused the Commission, early in the fiscal year, to create a Radio Operator and Amateur Division within the Bureau of Engineering. It consists of three branches, each having to do with a service in these classifications.

### 2. COMMERCIAL RADIO OPERATORS

As part of its obligation to regulate all persons in the United States engaged in communication or transmission of energy by radio, the Commission has established six classes of commercial radio operator licenses and a special authorization limited to operation of radio transmitters on private aircraft.

Unless exempted by the Commission's rules, persons operating radio stations licensed by the Commission must hold commercial radio operator licenses of the proper grades. The term "commercial radio operator" is used to differentiate between those who operate radio stations for a livelihood, as compared with the amateur radio operator whose interest in radio is solely personal and without pecuniary interest. Thousands of commercial operators are employed by broadcast, coastal harbor, coastal radiotelephone and radiotelegraph, ship radiotelephone and radiotelegraph, railroad, state, and municipal police, fire, and other stations.



With the exception of restricted radiotelephone operator permits and aircraft radiotelephone operator authorizations, commercial radio operator licenses are issued only to applicants who successfully complete prescribed examinations. These examinations are designed to establish that applicants possess a knowledge of technical matters and of regulations essential to the proper discharge of their duties. Licenses are divided into two main groups, authorizing operation respectively of radiotelegraph and radiotelephone stations. These general groups are classified according to the demonstrated qualifications (and in some cases experience) of the operators, with authorizations varying from limited and nontechnical operation of packaged transmitters to unlimited operation, installation, service, and maintenance of complicated broadcast or shipboard radiotelegraph installations.

The postwar increase in the number of licensed commercial radio operators continued, although the rate of increase dropped to some extent toward the close of the year. More than 347,800 persons held commercial operator authorizations as of June 30, 1948, an increase of nearly 18,800 over the preceding year.

A total of 26,652 examinations were given during the year for new licenses other than the aircraft radiotelephone operator authorization and the restricted radiotelephone operator permit, as a result of which 13,988 new licenses of the higher grades were issued. In addition, 5,699 restricted radiotelephone operator permits resulted from examinations in which the applicants qualified for that permit but failed to obtain a higher class of license. Commercial operator examinations are given and the examinations are graded in the Commission's field offices, which also issue new and renewed licenses.

The year saw the end of many wartime special regulations and provisions, as well as progress in modernization of the radio operator examination and license structure. Commission orders of the 77 and 128 series were allowed to expire, as having fulfilled their original purposes and being no longer necessary. The 77 series, the last of which (77-H) expired June 30, 1948, provided for the renewal of operator licenses without a showing of the normally required renewal service as a convenience to many license holders who were in the armed forces during the war. Since it was felt that ample time has been allowed all ex-service men to secure the required renewal service since demobilization, the Commission restored the former renewal service requirements, effective July 1, 1948.

The 128 series, the last of which (128-C) expired December 31, 1947, permitted renewal of expired operator licenses which were valid on or subsequent to December 7, 1941, the holders of which were in war service or who, because of civilian assignments outside the United

States in connection with the war effort, were unable to file timely applications for renewal. The Commission allowed the normal provisions of its rules to again become effective; namely, that application for renewal shall be made during the last year of the license term.

The Commission continued to authorize its district offices to waive the 6 months' experience requirement for sole or chief radiotelegraph operators of cargo ships so that operators without the requisite experience might be assigned to vessels otherwise unable to sail for lack of qualified personnel. In addition, the Commission, in September 1947, adopted an order which had the effect of reinstating or extending all temporary limited radiotelegraph second-class operator licenses which had expired, or would otherwise expire by their own terms prior to July 1, 1948, so that all such licenses (with the exception of those whose normal 5-year term would extend beyond that date) would expire June 30, 1948. The shortage of ship radiotelegraph operators being no longer acute at the end of the year and the Commission's authority to waive the 6 months' experience requirement having also expired at that time, both of these special provisions were allowed to terminate June 30, 1948. However, the Commission has requested from Congress that it be granted continuing authority to waive the 6 months' experience requirement to cope with any such shortage which may develop in the future. The issuance of temporary limited radiotelegraph second-class operator licenses was discontinued on June 30, 1946. These were nonrenewable licenses, valid only in the marine radiotelegraph service, which were issued for a 5-year term and as an emergency measure during the war years to applicants who could not fully qualify for the class of license normally required for that service.

Because of wartime and postwar demands on Commission personnel, it was impossible, until fiscal 1948, to revise the written examinations for the various grades of commercial licenses. This, coupled with the many new uses and applications of radio, necessitated that the examinations, which were last revised in 1939, be completely rewritten in the light of the current state of the radio art. At the close of the year, approximately one-half of this project has been completed and the examinations for the various grades of radiotelephone operator licenses revised to include newer material such as microwave and frequency modulation techniques. The examination for the radiotelephone first-class operator license now contains, for the first time, questions on such matters as television scanning and pulsing, FM bandwidth and deviation factor, and directional antenna power gain and distortion areas, to test the qualifications of applicants for that class of license for service in any kind of broadcast station. The remainder of this project—namely, revision and modernization of examinations

for the various grades of radiotelegraph licenses—is scheduled for completion during the 1949 fiscal year. Meanwhile, revision will be made from time to time as necessary to keep abreast of any new uses to which radio transmissions are put.

As part of its program of modernizing the operator examination and license structure, the Commission has considered establishing a separate series of three licenses and examinations for operators of the various classes of broadcast stations, these licenses to be graded according to technical knowledge and ability and operating duties. Primarily because of disagreement between labor and management on the desirability and feasibility of such a license structure, the Commission held several conferences and a public hearing in an endeavor to reach a solution acceptable to all concerned. Decision was pending at the close of the year.

In connection with the modernization of commercial operator examinations, it was necessary to revise the publication Study Guide and Reference Material for Commercial Radio Operator Examinations which is sold by the Government Printing Office as a guide in preparing for the examinations. A further revision is contemplated to include, among other things, pertinent extracts from the Atlantic City (1947) revision of the general radio regulations which will become effective January 1, 1949.

Modification of Commission order 133 to permit specially trained unlicensed personnel to make antenna tuning and coupling adjustments to transmitters in mobile units, under certain specified conditions, was pending at the end of the year. Some provisions, modified in accordance with acceptable proposals, were being incorporated into the individual parts of the Commission's rules governing the various services concerned. As a result, it is anticipated that order 133 can be cancelled in the very near future.

Pending establishment of permanent rules to govern the installation and operation of shipboard navigational radar, the Commission established temporary rules extending the operator requirements previously applicable while these installations were in an experimental category; namely, that the user of the equipment, as a navigator, need not be a licensed radio operator, but that any repairs or adjustments which might affect the proper operation of the equipment should be made by or under the supervision of the holder of a first- or second-class commercial radio operator license, either radiotelephone or radiotelegraph. The matter of whether the above provisions should be made a part of the permanent rules was still under consideration, with a possibility that it might be found necessary to redetermine the general requirements, authority, and responsibility of licensed commercial radio operators in connection with all classes of transmitters, including radar.

The need for bringing the Commission's rules governing commercial radio operators in step with the new era in electronics received considerable study. While it was not possible to accomplish a complete and major revision, several matters requiring immediate attention were covered by amendments to the existing rules. For example, the Commission, in June 1948, made it possible for an operator operating two or more stations at different locations to post a verified statement concerning his license at locations other than the one where his original was on display. Concurrently, the Commission liberalized its rules with respect to an operator engaged in the installation service and maintenance of radio transmitters at two or more stations by providing that he need only carry his license or a verification card while performing such duties. It further provided that these operators should make a written record of the work actually performed in each case and should properly identify themselves in that record as the operators responsible for the proper operation of the transmitters. These changes greatly reduced confusion and attendant routine clerical work on the part of both industry and the Commission. It is anticipated that a major portion of the commercial radio operator rule changes made necessary by the growth of the radio industry may be accomplished during the next fiscal year, and that it will then be possible to rearrange and simplify them to facilitate reference by the operators concerned.

Relaxation of the Commission's rules to allow applications for restricted radiotelephone operator permits to be filed by mail has proved popular with the industry in general and particularly with small boat operators and various law enforcement, conservation, and public utility agencies. At the close of fiscal 1948, a total of 278,061 such permits were outstanding, of which number 77,816 had been issued during the year.

The Commission's practice of issuing a special form of radio operator's license, known as the aircraft radiotelephone operator authorization, has been a convenience to private flyers. The number outstanding at the end of the fiscal year approximated 80,000. This authorization, which covers operation of licensed radiotelephone stations in aircraft only, is issued upon personal applications to any Commission field engineering office or to any of the over 2,400 CAA certified pilot examiners who have been designated by the Commission for that purpose. Such issuance at airfields is a particular convenience to operators of private planes.

### 3. AMATEUR RADIO SERVICE

The amateur radio service provides an opportunity for self-styled radio hams throughout the country not only to communicate with one another but also with other amateur stations throughout the

world. Amateurs operate primarily because of their interest in radio equipment and in the techniques of operating radio stations and handling communications by radio. They are not permitted to transmit or receive messages for pay, or to broadcast entertainment.

The amateurs continued to constitute one of the largest and most active radio services. Operators and stations were each nearing the 80,000 mark. The number of stations is now slightly higher than the number of operators. This is due to the fact that in some instances licensees have more than one station, either for their own use or, in their names, for amateur clubs or military training groups.

At the close of the year 71,952 new 5-year amateur station licenses and 71,441 amateur operator licenses had been issued. It was estimated that there were 6,482 old station and operator licenses which were renewed or revalidated by Commission orders, but which have not been replaced by new licenses. For their convenience, amateur operators are examined at the Commission's field offices, but their papers are graded at the Washington office, which issues the licenses.

Amateur operators differ from those in other services in that the former are largely interested in radio as an avocation rather than as a vocation, and in many cases amateur radio is the radio man's hobby. Although nominally a means to communicate with each other and, while doing so, conduct programs of experimentation and self-improvement, amateur radio furnishes training and experience for those who enter commercial radio fields. It also provides an invaluable reservoir of trained radio personnel available to the military in time of war. It has in many instances furnished the sole medium of communication in peacetime when normal facilities have been disrupted. Amateur radio has been the source and proving ground of many outstanding advances in radio technique.

Amateur radio station licenses are granted only to United States citizens who have qualified for and hold valid amateur radio operator licenses attesting their ability to properly operate stations in this service.

To promote the activities of this important group, the Commission has, insofar as possible, assigned harmonically related groups of frequencies for amateur use. With only three minor exceptions, these assignments are exclusive to the amateur service.

During the year, the amateur frequency assignments achieved a greater degree of stability than at any time since the end of the war. They were permanently incorporated in the amateur rules coincidental with the cancellation of the series of orders returning, from time to time, the amateur privileges as frequencies could be released from war-time use. Certain minor changes in frequencies and emissions were made. One of these was provision for greatly increased use of narrow

band frequency modulation. The resulting reduction of interference by amateur radiotelephone to broadcast reception has justified the establishment and extension of the 1-year experimental period.

Return to peacetime conditions eliminated the need for orders 132 and 132-A, and they were cancelled March 10, 1948. As a result, amateur licensees are no longer required to notify the Commission when engaging in operation away from the normal fixed station location on frequencies above 25 megacycles, but conversely fixed station operation at other than the licensed location in excess of 4 months is prohibited.

Provisions of the wartime number 77 series of orders were extended by adoption of a footnote to section 12.27 of the amateur rules to the effect that the existing prewar licenses would not require the showing of use as a prerequisite to renewal but, instead, that all postwar licenses would so require. This had the dual effect of eliminating much confusion as to requirements and also protected many whose military service would otherwise have prevented renewal. It also eliminated considerable paper work for both the amateur and the Commission.

Early in the year it was recognized that both wartime and postwar developments in radio presented problems not previously experienced. Therefore, studies of the needs of the service from an administrative standpoint and with a view to guiding amateur radio operation in a manner which would be in the best interests of the licensees and the public were inaugurated and pursued. Resultant actions by the Commission which affected the amateur included the development of a more efficiently processed amateur license form authorizing either operator or station privileges or both, and amendments of the rules to define and clarify the term "remote control" as applied to this service, including the conditions under which such authority may be granted; to clarify the prohibition against broadcasting; to define permissible one-way transmissions; to prohibit the use of codes and ciphers in amateur communications; to liberalize the time factor requirement of previous holding of an amateur license as a prerequisite to qualification for amateur class A privileges; and to simplify the procedure which licensees are required to follow when answering notices of violations. Provisions were made for utilization of newer techniques, and authorizations granted for the study of others. These included narrow band frequency modulation, suppressed carrier-single side band transmission, pulse-time modulation, radio remote control of transmitters, grounded-grid power amplifiers, and others.

The amateur service is vitally interested in the vexing problem of interference to television reception, and special consideration was given to this situation as it concerns the radio amateur. The actions of the Atlantic City telecommunications and radio conferences were

reviewed in order that their applicable requirements might be reflected in Commission administration of the amateur service.

As a result of observations and investigations by the Commission's monitoring stations and by personnel in the field during the year, citations were issued for irregularities in the operation of some amateur stations. The vast majority of these violations were of a minor nature and were promptly rectified by the licensee after receipt of official notice. However, a few cases were serious enough to warrant suspension of operator licenses and revocation of station licenses. Several unlicensed stations operating in the amateur frequency bands were located and appropriate action taken.

Amateur operators experimented with narrow band frequency modulation in the lower bands throughout the year. Considerable interest was evinced in single side band suppressed carrier transmissions as well. Information on both types of emissions is being studied for the purpose of evaluating their respective merits for possible permanent provision in the amateur rules.

As usual, the amateur fraternity gave unstintingly of its facilities and services during the year's emergencies. Outstanding was amateur network functioning in connection with the hurricane that struck Florida, Mississippi, and Louisiana during September, and the disastrous floods which ravaged the Northwestern Pacific States in the late spring and early summer of 1948. Such contributions to the national welfare by the amateur are made without regard to the financial loss and physical hazard which he often faces at such times and are resulting in a still greater degree of military and public appreciation of his value in communication emergencies.

#### 4. CITIZENS RADIO SERVICE

The citizens' radio service, still on an experimental basis, is designed to provide for short-distance radio communication, radio signaling, and control of remote objects by radio for private or personal use by citizens of the United States.

Individuals in general will benefit from the convenience of utilizing two-way portable radio equipment for private radio service between relatively close points where regular communication facilities either are not available or are not practicable. Examples of such use would be on farms and ranches, recreation areas, etc.

This potential service should be of particular value to parties requiring quick contact, such as physicians while en route in their cars, hospitals in communicating with ambulances, volunteer fire departments, and members of similar groups concerned with the protection of life and property.

Similarly, dairies, laundries, department stores, and other business

organizations having a dispatching problem might be able to use this service for communicating to and from their vehicles if distance and interference considerations are not too great.

Other uses indicated by inquirers are delivery trucks to shops, waterway dredging operations, construction crews to base, private aircraft to home, private boat to clubhouse, steeple jack aloft to helper on ground, directing parade activities, parking-lot operators, assembly lines, and various other activities which would be aided by a localized private radio-communication system.

In October 1947 technical requirements for the citizens' radio service were promulgated and became effective December 1, 1947. They established regulations governing transmitters and set up a procedure for obtaining type-approval for equipment submitted to the Commission for tests. This service already had been allocated the frequency band 460 to 470 megacycles, which is excellent for portable transmitter use since the high frequency makes feasible the design of small compact equipment.

However, technical developments had not reached the state where low-cost equipment could be manufactured for this new service and it was generally uneconomic to modify war surplus walkie-talkies for the purpose. The technical standards are spurring manufacturers to develop suitable equipment for prospective users prior to the actual inauguration of the service. Considerable progress has been made in technical design, and the Commission on March 22, 1948, issued its first type-approval certificate to a manufacturer of equipment specifically designed for citizens use.

The operation of citizens radio stations to date has been conducted on an experimental basis under class 2 experimental licenses. Data obtained from such experimental operation aided the Commission in drafting operating requirements intended to complete part 19 of its Rules and Regulations Governing the Citizens Radio Service. Adoption of this part would establish the service on a regular basis.

Simplified station licensing procedures which eliminate the need for licensed radio operators, except where telegraphy is used and adjustments to equipment are made, are important provisions of these proposals. Other regulations would establish minimum specifications for equipment to insure frequency stability and noninterference to other services.

In 1948 the number of experimental operators in the citizens service increased from 12 to 48, and applications rose from 20 to 165.

## 5. STATISTICS

A comparison of authorizations for commercial radio operators, special aircraft radiotelephone, amateur operators and stations, and



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citizens experimental for the past 2 fiscal years follows, based upon revised figures and estimates:

	1947	1948	Increase
Commercial operators.....	329,022	347,803	18,781
Aircraft radiotelephone.....	42,100	80,000	37,900
Amateur operators.....	70,500	77,923	7,423
Amateur stations.....	70,000	78,434	8,434
Citizens <sup>1</sup> .....	12	48	36
Total.....	511,634	684,208	72,574

<sup>1</sup> This service not yet established; figures represent class 2 experimental authorizations only.

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## CHAPTER VII. FIELD ENGINEERING AND MONITORING

1. GENERAL
  2. INSPECTIONS
  3. OPERATOR EXAMINATIONS
  4. MONITORING
  5. TECHNICAL OPERATION
- 
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### 1. GENERAL

The Commission's field engineering work is conducted along two major lines, one covering enforcement activities and the other monitoring. For this purpose the Field Engineering and Monitoring Division consists of four branches, namely, the Inspection and Operator Examination Branch, the Monitoring Branch, the Technical Operations Branch, and the Administrative Branch.

Enforcement activities, which include inspections, examinations, investigations, handling interference complaints, etc., are accomplished out of 23 district offices, 6 suboffices, and 4 ship offices.

A total of 10 primary monitoring stations and 11 secondary monitoring stations provide a fixed monitoring network which is supplemented by mobile monitoring units. Monitoring activities consist of frequency measurements, signal recordings, long-range direction finding, interference and unlicensed operation investigation, and the technical aspects of design, construction, and operation of monitoring equipment.

All field engineering activities are coordinated through 9 regional managers. In fiscal 1948 the Field Engineering and Monitoring Division had a personnel complement of 434 for the field service and 61 for departmental service.

A total of 143 automobiles, of which 54 are equipped with monitoring and direction-finding apparatus, were used in connection with the field work. These cars traveled a total of 1,054,007 miles in the performance of duties.

### 2. INSPECTIONS

#### BROADCAST STATION INSPECTIONS

During the year, Commission field engineers made 668 initial inspections of new broadcasting stations. Of this number, the majority were standard (AM) stations. There were also a number of new FM stations and a few new television stations, all of which were on equipment tests. The initial inspections were made to determine whether these stations had been constructed in compliance with their authori-

zations and with due regard to technical requirements necessary for rendering a satisfactory public service.

Continuing regular inspections were made of broadcasting stations throughout the United States and its possessions to assure that broadcasting met the required level of technical operations. A total of 2,176 broadcast-station inspections were made during the year.

#### SHIP INSPECTIONS

Some relaxation in ship-inspection work occurred due to the emphasis placed on the inspection of new broadcasting stations and to the urgency of performing special field work on technical projects. In the enforcement of prescribed safety standards, field engineers conducted nearly 12,500 ship radio station inspections. The following table compares the number of ship inspections conducted during the last 5 fiscal years:

*Number of ship inspection*

	1944	1945	1946	1947	1948
United States ships.....	10, 157	13, 843	12, 765	11, 717	10, 117
Foreign ships.....	1, 252	1, 888	1, 023	2, 231	2, 364
Total.....	11, 409	15, 731	13, 788	13, 948	12, 481

It will be noted that, due to the workloads in other categories, the number of ship inspections declined somewhat. However, there was an increase of approximately 35 percent in the number of discrepancy notices served. This is attributed to the decline in the degree of enforcement resulting from the indicated decrease in the number of ship inspections performed in 1948.

*Number of discrepancy notices served*

	1944	1945	1946	1947	1948
United States ships.....	7, 413	8, 677	8, 365	8, 040	10, 519
Foreign ships.....	257	714	404	1, 190	1, 688
Total.....	7, 670	9, 391	8, 769	9, 230	12, 207

Of the violations discovered on board ships in 1947 and 1948, 4,433 were cleared during inspections in 1948 as compared with 5,128 cleared during 1947 inspection. This indicates greater seriousness in the type of violations discovered during 1948 and that for this reason they could not be cleared during inspection.

*Violations cleared during inspections*

	1944	1945	1946	1947	1948
United States ships.....	5, 393	7, 580	6, 830	4, 673	3, 925
Foreign ships.....	187	229	129	455	508
Total.....	5, 580	7, 809	6, 959	5, 128	4, 433

## INSPECTION OF OTHER RADIO STATIONS

With the introduction of new forms of communication by radio, a large increase was noted in the number of stations other than broadcast, ship and common carrier which were subject to inspection. A total of 14,605 inspections of such land stations were made in 1948 as compared with 9,294 inspections the year previous. In 1947, technical deficiencies numbering 2,706 were reported; in 1948 this number was 4,308.

The increasing load on the field inspectional force resulted in the adoption of a new policy which provides for regular inspection of stations at irregular intervals.

## 3. OPERATOR EXAMINATIONS

During 1948 the Commission's offices in Washington and in the field acted upon 99,820 applications for the various classes of commercial radio operator licenses and authorizations as follows: 26,652 applicants who did not fail a code test during examination, 855 who did, and 5,512 applicants who failed the examination for higher grades of licenses and were issued the restricted radiotelephone permit in lieu thereof. In addition to the candidates who were examined, 65,097 applications for restricted radiotelephone operator permits (by declaration) were received and honored, as were 1,704 applications for aircraft authorizations. This compares with 67,401 applications received and acted upon during 1947. Amateur classes A and B operator applicants totaling 18,528 were examined in 1948 as compared with 12,994 during the fiscal year 1947.

Plans were made for the field offices to receive and process applications for licenses in the new citizens radio service (see Radio Operators) after that service is opened to the public on a regular basis.

## 4. MONITORING

Monitoring activities are of two main categories: service to industry, the general public, and Government organizations; and enforcement of radio laws.

A major task of monitoring today is to locate sources of interference. Causes of interference have kept pace with the growth of radio facilities. Interference to one or more radio services may come from a transmitter operating improperly or, in fact, from almost any piece of electrical equipment releasing energy. The Commission's field staff has traced sources of interference to medical apparatus, power lines, drawbridges, and even miniature aquariums. In one case last year serious interference to an aviation frequency on the west coast was traced to an electronic dryer in a furniture factory located in Pennsylvania.

## SERVICE TO INDUSTRY, PUBLIC, AND GOVERNMENT

A total of 1,445 major monitoring cases were acted upon in 1948. This compares with 1,112 the previous year. Additionally, a total of 19,859 minor problems were handled by monitoring, the majority of which were based upon interference complaints. These interference cases have kept pace with the number of radio stations crowding the spectrum.

One hundred and seventy requests were received for assistance in locating lost planes. This represents an increase over 1947 when 124 requests were received. Safety of life conferences acknowledge the necessity of long-range direction finding in the over-all aviation safety program and recognize the Commission's contribution in this field.

In carrying out the above services, the Commission's monitoring engineers employ not only several types of direction finders, but also frequency measuring, signal analysis, and high speed code recording and audio-recording equipment. Mobile units, which are in effect small monitoring and direction-finding stations, are used in the final stage of running down interference that has been localized.

The success of Commission monitoring depends upon a rapid and flexible communication network. Several problems can be handled at one time, or concentration put on one particular problem. The monitoring system operates so that primary monitoring stations, secondary monitoring stations, investigative offices, and mobile units are welded together in a service enforcement arm.

## ENFORCEMENT BY MONITORING

The listener to or user of a radio signal is often more concerned with the characteristics of the signal than with the means or method of its generation. It is for this reason that radio laws and regulations must concern themselves with the effects of radio signals. Monitoring for enforcement attempts to scrutinize the operation of all radio transmitting installations and, in addition, the many pieces of equipment which employ electric energy for manufacturing or medical purposes.

Additionally, there is an international consideration. Orderly and cooperative radio operation throughout the world, as well as in our own country, depends upon radio stations conforming to international and domestic technical requirements. The United States is required by international agreement to check the emissions of domestic stations to see that they keep within assigned frequencies and use authorized power.

The policing of one-half million signals is, therefore, a huge task, even if the full quota of 183 men assigned to the monitoring stations could be employed. Maintenance, construction, and other work reduces the effective policing force. However, because of long years of

experience, thousands of improper operations have been noted and corrected.

During 1948, as a result of monitoring activities, 15,064 advisory, violation, and other notices were served on radio stations or radio operators. This was slightly below the 1947 total of 16,483.

Unlicensed activity, perhaps spurred to some extent by the availability of war-surplus transmitters, continued to increase. The number of illegal radio stations located during the year totaled 153, an increase of 26 percent over 1947. Of these stations, many were operated without malicious intent, but some were of a more serious nature. All were either a source of interference to important communications services or posed a threat to the Commission's responsibility to maintain order in the radio spectrum.

Several cases involved false distress calls, much to the concern of the Government services charged with air and sea rescue operations. One example was an unlicensed station in Washington, D. C., which operated on a frequency assigned to the aeronautical services. Posing as a distressed aircraft on two occasions, this station caused military authorities to send out crash boats and planes in a search for a mythical plane. Field investigation located this station and, after obtaining admissions of unlicensed operation, the case was turned over to the Department of Justice.

Illegal stations located by mobile units included two which were involved in transmission of false distress signals on aircraft frequencies, several unlicensed broadcasting stations, aircraft, taxi, small craft, and amateur-band stations. Five of these cases were referred to the Department of Justice and two convictions were obtained.

Part of the increase in the work load on the Commission's mobile investigative units is attributable to the mounting number of cases involving the very high frequencies. Further increase is expected in view of the activities in the higher reaches of the radio spectrum and the increasing availability of VHF equipment.

The volume of television receiver sales and public interest in television broadcasting has resulted in adding greatly to the number of interference complaints received by Commission offices. Investigation and resolution of interference to television receivers involve more complexities than met with in aural reception.

## 5. TECHNICAL OPERATION

The rapid development of new VHF and UHF services requires suitable receiving and measuring apparatus being available at the field offices and monitoring stations. Consequently, the past year witnessed the procurement of new apparatus or modifying available equipment for the purpose.

Because of the specialized nature of the different services, and the rapid utilization of varying methods of modulation or other means of transmission, a difficult problem is presented to provide suitable receivers for general coverage purposes in the VHF, UHF, and SHF ranges of reception. It has not yet been met by any commercial equipment manufacturer, the most suitable receiving equipment presently available being a military counterradar receiver, a number of which have been located and purchased for the field.

There was an increase in the number of requests for technical information from various divisions of the Commission and from other agencies. Because of the additional technical apparatus delivered by manufacturers, or constructed by field personnel, it was possible to honor most of these requests. Accordingly, a large number of engineering studies, investigations, and measurements were performed in the field, being approximately evenly divided between district offices and monitoring stations.

For example, at the request of the Standard Broadcast Division, the field personnel checked the field intensity of signals emitted by 53 directional antenna systems to determine whether or not these signals agreed with those specified in the station license authorization. Also, a complete field strength survey was made of one standard broadcast station, and several other surveys determined ground conductivity between pairs of stations and whether or not the conductivity varied with the direction of transmission of the signal. Surveys were made of the student carrier current stations of eight colleges to obtain information on such operations.

General monitoring stations and the Baltimore district office are continuing long-range broadcast signal intensity recording. In addition, certain monitoring stations are recording field intensities of VHF signals on a long-time basis. During the past year an unprecedented number of requests for special recording of VHF and UHF tests and other transmissions were received, and most were accommodated.

In preparation for the Safety of Life at Sea Convention at London, the electrical characteristics of the antennas of a large number of ships of all types were measured, including their actual radiating efficiency, the directional pattern, if any, and similar data. Measurements of the relative intensity of emission of harmonics from all classes of stations were made and are being continued to provide information on which to base engineering recommendations for standards of harmonic suppression for all types of services.

Other technical studies have been conducted to determine means of meeting new problems, particularly with regard to improvement of present apparatus, new types of operations, and extension of the

normally used spectrum into higher frequencies. Continuing interest in increasing the accuracy of the Commission's direction finding system has resulted in the practical development of wide frequency range transformers for use in the fixed monopole direction finders which, when substituted for the wide frequency range vacuum tube coupling units previously used, give increased sensitivity and accuracy with less maintenance and attendant difficulties. Other minor changes and adjustments and more careful attention to all phases of maintenance and operation have also increased the accuracy of the rotating type direction finders.

During the past year a total of 83 new projects were initiated, an increase of almost 100 percent over those of fiscal 1947. In addition, many projects initiated during previous years were continued for part or all of 1948.

During the last fiscal year it was necessary to arrange to move two primary and seven secondary monitoring stations. A new primary monitoring station was placed in operation at Livermore, Calif., replacing the previous San Leandro station. It was constructed within the \$47,000 appropriated for land and buildings.



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## CHAPTER VIII. TECHNICAL STUDIES

1. TECHNICAL INFORMATION DIVISION
  2. LABORATORY DIVISION
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### 1. TECHNICAL INFORMATION DIVISION

During its twelfth year of operation, the Technical Information Division extended its long-term projects, inaugurated new projects, and enlarged its sphere of activities to meet the increased demands of a rapidly developing industry. As technical consultant to the Commission, the industry, and the public, this division continued to conduct special studies and to collect and analyze basic data relative to various communication problems, and to make the resulting scientific information available for guidance in the promulgation of general rules and the determination of practical engineering standards.

The Commission is represented by the chief of the division or his alternate on a number of important standing committees. Among these are the Executive Council of the Central Radio Propagation Laboratory (CRPL), the Executive Committee of the International Scientific Radio Union (URSI), Papers Review Committee of the Institute of Radio Engineers (IRE), Radio Propagation Committees of the Institute of Radio Engineers and of the Radio Manufacturers Association, Aircraft Radio and Electronics Committee of the Aeronautical Board, Preparatory Committees for the International Radio Consultative Committee (CCIR), the Society of Automotive Engineers-Radio Manufacturers Association (SAE-RMA) Vehicular Interference Committee, and Committee C63 of the American Standards Association (ASA). The chief of the division also served as second alternate for the Chairman of the Commission on the President's Scientific Research Board which dealt with the broad aspects of the national research program.

#### WAVE PROPAGATION RESEARCH

In order that the most logical allocation of frequencies may be achieved, it is necessary that the Commission be fortified with reliable knowledge of the propagation characteristics of radio signals throughout the usable spectrum. Allocations within services as well as the determination of channel widths, distance separations, service ranges, interference zones, and power limitations must be preceded by a knowledge of wave propagation. Such knowledge is best obtained through practical field measurements and the careful engineering analysis of the resulting data. It is the primary function of the Tech-

nical Information Division to obtain these data and furnish highly reliable answers to the technical problems involved. In arriving at such answers the division obtains some information from the industry and other Government agencies but more largely from practical research projects such as those enumerated below :

#### Medium frequency projects

*Sunspot cycle.*—Solar activity has a profound effect upon radio wave propagation. During daytime hours, standard broadcast stations are only heard over relatively short distances. At night, clear channel skywave signals may be heard from distant States as well as from Mexico and Canada. The sunspot cycle covers a period of about 11 years. The Commission's sunspot cycle project was inaugurated in 1938 and is still active. Continuous recordings of broadcast signals are being made at Baltimore, Md.; Grand Island, Nebr.; Portland, Oreg.; and Powder Springs, Ga., and from time to time at other points. This information is needed to aid the interpretation of data taken in various years. For example, the Canadian Department of Transport wishes to extend the latitude dependent skywave curves for 1944 and United States latitudes to Canadian latitudes using data from 1947, a year of high sunspot numbers.

*Weather effect on groundwave field intensities.*—The relationship between field intensities and weather conditions was the subject of a detailed study in which signal levels received at Baltimore from station WCAU in Philadelphia were compared with official weather bureau data including pressure, temperature, and humidity for those locations. While the study is far from complete, it is apparent that a close correlation exists between signal strength and weather conditions, especially temperature and precipitation. The need for further study is indicated as it is evident that the degree of protection from interference that stations afford each other is by no means constant in time.

*Atmospheric noise.*—Continuous field intensity recordings of atmospheric noise between 200 and 1600 kilocycles were continued as in previous years. The information received from these recordings is analyzed and correlated with thunderstorm data and the results are used in the preparation of a series of noise maps to show characteristic variations with the time of day and a percentage of time for each frequency band and for various latitudes. These maps are used in estimating the signal level required to provide an acceptable radio service in the presence of atmospheric noise and hence, the possible service ranges when interference from other stations is absent. Because of the pressure of other duties the analysis of data and preparation of new maps were not undertaken during fiscal year 1948.

*Skywave pulse transmissions.*—Radio signals which travel from the

transmitter to the receiver by way of the E or F layers of the ionosphere are characterized by multiple reflections of different relative amplitudes and phases, depending on the distance or range of reception. To determine action and effect, pulses transmitted by selected broadcast stations are received simultaneously on loran receivers at distances of 500 to 2,000 miles. The pulses appearing on the oscilloscopes of each receiver are photographed at equal intervals of time. The results are then analyzed to determine the signal intensities exceeded for various percentages of the time for the components arriving by way of one, two, three or more reflections or hops from the ionosphere. Considerable additional field data were obtained during the past year. Analysis indicates definitely that the nature of skywave propagation is not so simple as it is generally assumed to be in the design of directional antennas. Additional measurements, possibly over a rather long period of time, may be necessary before definite conclusions can be made. The work is being carried over into the next fiscal year.

*Daytime skywave reflections.*—The charts from the automatic field intensity recorders of the sunspot cycle recording project contain a great deal of incidental propagation information. Drawing on these data, a fairly extensive study was made in connection with docket 8333, of the occurrence of daytime skywave in the standard broadcast frequency band. Although the data utilized were somewhat meager, the nature of this phenomenon was probably adequately established for present allocation purposes. If appreciable changes should be made in the Commission's allocation policies, it is anticipated that this study might require further expansion.

#### VHF and UHF projects

Due to the rapid development of new radio services and the consequent demand for channels in these higher frequency regions, it has been necessary to accelerate currently active projects and inaugurate new studies with a view to providing the Commission with reliable technical information upon which to base allocation plans and promulgate new rules and engineering standards.

*Very high-frequency recording.*—During the year the number of VHF field intensity recording installations were increased to approximately 15 units. Recorders were in operation at Searsport, Maine; Millis, Mass.; Philadelphia, Pa.; Laurel, Md.; Powder Springs, Ga.; South Miami, Fla.; Allegan, Mich.; Grand Island, Nebr.; Portland, Oreg.; San Leandro, Calif.; Honolulu, Hawaii; and Trinidad, British West Indies. The measurement of field intensities from FM, television, and other VHF stations was accelerated in order to obtain data needed in the preparation of standards for predicting good service ranges and objectionable interference ranges.

The increased sunspot activity during the year brought an increase in long-distance transmission, via the F2 layer of the ionosphere, in the frequency range from 30 to 60 megacycles. Unusually strong signals from eastern stations were recorded at Portland and San Leandro. Information gained from these measurements verified the Commission's early contention that long-distance interference would be detrimental to FM reception in the frequency range near 50 megacycles. A report (exhibit No. 54) on this project was entered in the proceedings in docket 8487, November 10, 1947.

A long-term project started in 1946 involving the simultaneous recording of signals from WBAM at New York on 47.1 and 106.5 megacycles at Princeton, N. J., Southampton, Pa., Laurel, and Powder Springs was concluded during the year. The data thus obtained were analyzed to determine the instantaneous distribution of field intensities. This distribution made it possible to evaluate the reliability of service and the magnitude of interfering fields for locations and over distances for which the measurements were made. An engineering report (exhibit No. 52) with distribution charts and field intensity curves was also introduced in the docket 8487 proceedings. This report, at the time of release, represented the best available technical information on actual propagation measurements on the frequencies involved.

Approximately seven other investigative projects of somewhat similar nature were under way during the year. The analysis of the resulting data represents a serious problem in that the job is tedious and requires more man-hours than are available to the division. Much valuable information is presently concealed in the large quantity of unanalyzed recorder charts on hand.

#### SPECIAL STUDIES AND MISCELLANEOUS ACTIVITIES

The Technical Information Division carries on a variety of special technical studies and miscellaneous activities. These duties include the maintenance of a technical library, the furnishing of a free consulting service to industry and the public, the promulgation of standards, widespread committee work, and many special studies.

Many of the latest engineering textbooks and scientific periodicals have been added to the library listings. Personnel of this division represented the Commission on eight important standing committees and a number of subcommittees. Much technical information was furnished to the various bureaus and divisions of the Commission as well as to consulting engineers and the public. The list of special studies is too numerous to be tabulated here, but includes the suppression of harmonic and spurious radiations, standards and limitations for carrier current systems, single side band, suppressed carrier studies, shipboard antenna measurements, VHF and UHF vacuum

tube studies, etc. Due to limited personnel, only those studies which carry the highest priority can be undertaken by the division.

## 2. LABORATORY DIVISION

### GENERAL FUNCTIONS

The Laboratory Division maintains a laboratory at Laurel, Md., for technical research and investigation through laboratory methods to aid the Commission in allocating frequency bands and establishing and revising engineering standards and regulations for new as well as existing radio services.

Typical of the Laboratory Division's activities would be (1) tests of types of transmitters to determine whether interfering signals are emitted on other than the frequency actually employed, and (2) tests of receivers to determine how close together the Commission might place stations without the listener receiving several stations at the same time.

In general, the division's activities concern the type of equipment rather than individual units. An attempt is made to anticipate interference problems and to have remedial measures taken at the manufacturing end rather than to make individual investigation after a general interference occurs. If this procedure is not followed while a system is developing a multitude of units may be placed in operation, after which the only remedy may be a patchwork solution. Some of the laboratory activities engaged in during the year are outlined below:

### INDUSTRIAL HEATING, DIATHERMY, AND MISCELLANEOUS EQUIPMENT

In the last decade radio frequency heating for industrial, medical, and other miscellaneous uses has expanded to such an extent that the kilowatts of equipment used by this group exceeds the total transmitter kilowatt power required for radio communication. Such equipment employs the same frequencies used by the communications industry and if the equipments are not properly designed and operated severe interfering signals will be emitted. Some of these units use power far in excess of the 50 kilowatt maximum permitted our broadcast stations.

In order to cope with the interference situations the Commission adopted part 18 of the Rules and Regulations covering industrial, scientific, and medical service, effective June 30, 1947. Subsequently, the Commission added a portion to part 18 covering miscellaneous equipment.

The Laboratory Division has maintained contact with the industrial heating industry, having representation on a number of committees of the American Institute of Electrical Engineers and the Institute of Radio Engineers. Standards of measurement techniques and inter-

ference reduction procedures are presently under consideration by these committees.

Diathermy apparatus used for medical therapy involves a large number of units of identical type. During the fiscal year manufacturers made 50 submissions of models for laboratory-type testing. Approval was recommended for 16 types found to meet the Commission's requirements. Industry has cooperated to the end that interference suppression even greater than that required by present rules has been obtained in many cases.

A considerable number of devices employing radio frequency energy and capable of serious interference were not clearly within the industrial heating or diathermy classification, so they were covered by the subsequent Miscellaneous Devices section of part 18. Included in this group are electric signs which employ radio frequency power for excitation of gases, also radio cookers and welding equipment. The welding equipment industry has been granted an extension of the effective date of the application of part 18 to permit reduction of the emission of interfering signals to the permitted limits.

It is believed that the steps taken to control radio interference from noncommunication users of radio devices is of great importance not only to the rapidly developing television service and other civilian radio communication services, but also a great protection to the frequencies utilized by the armed services. This aspect merits particular consideration in view of the importance of the industrial heating devices to production of military material.

#### STRATOVISION

The Laboratory Division made observation and measurements of the television transmissions made from aircraft flying at 25,000 feet in experiments by the Westinghouse Electric Corp., in cooperation with the Glenn L. Martin Co. Few other tests of this nature were made due to the fact that the aircraft installation became available only during the latter part of the fiscal year. However, this activity is continuing in view of the impact that stratovision may have on the whole television broadcasting structure by offering a possible method whereby video could be received over wider areas than it is now possible to serve.

#### TELEVISION

A number of studies in the laboratory and in the field were made to determine the interference situation with regard to television. One series of tests indicated that the original allocation for the joint use of television bands by television broadcasting and other services was untenable in that the television viewer in many areas could expect numerous interferences or distortion in reception. (See also Television.)

Other studies were directed at interference problems due to oscillator radiation (both high frequency and sweep) from television receivers. The industry is considering methods to reduce such interference. Another study was made of the harmonic radiations of TV stations as well as from other stations emitting harmonics on TV channels.

To illustrate the basic reasons why television is so subject to interference: An ordinary voice broadcast channel is only 10 kilocycles wide. At 1,000 kilocycles this channel width is 1 percent of the operating frequency. A television channel is 6 megacycles wide. At 60 megacycles this is one-tenth of the operating frequency. So the probability of interference to the TV channel is 10 times as great. This, coupled with the fact that the eye is more critical than the ear, requires stricter engineering control over conditions causing interference.

#### FM BROADCAST

The increase in the number of operating FM stations resulted in interference developing between FM stations in the same locality. Many FM broadcast receivers were tested to determine the separations required between stations if these receivers were to be free of interference. A study, undertaken to determine the role of the multipath problem in causing distortion of FM programs, is continuing. (See also frequency modulation (FM) broadcasting.)

#### MOBILE SERVICES

The influx of police, fire, power company, taxicab and other mobile radio operation in the spectrum near 150 megacycles invited numerous interference problems. The laboratory measured some of this equipment. The results indicated that separations in excess of those anticipated would be required until further improvements could be made in equipment. Delineating the problem has spurred manufacturers to improve designs, but there is still need to prevent unimproved equipment getting into general use and thereby greatly restricting the number of stations which can be licensed.

#### EQUIPMENT TESTING

Numerous devices submitted by manufacturers were tested to determine whether they would meet existing Commission requirements or, if no requirements were specified, whether the equipment could be operated to serve the purpose for which it was intended without causing interference or degradation of other communications services. These cases were typical:

Tests were made on one frequency and modulation monitor. This is a device used by standard broadcast stations to indicate that they

are on their right wave length and that the voice or music is properly impressed on their carrier. After certain adjustments this particular device was recommended for type approval.

A number of short-wave receivers were tested in considering frequency spacing of stations in the international broadcast service.

Tests of a number of types of transmitters employed in the mobile service revealed that many could operate in such a fashion as to spread over a much wider part of the spectrum than they were supposed to. Steps are being taken to insure operations of existing equipment within their own channels and new rules are under consideration to require incorporation of devices which will assist in keeping them within bounds.

Several types of transceivers proposed to be used in the Citizens Radio Service were submitted during the year. The first units tested did not comply with the rules, but after extensive changes they were resubmitted and type approval granted. The first such type approval was announced March 23, 1948.

Type approval of proposed equipment has proved mutually advantageous to industry and the services affected, besides reducing the field monitoring workload.

#### FIELD SURVEYS

A large number of broadcast stations employ directional antennas to keep them from interfering with other broadcast stations. With the increase in the number not only of standard broadcast stations, but also of FM and TV stations, the presence of other radio towers has affected the effectiveness of certain of these directional systems with a resultant increase in interference. The laboratory conducted two surveys of this nature during the year and began a continuing series of measurements to determine other factors which may reduce the interference suppression below the values required.

#### CALIBRATION OF APPARATUS

The Field Engineering and Monitoring Division uses a large amount of technical equipment. The Laboratory Division must calibrate this apparatus for accuracy. The laboratory also maintains its own instruments in a highly accurate state. In addition, some equipment used by others in obtaining data submitted in applications was compared on the accuracy of the measurements. These latter tests covered only items for which the National Bureau of Standards was not prepared to calibrate at the time. During the year eight field intensity sets and seven signal generators were calibrated. Calibration measurements were also made at seven recording installations in various parts of the country.



## LOW-POWER DEVICES

This group consists of devices not expected to cause interference because of the low power employed. Examples are radio-operated garage-door openers, miniature broadcast stations, and devices for remote control of models. Of the devices tested, a considerable portion was found capable of causing radiation greater than that permissible. The manufacturers decided either to give such new products further study or withdraw others from sale.

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## APPENDIX

1. FIELD OFFICES
  2. PUBLICATIONS
  3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS
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### 1. FIELD OFFICES

The Commission's field offices are as follows:

#### BUREAU OF ENGINEERING

##### FIELD ENGINEERING AND MONITORING DIVISION

<i>Regional offices</i>	<i>Headquarters</i>
North Atlantic.....	506 Federal Bldg., New York 14, N. Y.
South Atlantic.....	411 Federal Annex, Atlanta 3, Ga.
Gulf States.....	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific.....	323-A Customhouse, San Francisco 26, Calif.
North Pacific.....	801 Federal Office Bldg., Seattle 4, Wash.
Central States.....	876 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes.....	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian.....	609 Stangenwald Bldg., Honolulu 1, T. H.
Alaskan.....	52 Post Office and Courthouse, Anchorage, Alaska.

<i>District offices</i>	<i>Address</i>
1.....	1600 Customhouse, Boston 9, Mass.
2.....	748 Federal Bldg., New York 14, N. Y.
3.....	1005 U. S. Customhouse, Philadelphia 6, Pa.
4.....	508 Old Town Bank Bldg., Baltimore 2, Md.
5.....	402 New Post Office Bldg., Norfolk 10, Va. (ship office), 106 Post Office Bldg., Newport News, Va.
6.....	411 Federal Annex, Atlanta 3, Ga. (sub office), 214-218 Post Office Bldg., Savannah, Ga.
7.....	312 Federal Bldg., Miami 1, Fla. (sub office), 409-410 Post Office Bldg., Tampa 2, Fla.
8.....	400 Audubon Bldg., New Orleans 16, La. (ship office), 324 Courthouse and Customhouse, Mobile 10, Ala.
9.....	324 U. S. Appraisers Bldg., Houston 11, Tex. (sub office), 329 Post Office Building, Beaumont, Tex. (ship office), 406 Post Office Bldg., Galveston, Tex.
10.....	500 U. S. Terminal Annex Bldg., Dallas 2, Tex.
11.....	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif. (sub office), 320 Customhouse and Courthouse, San Diego 1, Calif. (ship office), 326 Post Office and Court- house, San Pedro 1, Calif.
12.....	323-A Customhouse, San Francisco 26, Calif.
13.....	406 Central Bldg., Portland 5, Oreg.
14.....	801 Federal Office Bldg., Seattle 4, Wash.
15.....	521 Customhouse, Denver 2, Colo.

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<i>District offices</i>	<i>Address</i>
16.....	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17.....	838 U. S. Courthouse, Kansas City 6, Mo.
18.....	246 U. S. Courthouse, Chicago 4, Ill.
19.....	1029 New Federal Bank Bldg., Detroit 26, Mich.
20.....	328 Federal Bldg., Buffalo 3, N. Y.
21.....	609 Stangenwald Bldg., Honolulu 1, T. H.
22.....	322-323 Federal Bldg., San Juan 13, P. R.
23.....	7-8 Shattuck Bldg., Juneau, Alaska (suboffice), 53 Post Office and Courthouse, Anchorage, Alaska.

## *Primary monitoring stations*

Alegan, Mich.  
Grand Island, Nebr.  
Kingsville, Tex.  
Millis, Mass.  
Santa Ana, Calif.  
Laurel, Md.  
Livermore, Calif.  
Portland, Oreg.  
Powder Springs, Ga.  
Honolulu, T. H.

## *Secondary monitoring stations*

Searsport, Maine.  
North Scituate, R. I.  
Spokane, Wash.  
Twin Falls, Idaho.  
Richmond, Fla.  
Lexington, Ky.  
Broken Arrow, Okla.  
Bay St. Louis, Miss.  
Fort Richardson, Alaska.  
Anchorage, Alaska.  
Point Maldonado, P. R.

## COMMON CARRIER DIVISION FIELD OFFICES

Atlanta, Ga., 515 First National Bank Bldg.  
New York, N. Y., 604 Federal Office Bldg.  
San Francisco, Calif., 316 U. S. Customhouse.

## BUREAU OF ACCOUNTING FIELD OFFICES

Atlanta, Ga., 515 First National Bank Bldg.  
New York, N. Y., 624 Federal Office Bldg.  
St. Louis, Mo., 407 Old Customhouse.  
San Francisco, Calif., 316 U. S. Customhouse.

## LAW BUREAU FIELD OFFICES

New York, N. Y., 604 Federal Office Bldg.  
San Francisco, Calif., 100 McAllister St.

## 2. PUBLICATIONS

Following is a list of Federal Communications Commission publications which may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., unless otherwise indicated:

<i>Title</i>	<i>Price</i>
Communications Act of 1934, with amendments and index, revised to Sept. 1, 1948.....	\$0.20
<b>Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):</b>	
Vol. 2, July 1935 to June 1936.....	2.00
Vol. 3, July 1936 to February 1937.....	2.00
Vol. 4, March 1937 to Nov. 15, 1937.....	1.50
Vol. 5, Nov. 16, 1937, to June 30, 1938.....	1.50
Vol. 6, July 1, 1938, to Feb. 28, 1939.....	1.50
Vol. 7, Mar. 1, 1939, to Feb. 29, 1940.....	1.50
Vol. 8, Mar. 1, 1940, to Aug. 1, 1941.....	1.50
Vol. 9, Aug. 1, 1941, to Apr. 1, 1943.....	1.25
Vol. 10, Apr. 2, 1943, to June 30, 1945.....	2.00
Vol. 11, July 1, 1945, to June 30, 1947.....	(1)
<b>Annual reports of the Commission:</b>	
First Annual Report—fiscal year 1935.....	.15
Twelfth Annual Report—fiscal year 1946.....	.20
Thirteenth Annual Report—fiscal year 1947.....	.25
Fourteenth Annual Report—fiscal year 1948.....	(1)
<b>Statistics of the Communications industry:</b>	
For the year 1939.....	.25
For the year 1940.....	.20
For the year 1942.....	.35
For the year 1943.....	.30
For the year 1944.....	.40
For the year 1945.....	.50
For the year 1946.....	.55
Report on Chain Broadcasting.....	.30
Report on Public Service Responsibility of Broadcast Licensees [Blue Book].....	.25
An ABC of the FCC.....	.05
Radio—a Public Primer.....	.10
An Economic Study of Standard Broadcasting.....	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations.....	.25
Digest of Radio Regulations and Instructions for Restricted Radiotelephone Operators.....	.05
<b>Standards of Good Engineering Practice:</b>	
Concerning standard broadcast stations, revised to Oct. 30, 1947.....	1.00
Sec. 26, Sunrise and Sunset Table, revised to Apr. 20, 1948.....	.10
Concerning FM Broadcast Stations, revised to Jan. 9, 1946.....	.10
Concerning Television Broadcast Stations, revised to Dec. 19, 1945.....	.15

<sup>1</sup> In the process of printing—available at Government Printing Office at a later date.

## Rules and regulations :

	<i>Price</i>
Pt. 1, Organization and Practice and Procedure, revised to Feb. 20, 1947.....	\$0.30
Pt. 2, General Rules and Regulations, revised to June 1, 1946.....	.10
Pt. 3, Radio Broadcast Services, revised to Jan. 16, 1948.....	.35
Pt. 4, Experimental and Auxiliary Broadcast Services, effective Sept. 10, 1946.....	(2)
Pt. 5, Experimental Radio Services, revised to Jan. 16, 1948.....	.10
Pt. 6, Fixed Public Radio Services, revised to Feb. 18, 1947.....	.05
Pt. 7, Coastal and Marine Relay Services, revised to Sept. 30, 1945.....	(2)
Pt. 8, Ship Service, revised to May 31, 1943.....	.15
Pt. 9, Aeronautical Services, revised to July 1, 1947.....	.10
Pt. 10, Emergency Radio Services, revised to Aug. 7, 1946.....	(2)
Pt. 11, Miscellaneous Radio Services, effective Jan. 1, 1939.....	.05
Pt. 12, Amateur Radio Service, revised to May 9, 1946.....	.10
Pt. 13, Commercial Radio Operators, revised to Jan. 30, 1948.....	.10
Pt. 14, Radio Stations in Alaska (other than amateur and broadcast), revised to Apr. 2, 1942.....	.05
Pt. 15, Rules Governing Restricted Radiation Devices, recodified July 21, 1948.....	(2)
Pt. 16, Railroad Radio Service, revised to Sept. 1, 1947.....	.05
Pt. 17, Utility Radio Service, effective Sept. 12, 1946.....	(2)
Pt. 18, Industrial, Scientific, and Medical Service, revised to Apr. 30, 1948.....	.10
Pt. 19, Citizens Radio Service, effective Dec. 1, 1947.....	(2)
Pt. 31-32, Uniform System of Accounts for Class A and Class B Telephone Companies—Units of Property Class A and Class B Telephone Companies, revised to Aug. 1, 1946.....	.30
Pt. 33, Uniform System of Accounts for Class C Telephone Companies, effective Jan. 1, 1939.....	.15
Pt. 34, Uniform System of Accounts for Radiotelegraph Carriers, effective Jan. 1, 1940.....	.25
Pt. 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Aug. 1, 1947.....	.45
Pt. 41, Telegraph and Telephone Frauds, revised to Dec. 4, 1947.....	.05
Pt. 42, Preservation of Records, revised to May 27, 1943.....	.10
Pt. 43, Reports of Communication Common Carriers and Their Affiliates, revised to July 21, 1948.....	(2)
Pt. 51, Classification of Telephone Employees, effective July 25, 1944.....	.05
Pt. 52, Classification of Wire-telegraph Employees, effective July 11, 1944.....	.05
Pt. 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to Aug. 1, 1946.....	.10
Pt. 62, Applications Under Sec. 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944.....	.05
Pt. 63, Extension of Lines and Discontinuance of Service by Carriers, revised to Dec. 30, 1946.....	(2)
Pt. 64, Miscellaneous Rules Relating to Common Carriers, revised to Sept. 19, 1946.....	(2)

<sup>2</sup> Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

### 3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

Federal laws, international treaties, conventions, regulations, arrangements and other agreements to which the United States was a party as of January 1, 1948, are listed below for reference. Unless otherwise indicated copies of these documents may be purchased from the Government Printing Office, Washington 25, D. C. (TS relates to Treaty Series, EAS to Executive Agreement Series, and TIAS to Treaties and Other International Act Series.)

Date	Series	Subject
1910.....		Ship Act of 1910 as amended in 1912 (Radiocommunication on the Great Lakes.)
1925.....	TS 724-A.....	Arrangement with Great Britain, Canada, and Newfoundland to prevent broadcast interference by ships.
1928-29.....	TS 767-A.....	Arrangement with Canada concerning private experimental communication.
1929.....	TS 777-A.....	Arrangement with Canada, Cuba, and Newfoundland relating to high-frequency assignments.
1929.....	TS 910.....	Safety of Life at Sea Convention (London).
1930.....	TS 921.....	Amendment to Regulation XIX of Annex 1 of Safety of Life at Sea Convention.
1932.....	TS 867.....	International Telecommunications Convention (Madrid).
1934.....	EAS 62.....	Arrangement with Canada concerning amateur and private experimental communication.
1934.....	EAS 66.....	Arrangement with Peru concerning amateur communication.
1934.....	EAS 79.....	Same, with Chile.
1937.....	EAS 109.....	Agreement with Canada concerning issuance of radio licenses.
1937.....	TS 962.....	North American Regional Broadcasting Agreement (Havana).
1937.....	TS 938.....	Inter-American Radio Communications Convention (First Inter-American Conference, Havana).
1938.....	TS 948.....	General Radio Regulations (Cairo revision, 1938) annexed to Telecommunications Convention (Madrid, 1932).
1938.....	EAS 142.....	Agreement with Canada concerning radiocommunications between Alaska and British Columbia.
1938.....	TS 949.....	Regional Radio Convention (Guatemala—in behalf of the Canal Zone).
1938.....	EAS 186.....	Arrangement with Canada concerning broadcasting.
1939.....	EAS 143.....	Arrangement with Canada concerning civil aeronautical services.
1940.....	EAS 231.....	Inter-American Radio communications Agreement (Second Inter-American Conference, Santiago, Chile).
1940.....	EAS 196.....	Agreement with Mexico concerning broadcasting.
1941.....	EAS 227.....	Supplementary North American Regional Broadcasting Agreement (Washington).
1945.....		Inter-American Telecommunications Convention (Third Inter-American Conference, Rio de Janeiro).
1945.....	TIAS 1518.....	Telecommunications agreement with certain governments of the British Commonwealth (Bermuda).
1946.....	TIAS 1553.....	North American Regional Broadcasting Interim Agreement (Modus Vivendi), Washington.
1946.....	TIAS 1527.....	Agreement with Union of Soviet Socialist Republics concerning commercial radio teletype communication channels.
1947.....	TIAS 1726.....	Agreement with Canada concerning FM broadcasting in 88 to 108 megacycles.
1947.....	TIAS 1670.....	Interim arrangement with Canada concerning mobile transmitters.
1947.....		International Telecommunication and Radio Conferences, Atlantic City. (Copies available through the American Radio Relay League, West Hartford 7, Conn.)
1947.....	TIAS 1652.....	Agreement with Great Britain concerning standardization of distance measuring equipment.
1947.....	TIAS 1676.....	Agreement with the United Nations concerning its headquarters' use of radio.

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In addition, the United States is bound by certain treaties wherein some of the contracting countries did not become parties to subsequent agreements, thereby binding the United States to the original document. These include:

Date	Series	Subject
1912.....	TS 581.....	International Radiotelegraph Convention (London).
1927.....	TS 767.....	International Radiotelegraph Convention and General Regulations (Washington).
1932.....	TS 867.....	General Radio Regulations annexed to the International Telecommunications Convention (Madrid).
1937.....	EAS 200.....	Inter-American Arrangement concerning Radiocommunications and Annex (Havana).

There are also certain treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Commission insofar as they involve communications. Among the most important of these are the following:

Date	Series	Subject
1944.....	TIAS 1591.....	International Civil Aviation Agreement, Chicago.
1946.....	-----	ICAO Communication Division and Second Session, Montreal.
1946.....	-----	Special Radio Technical Meeting, Montreal.
1946.....	-----	{ ICAO Regional Air Navigation Meetings, Communications Committee, Final Reports.
1947.....	-----	
1948.....	-----	



FIFTEENTH ANNUAL REPORT

FEDERAL  
COMMUNICATIONS  
COMMISSION



FISCAL YEAR ENDED JUNE 30, 1949  
(With notation of subsequent important developments)



## **COMMISSIONERS**

### **MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION**

(as of December 1, 1949)

**CHAIRMAN**

**WAYNE COY**

(Term expires June 30, 1951)

**PAUL A. WALKER**

(Term expires June 30, 1953)

**ROSEL H. HYDE**

(Term expires June 30, 1952)

**EDWARD M. WEBSTER**

(Term expires June 30, 1956)

**ROBERT F. JONES**

(Term expires June 30, 1954)

**GEORGE E. STERLING**

(Term expires June 30, 1950)

**FRIEDA B. HENNOCK**

(Term expires June 30, 1955)

## LETTER OF TRANSMITTAL

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FEDERAL COMMUNICATIONS COMMISSION,  
*Washington 25, D. C., December 30, 1949.*

*To the Congress of the United States:*

Pursuant to section 4 (k) of the Communications Act, there is submitted herewith the Annual Report of the Federal Communications Commission for the fiscal year 1949.

Covering as it does the fifteenth year of operations by this Commission, the current report is particularly significant in reflecting the mushrooming growth of the nonbroadcast services, and the steps that have been taken by the Commission to provide for new or augmented safety and special radio facilities to better serve the public and industry. Broadcast activities are marked by the booming interest in television, and the attendant problems being dealt with by the Commission in order to meet the demand for video expansion and improvement. At the same time, the Commission's regulatory functioning has been taxed by events in the common carrier field.

The Commission is hard pressed to keep abreast of kaleidoscopic technical developments affecting both wire and radio communication, and its normal field operations have been curtailed to some extent by diverting manpower to projects with higher priority. In addition, the Commission has increased responsibilities with respect to United States participation in, and adherence to, international conferences and pacts looking toward uniform global communication practices.

Though its mounting administrative and regulatory work has necessarily suffered from personnel and other budgetary restrictions, the Commission's accomplishments in this year of unprecedented electrical communication progress constitute a fitting fifteenth anniversary record.

Respectfully,

WAYNE COY,  
*Chairman.*

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## INTRODUCTORY SUMMARY

1. HIGHLIGHTS OF THE FISCAL YEAR
  2. SUBSEQUENT EVENTS
- 
- 

### 1. HIGHLIGHTS OF THE FISCAL YEAR

#### GENERAL

The fifteenth year of operations by the Federal Communications Commission found radio more active than ever before. In addition to broadcast, radio was being used for an increasing number of public and private purposes, and was entering the common carrier field to an unprecedented degree.

When the Commission came into being in 1934, standard broadcast was the only form of radio program service, and nonbroadcast stations were few in number. Today the radio spectrum is crowded with about 50 different classes of stations engaged in radio communication. They represent more than 700,000 radio licenses and other authorizations, not including over 200,000 associated mobile units. Even with the advent of FM and television broadcasting, nonbroadcast stations outnumber program stations by about 36 to 1.

Radio use is fast expanding on the land, on the sea, and in the air. In the old days, protection of life and property was the major consideration. Today business requirements must also be considered. Such "war babies" as radar and microwave are having lusty growth, and radio relay links are being extended. These and other developments have brought many new and perplexing problems, many of which have international as well as domestic impact. At the same time, research and regulation are equally hard pressed to keep abreast of the mounting tempo of radio progress.

Technical improvements have made it possible to use more frequencies but, simultaneously, the number of people desiring to employ radio has grown even more rapidly. The result is that the demand for frequencies far exceeds the supply.

The development of FM and TV broadcasting, the rapid growth of land mobile communication, the inauguration of microwave links for general radio communication relaying, the increasing use of elec-

tronic aids to air and sea navigation, and the expansion of Government radio services have all contributed to problems of frequency allocation in the upper part of the radio spectrum.

And, as the ether becomes more congested, interference grows in seriousness. That is why mutual working arrangements are being put into effect, not only between services, but between nations.

The international aspect of radio has developed to such an extent that the primary allocation of frequencies must now be made by treaty or other agreement. This will permit maximum radio use with minimum interference. Most of this uniformity of purpose stems from the Atlantic City convention of 1947. In consequence, the Commission helped to arrange and participated in nearly a score of international meetings during the fiscal year, and 16 others were in prospect.

#### BROADCAST

In broadcasting matters the year was marked by such a rush for television facilities that action on applications for new TV stations was deferred pending proceedings looking toward extending TV operations into the ultra high frequencies, adopting a Nation-wide channel assignment plan covering commercial video broadcasting in both bands and, at the same time, inquiring into the possibility of color television. Even so, the year closed with 71 television stations serving 42 cities and metropolitan districts. In addition, more than 200 television stations were in experimental operation.

Though 150 additional frequency modulation stations went on the air during the year, the total number of FM authorizations decreased by 155. However, FM service was available over almost all of the eastern half of the United States, over most of the west coast area, and in a number of cities and adjacent rural areas in the West. Thus, more than 100 million people were within range of one or more FM stations. Also, this was the first year of facsimile operation on a commercial basis over FM stations.

Standard (AM) broadcast authorizations climbed to nearly 2,200. However, fewer AM stations were authorized than in 1948. Greater difficulty was experienced in wedging into this now very saturated band.

The 58 noncommercial educational stations represented a gain of 12. International broadcast stations continued at 37. The 10 categories of broadcast services together had more than 4,000 stations.

Aggregate AM broadcast income for the calendar year 1948 decreased over 10 percent from the previous year, while that of the 4 major networks dropped more than 5 percent. Of 593 AM licensees operating FM stations, 77 reported separate revenues from their FM operation, with only 4 of the latter showing income. Of 107 FM

stations with no AM connection, all but 3 of the 89 reporting stations showed a loss. The 4 TV networks and 50 TV stations on the air during the year all reported an operating loss.

A tabulation of AM, FM, and TV authorizations showed that Texas had more such grants collectively than any other State, closely followed by California, then Pennsylvania, New York, and North Carolina in that order. However, Pennsylvania had the most FM authorizations, while New York led the TV list. Chicago had more broadcast grants than any other city. New York and Los Angeles headed the FM and TV lists, respectively.

In June the Commission affirmed the right of broadcast licensees to editorialize as part of their presentation of public issues, but reiterated that such views may not be used to achieve a partisan or one-sided objective.

#### NONBROADCAST

Because developments have made it possible to move "upstairs" in the radio spectrum, the Commission is able to be more liberal regarding the general public use of radio. Results of experimental operations invited a complete revision of frequency allocations and rules for two-way radio communication by all types of land vehicles, which became generally effective July 1, 1949. Two new groups of services were established—Land Transportation and Industrial.

The nonbroadcast services (exclusive of operators), which had less than 10,000 authorized stations in 1940, increased to more than 61,000, not counting their associated mobile units. These services fall into two general categories: (1) those devoted to safety, and (2) those used by commerce, industry, and science.

The largest single group is composed of more than 27,000 aeronautical stations, followed by 20,000 stations in the marine services. They added some 6,400 and 5,000 new stations, respectively, during the year.

Land public-safety stations added about 800 stations, bringing their total to some 5,700, including 4,800 police stations, 124 fire, 600 forestry, 200 highway maintenance, and 100 special emergency.

Industrial authorizations neared 4,300—2,700 power, 800 petroleum, 150 forest products, and over 600 others.

Land transportation stations exceeded 3,500—334 railroad, 80 transit utility, 30 bus and truck systems, and over 3,100 taxicab systems.

Experimental authorizations approximated 500.

These figures do not include associated mobile units, which number more than 43,000 police, 24,000 aeronautical, 17,000 fire, 7,000 forestry, 27,000 industrial, 3,700 railroad, transit, highway, etc.; and 74,000 experimental. The latter embrace 46,000 individual taxicabs, 600 trucks and buses, and 24,000 vehicles in common carrier service.

## COMMON CARRIERS

Telephone facilities continued to expand, and the telegraph system pushed its mechanization program. The former extended its coaxial cable network, and both were engaged in microwave operation. The number of fixed radio stations handling general public communications traffic exceeded 1,000, but 24 times that many experimental mobile units were linked to the telephone system.

On June 1, 1949, the Commission invited comment and proposals on the question of whether rules should be adopted with respect to protecting telegraph or telephone employees in connection with the discontinuance or reduction of service.

Telephone and telegraph tariffs now include a provision that these facilities will not be used for unlawful purposes and, further, will not be furnished if local law-enforcement agencies determine that such service is being or will be used in violation of law.

Telephone business ran about 10 percent ahead of last year. New facilities were added at the rate of more than 3 million dollars a day. More than 39 million telephones were in domestic service and the Bell system, which operated about 82 percent of this total, handled over 42 billion calls during the year. Bell's rural telephones increased to nearly 2½ million. Dial systems were on the increase.

On January 11, 1949, the eastern and midwestern coaxial networks were connected. Microwave links were being added or proposed. These facilities were made available for television relay as well as for other communication. However, questions of rates and interconnection were raised in their TV operation.

Common carrier mobile radiotelephone service was especially active. Telephone companies and nontelephone companies were serving vehicles in 146 and 64 cities, respectively. There has been such a demand for this service that the Commission prescribed an order of precedence for carriers to serve new customers.

In the international field, radiotelephone service was opened with 7 additional countries, making 81 countries outside of North America so served—53 with direct circuits. Nearly 600,000 calls were handled in 1948.

Telegraph activities were marked by Western Union proceeding with its 72 million-dollar modernization program, its continued use of a microwave circuit connecting New York, Washington, and Pittsburgh, and the establishment of a microwave circuit between New York and Philadelphia for TV transmission. The Commission granted more than 900 requests for discontinuance or reduction in hours of telegraph offices, mostly small offices in places where other service was available.

On the urgent plea of overseas telegraph carriers for additional revenue, the Commission authorized, effective February 2, 1949, increased rates estimated to produce over \$3,100,000 annually. Direct

radiotelegraph service was established with 4 additional countries, making such service available to 69 overseas points, as well as other places having connections with foreign carriers. International cable and radiotelegraph carriers handled more than 562 million paid words, of which 282 million were outgoing.

#### RADIO OPERATORS

Rules to enable citizens to use two-way personalized radio when approved sets are available became effective June 1, 1949. Other radio operator authorizations increased more than 61,000, making an existing total in excess of 645,000. Of this number, over 378,000 were commercial operators and more than 80,000 were amateurs. The latter operated over 81,000 stations. Special radiotelephone authorizations to operators of private aircraft exceeded 100,000.

#### FIELD

Though its normal functioning was affected by budgetary and higher priority matters, the field staff made about 23,500 inspections, including 11,000 ships and 12,500 land stations, and served 10,000 violation notices as a result. It also handled over 28,000 monitoring cases, in which it served over 11,000 notices; made 8,200 other investigations; inquired into 7,600 cases of interference; located 155 unlicensed radio operations, and responded to nearly 150 requests to help locate lost aircraft. In addition, it gave 41,200 operator examinations, and issued nearly 100,000 operator authorizations.

#### TECHNICAL

Radio's growth and other developments emphasized the work of the technical staff in advising the Commission on frequency behavior, service ranges, interference, channel separations, power limitations, and other highly complicated matters that are fundamental to frequency allocation and the promulgation of rules and standards. This was particularly marked in questions affecting television, new non-broadcast services, and interference problems. Certain new manufactured equipment was tested and type approved at the Commission's laboratory before being placed on the market.

#### MISCELLANEOUS

The only change in the complexion of the Commission during the year was the addition of its first woman member—Frieda B. Hennock. The Commission functioned with a personnel of less than 1,400, about one-third of whom were in the field. Its fiscal 1949 appropriation was \$6,717,000.

## 2. SUBSEQUENT EVENTS

*Broadcast.*—On August 19, 1949, the Commission announced the adoption of rules affecting lotteries and "give-away" programs in the

light of the ban on these programs in section 1304 of the United States Code. The rules are substantially the same as those proposed August 5, 1948 (Docket 9113), mentioned elsewhere in this report. They were scheduled to become effective October 1, 1949 but, in view of court actions in Illinois and New York, the Commission on September 21, 1949 postponed the effective date of the rules until final court determination.

Acting on requests for continuance, the Commission on July 28, 1949 postponed to September 26 the commencement of hearing in the general television proceedings (Dockets 8736 et al.). Previously, on July 20, 1949, it requested holders of experimental TV authorizations to furnish research and experimentation data in this connection. On the same date it denied request by the Television Broadcasters Association for a partial lifting of the "freeze". There were special filings on color television. Various experimental demonstrations of color transmission over regular TV broadcast facilities, for reception on special receivers, took place in the summer and fall. The general hearing started September 26 with testimony on the color phase.

At the turn of the fiscal year the Commission addressed letters to certain motion picture interests and obtained replies concerning their plans and views with respect to theatre television. Since 1945, certain frequencies have been available on an experimental basis for the development of theatre television. The latter is not involved in the general TV proceedings previously referred to.

By late fall, more than 3 million TV receivers were estimated to be in use, and TV network facilities linked 24 cities.

Because of economic problems affecting FM broadcasting, the Commission on August 4, 1949 proposed to liberalize certain FM rules regarding radiated power and antenna height. On August 24, 1949, it scheduled hearing for December 12 thereafter to determine whether a suitable multiplex FM system has been developed which will not degrade the full tone range of which FM is capable. Multiplexing concerns the simultaneous broadcast of facsimile and FM aural programs on the same channel.

At the instance of FM broadcasters, rules to increase the minimum operating schedule of such stations were proposed by the Commission on November 16, 1949. Amended pick-up broadcast station rules became effective October 24, 1949. On November 17 the Commission announced that it would grant no further authorizations for point-to-point relay of TV programs for nonexperimental exhibition purposes.

The first broadcast station authorization to the Virgin Islands was made September 7, 1949, when a construction permit was issued for an AM station at Charlotte Amalie, St. Thomas.

*Nonbroadcast.*—At a meeting of representatives of interested companies and government agencies on August 9, 1949, a joint industry-government group was established to study various problems in connection with rules proposed for incidental radiation devices.

Rules to exempt operators of approved diathermy and industrial heating devices from being required to eliminate a certain type of interference to inadequately shielded television receivers were adopted by the Commission, effective December 1, 1949 (Docket 9386).

On August 4, 1949 the licenses of all provisional radio stations expiring in the period July 1–November 1, 1949, were extended to the latter date to enable them to apply for reclassification in the new services which supplant the provisional type station.

*Common carrier.*—During July the Commission requested telephone and telegraph companies to furnish information on present and planned coaxial cable and microwave facilities intended for television relay purposes. In August a similar request went to authorized TV stations with respect to existing wireline connections with their transmitters.

On September 8, 1949 the Commission issued a proposed report in Docket 8963 in which it concluded, among other things, that tariff regulations of the American Telephone and Telegraph Co. are unjust and unreasonable to the extent that they permit the Bell system not to furnish intercity television transmission connections with private facilities of TV broadcasters until such time as common carriers can provide an adequate video relay system. The rate aspect, and the refusal of the Bell system to interconnect its TV transmission facilities with those of Western Union, are involved in further proceedings.

On August 10, 1949 the Commission authorized new microwave circuits, estimated to cost 17 million dollars, to be used for telephone and TV transmission between Pittsburgh–Chicago, Chicago–Des Moines, Albany–Syracuse, Richmond–Norfolk, and Milwaukee–Madison. A new Bell coaxial cable, which will carry hundreds of additional telephone conversations and three more television channels, was placed in service between New York and Philadelphia September 1, 1949.

On August 4, 1949 the Commission ordered hearing to be held October 4, 1949 on the joint application of various telephone companies to acquire certain telephone properties of Western Union (Docket 9235), mentioned in the chapter on Common Carriers.

The Western Union Telegraph Co. was granted 1 year extension of time, from September 27, 1949, to divest itself of international telegraph operations as required by section 222 (c) (2) of the Communications Act, as amended, and pursuant to Commission order of Sep-

tember 27, 1943 (Docket 6517) approving merger of Postal Telegraph with Western Union.

Commission Chairman Coy, as chairman of the United States delegation to the International Telegraph and Telephone Conference (Paris, May–August 1949), on October 31, 1949, transmitted to the Department of State a report on the conference, which was released by that department on November 4. Meanwhile, on October 21, the Commission ordered a further hearing, to be held December 5 thereafter, to determine what changes, if any, should be made in international telegraph rates as a result of the Paris and London conferences.

An initial decision looking toward a grant of Mackay Radio and Telegraph Co.'s applications for authority to communicate with Portugal and The Netherlands and denial of its application to communicate with Surinam (Docket 8777) was issued July 29, 1949.

*Operators.*—The Commission on July 27, 1949, designated October 10, 1949 as the date of an informal conference to discuss proposed amendments to the amateur rules (Docket 9295), referred to in the chapter on radio operators.

On August 24, 1949 the Commission proposed to establish a new nontechnical commercial radio operator authorization to be known as "Radiotelephone third class operator permit" (Docket 9424). Temporary waiver of operator requirements for ship radar stations was extended from November 15, 1949 to May 15, 1950.

*Miscellaneous.*—By actions of March 9 and September 16, 1949, the Commission made available to the Bureau of Labor Statistics labor data relating to common carriers and broadcast stations for processing and publication by the Department of Labor.

On October 21, 1949, the Commission established a consolidated Amateur, Citizens Radio and Operator License Branch in its License Division, and changed the name of the Technical Information Division, Bureau of Engineering, to Technical Research Division.

As of October 31, 1949, outstanding radio authorizations exceeded 737,000, an increase of more than 25,000 in the four months since the close of the fiscal year. Comparative figures for services and groups follow:

Service	June 30, 1949	Oct. 31, 1949	Increase or (decrease)
<b>Broadcast:</b>			
Standard (A.M.).....	2,179	2,229	50
Frequency modulation (F.M.).....	865	815	(-50)
Television (TV).....	117	112	(-5)
Television (experimental).....	205	217	12
Noncommercial educational.....	53	66	8
International.....	37	37	0
Facsimile.....	2	0	(-2)
Remote pick-up.....	580	589	9
Studio transmitter (ST).....	23	29	6
Developmental.....	14	11	(-3)
<b>Total broadcast services.....</b>	<b>4,085</b>	<b>4,105</b>	<b>20</b>



Service	June 30, 1949	Oct. 31, 1949	Increase or (decrease)
<b>Nonbroadcast:</b>			
Aeronautical.....	27,227	29,247	2,020
Marine.....	20,004	22,236	2,232
Public safety.....	5,700	6,124	424
Industrial.....	14,268	4,852	584
Land transportation.....	13,586	3,462	(-124)
Experimental.....	455	454	(-1)
Miscellaneous.....	46	43	(-3)
<b>Total nonbroadcast services.....</b>	<b>61,286</b>	<b>66,438</b>	<b>5,152</b>
<b>Common carrier:</b>			
Fixed public telephone.....	26	26	0
Fixed public telegraph.....	57	58	1
Land mobile.....	795	733	(-62)
Experimental.....	174	180	6
<b>Total common carrier services.....</b>	<b>1,052</b>	<b>997</b>	<b>(-55)</b>
<b>Radio operators:</b>			
Commercial.....	378,500	389,366	10,866
Aircraft radiotelephone.....	104,569	110,655	6,086
Amateur operators.....	80,721	82,412	1,691
Amateur stations.....	81,675	83,485	1,810
Citizens.....	122	194	72
<b>Total.....</b>	<b>645,587</b>	<b>666,112</b>	<b>20,525</b>
<b>Grand total.....</b>	<b>712,010</b>	<b>737,652</b>	<b>25,642</b>

<sup>1</sup> Revised figures.

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## CHAPTER I. GENERAL

1. FIFTEENTH ANNIVERSARY
  2. FUNCTIONS
  3. COMMISSION
  4. STAFF ORGANIZATION
  5. PERSONNEL
  6. APPROPRIATIONS
  7. LEGISLATION
  8. LITIGATION
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  10. LICENSES AND OTHER AUTHORIZATIONS
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### 1. FIFTEENTH ANNIVERSARY

The fiscal year 1949 marked the fifteenth year of operation of the Federal Communications Commission.

It was on June 19, 1934, that the Communications Act was signed. This law established the Federal Communications Commission to regulate interstate and international communication by means of telegraph and telephone, also all radio transmission to the inclusion of broadcast. Besides unifying tasks previously performed by several Federal agencies, the act gave the Commission broader supervisory powers in this field.

### 2. FUNCTIONS

In general, the Commission's duties include supervision of common carrier land wire, ocean cable and radio services; allocation of radio frequencies, and licensing of radio stations and radio operators; encouraging new uses for radio, particularly in promoting safety of life and property on the land, on the sea, and in the air; participation in formulating and domestically administering wire and radio provisions of treaties and other international agreements to which the United States is a party; and assistance in coordinating the use of the many forms of electrical communication with the national security program.

The tremendous expansion in scope and extent of the communications industry has added to the problems and workload of the Com-

mission. Besides being required to participate in an increasing number of international conferences, the Commission's regulatory duties must provide rules and regulations, engineering standards, and over-all policy determinations to meet new developments and, at the same time, minimize the administrative problems involved in regulation. In so doing, it must conform to the Administrative Procedure Act which prescribes a definite procedure for Federal agencies to follow in rule-making.

The Commission exacts no fee or other charge in connection with its application, licensing, and other functions.

### 3. COMMISSION

The Commission is an independent Federal establishment created by Congress and, as such, reports directly to Congress. It is administered by seven Commissioners appointed by the President, subject to confirmation of the Senate. The President also designates the chairman. Commissioners hold office normally for 7 years. Not more than four Commissioners may be members of the same political party.

In 1949 the Commission continued to function as a unit, directly supervising all activities, with delegations of responsibility to boards and committees of Commissioners, individual Commissioners, and the staff. Policy determinations were made by the Commission as a whole.

The only change in the complexion of the Commission during the year was the addition of Miss Frieda B. Hennock, who took office July 6, 1948, for seven years, succeeding Clifford J. Durr. On May 4, 1949, Commissioner Edward M. Webster was renominated for a seven-year term. He was confirmed by the Senate on July 20, for the period from June 30, 1949. (The Commission's 1948 annual report inadvertently omitted mention that Commissioner George E. Sterling took office on January 2, 1948, under a recess appointment to succeed Ewell K. Jett, resigned as of December 31, 1947, whose term expires June 30, 1950.)

### 4. STAFF ORGANIZATION

As of June 2, 1949, the chairman was made responsible for the general administration of the internal affairs of the Commission, with the duty of keeping the Commission advised of his actions taken under this delegation of authority. This abolished the Bureau of Administration as an entity under the Commission and, in its stead, established an Office of Administration under the chairman.

In consequence, there are now four bureaus—Engineering, Accounting, Law, and Secretary—augmented by a Hearing Division, a Special Legal and Technical Group, an Office of Information, and the new Office of Administration. The Bureaus of Engineering, Accounting

and Law are, in effect, broken down into comparable divisions for coordinated operation.

Organization of these bureaus and the Office of Administration follows:

*Bureau of Engineering.*—FM Broadcast, Television Broadcast, Standard Broadcast, Common Carrier, Aviation, Radio Operator and Amateur, Marine Radio and Safety, Field Engineering and Monitoring, Technical Information, Public Safety and Special Services, Laboratory, and Frequency Allocation and Treaty Divisions.

*Bureau of Accounting.*—Economics and Statistics Division (Common Carrier, Broadcast, and Special Studies Branches); Broadcast Division (Applications, Renewals and Annual Reports, and Hearings Branches); Rates Division (Tariffs and Telephone Rates, and Telegraph Rates Branches); Accounting Regulation Division (Development and Compliance, and Original Cost and Depreciation Branches); and Field Division.

*Bureau of Law.*—Safety and Special Services Division (Aviation and General Mobile, Marine Operator and Amateur, and Emergency, Experimental and Miscellaneous Branches); Broadcast Division (AM, FM, TV, Renewals and Revocations, and Transfer Branches); Litigation and Administration Division (Litigation, and Administration Branches); Common Carrier Division (Rate, International, Domestic Wire, and Domestic Radio Branches).

*Bureau of the Secretary.*—License, Service, and Records Divisions, and Minute and Library Branches.

*Office of Administration.*—Budget and Fiscal Division, Organization and Methods Division, and Personnel Division.

As of June 2, 1949, the Commission removed staff members engaged in hearing and opinion work from supervision by officials having prosecutory or investigatory functions by placing the former under the immediate direction of the Commission. This resulted in a number of special legal and technical assistants being detailed to work on hearing matters for the Commissioners as a body.

Administrative rule changes, made effective at the same time, authorized initial decisions to be issued by hearing examiners or Commissioners presiding at hearings, and motions formerly handled by the Motions Commissioner, with certain exceptions, to be acted upon by hearing examiners. One result is that initial decisions have supplanted proposed decisions of the Commission.

## 5. PERSONNEL

On June 30, 1949, a total of 1,340 persons were employed by the Commission. This is a reduction of 40 during the year. Personnel distribution was:

Bureau	Washington	Field	Total
Engineering.....	296	424	720
Law.....	102	4	106
Accounting.....	119	36	155
Secretary.....	259	0	259
Administrative.....	100	0	100
Total.....	876	464	1,340

## 6. APPROPRIATIONS

A break-down of the Commission's appropriations and expenditures for the fiscal year 1949 follows:

<i>Appropriations</i>		<i>Expenditures</i>	
Regular appropriations (salaries and expenses) ..	\$6,310,000	Personal services.....	\$5,990,627
Deficiency—P. L. 900.....	367,000	Travel .....	74,982
Printing and binding.....	40,000	Transportation of things..	22,404
		Communications .....	146,279
		Rents and utilities.....	63,567
Total funds available.....	6,717,000	Printing and binding.....	38,898
		Other contractual services..	71,040
		Supplies and materials....	130,439
		Equipment .....	173,023
		Total obligations....	6,711,259
		Transfer to public health..	2,230
		Savings, unobligated balance .....	3,511
		Total .....	6,717,000

## 7. LEGISLATION

During the fiscal year 1949, no substantive changes were made in the Communications Act and no laws were enacted which directly affected the Commission's functions or jurisdiction. However, numerous bills were introduced and considered by Congress which did, directly or indirectly, concern the Commission.

The most important of these were S. 1973, introduced by Senator McFarland, which would make substantial changes in the Communications Act, and would extensively revise the organization and procedures of the Commission in several major respects; H. R. 2915, introduced by Congressman Hobbs, which would revise the procedure for handling appeals to the courts from Commission decisions; S. 238, introduced by Senator Johnson, which would authorize the Interstate Commerce Commission to require railroad common carriers to install and maintain communication systems; and H. R. 3644, H. R. 4048 and H. R. 4124, all of which would amend section 605 of the Communications Act which deals with the unauthorized interception of communications. Congressional committee hearings were held on all but the

last three of these bills and the Commission appeared and presented extensive testimony. In addition, the Commission prepared comments on more than 50 other proposed bills containing provisions having a bearing on the Commission's activities.

### 8. LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the district courts over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission (with certain exceptions); section 402 (b) provides for appeal from other decisions of the Commission to the United States Court of Appeals for the District of Columbia. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year, there were 31 cases involving the Commission in the Federal courts. Of this total, 17 cases were instituted in the Court of Appeals, 3 in district courts, and three were in the United States Supreme Court. The other 8 cases were pending at the start of the fiscal year.

The Supreme Court upheld the Commission in the three cases brought before it. The Court of Appeals upheld the Commission in nine cases but in six cases the Commission's decision was reversed by that court. However, in two of these latter cases which were taken to the Supreme Court by the Commission, the decision of the Court of Appeals was reversed. In the district courts, two cases were decided, both in favor of the Commission.

At the close of the fiscal year 12 cases were pending in the Court of Appeals for the District of Columbia and 1 pending in the United States District Court for the Northern District of Illinois.

The following cases decided during the fiscal year were of particular interest:

1. In *Federal Communications Commission v. WJR, the Goodwill Station, Inc.* (337 U. S. 265, 69 Sup. Ct. 1007), WJR contended it would suffer electrical interference from the grant of a new station on the same frequency during daytime hours only in an area where its signal was of an average intensity of 32 mv/m. The Commission had denied a petition to set aside the grant to the new station on the grounds that the alleged interference occurred outside the protected contour of WJR. The Commission took this action on the basis of the written pleadings filed by WJR and the new station which presented no disagreement as to the facts. By a divided court, the Court of Appeals reversed the action of the Commission on the grounds that

WJR, as a matter of constitutional law, was entitled to a hearing, at least by way of oral argument, before the petition could be denied. Upon review by the Supreme Court, the decision of the Court of Appeals was reversed, the Supreme Court holding unanimously that under the circumstances of the case neither the Constitution nor the Communications Act required that WJR be afforded a hearing before its petition could properly be denied. The Supreme Court remanded the proceedings to the Court of Appeals for a decision as to whether or not the Commission was correct in its disposition of the WJR petition on the merits. The case now awaits further proceedings in the Court of Appeals.

2. In *Federal Communications Commission v. Broadcasting Service Organization, Inc. (WORL)* (337 U. S. 901, 69 Sup. Ct. 1047), the Supreme Court in a *per curiam* decision on May 16, 1949 reversed the Court of Appeals for the District of Columbia and upheld the Commission's determination that a renewal of a station license would not be in the public interest where the licensee had on a number of occasions submitted false information to the Commission concerning the ownership of its stock and its financial status, and had withheld other information it was obliged to report under the Communications Act and the Commission's Rules and Regulations. The Commission had found in its decision that these derelictions were the result of either a willful deception or at least reckless indifference to the responsibilities of a licensee. The Supreme Court sustained the Commission's contention that it could infer such willfulness or recklessness from substantial evidence reasonably supporting the inference despite the alleged absence of direct evidence of intent to deceive and of motive.

3. In *Carlson v. Federal Communications Commission* (172 F. 2d 766), the Court of Appeals for the District of Columbia similarly affirmed a decision of the Commission denying an application for renewal of a station license on the grounds that the applicant had persistently violated the Commission's Rules and Regulations and Standards of Good Engineering Practice. The Supreme Court denied a petition for certiorari on June 13, 1949 (337 U. S. 930, 69 Sup. Ct. 1494).

4. In three cases decided by the Court of Appeals, *Bay State Beacon, Inc. v. Federal Communications Commission* (App. D. C., 171 F. 2d 826), *Kentucky Broadcasting Co. v. Federal Communications Commission* (App. D. C., 174 F. 2d 38), and *Johnston Broadcasting Co. v. Federal Communications Commission* (App. D. C., May 4, 1949), the court recognized and upheld the Commission's authority to examine the proposed program plans of competing applicants. In the *Bay State Beacon* case, the Commission's authority to consider the

proportion of time devoted to sustaining and commercial programs as a relevant factor in passing on competing applications was upheld. In the *Kentucky Broadcasting Co.* case, the Commission's authority to consider past program structure of an applicant with respect to the amount of time devoted to locally originated programs was upheld. In the *Johnston* case, the Commission's decision was reversed by the court because the successful applicant had signed and sworn to his application prior to the completion of the necessary attached engineering report. However, the court expressly upheld the right of the Commission, in comparative cases, to consider as one important factor in choosing between competing applicants the fact that one applicant proposed to present a relatively large number of programs devoted to consideration of controversial issues and other public affairs of interest to the community to be served, whereas the competing applicant proposed to devote a substantially lesser percentage of his time to such programming.

5. In *Plains Radio Broadcasting Co. v. Federal Communications Commission* (App. D. C., May 4, 1949), the Court of Appeals reversed a decision of the Commission on the ground that the findings of fact in its decision were insufficient to support the Commission's conclusions granting the application of one of two competing applicants for radio facilities. In its opinion, however, the court expressly affirmed the authority of the Commission to consider the newspaper ownership of or control over a given applicant, or the fact that such applicant also owned or controlled other stations serving a substantial percentage of the area to be served by the proposed new station, in determining which of the two applications would best serve the public interest, convenience or necessity.

6. In *Easton Publishing Co. v. Federal Communications Commission* (App. D. C., May 4, 1949), decided the same day, the court, in reversing a decision of the Commission because of the insufficiency of its findings and conclusions, affirmed the Commission's holding that in determining the amount of existing radio service available to various communities in choosing between mutually exclusive applicants for stations in such communities, it could consider AM and FM stations as being in separate categories to be independently evaluated according to the particular circumstances of each case.

7. In *Mansfield Journal Co. v. Federal Communications Commission* (App. D. C. 173 F. 2d 646) and *KFAB Broadcasting Co. v. Federal Communications Commission* (App. D. C., June 13, 1949), the Court of Appeals handed down decisions to the effect that the Commission was not required to consider upon a comparative basis pending applications for facilities in the same community where, at the time of Commission action, there were sufficient channels or facilities



available to enable the Commission to grant any one of the pending applications without adversely affecting the possibility of granting any of the other applications pending at the time of the action taken.

### 9. HEARINGS

Under provisions of the Communications Act, an application cannot be denied or an existing authorization modified arbitrarily without affording an opportunity for a hearing. The bulk of the Commission's hearings involve determination of which of several applications for the same or conflicting broadcast facilities should be granted, and whether the facilities applied for would interfere with the operations of stations already authorized.

Docket summaries for the fiscal year follow:

	Pending July 1, 1948	Designated for hearing	Disposed of without hearing	Disposed of follow- ing hearing	Pending June 30, 1949
Broadcast.....	718	334	290	163	599
Safety and special.....	29	12	17	5	19
Common carrier.....	21	25	11	7	28
Other.....	3	12	2	4	9
Total.....	771	383	320	179	655

### 10. LICENSES AND OTHER AUTHORIZATIONS

As of June 30, 1949, the Commission had more than 700,000 outstanding licenses and other authorizations. Of this number, some 4,000 were in the broadcast services, and nearly 145,000 in the non-broadcast services, exclusive of operators who approximated 564,000. The figures on station authorizations do not include more than 200,000 transmitters on associated mobile units.

The Communications Act extends the license privilege only to citizens of the United States. It is denied to corporations in which any officer or director is an alien or of which more than one-fifth of the capital stock is owned by aliens or foreign interests.

### 11. APPLICATIONS AND OTHER FILINGS

Nearly 225,000 applications of all kinds were received by the Commission during the year. The broadcast services accounted for almost 6,300 of these, while those in the nonbroadcast radio services amounted to more than 86,000, including over 33,000 for amateurs. Commercial radio operator applications topped the 100,000 mark, while requests for special aircraft authorizations exceeded 26,000. Common carrier applications totaled nearly 3,200. Tariff and other common carrier filings, not included in the foregoing figures, aggregated 32,000, of which number about 25,000 were tariff schedules and the remainder were monthly and annual reports which also required analysis.

**12. CORRESPONDENCE, RELEASES, AND PUBLICATIONS**

Almost 1,150,000 communications in the form of letters and telegrams were handled by the Commission in the 12-month period. Of this total, more than 800,000 were incoming messages and nearly 350,000 were outgoing.

Public notices, orders, decisions, and opinions issued during the year required nearly 60,000 stencils, over 8,000,000 sheets of paper, and more than 12,000,000 mimeographed impressions.

The Commission's printed publications are processed at the Government Printing Office and are sold by the Superintendent of Documents. A list of those currently available appears in the appendix.

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## CHAPTER II. RADIO FREQUENCIES

1. ALLOCATION OF FREQUENCIES
  2. INTERNATIONAL CONFERENCES
  3. DOMESTIC FREQUENCY CHANGES
  4. INTERDEPARTMENT RADIO ADVISORY COMMITTEE
  5. TREATY AND INTERFERENCE CASES
  6. ALLOCATION AND TREATY RULES
  7. FREQUENCY AND STATION RECORDS
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### 1. ALLOCATION OF FREQUENCIES

It is a fundamental duty of the Commission to allocate the radio spectrum to the various radio services and to write the rules and regulations to govern the operation of these services on the respective frequencies that are assigned to them. This is basic to all other radio activities of the Commission and is designed to protect the public interest by assuring an equitable distribution of frequency space among the various radio services.

The primary obstacle to greater and greater use of radio communication facilities is the relative unavailability of channels. Technical developments have made it possible to use more frequencies and to use them more efficiently but, simultaneously, the number of people desiring to employ radio has grown even more rapidly. The result is that the demand for frequencies far exceeds the supply. And the demand is increasing faster than advances in the radio art can enable additional radio needs to be accommodated.

Radio developed in the lower part of the radio spectrum. As the number of stations and possible uses increased, the available low frequencies were either exhausted or were found to be unsuited for particular purposes, and higher and higher frequencies were explored and opened to use. This has added to the engineering difficulties in making frequency allocations and station assignments as well as to the problems in connection with manufacturing suitable equipment.

Frequency allocation is a very complex subject. There is a difference between frequency "assignment" and frequency "allocation." The former pertains to assigning a particular frequency for use by a particular station, while "allocation" refers to the setting up of bands of frequencies for the use of the various radio services.

Frequency allocation, briefly, may be likened to building communication highways in the ether. In ordinary road building there is a wide choice of routes. However, in frequency allocation most of the usable lanes are already well filled and, unlike land traffic, radio transmissions cannot be routed by underpasses and overpasses. Neither do they obey traffic signals to allow other traffic to pass, or go just to the point where they are to be heard. They spread out to thousands of other points as well, crossing political and geographical boundary lines in all directions.

The theoretically usable radio spectrum extends from 10 to 30 million kilocycles, but for practical purposes the present ceiling for commercial utilization is around 10 million kilocycles.

It is customary to speak of the allocation of spectrum space to the various radio services as the allocation of "bands" of frequencies to specified services, meaning the designation of groups of frequencies in a particular region of the spectrum for the use of specified services. The bands assigned to a particular service are broken down into "channels" which are, in effect, the ether traffic lanes. Within these channels, each station operates on a designated "frequency." Thus, for example, in the medium-wave region of the spectrum the frequencies 550 to 1600 kilocycles are allocated as the standard broadcasting band. This band is divided into 106 channels, each 10 kilocycles in width. Individual stations are assigned to frequencies at the center of each channel, such as 550 kilocycles, 560 kilocycles, etc.

Not all channels are the same width. Some types of transmission require wider paths than others. In broadcasting, for example, though a standard (AM) station uses a channel 10 kilocycles wide, an FM station needs one 20 times wider, while a television station requires about 600 times the spectrum space occupied by one AM station. In the nonbroadcast field, too, channel widths differ according to the requirements of the particular services.

By the same token, the nature of a service is an important factor in determining its position in the radio spectrum. Each band has inherent characteristics which must be taken into account in determining the kind of stations permitted to use it. Thus, at the lower part of the spectrum are radio aids to air and sea navigation. Further up, in turn, are AM broadcasting, long-distance communication, FM and television broadcasting, developmental services, radar, and experimental operation. Sandwiched in between are segments for various government and miscellaneous nongovernment services.

In the early days of radio regulation a few kilocycles one way or another was of little importance. Later, with the filling of the spectrum, the problems of interference between stations became more

pronounced, and it became necessary to define more precisely channel boundaries, engineering standards, etc.

So, in order to plan the use of a frequency intelligently the Commission must take into account many intricate factors. Among these may be mentioned the kinds of communication to be handled, the distances involved, the type of operation, the locations of the transmitting and receiving points with respect to land mass and bodies of water, the presence of other radio stations in the vicinity or operating on the same frequency elsewhere, and many other things. It must know the behavior of the radio waves upon that frequency for various hours of the day, seasons of the year, and phases of the sunspot cycle and during atmospheric disturbances. There is still much to learn about the propagation characteristics, particularly in higher portions of the radio spectrum, now that radio must continue to move "upstairs." There is also much to learn concerning equipment capabilities, particularly in higher portions of the spectrum, since this, too, is essential information in laying a firm foundation for sound frequency allocation.

The development of FM and TV broadcasting, the rapid growth of land mobile communication, the inauguration of microwave links for general radiocommunication relaying, the increasing use of electronic aids to air and sea navigation, and the expansion of government radio services are some of the factors that have contributed towards making the current problems of frequency allocations, particularly in the "upper" radio spectrum, i. e., that portion above 30,000 kilocycles, an exceedingly complicated matter.

As the spectrum becomes more congested, interference grows in seriousness. It can come not only from domestic stations but also from the many thousands of foreign stations which can be heard in this country. That is why mutual working arrangements between nations to handle radio's expanded usage is imperative.

## 2. INTERNATIONAL CONFERENCES

Regulation of radio is necessary because transmissions know no state or national boundaries and must be controlled among the users to prevent interference and waste of frequencies. The international aspect of radio has developed to such an extent that almost no major frequency allocation can be met properly without considering international usage. Hence, the primary allocation of frequencies is now made by international treaty or other agreement.

The Atlantic City Telecommunications and Radio Conferences of 1947 produced a new international table of frequency allocations to supersede that agreed upon in previous international conferences.

The Atlantic City session also recognized that effective implementation of the allocation table would require taking the allocations, band by band, and dealing with them in terms of the specific frequency assignments to individual stations that might be accommodated in those bands. As a result, this conference did the spade work on an over-all design of frequency use intended to take account of postwar developments and set up certain rules and regulations which if adhered to by the participating nations would go far towards achieving maximum use of the radio spectrum, with minimum interference, through co-ordinated action.

The conference also provided for certain future conferences of a more limited nature, both regional and world wide, to complete the work started at Atlantic City by formulating detailed station assignment lists covering the various bands and services. Because of the great demand for radio facilities, this job of providing for the needs of the various countries within the allocated bands is particularly difficult. However, not all of these international sessions deal with radio. Some of them concern operations and practices of telegraph and telephone common carriers engaged in international service. Many conferences have already been held; others are in prospect. It is the Commission's job to prepare for and participate in these sessions, held under Department of State auspices, and to put the conference decisions into effect as they pertain to radio services in the United States and its possessions.

During the fiscal year the Commission helped arrange for or participated in nearly a score of international conferences and other sessions as compared with 15 the year previous. They included:

Provisional Frequency Board, Geneva, has been sitting since January 1948 to draft a frequency list.

International Radio Consultative Committee (CCIR), Stockholm, July 1948.

European Maritime Regional Radio Conference, Copenhagen, June-September 1948.

Planning Committee on High Frequency Broadcasting, Mexico City, October 1948.

International Administrative Radio Conference on High Frequency Broadcasting, Mexico City, October 1948-April 1949.

Committee on Revision of International Telegraph Regulations, Geneva, January 1949.

Special Loran Conference, Geneva, January 1949.

International Telecommunications Union Region II and Fourth Inter-American Radio Conference, Washington, April-July 1949.

CCIF Technical Study Groups, The Hague, April 1949.

International Administrative Telegraph and Telephone Conference (ITU), Paris, May–August 1949.

Technical Planning Group (preparing for 1950 Rome High Frequency Broadcasting Conference) Paris, June 1949.

European Conference for Study of Bands 1605–2850, 3155–3400 and 2500–3900 kilocycles, Oslo, June 1949.

CCIF Meeting, Paris, July 1949.

International Civil Aviation Organization (ICAO); North Atlantic Regional Air Navigation Meeting, Paris; North Pacific Regional Air Navigation Meeting, Seattle; African-Indian Ocean Regional Air Navigation Meeting, London; Communications Division Meeting, Montreal.

Region I and III Radio Conference, Geneva, close of fiscal 1949.

The Commission was also at work on 16 other scheduled conferences, namely:

Second Session of International Administrative Aeronautical Radio Conference, Geneva, July 1949.

Conference on Revision of Bermuda Telecommunications Agreement, London, August 1949.

Television Congress, Milan, September 1949.

Conference with Canada on Ship Safety Requirements for the Great Lakes, Ottawa, November 1949.

Third North American Regional Broadcasting Agreement (NARBA) Conference, Montreal, September 1949.

Special Administrative Radio Conference for Approval of New International Frequency List, Geneva, October 1949.

International Civil Aviation Organization (ICAO), Search and Rescue Division Conference, Montreal, November 1949.

Intergovernment Maritime Consultative Organization (IMCO) Meeting, London, 1950.

High Frequency Broadcasting Conference, Rome, spring of 1950.

International Civil Aviation Organization (ICAO): South Pacific, Middle East, South Atlantic and South American Regional Air Navigation Meetings, at places to be determined, 1950.

International Radio Consultative Committee (CCIR), Prague, spring of 1951.

International Telegraph Consultative Committee (CCIT), The Netherlands, 1951.

International Plenary Telecommunications Conference, Administrative Telegraph and Telephone Conference, and Administrative Radio Conference of ITU, Buenos Aires, 1952.

The importance of several of the conferences held during the past fiscal year requires particular mention:

The International Telecommunications Union Region II and Fourth Inter-American Radio Conference at Washington considered revision of agreements made at the Santiago and Rio de Janeiro Inter-American Radio Conferences. It resulted in the adoption of a procedure for the submission of regional frequency assignment plans for the nations of the Western hemisphere. The procedure adopted covers assignments of bands to aeronautical, marine, broadcasting, amateur and other services in that part of the radio spectrum from 10 to 4000 kilocycles.

The High Frequency Broadcasting Conference at Mexico City drafted part of a list for use of high-frequency broadcasting stations which was accepted by the conference (56 nations) but was not endorsed by 14 nations including the United States and the U. S. S. R. It is the basis of work now being done by the Technical Planning Committee. The entire plan was expected to be ready for consideration at another conference tentatively scheduled for Rome in the spring of 1950.

The International Administrative Telephone and Telegraph Conference in Paris, which extended over the close of the fiscal year, had for its purpose revising the existing Cairo regulations of 1938, which apply to international operation and rates in these two fields. The United States has heretofore not been a party to either the telephone or telegraph regulations.

The Provisional Frequency Board (PFB) continued its efforts, begun in January 1948, to construct a frequency assignment plan for the spectrum between approximately 4 to 27.5 megacycles (a megacycle is 1000 kilocycles). This project has required the maintenance of a delegation to the PFB as well as a special government and industry group in Washington for liaison purposes. The PFB was expected to make a special report to the Administrative Council of the International Telecommunications Union (ITU) in the fall of 1949.

### 3. DOMESTIC FREQUENCY CHANGES

During the fiscal year a dozen separate and distinct steps relative to domestic frequency allocations were taken by the Commission. These are discussed under reference to particular services elsewhere in this report, but a summary here may be helpful.

The frequency band 960-2100 megacycles was reallocated to the various government and nongovernment services in order to provide space in the vicinity of 1000 megacycles for the development of an integrated system of electronic aids to air navigation and traffic con-



trol. This required certain adjustments in the band 1000-13200 megacycles with respect to allocations to other services.

The 9800-9900 megacycle band was allocated to the nongovernment services.

Of importance to the expanding mobile radio services was the outcome of proceedings with respect to allocations of the bands 25-30, 44-50, 72-76, 152-162, and 450-460 megacycles. The Commission also suballocated frequencies to the various mobile users such as police, industrial, railroads, taxicabs, and others.

The band 1750-1800 kilocycles was allocated to the fixed and mobile services, to become available when a coordinated emergency communication system can be worked out. Meanwhile, this band was made usable temporarily to assist in locating oil deposits in the Gulf of Mexico pending consideration of the advisability of establishing a radiolocation service on a permanent basis.

Because of serious interference between ship stations on the Great Lakes and ship stations on other inland and coastal waters on the common intership frequency 2738 kilocycles, the Commission proposed the use of 2203 kilocycles for intership use in the Great Lakes area.

Radio amateurs were allocated the band 220-225 megacycles on a permanent basis in lieu of their former allocation of 235-240 megacycles. The 1800-2000 kilocycle band was restored to the amateurs, subject to protecting the use of loran in the radionavigation service.

#### 4. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Commission does not license United States Government radio stations or assign their frequencies. Such frequency assignments are made by the President upon recommendation of the Interdepartment Radio Advisory Committee (IRAC), composed of Federal agencies which use radio. The Commission furnishes the secretariat of the IRAC.

During the fiscal year the IRAC approved 5,140 new and deleted 848 regular assignments, bringing the total number of outstanding regular assignments to 56,451. In addition, it approved 262 changes in assignments, 2,323 temporary assignments, and 555 deletions of temporary assignments.

#### 5. TREATY AND INTERFERENCE CASES

Between 500 and 600 cases of treaty infractions, as observed by the Commission's monitoring stations, are processed each month. They involve foreign and our own Government stations. Most of these infractions are caused by spurious emissions, harmonic radiations, off-frequency operation, and other faulty techniques. Notice is served,

through channels, on the foreign and domestic administrations responsible.

The above figures do not include more than 300 international interference cases which were handled during the year.

#### 6. ALLOCATION AND TREATY RULES

The Commission adopted a new Part 2, Rules Governing Frequency Allocations and Radio Treaty Matters, in its General Rules and Regulations. It defines the various radio services and lists their frequency assignments in conformity with the Atlantic City agreements, and also lists international treaties and other agreements in force with respect to radio operation. Reference to those international treaties and agreements will be found in the appendix to this report.

#### 7. FREQUENCY AND STATION RECORDS

For the purpose of notifying the Bureau of International Telecommunication Union, Geneva, for registration and publication in frequency and station lists issued by that bureau, the Commission maintained a file of 30,900 frequency cards (22,300 Government and 8,700 non-Government), and 22,000 station cards. Notification for the list of coast stations was resumed for the first time since the war. Notification of Government ships, and stations in the aeronautical and special services has not yet been resumed.

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## CHAPTER III. RADIO BROADCAST SERVICES

1. GENERAL
  2. STANDARD (AM) BROADCAST SERVICE
  3. FREQUENCY MODULATION (FM) BROADCAST SERVICE
  4. TELEVISION (TV) BROADCAST SERVICE
  5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE
  6. FACSIMILE BROADCAST SERVICE
  7. INTERNATIONAL BROADCAST SERVICE
  8. REMOTE PICK-UP BROADCAST SERVICE
  9. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE
  10. DEVELOPMENTAL BROADCAST SERVICE
  11. STATISTICS
- 
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### 1. GENERAL

#### BROADCAST REGULATION

One of the major activities of the Commission is the general regulation of radio broadcasting—now visual as well as aural. This regulation is largely technical in nature. It involves determining the frequencies to be allocated to different broadcast services; establishing engineering standards and other rules governing transmission; authorizing individual stations to operate on specific frequencies with prescribed power; and exercising licensing functions in passing on applications for construction permits, renewals and modification of licenses, and applications for transfer and assignment of licenses. Broadcast matters are a major consideration in international conferences and agreements; also in litigation and administration.

#### TYPES OF BROADCAST STATIONS

As of June 30, 1949, there were more than 4,000 broadcast authorizations in 10 categories. The 3 principal commercial broadcast services are the older standard or AM (amplitude modulation); FM (frequency modulation), a comparatively new type of high-fidelity and static-free broadcasting; and TV (television), which is also known as video. In addition, there are facsimile, international, and non-commercial educational broadcast services; remote pick-up and studio links; and experimental and developmental broadcast stations.

## GROWTH OF BROADCASTING

Broadcast authorizations saw a net gain of 118 for the year. Standard (AM) authorizations increased by 145, to a total of 2,179. The only broadcast service to show a decrease was FM, whose 865 authorizations were 155 less than at the close of fiscal 1948. Eight new TV broadcast stations were authorized before the "freeze." Experimental TV authorizations, not affected, increased from 124 to 205. Non-commercial educational authorizations rose to 58, or 12 more than last year. International broadcast stations remained at the same figure, 37.

Outstanding AM, FM, and TV authorizations, collectively, totaled 3,161, which was two less than the aggregate for the previous year. The number of licensed stations rose to 2,353, which was one-fourth more than there were in 1948 and more than double the number in 1946. The growth of AM, FM, and TV broadcast services in the past seven fiscal years is shown in the following table:

Fiscal year	AM		FM		TV		Total	
	Authorizations	Licenses	Authorizations	Licenses	Authorizations	Licenses	Authorizations	Licenses
1943.....	912	911	48	37	6	6	966	954
1944.....	924	912	52	45	9	6	985	963
1945.....	955	931	53	46	25	6	1,033	983
1946.....	1,215	961	456	48	30	6	1,701	1,015
1947.....	1,795	1,298	918	48	66	6	2,779	1,352
1948.....	2,034	1,693	1,020	142	109	7	3,163	1,842
1949.....	2,179	1,963	865	377	117	13	3,161	2,353

## BROADCAST APPLICATIONS

Section 308 (a) of the Communications Act provides that "the Commission may grant licenses, renewals of licenses, and modifications of licenses only upon written application therefor received by it." Consequently, a large portion of its broadcast work involves the processing of applications by existing and prospective broadcasters. A brief description of the chief types of applications follows:

*Construction permit.*—A person seeking a new station (be it AM, FM, or TV) must first file an application for a "construction permit." If, as frequently happens, the grant is made subject to certain engineering or other conditions, he must next file an application for "modification of construction permit" to meet these conditions. If this application is approved, he may then proceed to construct the station. A permittee normally has 8 months in which to complete construction. After operating tests, he applies for the actual "license."

*Change in facility.*—If a permittee desires to change locality, increase power, shift to another frequency, etc., he applies for "modifi-

cation" of his construction permit. A licensee wishing to change facilities may sometimes file for a modification of license but more often he has to ask for a new construction permit.

*Renewal.*—Under the Communications Act, broadcast licenses may not be granted for a longer period than three years. At present, both AM and FM licenses are issued for the maximum statutory period, whereas TV stations (because of their relative newness) are licensed for one year. Section 307 (d) of the act requires the Commission, in considering renewal applications, to be "governed by the same considerations and practice which affect the granting of the original applications."

*Transfer of control.*—Another common type of broadcast application is for "assignment" of construction permit or license, or "transfer of control." This arises from section 310 (b) of the act which prohibits such shifts without prior consent of the Commission. In June 1949 the Commission adopted a convenient short form for certain transfer and assignment applications that are pro forma in nature.

All applications are processed through the Bureaus of the Secretary, Engineering, Accounting, and Law. The last three named bureaus, after detailed study of qualifications of the parties and other pertinent problems, make their respective recommendations to the Commission. The system of processing is such that applications are considered by different categories in the order in which filed.

The Bureau of the Secretary receives all applications initially, examines them for completeness, returns them to the applicants if incomplete, records their filing, distributes them for study by the other bureaus, handles the administrative matters incident to conducting hearings, issues official authorizations, and maintains the official files.

The Bureau of Engineering makes a technical study of the quality of signal to be expected and the effect the proposed station or change in an existing station would have on existing stations and on applications on file.

The Bureau of Accounting studies the financial ability of the applicant to take over, construct, change or continue operating a station in the public interest.

The Bureau of Law considers the applicable provisions of the act and the Commission's rules and regulations with respect to applications, advises whether the application may be granted without hearing, and, where hearings are recommended, prepares the issues, recommends disposition of pleadings, and participates in the hearing to insure production of evidence on the matters which the Commission must decide.

A total of 6,268 broadcast applications of all kinds were received during the year, which was a decrease of 1,442 from fiscal 1948. The

year closed with 2,156 applications pending as compared with 2,555 at the start of the year. Pending applications for new stations numbered 932 on June 30, 1949, as against 1,170 the year previous. Applications for assignments and transfers of licenses and permits rose to 503, or 78 more than in fiscal 1948.

More than 40 percent of all broadcast applications involved AM. FM applications amounted to 1,996 and TV applications to 444. The year closed with 382 pending applications for new AM stations as compared with 338 for TV and 65 for FM.

A breakdown of broadcast applications will be found at the conclusion of this chapter.

#### PROCEDURAL CHANGES

During the year the Commission on various occasions, through formal proceedings and otherwise, made changes in its organization, streamlined its procedures, reduced the information required by it to act upon applications, and dispensed with or modified certain forms. It delegated functions to its staff to accelerate the work and revised its rules and engineering standards accordingly.

#### BROADCAST HEARINGS

Broadcast cases still constitute the major portion of the Commission's hearing workload, with AM accounting for more than half of the hearing docket. The following docket statistics for the year include all types of broadcast cases:

	Pending July 1, 1948	Desig- nated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1949
AM.....	473	278	233	149	369
FM.....	53	18	25	12	34
TV.....	188	34	29	2	191
Other.....	4	4	3	0	5
Total.....	718	334	290	163	599

#### BROADCAST PROGRAMS

Under the provisions of the Communications Act it is the responsibility of each broadcast station licensee to arrange his program structure so that his operations will be in the public interest. Pursuant to duties imposed by the act, the Commission periodically reviews the over-all performance of stations, usually when they apply for renewal of licenses, to determine whether they have lived up to their obligations, and the promises they made in applying for facilities.

This statutory duty does not, however, vest in the Commission any authority to direct a station to put a particular program on or off the air. Section 326 of the act expressly prohibits the Commission from

censoring programs. Moreover, section 3 (h) of the act provides that a broadcaster as such is not a common carrier; consequently broadcast stations are not required to sell or to give time to all who seek to go on the air.

#### EDITORIALIZING BY BROADCAST LICENSEES

The Commission has consistently held that broadcast station licensees should strive for fairness in airing controversial public issues. On June 2, 1949, the Commission issued its final report in the matter of editorializing by broadcast licensees (Docket 8516) which was the subject of extensive public hearings in March and April of 1948. Its conclusions are here summarized:

To recapitulate, the Commission believes that under the American system of broadcasting the individual licensees of radio stations have the responsibility for determining the specific program material to be broadcast over their stations. This choice, however, must be exercised in a manner consistent with the basic policy of the Congress that radio be maintained as a medium of free speech for the general public as a whole rather than as an outlet for the purely personal or private interests of the licensee. This requires that licensees devote a reasonable percentage of their broadcasting time to the discussion of public issues of interest in the community served by their stations and that such programs be designed so that the public has a reasonable opportunity to hear different opposing positions on the public issues of interest and importance in the community. The particular format best suited for the presentation of such programs in a manner consistent with the public interest must be determined by the licensee in the light of the facts of each individual situation. Such presentation may include the identified expression of the licensee's personal viewpoint as part of the more general presentation of views or comments on the various issues, but the opportunity of licensees to present such views as they may have on matters of controversy may not be utilized to achieve a partisan or one-sided presentation of issues. Licensee editorialization is but one aspect of freedom of expression by means of radio. Only insofar as it is exercised in conformity with the paramount right of the public to hear a reasonably balanced presentation of all responsible viewpoints on particular issues can such editorialization be considered to be consistent with the licensee's duty to operate in the public interest. For the licensee is a trustee impressed with the duty of preserving for the public generally radio as a medium of free expression and fair presentation.

#### PROGRAMS INVOLVING LOTTERIES OR GIFT ENTERPRISES

Effective September 1, 1948, section 316 of the Communications Act, prohibiting the broadcast of any advertisement of, or information concerning, any lottery, gift enterprise or similar scheme, was recodified without substantial change, as part of a general recodification of the criminal law as section 1304 of the Criminal Code (18 U. S. C. sec. 1304) and section 316 of the Communications Act was repealed. Previously, on August 8, 1948, the Commission had issued a notice of proposed rule making (Docket 9113), looking toward the adoption of

new rules applicable to AM, FM, and TV broadcasting, spelling out the elements of programs which would, on the basis of the Commission's understanding of the existing law applicable, involve violation of the Congressional prohibition against lotteries, gift enterprises, and similar schemes. On August 27, 1948, the Commission issued a supplemental notice of proposed rule making, calling attention to the recodification of the prohibition on the broadcast of such information, and reiterating its intention of promulgating rules for informing licensees and other interested persons of the Commission's interpretation of the law in this matter, which would be followed in the exercise of the Commission's licensing functions. Oral argument was held the following October and decision was pending at the close of the year.

#### OBSCENITY ON THE AIR

A provision formerly in the Communications Act as section 326 was recodified in the United States Criminal Code as section 1464, effective September 1, 1948. It states: "Whoever utters any obscene, indecent, or profane language by means of radio communication shall be fined not more than \$10,000 or imprisoned not more than 2 years, or both." This prohibition is reflected in the Commission's rules applicable to broadcasting and other forms of radio communication, also operator performance.

#### AVCO RULE REPEALED

On February 21, 1949, the Commission (in Docket 9061) proposed repeal of the so-called "AVCO" procedure, adopted in 1945, which required advertising for competitive bids in connection with the sale of broadcast stations. At the same time, the Commission proposed extensive changes in its handling of broadcast applications which, among other things, would have required applicants for new AM, FM, and TV stations, or changes in existing stations, as well as applicants for renewals, to publicly advertise such intent. On June 9, 1949, the Commission abolished the AVCO rule, effective as of that date. Oral argument on the other proposals, heard June 27, however, resulted in this proceeding being vacated as of July 15, 1949.

#### SPOT ADVERTISING

Tie-in agreements between broadcast networks and their affiliates for the sale of national spot advertising and other commercial time were the subject of a hearing before the Commission during the past winter, pursuant to order of July 21, 1948 (Docket 9080). Decision on whether such arrangements violate the chain broadcasting regulations or are otherwise contrary to the public interest was pending at the close of the fiscal year.



## MAIN STUDIOS

Under the Commission's present rules and regulations, it is possible for a broadcast station to originate most of its local programs from a place other than the city in which its main studio is located. Accordingly, the Commission on February 24, 1948 (in Docket 8747), proposed to recognize AM and FM stations as being located in the city and State where the "main studio" is shown on the license, and to require a majority of a station's nonnetwork programs to originate locally. Hearing was held in October 1948, and decision was pending.

## RADIO TIME RESERVATION IN STATION SALES

Special rules relating to contracts which seek to reserve radio time upon the sale of an AM, FM, or TV station were announced by the Commission on January 7, 1949. They are the result of proposals made February 6, 1948, in Docket 8774.

## MULTIPLE OWNERSHIP

The Commission, on August 19, 1948, proposed changes in the multiple ownership rules affecting commercial broadcast stations which would limit ownership, operation, or control by the same interests to not more than seven AM stations in the country as a whole, and overlapping interests or connections to not more than 14 AM, 12 FM, and 10 TV stations (Docket 8967). Oral argument was held in January 1949 and decision was pending.

The proposals would augment existing rules which preclude the same interest or group from operating more than one station in either category in the same service area, or more than six FM stations or five TV stations throughout the country.

## NETWORKS

Stations owned by or affiliated with networks are subject to the chain broadcasting regulations promulgated by the Commission in 1940 and now contained in part 3 of its rules.

At the close of the year, there were 4 major networks—American Broadcasting Co., Columbia Broadcasting System, Mutual Broadcasting System, and National Broadcasting Co.—more than a score of regional webs, also various FM and TV affiliations. A breakdown of the 1,152 stations linked with the 4 national networks follows:

Network	Network owned stations	Affiliated stations
ABC.....	4	272
CBS.....	6	178
MBS.....	10	520
NBC.....	6	166
Total.....	16	1,136

<sup>1</sup> Although MBS does not itself operate any broadcast station, its stock is held by seven corporations which are station licensees.

## RECEIVING SETS

The total number of radio receiving sets was estimated to be approaching 79 million. Ninety-five percent of the families in this country (about 40 million) are said to possess one or more receivers.

Production of home receivers declined 27 percent between 1947 and 1948 and was expected to show a further drop in 1949 of 40 percent. This drop has been mainly confined to the AM only sets. Both TV and FM set production gained in 1948 as these services expanded. During 1949, production of TV sets was further stepped up while the output of FM receivers (including AM-FM) decreased. During the first half of 1949, home receiver production was reported at 3,244,024 sets. Of this total, 913,071, or 28.1 percent, were TV sets, and 424,381, or 13.1 percent, were FM. Production of AM only receivers accounted for 58.8 percent of the total; as contrasted with 90.8 percent in 1947. Many of the new TV sets, however, contain FM or AM bands, or both.

The Commission does not license receiving sets or regulate their production.

## 2. STANDARD (AM) BROADCAST SERVICE

The number of standard (AM) broadcast stations holding authorizations from the Commission increased to 2,179 by the end of the fiscal year as compared with 2,034 at the close of the fiscal year 1948.

Fewer applications for new AM authorizations were filed in fiscal 1949 than in fiscal 1948 and at the close of 1949 there were 382 such applications pending as compared with 575 at the end of the previous year. The decrease in the number of AM applications filed during fiscal 1949 and the number of authorizations granted is due in large part to a crowded spectrum and, in a lesser degree, to economic readjustment in the broadcasting field. Nevertheless, the number of stations holding AM broadcast authorizations continued to be the largest of any category of the broadcast services.

The Commission is continuing its policy of handling AM applications in two processing lines, the first dealing with those which involve relatively simple technical problems, such as requests for local (class IV) stations, or for daytime facilities, and the second dealing with those involving complex engineering problems, such as requests for unlimited time facilities on clear or regional channels, most of which involve directional antennas. The Commission has a smaller staff than was previously available to work on these cases. However, the Commission is undertaking to provide field offices with facilities and needed information so that they may aid in the processing of such cases and thus reduce the time within which final disposition may be had.

On April 13, 1949, the Commission (in Docket 9287) proposed to refrain from authorizing further share-time or specified hours AM stations, but on June 24 vacated this proceeding. As of January 1, 1949, there were 35 and 16 stations respectively in these categories. The proposal did not involve regular daytime operation stations, which now exceed 500.

As a convenience to AM stations which initiate live programs for foreign broadcast or make transcriptions for such purpose, the Commission on May 19, 1949 (Docket 9320) proposed to eliminate formal applications in this connection. The proceeding was pending.

In view of the receipt of the first applications for regular broadcast facilities in the station-less Virgin Islands, the Commission on June 22, 1949, vacated its proposal of March 23, 1949 (Docket 9261) to relax certain requirements in order to bring broadcasting to those islands.

#### CLEAR CHANNELS

The Commission had under renewed consideration the testimony and exhibits presented at the clear channel hearing (Docket 6741) which was held throughout 1946 and 1947, since the Committee on Interstate and Foreign Commerce of the United States Senate withdrew its request that the Commission withhold its decision while the committee had under consideration the Johnson bill (S. 2231) providing for limitation of power for 50 kilowatt and duplicate operation on clear channels. Subsequent to the adjournment of the clear channel hearing on October 31, 1947, the matter was consolidated with Docket 8333 which deals with the related problem of daytime skywave transmission.

The clear channel hearing involves issues of importance both to the American listening public and to the broadcasters. The controversy resolves itself into whether it would be better to share existing nighttime facilities on clear channels with applicants throughout the United States proposing to serve areas where little or no satisfactory service presently exists, or to allow only the present licensees on each clear channel to have super power in order to better their coverage. The solution of the problem depends upon which plan would tend toward betterment of service or duplication of service, particularly as it concerns rural listeners. Also presented are questions such as the economic and competitive effects upon other broadcasters if a few should be allowed super power, and whether this would be conducive to the proper distribution of broadcasting service and the larger and more effective use of radio as contemplated by the Communications Act.

The allocation and use throughout North American countries of these channels (traditionally enjoying more power than others al-

lotted for regional or local use) will be among the chief subjects for deliberation by the forthcoming North American Regional Broadcasting Agreement Conference. The Commission has, accordingly, sought to coordinate its efforts in these matters. Further reference to clear channels appears in the Commission's 1948 Annual Report.

#### 540 KILOCYCLES

Under the terms of the Fourth Inter-American Radio Agreement, which was negotiated in the latter part of the fiscal year, the addition of 540 kilocycles to the AM broadcast band cannot be made effective until after the reallocation of stations on frequencies immediately below the present band. For that reason the Commission is not yet in a position to promulgate rules for the assignment of any particular class of stations to this frequency. There appears to be no question that 540 kilocycles is to be used for broadcasting as soon as the rearrangement of the services on the adjacent bands can be effected. This matter will be given consideration by the forthcoming Third North American Regional Broadcasting Conference.

The Department of State's protest of the Mexican operation on this channel, as reported in the 1948 Annual Report, was not resolved during the year.

#### NORTH AMERICAN REGIONAL BROADCASTING AGREEMENTS

The Commission's services in the international field as concern broadcasting are related chiefly to its activities in connection with the North American Regional Broadcasting Conferences and the work of their committees. The first of these conferences formulated an agreement (NARBA) for the purpose of establishing principles and regulations governing the allocation and use of broadcast channels throughout the various North American signatory countries. This agreement expired in March 1946 but was extended in that year to March 28, 1949, with certain modifications.

The second conference (1946) also established a Technical Engineering Committee (NARBEC) which had for its chief purpose the determining of facts and making of recommendations to enable the signatory governments to comply with the technical provisions of the NARBA and to aid in the establishment of better broadcast reception throughout the countries involved. This committee, whose activities are continuous, has so far resolved at least three international disputes which involved station operations and has handled surveys and projects which have provided data useful in connection with settlement of interference questions between the countries concerned.

Signatories to the conference have, with the exception of Cuba, agreed to extend the present agreement until a new agreement could be formulated and made effective. For this purpose, the third

NARBA conference is scheduled to be held in Montreal, starting September 13, 1949.

Preparatory to this conference the Commission, in collaboration with the Department of State, organized a Government-Industry NARBA Preparatory Committee for the purpose of considering United States proposals for the new agreement. The work of the committee has included studies of standards, broadcasting coverage, improvement of broadcast reception on a region-wide basis, as well as legal and administrative problems. The representation and activity of industry on the committee were extensive. Particularly noteworthy were the tests of highly directional antennas and the comparison of their theoretical with actual effects. Such tests involved operation of some 30 stations after midnight in conjunction with that of about 15 field intensity recording installations scattered throughout the United States. Other committees engaged in various other projects, including the determination of coverage of existing broadcast stations of Canada, Cuba, Mexico, and the United States.

The proposals for the new conference were submitted at the close of the year when they were given distribution to all NARBA signatories. The preparatory committee will continue its efforts and will advise the United States delegation to the 1949 session.

### 3. FREQUENCY MODULATION (FM) BROADCAST SERVICE

#### FM SERVICE NOW AVAILABLE OVER LARGE AREA

During the year the number of FM stations on the air increased by 150, bringing the total on June 30, 1949, to 737, of which 377 held licenses. FM service is now available over almost all of the Eastern half of the United States, over most of the West Coast area, and in a number of cities and adjacent rural areas in the West. It has been estimated that more than 100 million people live within range of one or more FM stations. While the construction planned by many FM broadcast stations was completed during the year, many of them decided not to install high powered equipment because of economic problems; in addition many found that the coverage provided by their lower powered installations exceeded expectations and was adequate for their areas.

#### FEW NEW FM APPLICATIONS

Although FM service was expanded by previously authorized stations commencing operation and by existing stations improving their facilities, the rate of filing of new FM applications fell off sharply during the year. Many FM modification applications were received, but only 43 applications for new FM stations were filed during the twelve-month period.

Also, the total number of FM stations authorized decreased from 1,020 to 865. This reduction was largely due to economic problems and uncertainties; the relatively small number of FM receivers owned by the public and the resulting limited audience to attract substantial broadcast advertising revenue; competition from standard AM broadcast and TV stations (as well as other FM stations); and high costs of station construction. In a number of instances permittees were dilatory in constructing their authorized stations and forfeited their FM permits for failing to comply with the Commission's requirement that they either complete construction or commence operation with interim equipment. Some FM permittees withdrew from the field because of their active desire to engage in television broadcasting. Although most FM stations are at present operating at a deficit, only a few stations ceased operation during the year. Approximately 80 percent of FM stations are operated in conjunction with standard broadcast stations and operating expenses are thus minimized.

#### FM RECEIVERS

At the end of the fiscal year, approximately 3,500,000 FM receivers were in use. Although recent FM receiver production was less than expected, the appearance of AM-FM receivers in practically all price ranges indicates that the FM audience will grow in the future. Placed on the market during the past year were several makes of small inexpensive receivers providing FM reception only. Further, a large percentage of television receivers now being offered for sale are combination television-FM sets. Since the FM and television services operate in the same general frequency range, it is thus possible to provide FM broadcast reception in television receivers at very little increase in cost.

#### SERVICES PROVIDED BY FM STATIONS

Under the Commission's rules, FM stations operated in conjunction with AM stations may employ duplicate or separate programming of the two stations or a combination of the two. In most cases fully duplicated programming is chosen. Accordingly, established standard broadcast programs are available over the superior FM system, as well as the programs broadcast only by FM stations.

Due to the noise-free characteristics of FM reception, many FM stations rebroadcast the programs of others and thereby form regional networks without the use of wire facilities. Also, a number of AM stations pick up programs from FM stations for rebroadcasting. In one instance, an FM station serves many AM stations within a radius of approximately 150 miles.

#### 4. TELEVISION (TV) BROADCAST SERVICE

##### INCREASE IN TV APPLICATIONS AND SERVICE

With the greater availability of television receivers, transmitting equipment, and the increased public interest and acceptance, there was a steady increase in the number of applications for new television broadcast stations. However, the number of authorizations granted was temporarily curtailed due to the adoption of the current so-called "freeze" policy, explained hereafter.

At the end of the year 13 television stations were licensed, 104 construction permits were outstanding, and 338 applications were pending. In addition to those licensed, 58 stations were operating on a commercial basis under special temporary authorizations.

Thanks to relay facilities, television is no longer limited by the horizon. Despite only 12 channels (between 54 and 216 megacycles) being available throughout the Nation for commercial TV use, the year's close saw 71 stations bringing television broadcast service to 42 cities and metropolitan districts, as compared with 17 cities served by 30 stations the previous year. The demand for new stations remained greater than the available facilities so that 237 of the pending applications were in comparative hearing at the end of the year.

Television receiver production continued to mount with a trend toward reduced prices. It was estimated that approximately 1,750,000 receivers were in the hands of the public in the broadcasting areas. The 10-inch-tube model continued to be the most popular. The 16-inch-tube direct view receiver made its debut.

##### EXPERIMENTAL TV SERVICE

At the end of the fiscal year there were 175 experimental television stations licensed and 30 outstanding construction permits. Included in these figures were 136 relay stations operating in the microwave region and used primarily as television pick-up, television studio-to-transmitter link, and interim television intercity relay stations. Rules were in preparation to cover these television auxiliary services on a regular basis.

Television research and experimentation continued with special interest displayed in the 475-890 megacycle band which is allocated to experimental television. About 30 authorizations were outstanding in this band. Emphasis was placed on studies of propagation, developments in circuits and tubes for use in the UHF (ultra high frequency), color transmission, phonevision, stratovision, comparisons with transmission conditions in the present VHF (very high frequency) or low-band television channels, and television relaying.

Several applicants proposed to use simple pulse-type transmitters for the sole purpose of exploring the coverage possibilities of UHF television signals in a particular area or city.

#### OTHER TELEVISION DEVELOPMENTS

The principal development in the expansion of TV network facilities was the linking of the eastern and midwestern coaxial cable systems, bringing 14 metropolitan areas into the coaxial cable and microwave relay chain. Additional cities on the main routes and on proposed branches of these routes were added to the system, so that simultaneous networking of programs could make possible the viewing of a program by about one-third of the population of the country. (See also coaxial cable and microwave relay in the chapter on common carriers.)

The constant improvement in camera techniques, kinescope recordings, studio lighting and pick-up facilities resulted in improved picture quality. Some novel telecasting included television transmissions from a plane in motion and the splitting of the screen image into two parts with two people at different locations being televised simultaneously. Two motion-picture companies continued their experiments in the microwave relaying of events of interest to theater audiences.

#### TV CHANNEL ALLOCATIONS

Since part 3 of the Commission's rules presently provides only 140 metropolitan districts with television broadcast channel allocations, it was necessary to propose changes in the allocation plan to provide service to the smaller cities throughout the country and to as much of the rural areas as possible. A hearing for this purpose was held commencing June 29, 1948. More than 80 appearances were filed and over 130 exhibits were introduced into the record. The Commission proposed an allocation table that was an expansion of the existing one and included cities with a population as low as 5,000 wherever geographically possible. Although most of the witnesses requested additional allocations for various cities, a few introduced evidence with respect to tropospheric interference and contended that the proposed allocation plan would result in intolerable interference between stations. At about that time, the Commission had completed a study based on measurements made over a period of a number of years which also pointed to the need for greater station separation than had been provided for in the proposed plan.

On September 13 and 14, 1948, a joint Commission-Industry Conference was held to discuss procedural problems in the light of the



latest engineering information which had been introduced in the previous hearing. The result of this conference was reflected in the so-called "freeze" order of September 30, 1948, which called a halt in the processing of applications for new television stations pending the adoption of new rules and standards based on the latest available engineering information with respect to coverage and interference. During the week of November 30, 1948, an engineering conference was held to discuss the technical reports concerning propagation characteristics in the VHF band which had been made available to the public, and to gather any further information from the expert witnesses present in order to provide for the best possible television service to the country. The final act of the conference was to appoint an Ad Hoc Committee composed of members of the Bureau of Standards, consulting engineering firms, and the Commission's Engineering Bureau to make a study of propagation problems left unsolved at the engineering conference and to submit a report thereon. The Ad Hoc report was signed by all its members (with reservations on the part of several, which did not affect its conclusions), and was presented to the Commission on May 27, 1949. (For detailed information as to the contents of this report see the section dealing with Technical Information.)

In a public notice dated May 26, 1949, the Commission presented to the industry and the public a status report on the "freeze" and a working schedule for lifting the "freeze" and adopting new rules and standards for the television broadcast service.

#### ULTRA HIGH FREQUENCY TV

The Commission several times in the past indicated that the 12 "low band" television channels did not constitute a sufficient allocation of spectrum space to provide for a nation-wide competitive system of TV broadcasting. In allocating the 475-890 megacycle band to experimental television, the Commission further pointed out that any future expansion would have to take place in that portion of the radio frequency spectrum. The great demand for television assignments, coupled with the fact that the evidence on hand pointed to the need for greater spacing between stations, thus resulting in fewer possible assignments, further emphasized the need for more space for this service.

On September 20, 1948, a hearing was begun to determine the utility of the band 475-890 megacycles for television broadcasting. The purpose of this hearing was to obtain information on the state of development of transmitting and receiving equipment capable of operating in this band in color as well as monochrome; to obtain information on

any proposals for the utilization of the band and standards to be proposed; to receive any additional information as to the propagational characteristics of the band; and to obtain information concerning interference to television stations on channels 2 through 13.

Most of the witnesses urged that additional channels be allocated for monochrome television using the same standards as are presently used. Several witnesses recommended that a portion of the UHF band be reserved for experimental work in color, high definition black and white, and "stratovision." Subsequent to the adjournment of the hearing, a consulting engineering firm filed a petition to provide for a type of telecasting in the UHF band, called "polycasting," which envisions the use of a large number of low-powered stations to cover a given area.

#### 5. NONCOMMERCIAL EDUCATIONAL BROADCAST SERVICE

Stations in this service are used principally by universities and school systems for transmitting educational and entertainment programs to schools and to the public. Their operation is entirely on a noncommercial basis. Since the 20 channels allocated for this service are contained within the regular FM band (88 to 108 megacycles), regular FM receivers can be used by the schools. FM receivers used by the public, of course, also can pick up the school programs.

Interest in the Noncommercial Educational Broadcast Service has been increasing gradually, and 58 stations were authorized at the end of the fiscal year as compared with 46 in 1948.

Nearly all of the new activity in this service centers around the low power (10 watt), low cost equipment permitted under rules adopted by the Commission in September 1948. With such equipment, easily installed and operated, schools may begin broadcasting for as little as \$2,000 if studio facilities are available. (If studio equipment is required, the minimum cost is usually increased by another \$1,000 or more.) Such inexpensive equipment fits into many school budgets, permitting FM broadcasting to begin with service to a small area, generally about 2 to 5 miles in radius. Higher powered equipment may be added when desired. Many inquiries concerning 10-watt stations and requests for application forms were received during the year, and it appears that a considerable number of such stations will be established during the next year.

A considerable number of educational institutions are also licensed in the standard (AM) broadcast service, and some of the latter operate on a nonprofit basis.

## 6. FACSIMILE BROADCAST SERVICE

Following years of development and experimentation, which indicated that broadcast facsimile equipment was adequately developed, the Commission adopted rules providing for commercial facsimile broadcasting by FM stations, effective July 15, 1948. A few FM stations carried on a regular facsimile service during the year, and in some instances FM stations operated facsimile on a temporary basis for experimental and exhibition purposes. Upon the further development and distribution of inexpensive facsimile recorders, it is expected that facsimile broadcasting will become a more important broadcast service.

Facsimile transmission of printed matter and pictures, for reception by recorders attached to FM receivers, may be accomplished on either a simplex or a multiplex basis. When using simplex facsimile the regular aural FM program is not transmitted, but with multiplex operation both are transmitted simultaneously. It is, of course, preferable that multiplex operation be employed so that there will be no interruption of the aural programs. While multiplex operation has not been entirely satisfactory in the past, recent developments indicate that it may readily be done without perceptible interference between the sound and facsimile. With a relatively small additional investment for facsimile equipment, FM broadcasters may thus provide simultaneous aural and facsimile programming on the same channel without perceptible adverse effect upon either program service.

## 7. INTERNATIONAL BROADCAST SERVICE

Though licensed by the Commission, international broadcast stations operating in this country function under the auspices of the Department of State. Their number—37—remained unchanged during the year.

## 8. REMOTE PICK-UP BROADCAST SERVICE

Remote pick-up broadcast stations, employing portable or mobile transmitters of low power, are used for providing temporary circuits to the main studios of broadcast stations from program origination points where regular wire circuits are not feasible. Such transmitters are used at sports events, parades, and for other special broadcasts. These transmitters are also utilized for emergency communications during the disruption of normal circuits by floods or storms. A rule adopted during the year permits broadcasters in Alaska, Hawaii, and Puerto Rico to use remote pick-up broadcast transmitters for any auxiliary purpose except for transmissions intended for direct reception by the general public.

Frequency reassignments were established during the year for this service in the ranges of 26, 153, 166, 170, and 450 megacycles, and proposed rules were issued for specific groupings and licensing of these frequencies. In view of this rule making procedure, construction permits were not issued for remote pick-up broadcast stations during the year except for frequencies in the 2-megacycle range. As a result, the number of stations licensed did not change appreciably. However, hundreds of temporary authorizations were granted to permit equipment to be used for the new frequencies until construction permits and licenses may be issued.

#### 9. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

FM broadcast stations are often located on mountain tops or at other remote locations where wire circuits may not be available or satisfactory for program transmission from the studio to the transmitter. Studio-transmitter broadcast stations provide a high quality connecting link between the studio and transmitter, and the band of 940 to 952 megacycles is allocated for this purpose. The number of stations authorized during the year increased from 9 to 28, and the equipment now available appears to be very satisfactory. In one case a distance of 89 miles is spanned by one ST transmitter, using only a few watts of power and directional antenna.

#### 10. DEVELOPMENTAL BROADCAST SERVICE

To aid manufacturers or broadcasters who require radio transmission for the testing of transmitters and antennas and for radio propagation studies, the developmental broadcast stations are authorized. The number of these stations decreased by one during the year, giving a total of 14. Projects carried on during the year by developmental broadcast stations included the testing of high power FM transmitters, the testing of FM antennas employing circular polarization, and the development of remote pick-up transmitters operating in the 450-megacycle range.

#### 11. STATISTICS

##### TOTAL BROADCAST AUTHORIZATIONS

Despite a decrease of FM authorizations, the total number of outstanding broadcast grants passed the 4,000 mark during the year. A tabulation of stations licensed or holding construction permits in the various classes of broadcast services at the close of the past two fiscal years is shown below:

Class of broadcast station	1948	1949	Increase
Standard (AM) .....	2,034	2,179	145
Frequency modulation (FM).....	1,020	865	(-155)
Television (TV).....	109	117	8
Television (experimental).....	124	205	81
Noncommercial educational.....	46	58	12
International.....	37	37	0
Facsimile.....	2	2	0
Remote pick-up.....	571	580	9
Studio transmitter (ST).....	9	28	19
Developmental.....	15	14	(-1)
Total.....	3,967	4,085	118

#### BROADCAST AUTHORIZATIONS BY STATES AND CITIES

A tabulation of AM, FM, and TV broadcast authorizations as of June 30, 1949, showed that Texas had more such grants collectively than any other State. However, California was a close second, followed by Pennsylvania, New York, and North Carolina in that order. Other States having more than a hundred broadcast authorizations were Ohio, Illinois, Florida, and Georgia.

Texas also led in the number of authorized AM stations, followed in turn by California and Pennsylvania. The most FM authorizations were in Pennsylvania, New York, California, Ohio, and Illinois in the order mentioned. New York, Ohio, and California, respectively, topped the TV list.

All States had AM stations, but five States (Arizona, Montana, New Mexico, Vermont and Wyoming) had no FM authorizations, and 14 States were without TV grants. Puerto Rico's total authorizations were more than any of 15 States. The Virgin Islands was the only possession yet without a broadcast facility.

More than 1,300 cities and towns had broadcast authorizations of one type or another. Chicago led in total authorized stations. New York was a close second, followed by Los Angeles, Philadelphia, New Orleans, Washington, and San Francisco. Both the AM and FM lists were headed by Chicago and New York, in that order, but Los Angeles led all other cities in the number of TV authorizations.

A break-down of AM, FM, and TV authorizations by States and chief cities follows:

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## BROADCAST AUTHORIZATIONS BY STATES

	AM	FM <sup>1</sup>	TV <sup>2</sup>	Total
Alabama.....	62	18	2	82
Arizona.....	24	0	2	26
Arkansas.....	32	8	0	40
California.....	147	62	11	220
Colorado.....	34	3	0	37
Connecticut.....	26	13	1	40
Delaware.....	6	5	1	12
District of Columbia.....	7	9	4	20
Florida.....	72	24	5	101
Georgia.....	71	27	3	101
Idaho.....	21	5	0	26
Illinois.....	71	50	6	127
Indiana.....	44	29	3	76
Iowa.....	47	22	2	71
Kansas.....	38	8	0	46
Kentucky.....	43	13	2	58
Louisiana.....	39	18	3	60
Maine.....	16	3	0	19
Maryland.....	24	17	3	44
Massachusetts.....	46	30	3	79
Michigan.....	61	28	6	95
Minnesota.....	44	11	3	58
Mississippi.....	40	6	0	46
Missouri.....	45	21	2	68
Montana.....	26	0	0	26
Nebraska.....	21	4	2	27
Nevada.....	9	2	0	11
New Hampshire.....	11	6	0	17
New Jersey.....	19	17	1	37
New Mexico.....	23	0	1	24
New York.....	93	64	14	171
North Carolina.....	90	40	2	132
North Dakota.....	14	1	0	15
Ohio.....	63	53	12	128
Oklahoma.....	43	14	2	59
Pennsylvania.....	108	71	7	186
Rhode Island.....	11	7	1	19
South Carolina.....	43	14	0	57
South Dakota.....	14	1	0	15
Tennessee.....	56	18	2	76
Texas.....	178	39	6	223
Utah.....	19	3	2	24
Vermont.....	8	0	0	8
Virginia.....	53	24	2	79
Washington.....	46	7	1	54
West Virginia.....	34	20	1	55
Wisconsin.....	51	22	1	74
Wyoming.....	12	0	0	12
Alaska.....	8	0	0	8
Hawaii.....	9	0	0	9
Puerto Rico.....	26	1	0	27
Virgin Islands.....	0	0	0	0
Total.....	2,187	868	120	3,175

<sup>1</sup> Does not include 58 authorized noncommercial educational broadcast stations.

<sup>2</sup> Includes 2 experimental authorizations operating on commercial basis (Los Angeles and Salt Lake City).

## BROADCAST AUTHORIZATIONS BY CITIES

	AM	FM	TV	Total
Chicago.....	16	14	4	34
New York.....	14	12	6	32
Los Angeles.....	12	10	7	29
Philadelphia.....	10	10	3	23
New Orleans.....	11	7	3	21
Washington.....	7	9	4	20
San Francisco.....	8	8	3	19
Minneapolis-St. Paul.....	11	3	3	17
Pittsburgh.....	7	9	1	17
Portland (Oreg.).....	10	6	1	17
San Antonio.....	9	6	2	17
Baltimore.....	7	6	3	16
Boston.....	7	6	3	16
Cleveland.....	6	6	3	15
Seattle.....	9	5	1	15
Detroit.....	5	6	3	14
Miami.....	6	7	1	14
Houston.....	8	4	1	13
St. Louis.....	7	5	1	13
Buffalo.....	6	5	1	12
Cincinnati.....	5	4	3	12
Columbus (Ohio).....	4	5	3	12
Dallas.....	5	5	2	12
Jacksonville.....	6	3	3	12
Louisville.....	7	3	2	12
Oklahoma City.....	7	4	1	12
Providence.....	6	5	1	12
Richmond.....	6	5	1	12
Denver.....	8	3	0	11
Milwaukee.....	7	3	1	11
San Diego.....	7	3	1	11
Syracuse.....	5	4	2	11
Rochester.....	6	3	1	10
Kansas City (Mo.).....	4	4	1	9
Salt Lake City.....	5	2	2	9
Charleston (S. C.).....	5	3	0	8
Fort Worth.....	6	1	1	8
Tulsa.....	5	2	1	8
Albany.....	5	2	0	7
Toledo.....	3	3	1	7
Spokane.....	6	0	0	6

**BROADCAST APPLICATIONS**  
**AM BROADCAST APPLICATIONS**

	Pending July 1, 1948	Received	Disposed	Pending June 30, 1949
New stations.....	575	193	386	382
Change in facilities.....	306	240	253	293
Renewals.....	197	619	616	201
License.....	194	481	583	92
Transfers.....	82	331	310	103
Miscellaneous.....	205	964	1,054	116
<b>Total.....</b>	<b>1,559</b>	<b>2,828</b>	<b>3,201</b>	<b>1,186</b>

**FM BROADCAST APPLICATIONS**

New stations.....	188	43	166	65
Change in facilities.....	5	104	59	50
Renewals.....	17	106	102	21
License.....	81	275	267	89
Transfers.....	27	54	66	15
Miscellaneous.....	151	1,414	1,539	26
<b>Total.....</b>	<b>469</b>	<b>1,996</b>	<b>2,199</b>	<b>266</b>

**TV BROADCAST APPLICATIONS**

New stations.....	294	88	44	338
Change in facilities.....	19	61	66	14
Renewals.....	0	7	5	2
License.....	1	14	6	9
Transfers.....	0	22	12	10
Miscellaneous.....	10	252	249	13
<b>Total.....</b>	<b>324</b>	<b>444</b>	<b>382</b>	<b>386</b>

**ALL OTHER BROADCAST APPLICATIONS<sup>1</sup>**

New stations.....	113	252	218	147
Change in facilities.....	12	45	44	13
Renewals.....	42	306	267	81
License.....	25	182	174	33
Transfers.....	2	96	58	40
Miscellaneous.....	9	119	124	4
<b>Total.....</b>	<b>203</b>	<b>1,000</b>	<b>885</b>	<b>318</b>

**TOTAL BROADCAST APPLICATIONS**

New stations.....	1,170	576	814	932
Change in facilities.....	342	450	422	370
Renewals.....	256	1,038	989	305
License.....	301	962	1,030	223
Transfers.....	111	503	446	168
Miscellaneous.....	375	2,749	2,966	158
<b>Total.....</b>	<b>2,555</b>	<b>6,268</b>	<b>6,667</b>	<b>2,156</b>

<sup>1</sup> Includes noncommercial educational, facsimile, international, relay and studio link, experimental and developmental.



## BROADCAST DELETIONS

Actual deletions of broadcast authorizations rose to 274 during the year, with those in FM accounting for more than 200. There follows a list of deletions by months:

Deletions	AM	FM	TV	Monthly total
1949:				
June .....	5	20	3	28
May .....	7	17	0	24
April .....	10	38	1	49
March .....	5	31	1	37
February .....	3	10	1	14
January .....	1	17	1	19
1948:				
December .....	6	19	0	25
November .....	7	16	0	23
October .....	1	14	0	15
September .....	3	9	0	12
August .....	3	9	0	12
July .....	4	12	0	16
Total .....	55	212	7	274

## ASSIGNMENTS AND TRANSFERS

	Pending July 1 1948	Received	Disposed	Pending June 30, 1949
AM .....	82	331	310	103
FM .....	27	54	66	15
TV .....	0	22	12	10
Other .....	2	96	58	40
Total .....	111	503	446	168

## STANDARD BROADCAST FINANCIAL DATA

The following table shows comparative calendar year 1947-48 financial data for the standard (AM) broadcast industry as a whole:

AM networks and stations	1947	1948	Percent increase or (decrease)
	7 networks 1,464 stations	7 networks 1,824 stations	
Investment in tangible broadcast property:			
Cost to respondent .....	\$150,373,623	\$201,408,564	33.94
Depreciation to date under present owner .....	57,065,893	66,745,050	16.96
Depreciated cost .....	93,307,730	134,663,514	44.32
Revenues from sale of network time .....	134,726,631	141,052,353	4.70
Revenues from sale of nonnetwork time .....	239,360,055	275,667,926	15.17
Commission paid representatives, etc. ....	47,969,521	50,292,281	4.84
Revenues from sale of talent, etc. ....	37,597,222	40,567,416	7.90
Total broadcast revenues .....	363,714,387	406,995,114	11.90
Total broadcast expenses .....	291,918,447	342,903,730	17.47
Broadcast income (before Federal income taxes) .....	71,795,940	64,091,684	(10.73)

The following table compares the 1947-48 broadcast revenues, expenses and income of the four Nation-wide networks and their key stations:

4 Nation-wide (AM) networks and their key stations	1947	1948	Percent increase or (decrease)
Number of key stations.....	11	11	
Total broadcast revenues.....	\$91,232,718	\$95,788,942	4.99
Total broadcast expenses.....	\$75,091,412	\$80,508,811	7.21
Broadcast income (before Federal income taxes).....	\$16,141,306	\$15,280,131	(5.34)

The distribution of the 1948 broadcast revenues and broadcast income (before Federal income taxes) as between networks and stations is shown in the following tables:

*Distribution of total (AM) broadcast revenues, 1948*

	Amount	Percent of total	Amount	Percent
Networks, including 27 owned and operated stations.....			\$109,031,802	28.8
Networks and their 11 key stations.....	\$97,290,571	23.9		
16 other networks owned and operated stations.....	11,741,231	2.9		
1,797 other stations.....			297,963,612	73.2
1,080 stations serving as network outlets.....	228,938,322	58.2		
717 stations not serving as network outlets.....	69,025,290	17.0		
Total broadcast revenues.....			406,995,414	100.0

*Distribution of (AM) broadcast income (before Federal income taxes)*

	Amount	Percent of total	Amount	Percent
Networks, including 27 owned and operated stations.....			\$18,085,191	28.2
Networks and their 11 key stations.....	\$15,283,970	23.8		
16 other network-owned and operated stations.....	2,801,221	4.4		
1,797 other stations.....			46,006,493	71.8
1,080 stations serving as network outlets.....	43,347,338	67.6		
717 stations not serving as network outlets.....	2,659,155	4.2		
Total broadcast income (before Federal income taxes).....			64,091,684	100.0

Because of the substantial number of new stations in their early and less profitable months of operation included in 1948, trends in the data given above may not correspond to trends in the experience of "old" stations. For this reason, comparative data for the 2 years are presented below for identical stations, i. e., for stations which were in operation in both years and which did not change their status during the period with respect to class, time, and whether or not affiliated with a network. The data are shown in terms of averages per station of broadcast revenues, expenses and income for each class of station, excluding the Nation-wide networks and their 11 key stations.

AM broadcast stations (excluding 11 key stations of National-wide networks)	1947	1948	Percent increase or (decrease)
<b>Averages per station:</b>			
<b>Clear channel 50-kw. unlimited:</b>			
Number of stat.ons, 41.....			
Total broadcast revenues.....	\$1,187,743	\$1,238,963	4.31
Total broadcast expenses.....	857,682	897,736	4.67
Broadcast income.....	330,061	341,257	3.39
<b>Clear channel 50-kw. part time:</b>			
Number of stations, 4.....			
Total broadcast revenues.....	871,561	900,983	3.37
Total broadcast expenses.....	660,742	729,705	10.44
Broadcast income.....	210,839	171,278	(18.76)
<b>Clear channel 5-25 kw. unlimited:</b>			
Number of stations, 29. <sup>1</sup> .....			
Total broadcast revenues.....	420,895	437,741	4.00
Total broadcast expenses.....	346,285	357,596	3.27
Broadcast income.....	74,610	80,145	7.42
<b>Regional unlimited:</b>			
Number of stations, 342.....			
Total broadcast revenues.....	301,129	310,777	3.20
Total broadcast expenses.....	228,111	245,786	7.75
Broadcast income.....	73,018	64,991	(10.99)
<b>Regional part-time:</b>			
Number of stations, 185.....			
Total broadcast revenues.....	86,486	110,321	27.56
Total broadcast expenses.....	81,779	103,576	26.65
Broadcast income.....	4,707	6,745	43.30
<b>Local unlimited:</b>			
Number of stations, 641.....			
Total broadcast revenues.....	92,521	100,660	8.80
Total broadcast expenses.....	77,803	88,135	13.28
Broadcast income.....	14,718	12,525	(14.90)
<b>Local part time:</b>			
Number of stations, 66.....			
Total broadcast revenues.....	49,930	72,739	45.68
Total broadcast expenses.....	46,526	68,275	46.75
Broadcast income.....	3,404	4,464	31.14
<b>All stations:</b>			
Number of stations, 1,313.....			
Total broadcast revenues.....	191,863	205,111	6.90
Total broadcast expenses.....	150,971	166,646	10.38
Broadcast income.....	40,892	38,465	(5.94)

<sup>1</sup> Includes 1 part-time station.

NOTE.—All broadcast income before Federal income taxes.

**FREQUENCY MODULATION BROADCAST FINANCIAL DATA**

Of the 700 commercial FM stations on the air as of December 31, 1948, 593 (or 85 percent) were authorized to licensees of standard broadcast (AM) stations and 107 (or 15 percent) to persons having no AM broadcast interests.

Financial reports filed by FM licensees for the calendar year 1948 indicated that in the majority of cases where FM stations were authorized to AM licensees, the two stations were "jointly operated," i. e., programs broadcast over the AM stations were duplicated simultaneously by the FM station at no additional cost to the advertiser.

Thus, of the 593 AM licensees operating FM stations, only 77 reported separate revenues from their FM operation during 1948. A summary of the financial information reported for these 77 stations is as follows:

	Aggregate	Average per station
Total broadcast revenues.....	\$621,469	\$8,070
Total broadcast expenses.....	2,153,659	27,970
Total broadcast loss.....	1,532,190	19,900

Of these 77 FM stations, 54 had been in operation for the full year of 1948. Total revenues of the full-year group averaged \$9,300 per station and average expenses about \$33,600. Thus, the average loss for stations operating the full 12 months was slightly over \$24,000. Of the 77 stations, 4 reported an income from FM operation during 1948.

Estimated FM station expense data were submitted by 65 of the 516 FM licensees who apparently engaged in a joint AM-FM operation during 1948. These reports indicated that FM station costs in an AM-FM joint operation averaged about \$15,000 during 1948.

The following table summarizes the 1948 financial information reported for 89 of the 107 FM stations operated by persons having no AM broadcast interest:

	Aggregate	Average per station
Total broadcast revenues.....	\$1,126,208	\$12,650
Total broadcast expenses.....	4,182,558	46,990
Total broadcast loss.....	3,056,350	34,340

Of these 89 FM stations, 52 had been in operation for the full year of 1948. Total revenues of the full-year group averaged \$19,000, expenses \$53,300 with an average loss of \$34,300. All but 3 of the 89 reporting stations showed a loss from operations during 1948.

TELEVISION BROADCAST FINANCIAL DATA

During the calendar year 1948, the 4 television networks and 50 stations (total on the air during the year) reported aggregate revenues of 8.7 million dollars, aggregate expenses of 23.6 million dollars and losses of almost 15 million dollars. All TV networks and stations reported a loss from operations during the year.

Of the 8.7 million dollars TV industry revenues, approximately 2.5 million dollars were derived from network programs with the remaining 6.2 million dollars sold directly by stations.

The distribution of total revenues, expenses and losses as between TV networks and stations was as follows:

	Revenues	Expenses	Loss
	<i>Millions</i>	<i>Millions</i>	<i>Millions</i>
4 networks (including 10 owned and operated stations).....	\$4.8	\$11.2	\$6.4
40 other stations.....	3.9	12.4	8.5
Industry total.....	8.7	23.6	14.9

Exactly half of the TV stations operated 6 months or less with only 17 in operation during the entire year. Average monthly station revenues ranged from \$20,000 in the case of the "full year" stations to \$5,000 for stations in operation only 2 months or less.

With respect to operating costs of TV stations, the following data are based on 14 of the 17 stations in operation during the whole of 1948:

Aggregate annual operating costs of 14 stations.....	\$7, 532, 000
Average per station.....	538, 000
Average per month per station.....	45, 000
Highest annual operating expense.....	814, 000
Lowest annual operating expense.....	159, 000

<sup>1</sup> The wide range in annual operating costs reported during 1948 is accounted for, in large measure, by differences in the number of hours of station operation per week.

In several of the large cities, TV station revenues during 1948 constituted a relatively high proportion of the total revenues reported by all stations (both aural and visual) in those cities. In Philadelphia, TV revenues reported by three stations were almost 10 percent of the combined revenues of all broadcasting stations in that city. In New York and Washington, the proportion going to TV was approximately 8 percent, while in Baltimore and Milwaukee TV accounted for approximately 7 percent of the total revenues of all stations.

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## CHAPTER IV. SAFETY AND SPECIAL RADIO SERVICES

1. GENERAL
  2. AERONAUTICAL RADIO SERVICES
  3. MARINE RADIO SERVICES
  4. PUBLIC SAFETY RADIO SERVICES
  5. LAND TRANSPORTATION RADIO SERVICES
  6. INDUSTRIAL RADIO SERVICES
  7. INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE
  8. EXPERIMENTAL RADIO SERVICES
  9. LOW POWER RADIO DEVICES
  10. STATISTICS
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### 1. GENERAL

The Safety and Special Services comprise all of those varied and extensive radio activities administered by the Commission with the exception of the broadcast and common carrier services.

Until recently, the technical limitations on the use of the radio spectrum made it necessary to confine the special employment of radio to purposes directly concerned with the safety of life and property. As a result of developments during the war years, the Commission found it possible to embark upon a more liberal policy regarding the general public use of radio. It encouraged experimentation on the part of all those interested in order that the most informed judgment possible might be exercised with respect to the fullest use that could be made of upper portions of the radio spectrum that new techniques had opened.

At the close of fiscal 1948, it was felt that the experimental program had progressed sufficiently to enable the Commission to determine which services might best serve the public interest if established on a regular basis. Accordingly, comprehensive rule-making proceedings were instituted involving a complete revision of frequency allocations and rules for the domestic use of two-way radio communication by all types of land vehicles. Because of the widespread interest, extensive oral argument was heard during October 1948.

As the result of the comments filed and the arguments presented, the Commission, on April 27, 1949, issued a report and order which, among other things, established two new groups of services—Land

Transportation, and Industrial—and revised the Public Safety Radio Services. These rules represented the culmination of several years of study and coordination by various State and local government instrumentalities, industry, and the Commission.

The new commercial services, together with those relating primarily to the public safety which had been in existence for a number of years, may, for convenience, be considered as falling into three general categories as follows:

1. *Services devoted to safety.*—Aeronautical; Marine; Public Safety (Police, Fire, Forestry-Conservation, Highway Maintenance, and Special Emergency).
2. *Services devoted to commerce, industry, and science.*—Land Transportation (Railroad, Taxicab, Automobile Emergency, Intercity Bus, Highway Truck, and Urban Transit); Industrial (Power, Petroleum, Forest Products, Relay Press, Motion Picture, Low Power Industrial, Special Industrial); Industrial, Scientific, and Medical (special radiating equipment, such as industrial heating and diathermy); Experimental (developing new radio equipment and techniques); and Low Power Radio Devices.
3. *Services covering operation of radio transmitters by individuals.*—Commercial Radio Operators, Amateurs, and Citizens. (For the purpose of this report, these services are grouped and discussed in a separate chapter.)

The number of stations is one index of the regulatory workload in connection with the Safety and Special Services. The nonbroadcast services (exclusive of commercial and amateur operators) had less than 10,000 authorized stations in 1940, did not reach 13,000 at the outbreak of the war, but increased to nearly 22,000 in 1946, to over 36,000 in 1947, exceeded 47,000 in 1948, and numbered more than 61,000 stations, exclusive of associated mobile units, in 1949.

## 2. AERONAUTICAL RADIO SERVICES

The Aeronautical Radio Services, one of the most vital groups in the safety category, is of the utmost importance to aircraft operation and the safety of life and property in the air. This group includes not only communications equipment for private and carrier aircraft but also various navigational aids, both on the ground and in the air, essential to provide an adequate system of air navigation.

The rapid rate of expansion of the Aeronautical Radio Services which has been experienced since the war continued during 1949. Comparison statistics show an increase from 20,858 authorized aircraft and ground stations at the close of fiscal year 1948 to 27,227 aircraft

and ground stations at the close of fiscal 1949. Applications received for 1949 totaled 17,824.

#### AVIATION ORGANIZATIONS AND CONFERENCES

In order to maintain these services at the very high level of efficiency and reliability necessary for safety purposes and to encourage further development, the Commission has had to increase its participation in the various interagency coordinating and policy groups both on a domestic and international scale. The most important of these are the International Administrative Aeronautical Radio Conference, the Air Coordinating Committee, The Radio Technical Commission for Aeronautics, and the International Civil Aviation Organization.

The International Administrative Aeronautical Radio Conference convened in Geneva in May 1948 to deal with frequency assignments in the bands allocated exclusively for aeronautical use. This conference established technical standards for the assignment of frequencies and drew up a plan for their allotment for the aeronautical mobile off-route services. A plan for the route services could not be completed because of lack of information, and a recess was called to enable administrations to coordinate their requirements. During this recess the nations of the Western Hemisphere met in Washington in conjunction with the Fourth Inter-American Radio Conference, and an allotment plan was established which will be used at the second session of the International Administrative Aeronautical Radio Conference convening in Geneva in July 1949. Upon conclusion of this conference, the recommendations and plan adopted will be used as a basis not only for the international allocation of frequencies but also in the high frequency for the continental United States.

A major and continuing function of the Commission is participation in the work of the Air Coordinating Committee. The ACC recommends proposed United States policy on aviation to the President, and acts as a vehicle for coordinating aviation matters between the various departments of the government and industry. The Commission is active in the ACC through its membership on the Technical Division and the following subcommittees of that division: Aeronautical Communications and Electronic Aids; Airspace—Rules of the Air and Air Traffic Control; Search and Rescue; Dimensional Standardization; and Airmen Qualifications.

In addition, the Commission is represented on the Air Traffic Control and Navigation Panel which was established by the Air Coordinating Committee for the guidance and implementation of the National All-weather Air Navigation and Traffic Control Program. The activity of this panel has been appreciable during the past year and is expected to increase during the next year.



The Radio Technical Commission for Aeronautics is a cooperative association of the United States Government-industry aeronautical telecommunication agencies. It conducts studies of aeronautical telecommunications problems and related matters for the purpose of providing guidance to and coordinating the efforts of the organizations concerned. One of the major and continuing activities of the Commission involves participation in the executive committee and special technical committees of the RTCA. During the past year, the RTCA has studied and recommended on such problems as:

Test standards and procedures for VHF radio equipment.

Standardization of distance measuring equipment testing procedures.

Implementation of air traffic control transponder—private line visual communication equipment.

Implementation of VHF emergency and airway station communication frequencies.

The International Civil Aviation Organization is an advisory group established to develop the principles and techniques of international air navigation and to foster the planning and development of international civil aviation throughout the world. During 1949 the Commission assisted in the preparation of the United States position and furnished advisers to three Regional Air Navigation meetings and one divisional meeting of ICAO. These meetings were: North Atlantic Regional Air Navigation Meeting, Paris; North Pacific Regional Air Navigation Meeting, Seattle; African-Indian Ocean Regional Air Navigation Meeting, London; and Communications Division Meeting, Montreal.

In addition, the Commission helped prepare the United States position for the Ocean Stations Vessel Conference in London, April-May 1948, and the MET-Telecommunications Meeting held in London, April-May 1949, through its activities on the Technical Division of the Air Coordinating Committee and its subcommittees.

During the past year it became increasingly evident that the development of unified regulations and specifications covering the erection and marking of radio towers, which are potential hazards to aircraft in flight, were required. This matter received extensive consideration during 1949 and, at the present time, a proposal is being discussed with radio interests in order to arrive at a basis for the promulgation of rules setting forth criteria for determining obstructions to air navigation caused by radio towers. Since both aviation and radio interests are users of airspace and, since the locations of airports are normally ideal locations for the erection of antenna towers, the interests are conflicting to a certain degree. For this reason, it has been and will continue to be necessary to effect thorough coordi-

nation in order that the standards established are equitable to both interests.

#### AIRCRAFT RADIO STATIONS

The largest increase in the Aeronautical Radio Services was that of private aircraft. There were 23,723 licensed aircraft stations at the end of 1949 compared with 17,736 in 1948 and, of the former, 21,517 were private planes. This large increase was due to several factors.

More and more aircraft owners are becoming familiar with the advantages of very high frequency communication, thus making the use of radio more popular. A very high frequency plan for "air carrier en route" communications in the United States was formulated by the Commission during 1949 and, although full effect of this plan is not expected until 1950, the implementation accomplished during 1949 is reflected in the growth of aircraft stations.

There has been a sizable increase in the number of aircraft using specialized air-borne radio equipment such as radio altimeters, air-borne radar, and other traffic control and navigational equipment. Until recently, this equipment was used primarily by transport aircraft; however, private aircraft production has shifted to larger type planes, some of which are used for executive purposes and are capable of carrying equipment comparable to the regular air lines.

The aforementioned factors, together with the fact that many major airdromes now require aircraft to be radio-equipped before they can use their facilities, and the fact that a large number of aircraft manufacturers offer two-way radio as standard equipment on their aircraft have resulted in a 33 percent increase in the number of aircraft stations during 1949.

#### AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

The Aeronautical Land and Aeronautical Fixed Services are other continuously expanding aids to aviation. These stations provide radio communication service necessary for the safe, expeditious, and economical operation of aircraft. At the close of fiscal 1949, the Commission had licensed 1,485 such stations in the United States and Alaska. The expansion is due in large measure to the implementation of the VHF plan previously mentioned. VHF aeronautical stations are being located within approximately 200 miles of each other along established air routes to provide effective communication. This plan provides for future expansion and will accommodate additional VHF aeronautical stations as required by the growth of the industry.

The growing importance of Alaska and the reconversion from military to civilian status of the airways has necessitated major changes in aeronautical communication. An Alaskan communications plan

is being formulated, and will require considerable coordination between Government agencies and industry because of the diversified nature of Alaskan operations before it can be finally implemented.

#### CIVIL AIR PATROL STATIONS

The Civil Air Patrol is a civilian auxiliary of the United States Air Force but its radio stations are licensed by the Commission. The number of ground stations in this service has increased from approximately 1,000 in 1948 to 1,608 in 1949. This count does not accurately reflect the actual number of CAP stations, since one licensed base station may have as many as 100 mobile units associated with it. To expedite the handling of applications for radio facilities to be used in this service, it has been necessary to promulgate and add appropriate rules to part 9 of the Commission's Rules and Regulations Governing Aeronautical Services.

#### AIRDROME CONTROL STATIONS

The number of airdrome control stations licensed at the end of the fiscal year showed a decrease of six stations as compared with 1948. This is due mainly to the fact that the Civil Aeronautics Administration has taken over the operation of certain airdrome control stations throughout the country rather than to any cessation of operation.

#### AERONAUTICAL MOBILE UTILITY STATIONS

This service was first implemented in 1947 and is used aboard crash, maintenance, and emergency vehicles at airdromes for communication with the control tower, ground vehicles and aircraft on the ground. It has increased from 109 stations in 1948 to 162 stations in 1949.

#### AERONAUTICAL NAVIGATION RADIO STATIONS

This service, for the most part, is operated by the Civil Aeronautics Administration; however, the number of stations licensed by the Commission has increased from 66 in 1948 to 88 in 1949. This increase is caused primarily by the inauguration of new routes in areas where the CAA is not prepared to render the desired service.

#### FLYING SCHOOL RADIO STATIONS

Flying school stations on the ground and aboard aircraft are used for communication pertaining to instructions to students or pilots while actually operating aircraft. There were 19 flying school stations licensed at the close of fiscal 1949, whereas 23 stations were licensed at the close of 1948.

#### FLIGHT TEST RADIO STATIONS

A flight test radio station is a radio station, ground or aircraft, used for the transmission of communications in connection with the test of

aircraft and major components of aircraft. There were 89 flight test stations licensed at the close of fiscal 1949 in comparison with 104 flight test stations the year previous.

#### AERONAUTICAL PUBLIC SERVICE RADIO STATIONS

The public service type of station has been provided so that individuals aboard aircraft in flight can communicate with land radio facilities connected with land-line telephone and telegraph systems. There were 606 public service aircraft at the close of fiscal 1949, or 94 more than the year before. Although an exclusively aviation public air-ground telephone communication system has not yet been provided, this service has continued to increase. Coastal telegraph and coastal telephone stations are providing this communication service at the present time.

### 3. MARINE RADIO SERVICES

#### GENERAL

The use of radio on ships is the oldest of the safety radio services and the one with which the public is perhaps the most familiar because of the publicity attending its use under distress conditions. The Marine Radio Services include the radio equipment of ships for commercial as well as for safety communication and for aids to navigation, the shore stations of all types, and the necessary means to connect them with general public service land line systems. Communication may be between ships, between ships and aircraft, or between ships and shore. Since many ships normally engage in international voyages, they must be able to communicate with the ships and shore stations of other maritime nations.

Broadly speaking, maritime radio uses may be divided into those which are compelled by law for safety purposes, and those which are voluntary on the part of ship owners and combine safety with other purposes such as navigation and commerce. The Commission is required by the Communications Act to license all radio stations (other than United States Government stations) on board ships of United States registry whether voluntary or compulsory, and of whatever kind (radiotelephone, radiotelegraph, radar, etc). At the same time, the Commission is responsible for the administration, including many phases of enforcement, of the purely compulsory safety provisions of the law in this field.

Important from the compulsory safety standpoint, in addition to the Communications Act, are the Ship Act of 1910 and the International Safety of Life at Sea Convention (London, 1929 and 1948). The Ship Act applies only to the Great Lakes; the other two are applicable to the oceans. The 1948 Safety Convention, which will supersede the 1929 Convention, establishes numerous important ad-

vances in safety at sea through compulsory radio. During 1949, steps were taken by the Commission looking toward negotiations with Canada to improve the safety situation on the Great Lakes.

Apart from its aforementioned responsibilities, the Commission is obliged by the Communications Act to foster new uses of radio in the public interest. In this connection, the past year witnessed some significant developments. Important from the marine standpoint was the establishment, on an experimental basis, of certain radar stations located at fixed positions on or near the shore intended to aid the safe and expeditious movement of ships in adjacent waters. Another important activity was laboratory and field investigation on the part of the Commission, together with considerable national and international consultative work, looking to the development of a suitable radiotelephone automatic alarm signal and receiving device for calling and distress purposes on the new international radiotelephone frequency 2182 kilocycles.

The Commission continued to cultivate and maintain liaison with the domestic government and nongovernment shipping interests. In this connection, it is active in the Radio Technical Commission for Marine Services which is striving to bring government and industry closer together to the mutual benefit of all concerned.

A further discussion of various phases of marine radio activity is set forth below.

#### ADMINISTRATION OF SHIP SAFETY PROVISIONS

As of June 30, 1949, the Commission's records disclosed that 1,863 ships of United States registry were compulsory equipped with radiotelegraphic installations under title III, part II, of the Communications Act. These ships, when navigated in the open sea, must carry qualified radiotelegraph operators and maintain radio watches for safety purposes.

In administering these provisions, the Commission finds it necessary from time to time to impose fines and forfeitures and to apply other corrective measures of a less stringent nature. Because of a small decrease in the total number of compulsory equipped ships and partly because of the existence of a maritime strike in this country from August to November 1948, the number of violations involving this class of vessel declined slightly during the year. However, the number of reported violations involving foreign vessels subject to compulsory United States radio requirements showed an increase over 1948.

#### VOLUNTARILY EQUIPPED SHIP STATIONS

An aggregate of 18,140 ship stations are licensed by the Commission to use radio for communication. Of these, 15,647 use radiotelephone

and 630 employ radiotelegraph, all "voluntarily" established. Violation cases concerning voluntarily equipped ships showed a marked increase during the year. Further, the continuing increase in the number of radiotelephone equipped ships has aggravated the already serious congestion in the medium frequency band in which practically all of these stations now operate. Hence, the Commission has had to devote more effort to the regulation and control of such frequencies in order to secure their effective and beneficial use by all concerned.

#### SHIP RADIO EXEMPTIONS

The Communications Act and the 1929 Safety Convention authorized the Commission to grant exemptions from the compulsory radiotelegraph requirements of the act and the treaty respectively when the vessels concerned are navigated under certain limiting circumstances.

Acting under this authority, the Commission continued to grant blanket exemptions, on an annual basis, for passenger vessels of 15 gross tons or under when navigated not more than 20 nautical miles from the nearest land or more than 200 nautical miles between two consecutive ports, and to passenger vessels of less than 100 gross tons when navigated within certain prescribed areas which are not considered hazardous. It was felt that it would be unreasonable, because of the size of these vessels, to require the radio installation and operators prescribed by law. Individual applications for exemptions received during the year numbered 56.

#### INTERNATIONAL COORDINATION

The administration of the maritime services cannot be carried forward without international coordination inasmuch as ships travel to almost all parts of the world and there must be universality of communication.

Many of the provisions contained in the regulations resulting from the International Administrative Radio Conference of Atlantic City, 1947, came into force for this country on January 1, 1949, and brought several changes in the Commission's rules governing ship service. In order to accomplish these changes, as well as others necessitated by the wartime lag, over-all revision was undertaken during the year. A redraft was completed and conferences thereon were held with industry representatives. It is anticipated that the proposed rules will be finalized during the coming year.

The 1948 Safety Conference reviewed the 1929 Safety Convention and adopted improvements in the application of radio for the safety of life and property at sea. The United States Senate ratified the 1948 Convention and, assuming its future proclamation by the President and ratification by the prescribed minimum number of countries, it will come into force on January 1, 1951.

The Commission participated in the preparatory work for the sixth meeting of the International Radio Consultative Committee (CCIR) to be held in Prague, Czechoslovakia, in 1951. This Committee is associated with the International Telecommunications Union. Its function is the study of technical radio problems and the submission of recommendations to the 76 members of the Union. The latter then translate such recommendations into proposals for possible adoption by the next International Administrative Radio Conference.

The Commission was represented in the United States delegation to the European Maritime Regional Radio Conference at Copenhagen in the summer of 1948. This Conference, held simultaneously with the European Broadcast Conference, reached tentative agreements for the protection of the frequency band used fundamentally for distress and safety by the maritime mobile radiotelegraph service against encroachment by European broadcast stations operating in portions of the same band. As a result, several continental European broadcast stations were removed from this band.

The 1947 Atlantic City Conference extended the lower limit of the standard broadcast band from 545 to 535 kilocycles, realizing, however, that this might create a source of interference to the operation of certain types of ship-borne auto alarms designed to intercept distress signals on frequencies between 487.5 and 512.5 kilocycles. Numerous tests were conducted during the year to determine the extent to which existing types of auto alarms might be interfered with by emissions from broadcast stations using the new 540 kilocycle frequency.

Of particular advantage to maritime radio was the recognition by the Fourth Inter-American and Region 2 Radio Conferences of a detailed safety radio system for the maritime telephone service based upon the new calling and distress frequency 2182 kilocycles, as well as standardized frequencies for operational communications and public correspondence. Important regulations for relatively short-distance maritime telegraphy also were established. These matters required coordination with contiguous countries, and will require further coordination with countries throughout the Western Hemisphere.

A Commission marine radio engineer was assigned to the United States delegation attending the Region 1 and 3 Radio Conferences at Geneva at the close of the year. These sessions are similar in purpose to the Region 2 Conference, except that they pertain to other regions of the world. Another marine radio engineer rendered technical assistance to the United States delegation to the Provisional Frequency Board in session at Geneva for the purpose of preparing the new International Frequency List pursuant to provisions of the Atlantic City Radio Conference.

Informal conferences were held with Canadian and United States interests concerning a proposed treaty encompassing compulsory safety radio requirements of a regional character for ships plying the Great Lakes. Vessels navigating these waters are excluded from the Convention for Safety of Life at Sea and from title III, part II, of the Communications Act. It is expected that these negotiations will be completed shortly.

The 1948 Safety Conference adopted, for the first time in the history of radio, provisions which will permit the use of radiotelephone equipment and operators as an alternative to compulsory radiotelegraph and operator requirements on previously exempt class of cargo vessels of between 500 and 1,600 gross tons engaged on international voyages. These provisions, however, may be waived for individual ships under certain conditions. It is estimated that not more than 200 United States ships would come under this requirement when the new Safety Convention comes into force January 1, 1951. Radiotelephone equipment on those ships must be capable of operation on the radiotelephone distress frequency 2182 kilocycles adopted at the Atlantic City Conference, 1947, and further included in the Regulations of the Inter-American Radio Agreement of Washington, 1949.

During the year, informal negotiations were undertaken with interested European maritime nations looking toward an advance partial implementation of the Radiotelegraph High Frequency Maritime Mobile Plan included in that portion of the Atlantic City Radio Regulations which is to become effective some time after 1949.

Another matter discussed informally with Europe maritime nations and with Canada concerned the necessary coordinated organization of the maritime mobile telephone service in the very high frequency 152-162 megacycle band. Because the United States had previously adopted a channel separation in this band of 60 kilocycles and the United Kingdom had adopted 100 kilocycles for this purpose, only one maritime mobile service frequency in this band was internationally agreed upon at Atlantic City—namely 156.80 megacycles, for calling, safety, intership, and harbor-control purposes. Through these informal discussions, a workable compromise was achieved, and frequency assignment plans for radiotelephone service in this band are being prepared for implementation in the United States, Canada, and Great Britain. The Commission, through readjustments of its VHF frequency allocation plan, adopted 100 kilocycle channel separation in this maritime band in the interest of international standardization.

#### RADIO TECHNICAL COMMISSION FOR MARINE SERVICES

The Commission does not have the staff nor facilities sufficient to develop adequately new equipment or conduct extensive technical in-



vestigations as are required from time to time for effective regulation of the maritime service. Consequently, much of the necessary information must be obtained from the researches and developments of other government agencies, private industry, and joint industry-government committees such as the Radio Technical Commission for Marine Services (RTCM), on which the Commission is represented.

#### SAFETY ON THE GREAT LAKES

During the year, the Commission, in coordination with the Interdepartment Radio Advisory Committee and the Radio Administration of Canada, allocated a new intership medium working frequency (2003 kilocycles) exclusively for use by ships on the Great Lakes. This frequency, available for safety and ship operational radiotelephone communication effective August 1, 1949, replaces the present intership medium frequency (2738 kilocycles) on the lakes, which is widely used for this same purpose in other regions. The serious interference condition heretofore existing on 2738 kilocycles in the Great Lakes area will thereby be alleviated.

#### COMMERCIAL COAST STATIONS

During World War II, United States military stations made use of the coast telegraph high frequencies normally assigned to commercial stations by the Commission. These frequencies are gradually being released and returned to coast stations previously using them, so that in numerous instances during the past year coast stations regained assignment of their prewar frequencies or substitutions therefor. There were no changes in the number of public coast harbor (telephone) stations although a large number of applications were filed. In most cases the applications were not finally acted upon by the Commission because of the lack of frequencies available for additional assignments, and in four cases the applications were designated for public hearing. These hearings, in all probability, will not occur until extensive study concerning a revision of frequency allocation for all radio services within the band 2000-4000 kilocycles has been made relative to the Inter-American Radio Agreement of Washington, 1949.

A new public coast telegraph station was authorized at Jacksonville, Florida, where none previously existed, in order better to serve ships using that port.

The total number of public coast harbor (telephone) stations in the United States, exclusive of Alaska, is 52. There are five coast telephone stations in the United States employing high frequencies for long-distance public service with ocean-going vessels. In addition,

three mobile press stations are licensed for ship-shore telegraph press traffic exclusively, and 80 Class 2 experimental stations are engaged in the development of marine radio services.

In Alaska, where both radiotelegraphy and radiotelephony are widely used to exchange safety, weather and commercial messages, the number of licensed stations on land (excluding stations in the aeronautical services) increased to a total of 480 for point-to-point communication and 302 for communication with ships in Alaskan waters. As an established regulatory policy, these stations normally are licensed for general public correspondence entirely within the territory; in addition, they operate in conjunction with the network of United States Government point-to-point stations under jurisdiction of the Army Signal Corps. As an aftermath of World War II, the activity of the military stations as related to commercial stations has given rise to certain problems of a regulatory and policy nature which are being studied jointly by the Commission and the Army.

#### RADAR AIDS TO NAVIGATION

The first shore-based nonmilitary harbor radar authorization in the United States was granted on an experimental basis to the City of Long Beach, California, on March 16, 1949. It emphasized a notable growth in radar as an aid to the movement of ships. Similar authorizations were subsequently granted to the cities of San Francisco, Calif., and Baltimore, Md. The value of shore based radar in association with very high frequency radiotelephone communication as an aid in the movement of ships in periods of reduced visibility will be tested by these trial operations. As a result of coordination with the United States Coast Guard, a limitation has been imposed that information furnished through the operation of these radar stations will not be used to aid the movement of any ship unless the station licensee first obtains from the Commandant of the Coast Guard a permit such as required by law for a so-called private aid to navigation.

A number of experimental radar authorizations (for radionavigation land stations) has been granted to the petroleum industry engaged in off-shore oil-drilling activities in the Gulf of Mexico. These grants were for the very limited purpose of aiding in the movement of ships utilized by the licensee in his particular operations.

Aside from the radionavigation land stations, there were 863 United States merchant ships equipped with radar for regular use in navigation, and additional installations are being made continually.

A few experimental authorizations have been granted to cover shore-based radar training stations for the training of merchant marine deck officers in shipboard radar operation.

## EQUIPMENT APPROVAL

Three new types of radiotelegraph transmitters for use aboard ships compulsorily equipped for safety purposes were given type approval after commercial laboratory tests witnessed by Commission engineers. Two types of ship radiotelegraph receivers were approved with respect to the Commission's rules imposing limitation on the radiation of energy from shipboard receiving equipment. A number of commercial type radar sets have also been type approved for licensing in the ship service.

## INTERFERENCE PROBLEMS

Numerous reports of interference involving the maritime service were received during the year. Some of this interference was caused by emissions on frequencies which were multiples of the assigned frequencies. In such case the interference is usually readily eliminated by suppression circuits. In other instances, when interference results from stations in the same area using adjacent frequencies, the interference is not so easily eliminated. Instances of the latter kind have been numerous in Alaska where ships, coast, and point-to-point telephone stations have repeatedly been reported by the Civil Aeronautics Administration stations to have caused interference to reception from aircraft. While one case of interference was so severe that the use of a commercial point-to-point frequency in one locality was discontinued, the Commission is studying the general problem with the object of possibly eliminating the interference without serious curtailment in the use of frequencies already licensed.

## 4. PUBLIC SAFETY RADIO SERVICES

After extensive rule-making proceedings, the Commission, on April 27, 1949 approved a major revision of Part 10, Rules Governing Emergency Radio Services, to become effective July 1, 1949. As virtually all communications authorized in the Emergency Radio Services relate either directly or indirectly to public safety and general welfare, and licenses are normally limited to instrumentalities of government (i. e., State, county, and municipal governments), this part has been renamed "Rules Governing Public Safety Radio Services," and includes the Police, Fire, Forestry-Conservation, Highway Maintenance, and Special Emergency services.

The revised rules embody the Commission's experience, from both an administrative as well as a technical standpoint, obtained since 1938 when part 10 was originally promulgated. Information regarding the administrative procedures incidental to submission of applications, technical standards for the transmitting equipment, operator regulations, and rules for the particular services, are now grouped in part 10.

Increased frequency allocations have been approved for the different services which will allow more flexibility and a broader scope of service for existing operations. The Highway Maintenance Service has been established on a regular basis. The revised frequency allocations were adopted after extensive rule-making procedures, and, while some changes in the previous public safety allocations were required, particularly with respect to the police and forestry services, the over-all allocation for these services as now set forth in part 10 appears to meet existing needs more fully than previous allocations.

The trend in equipment development has been in the direction of apparatus capable of satisfactory performance while at the same time conserving frequency space. In this connection, several manufacturers striving to meet the channel width requirements established by the Commission have produced equipment which can be reliably operated on adjacent frequency assignments. This achievement is considered a major advancement in the communications field since all previous equipments have required at least alternate assignment separation. Development of microwave equipment for use in control and repeater links, which are an integral part of many radio systems, has been very slow and is still not readily available for application in these services. Control and repeater operation is being continued temporarily on the lower land mobile frequencies, pending availability of higher frequency equipment.

#### POLICE RADIO SERVICE

The Police Radio Service is available to non-Federal governmental organizations with police responsibilities. The licensees in this service, through the judicious use of the various classes of stations provided for in the rules and through use of the increased number of frequencies made available, may obtain service between headquarters base stations and mobile stations, and between mobile stations, including walkie-talkie operation between officers in the field where necessary, as well as intercity communication by either voice or telegraph emission.

Police radio stations have been established in every State in the country. Nearly every county and most cities with populations above 5,000 persons now have some degree of police radio service. More than 4,500 authorizations covering approximately 50,000 radio transmitters were outstanding on June 30, 1949.

In addition to established voice and telegraph radio communications in the police service, some licensees are developing other radio and electronic techniques to assist in performing efficient police work. Examples of such development are the radio speed meter, which from a fixed point can measure the speed of passing automobiles, and spe-

cialized television for transmitting police line-ups from headquarters to all precincts.

#### FIRE RADIO SERVICE

In view of the increased frequency allocation to this service and the needs of smaller communities, the eligibility requirements for the Fire Radio Service has been extended from cities having a minimum population of 250,000 to include not only all of the various governmental subdivisions, such as cities, counties, States, territories, and possessions, but also persons and organizations charged with specific fire-protection activities. The latter category now includes volunteer fire departments.

While the smaller communities may continue to serve both the police and fire mobile stations from the police base station, it is expected that many of the present licensees will provide separate systems for each service, particularly in the larger communities where each service is relatively busy. Judging from the widespread interest shown by volunteer fire departments throughout the country, a very sharp rise in the number of stations may be expected. A total of 124 licenses was outstanding at the year end.

The scope of communication provided under the revised rules for the fire service now permits a fire headquarters base station on a secondary basis to transmit to radio receivers at fixed locations. This, for example, would permit the operator to place a call on the air advising volunteer firemen in their homes or places of business of the location of a fire, thereby precluding the necessity for such personnel to assemble at headquarters. This operation is, of course, in addition to the normal communication with mobile units and secondarily between base stations.

#### FORESTRY-CONSERVATION RADIO SERVICE

In order to permit a closer coordination between related state agencies, the previously established forestry operation was combined with conservation activities and established as the Forestry-Conservation Radio Service in the new rules. Stations in this service are authorized to transmit communications directly relating to public safety and the protection of life and property including those essential to the prevention, detection, and suppression of forest fires and official forestry-conservation activities. Eligibility for this service is restricted to States, territories, possessions and other governmental subdivisions, including counties, cities, towns, and similar governmental entities, and persons or organizations charged with specific forestry-conservation activities.

A total of 565 licenses was outstanding on June 30, 1949, including over 7,000 authorized radio transmitters. Some increase in the num-

ber of stations in this service may be expected as the conservation activities in many states begin to more fully utilize radio communication in their operations.

#### HIGHWAY MAINTENANCE RADIO SERVICE

The Highway Maintenance Radio Service is a new service authorized on a regular basis as of July 1, 1949. Eligibility for this service has been restricted to states, territories, possessions, and other governmental subdivisions. Stations in this service are authorized to transmit messages directly relating to public safety and the protection of life or property, also communications essential to official activities directly relating to the maintenance, supervision, and operation of public highways. This service, like other public safety services, provides for communication primarily between base stations and mobile stations, and between mobile stations, and secondarily between base stations.

The use of radio communication in highway maintenance was observed for some time by the Commission through the medium of reports on experimental radio operation prior to the establishment of the service on a regular basis. At the time of its regular establishment, there was a total of 165 stations operating experimentally. It is expected that this service will have a rather rapid growth in view of its regular frequency allocation and the material contribution radio makes toward the public safety and convenience in the highway maintenance field.

#### SPECIAL EMERGENCY RADIO SERVICE

Communications in the Special Emergency Radio Service are restricted to matters directly relating to public safety and the protection of life and property. The eligibility requirements have been expanded in the revised rules to include physicians normally practicing in remote areas where other communication facilities are not available, ambulance services, beach patrols responsible for life-saving activities, school bus operators having regular routes into rural areas where other communication facilities are not available. These are in addition to the previously recognized eligible groups, namely, persons having establishments in remote locations where other communication facilities are not available, organizations established for relief purposes in emergencies and which have a disaster plan, and communication common carriers when using such facilities for bridging breaks in lines.

A total of 87 licenses was outstanding. New groups, now eligible under the revised rules, will undoubtedly seek licenses in large numbers.

## DEVELOPMENTAL RADIO OPERATION

Rules governing developmental or experimental projects expected to be used exclusively in the Public Safety Radio Services were incorporated in the revised part 10, effective July 1, 1949. This addition was considered essential for better administrative control and evaluation of certain experimental phases of the activities related to the established services.

## 5. LAND TRANSPORTATION RADIO SERVICES

## RULE CHANGES

The adoption of part 16 of the Commission's Rules, on April 29, 1949, consummated the efforts of the Commission to consolidate radio services which are closely connected with the transportation industry. Part 16—Rules Governing Land Transportation Radio Services—embraces regulations for the following individual radio services: Railroad Radio Service, Taxicab Radio Service, Automobile Emergency Radio Service, Intercity Bus Radio Service, Highway Truck Radio Service, and Urban Transit Radio Service.

These rules were drafted after considerable study had been made of the docket and the comments at the oral argument held in this connection. They reflect to a large extent the experience gained in the general mobile experimental program which has been in progress since the end of the war. The rules are designed primarily for permitting the maximum utilization of frequencies allocated to the various services with a minimum of interference. They cover not only the technical specifications for the equipment to be used but also provide for the taking of necessary steps by licensees to determine that the equipment is in proper operating condition. Application procedures looking toward expeditious processing are also provided in the rules.

One of the features of the new rules is a provision whereby a person who is licensed in any one of the Land Transportation Radio Services can render dispatching service on a cost-sharing nonprofit basis to any other person engaged in the same type of transportation activity. This will permit separate companies to make use of common facilities, thereby reducing original investment and operating cost. Provision is also made for experimental use of newly developed equipment pursuant to the terms of a "development" license.

## RAILROAD RADIO SERVICE

In view of the overwhelming demand made upon the Commission for frequencies in the 152-162 megacycle band, it has been necessary to review the frequency allocations to all services for the purpose of reevaluating their individual requirements. Inasmuch as information

then available indicated that 30 usable frequencies would be required to provide satisfactory radio communication systems for the railroads in Chicago, which was the most congested area, the original frequency allocation, made in May 1945, allocated 60 frequencies to the Railroad Radio Service.

Due to the technical limitations of equipment, assignments could be made only on the alternate channels. Therefore, it was necessary to allocate a total of 60 channels in order to provide 30 usable channels. As the railroads, until recently, have had difficulty in obtaining radio equipment suitable to their needs, and as they experienced difficulty in integrating radio communication with their already existing communication systems, the Railroad Radio Service did not expand as rapidly as some of the other radio services.

In reviewing the situation it was found that the railroads were using only 13 channels in Chicago and, by making use of new improved radio equipment which is now available, the required 30 channels in that area could be obtained with less than the 60 frequencies originally allocated. Consequently, following the allocation made in the proposed rules for the Railroad Radio Service, released June 11, 1948, the final rules allocated 41 frequencies to the railroads in the Chicago area. Thirty-nine of these 41 frequencies are allocated to the Railroad Radio Service for use outside of the Chicago area but may also be used by stations in the Public Safety Radio Service in areas where there will be no interference to the Railroad Radio Service. Although this action results in a reduction of 19 and 21 channels respectively, it is believed that a satisfactory radio communication system can be evolved and the safety aspects of the service will not be impaired.

#### TAXICAB RADIO SERVICE

The Taxicab Radio Service has at the present time approximately 3,000 separate radio communication systems involving about 46,000 mobile units. Although seriously hampered by the lack of frequencies, this service has grown at a phenomenal rate.

During the 4 years it has been authorized, licenses were issued on an experimental basis and only two frequencies in the 152-162 megacycle band were available for assignment. However, in accordance with the final rules which became effective July 1, 1949, a total of eight frequencies in this band are now available. In addition, ten frequencies in the 450-460 megacycle band have been allocated to this service for developmental operation looking toward the eventual establishment of this service on higher frequencies.

It is felt that as soon as these additional frequencies can be put into use, interference caused by simultaneous operation of several systems on the same frequency in the same area will be reduced and a general



improvement will continue to grow at a rapid rate for the next several years.

#### AUTOMOBILE EMERGENCY RADIO SERVICE

The Automobile Emergency Radio Service has been included as a part of the Land Transportation Radio Services because of the very close relationship with other transportation activities. This service is available to persons or organizations rendering emergency automobile road service to the general public and is intended to be used for dispatching service cars and trucks. Prior to July 1, 1949 authorizations were issued only on an experimental basis. However, now that the service is on a regular basis, and due to the apparent widespread need for this type of communication, it is expected that there will be a substantial expansion.

#### INTERCITY BUS RADIO SERVICE

Prior to the adoption of the new part 16, eight frequencies were made available on an experimental basis for the use of intercity buses. After an examination of the record and of the experience gathered in the experimental operation, the service was established on a regular basis July 1, 1949 and 16 frequencies were allocated for its use.

As the name implies, this service is intended for operators of intercity buses. Its primary purpose is to furnish communication between the buses en route and the terminal, thus improving the efficiency of motorbus operation. In addition, the use of radio provides for immediate communications in emergency situations requiring medical and other assistance. It also permits prompt reporting of weather and local road conditions for safety purposes.

#### HIGHWAY TRUCK RADIO SERVICE

The Highway Truck Radio Service has been established for the purpose of making radio communication systems available to those persons engaged in trucking operations on an intercity basis or in rural areas where normal wireline facilities are not generally available. Although the proposed rules restricted this service to common carrier operators traveling on an intercity basis only, the Commission, after examination of the record and of the needs of the trucking industry, revised the rules so as to include distributors who operate outside of metropolitan areas on a route basis.

This service was licensed previously on an experimental basis only and it is believed that many persons eligible for the service have delayed making application for facilities because of the financial risk involved. However, increased interest is expected now that a regular service has been established.

## URBAN TRANSIT RADIO SERVICE

The Urban Transit Radio Service is intended to be used for improving the efficiency of street railway systems and city bus lines. This service was formerly the Transit Utility Radio Service but the name has been changed in order to more clearly define its scope. The primary purpose is to furnish communication between supervisors' cars and repair trucks during periods of emergency occasioned by power failures, collisions, or break-down of equipment.

## 6. INDUSTRIAL RADIO SERVICES

During the period covered by this report, extensive rule-making proceedings were concluded to cover the Industrial Radio Services. These rules became effective July 1, 1949. They consolidated a number of services previously administered by the Commission under different sets of rules and, in addition, make radio facilities available on a regular basis to a number of industries previously unrecognized or operating only to a limited extent under temporary experimental authorizations. Among the services superseded in their entirety to make way for the more all-inclusive new ones were the Geophysical, Special Press, Intermittent, and Utility Radio Services, all of which were described in chapter IV of last year's annual report.

Seven new services—Power, Petroleum, Forest Products, Motion Picture, Relay Press, Low-Power Industrial, and Special Industrial—make up the new industrial group. In these services, radio is authorized in connection with all matters pertaining to safety of personnel and property, and for operational purposes essential to the conduct of the licensee's business.

The plan for administration of the industrial group is similar to that adopted for a number of other business and government groups using radio. Separate industries are recognized individually by name for purposes of frequency allocation and determination of eligibility, but are required to follow licensing and operating procedures common to the entire group, and to use transmitting equipment which conforms to common technical standards of performance. In this way the Commission's administrative burden is reduced to a minimum while at the same time a mechanism is established for recognizing specialized spectrum requirements of industrial groups.

One of the problems encountered by the Commission, when dealing directly with thousands of businesses both large and small, is the education of industry as to the types of communications systems which are practical within the limits of the frequencies available. To assist in achieving this educational goal, and to aid it in discharging regulatory obligations, the Commission has encouraged the organization of regional industry advisory committees of engineer employees in the

principal industries using radio, for the purpose of coordinating the industry needs at the local level with respect to the selection of satisfactory frequencies from among those available.

A brief outline of the seven industrial radio services is given in the following paragraphs:

#### POWER RADIO SERVICE

This service concerns radio use by those public utilities which supply electricity, gas, water, and steam to the public. These facilities were formerly provided to a lesser extent in the superseded Utility Radio Service and before that, although on a very restricted basis, under the Special Emergency classification of the Public Safety rules.

The most important use of radio by these utilities is generally conceded to be in connection with restoration of service after interruption due to fire, storm, flood, or other cause, although the principal volume of messages concerns routine day-to-day maintenance activities which are not necessarily of an emergency nature.

It is anticipated that the approximate doubling of the number of frequencies available for public utilities eligible for the Power Radio Service will provide sufficient spectrum space to permit installation in most parts of the country of two-way radio equipment on every utilities service truck in operation. These frequencies appear to be adequate to allow coverage of approximately 90 percent of the land area of the country where electric power, gas, or water supply is available, although the degree of interference between stations may be considerable in some instances.

In connection with development of the microwave part of the radio spectrum, a number of utilities are being encouraged to experiment with different types of multi-channel radio links between control centers and generating plants. When sufficiently reliable equipment is developed, these circuits will be used for automatic supervisory control and telemetering functions. Such functions are now accomplished by wire circuits which are subject to failure.

There are 4,000 electric utilities, 1,200 gas utilities and 13,000 water utilities, or a total of 18,200 companies eligible to operate their own mobile radiocommunication systems in the Power Radio Service. Members of the industry estimate, however, that not more than 5,000 of these companies will in fact install their own systems in the near future. It is estimated that the number of utility licensees and transmitters will more than double within the next three years, and that the greatest density of transmitters, with attendant interference problems, will be found in the Northeastern States, particularly in New England.

## PETROLEUM RADIO SERVICE

This service is available to all members of the petroleum and natural gas industries, except persons engaged in retail distribution activities who are provided for to a limited extent under other rules. The service is used by persons employing geophysical methods in their search for subsurface structures favorable to accumulation of gas and oil; persons engaged in drilling for, producing, collecting, or refining oil and gas; and persons engaged in transporting these materials and their byproducts by means of pipe lines from the sources of supply to the points of distribution.

Petroleum is usually sought and found in areas remote from existing communication facilities and where the construction of telephone or telegraph lines would be impractical. It is necessary that continuous communications be maintained between the well site, field headquarters, and mobile units. Because of the extremely hazardous and expensive type of operation, adequate radio communication facilities are essential to the successful completion of wells and to limit inherent risks. In addition to the mentioned normal radiotelephone requirements, the use of radio telemetering and supervisory control circuits is being developed experimentally. Many producing areas are accessible with difficulty under normal conditions and inaccessible during periods of adverse weather. These locations require constant supervision of production facilities by the remote control of valves and the telemetering of pressures and fluid levels which is often possible only through the medium of radio.

Use of radio by the industry, particularly in the production and pipe line phases, has been increasing at a very rapid rate during the past year. It is estimated that less than 20 percent of the ultimate number of transmitters has been placed in service, and that the number in service will more than double during the next 2 years.

A particularly acute communications problem now exists in connection with expanding off-shore exploration and production operations in the Gulf of Mexico where the use of radio frequencies with long range propagation characteristics is required. The shortage of suitable frequencies is such that no complete solution has as yet been achieved. The problem has been partially solved by establishment of the Petroleum Radio Service, but further steps now being considered are necessary before communication ceases to be a major problem in speedy and efficient development of our off-shore oil reserves on the Continental Shelf.

One of the greatest uses for radio communication in the industry lies in the operation of oil, gas, and refined products pipe lines, which have become an important link in our Nation's transportation system.

Movement of petroleum and petroleum products, including natural gas, through a pipe line is controlled by dispatchers using methods similar to those used in train dispatching. In addition to radio communication with roving pipe line repair crews and patrolling aircraft, a new method of pipe line operation designed around microwave radio technique is being developed experimentally. Microwaves are expected to provide voice communication from one end of the pipe line to the other (in some cases more than 1,000 miles) and would include intermediate relays, teleprinters, facsimile, supervisory controls, and the usual multiplicity of circuits necessary for present day operations. Properly designed directional antennas will minimize the possibility of interference between pipe lines and to other services. It is not expected that adoption of microwave technique will be rapid in this field, because the capital investment will be heavy and equipment is in some cases still under development, but pilot installations now under construction may produce sufficient operating data to invite expansion. In the majority of cases the microwave facilities would not replace existing equivalent wireline facilities but would provide circuits where none or inadequate ones existed before.

#### FOREST PRODUCTS RADIO SERVICE

The Forest Products Radio Service is designed to place in the hands of privately owned timber and logging companies radio communication facilities similar to those already in use by Federal and State governments for purposes of fire detection, prevention, and suppression. Coincidentally, to serve a communications need that has become increasingly important since the lumber industry started mechanizing itself more than a decade ago, these same facilities may be used in the interest of safer, more efficient, and more economical logging operations.

The logging industry is believed to have the highest accident rate of any major industry in the United States, due primarily to the character of its operations. Radiocommunication, by speeding assistance and evacuation when needed, could aid in reducing this accident rate. Radio is used in connection with actual logging operations, and for protection of privately operated forests and tree farms.

The Forest Products Service is one of the services established by the Commission as of July 1, 1949. It is too early to predict the number of companies which will eventually take advantage of the facilities made available, although it is anticipated that all major timber operators in the country will be using mobile radio communications facilities to some extent within the next few years. There is less certainty that a large number of the small operators will be able to justify the cost of extensive radio installations, however desirable such installa-

tions might be from the conservation and accident prevention viewpoints.

#### RELAY PRESS RADIO SERVICE

There has been available to the newspapers and press associations of the country for many years the privilege of licensing portable radio equipment for relaying news stories from the scene of a news event to a reporter stationed at the nearest telephone. However, this type of operation has never proved to be very practical, apparently for the reason that the special radio equipment was quite expensive and seldom available when needed.

For the past 2 years there has been available to these news-gathering agencies, on a temporary experimental basis, the opportunity of installing a central station transmitter at the newspaper office and mobile radio telephone equipment in the automobiles of reporters and photographers employed by the licensee. The vehicles are then dispatched to the scene of news events when required. One of the advantages of this system is that reporters or photographers can be sent on a routine assignment with the knowledge that they can be contacted at any time by radio and directed to the scene of a more important matter without delay.

The results of experimental operations were recognized as conclusive of the need for this type of radiotelephone facility and the Relay Press Radio Service became a regular service on July 1, 1949. It is expected that those newspapers operating experimentally will convert to regular operation and that a large number of newspapers will establish their own private radiotelephone systems in the interest of a more rapidly and fully informed American public and, at the same time, more economical operation.

#### MOTION PICTURE RADIO SERVICE

The Motion Picture Radio Service is available only to persons engaged in filming motion pictures for public showing. In the main, radio is used by motion picture companies only when on location. It is used to tie parties out on location to the nearest reliable wire communications facility for purposes of safety and of quick supply, also during the filming of a picture to coordinate action taking place on out-door sets. Since it is estimated that motion picture companies spend as much as \$2,000 to \$3,000 per hour while on location, exclusive of talent fees, it is apparent that the low-power equipment customarily used for coordination purposes serves a very useful function in smoothing action, frequently to the point where retakes are unnecessary. Owing to the limited number of motion pictures produced at any one time, the number of transmitters in service is compara-

tively small and is not expected to increase materially. To improve flexibility of use, the number of frequencies available to the Motion Picture Radio Service has been increased, but the use of such frequencies is on a shared basis with other industries.

#### LOW-POWER INDUSTRIAL RADIO SERVICE

This service is available to all the industrial and commercial concerns. It provides for operation of any desired number of units which are restricted to very low power in order to reduce the interference range and thereby allow large numbers to operate on few frequencies.

Although this service did not become available to business until July 1, 1949, it bears promise of being one of the fastest growing in terms of use. It is expected that many thousands of low-power hand-carried or pack-carried transmitter-receiver units will be placed in service during the next two or three years. They are expected to be particularly useful in coordinating all kinds of survey and construction operations. A number of radio manufacturers have recently placed appropriate equipment in quantity production.

Although similar equipment may be licensed in other services as part of a more extensive mobile radiocommunications system, there are tens of thousands of businesses throughout the country which are eligible to hold their own licenses in this service. The distance which can be covered with the equipment varies from something less than three blocks to several miles, depending upon the positions of the two parties with respect to surrounding terrain and other factors.

#### SPECIAL INDUSTRIAL RADIO SERVICE

This is one of the newly organized services, and is designed to provide frequencies for a number of miscellaneous industrial activities which are not specifically provided for elsewhere in the Commission's rules. The service is available to firms engaged in production, fabrication, construction, or manufacturing, provided the radio is used only within the confines of the plant area, or in connection with construction work of a public character, or in a remote and sparsely settled region. A modest number of frequencies have been made available pending further development of the service by its users.

The establishment of the Special Industrial Service has been attended by many problems, some of which are still unresolved. One of the general problems is how far the Commission should go, in view of the limited spectrum space, toward allowing all enterprises, whatever their character, to license their own private two-way mobile radio systems. Since common carrier radio service is available in most metropolitan areas on a subscription basis, it is felt that such service may provide a partial solution to unsatisfied private communi-

cation system demand. For this reason, the majority of retailing, servicing, and distributing organizations have been declared ineligible to license their own conventional mobile communications systems. The Commission will be faced with many border-line cases which may require some modification of the present rules.

#### 7. INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE

One of the most serious limiting factors in the use of radio transmitting and receiving equipment is the prevalence of electrical interference tending to prevent the satisfactory reception of transmitted signals. This interference may be in the form of atmospheric background noise, or it may appear as a result of spurious and harmonic emissions from various types of electrical and radio frequency operated equipment. Among the latter, the Commission has long recognized that certain radiating machines and apparatus not designed for communication purposes constitute the prime offenders, and often result in the serious disruption of authorized radio signals. On occasion this equipment has prevented the reception of intelligence vital to the safety of life and the safeguarding of property.

In order to minimize the actual or potential interference from special kinds of radiating equipment, the Commission adopted, effective June 30, 1947, part 18 of its rules relating to the Industrial, Scientific, and Medical Service. They are designed to govern the operation of medical diathermy, industrial heating, and miscellaneous apparatus.

Medical diathermy equipment includes any apparatus (other than low power intermittent surgical diathermy equipment) which generates radio frequency energy for therapeutic purposes. Industrial heating equipment refers to radio frequency apparatus used for heating operations in a manufacturing or production process. Miscellaneous equipment covers apparatus, other than diathermy or industrial heating equipment, in which the action of the energy emitted is directly upon the workload and does not involve the use of associated radio receiving equipment.

Part 18 also defines the extent to which harmonic and spurious radiations must be suppressed and stipulates specific frequency bands in which such equipment may operate. Subsequent to the adoption of this part, five additional frequency bands above 40 megacycles have been made available for this purpose but have not as yet been included in part 18.

Proceeding under these rules, the Commission has dealt with interference problems first on a request-for-cooperation basis, and later, in those cases where cooperation was not satisfactorily accomplished, by the use of enforcement provisions available to the Commission. In the administration of part 18, the Commission has been guided by a



desire to provide interference-free communications, and, on the other hand, to permit necessary use of medical diathermy, industrial heating, and miscellaneous equipment. In connection with older types of equipment, it has disseminated advice and suggestions regarding the possibility of modifying and shielding such equipment so that compliance might be secured. In the main, the Commission's efforts have been well received, and most cases arising in this connection have been settled to the satisfaction of all parties concerned.

With the spreading use of television over the past year, and the increased congestion in the spectrum, it is anticipated that a correspondingly greater number of these cases will be encountered. As of this time, an apparently satisfactory procedure has been set up regarding the processing of complaints of interference to radio and television reception; however, the future may present difficult situations capable of resolution only by the use of stronger measures available under the act.

In addition to its regulatory duties, the Commission has held conferences with representatives of industries engaged in the manufacture, sale or distribution of equipment regulated by part 18. On the whole, these conferences have resulted in a better understanding of the problems facing the Commission with regard to interference, and have engendered an increased desire on the part of manufacturers to produce equipment less likely to create the spurious and harmonic emissions. Pursuant to those sections of the rules providing that equipment manufactured by industry may be tested and "type approved" by the Commission's laboratory, approval certificates have been issued covering 44 machines and equipment found to be in compliance with the technical standards.

No amendments or changes of significance in part 18 have been proposed or adopted during the year. However, through rule-making procedure, the Commission has issued orders successively postponing the effective date of rules concerning radio-frequency operated welding equipment until January 30, 1950. An industry-wide group, with the cooperation of the Commission, has striven to eliminate interference resulting from the operation of such welders, and vacuum-type oscillator equipment has been developed to comply with the applicable rules. Two of these vacuum-type machines have been type approved under regulations governing miscellaneous equipment.

#### 8. EXPERIMENTAL RADIO SERVICES

The Communications Act requires the Commission to "study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest." Pursuant to this provision, rules governing the

Experimental Radio Services have been adopted, and licensing procedures established.

Designed to foster all types of experimentation in and relating to the radio art, part 5 of the rules became effective October 1, 1939, and has been modified from time to time as the exigencies of the experimental service have required. At the present time, class 1, class 2, and class 3 experimental radio stations provide the means for futhering any program of radio experimentation now licensed by the Commission. Of these categories, class 1 stations are for the use of persons or organizations desiring to pursue fundamental scientific research in the radio art; class 2 stations are directed toward the development of a new radio service or the expansion of an established service; class 3 stations may be authorized for the use of a citizen interested in conducting an experimental program on his own behalf for a limited time.

In addition to the above broad categories, two new subclasses of experimental stations have been established by part 2 of the rules. These classes covering the testing of equipment manufactured for export to a foreign country or for use by the United States Government. The former is classified as an "export," and the latter as a "contract" type of experimental station. Details covering these two types of stations are expected to be incorporated in part 5.

Most class 1 experimental stations are presently operated by equipment manufacturers and research and developmental organizations. Their experimentations involve not only the development of new uses of electronics but also the improvement of existing equipment. Considerable research was done during the past year on the development of equipment to operate on closer channel spacing to permit more efficient use of the radio spectrum. Other activities include improvement of equipment to diminish spurious and harmonic emissions, thereby reducing interference among the various radiocommunication systems; development of accurate radiolocation systems, for use in locating oil deposits; projects involving microwaves to further point-to-point communications, and aids to navigation involving radar and racon beacons. Another project involved the use of radio reflections in connection with meteor observations to determine their orbit of travel when penetrating the earth's atmosphere.

The Commission keeps abreast of the result of such authorized experimentation by means of conferences with licensees and through the examination of progress reports which they are required to submit.

Numerous requests are being received from various institutions and manufacturers for permission to train operators and technicians in the operation and maintenance of radar equipment. Normally the Commission does not license radio stations for training purposes only be-

cause, in most instances, adequate training can be given with dummy apparatus without the radiation of radio-frequency energy. However, adequate radar instructions cannot usually be obtained by such means and, accordingly, the Commission has authorized many schools, colleges, and manufacturers to use radar for training purposes.

In the past, specific frequencies above 25 megacycles were available for assignment to class 1 stations. As of February 1, 1949, these frequencies were no longer specifically allocated for class 1 experimental stations. In lieu thereof, part 2 of the rules provides for the use of frequencies in various bands throughout the spectrum, subject to the condition that interference is not caused to the service or stations to which these frequencies are regularly assigned. Under this new plan the Commission may not be able to assign specific frequencies to experimental stations for general use throughout the United States as has been the practice in the past, but may limit the use of a given frequency to a designated geographical area. Specific frequencies below 25 megacycles allocated for class 1 stations and listed in part 5 of the rules are not affected by this change.

Numerous class 1 authorizations have been issued to manufacturers and sales engineers for field intensity or coverage surveys in areas where radio communications are proposed. Results of such surveys provide valuable information for choosing the proper operating frequencies, power, emission, and antenna location for best performance.

Applications for class 2 experimental stations usually involve proposals for the establishment of new services which are not provided for in the regular service or are directed toward the development of some phase of an established service. The number of class 2 licensees has diminished in view of the new services which have been established on a regular basis. These include part of the Land Transportation and the Industrial services.

Because of the limited type of experimentation permitted by class 3 stations, the Commission receives few requests for such operations. Most types of experimentation permitted under the class 3 experimental rules may also be conducted under a class 1 authorization or under the Commission's rules governing the Amateur Radio Service.

Steps and studies looking toward a needed revision of part 5 have been initiated in the last year. It is expected that the additional necessary rule-making procedure will be completed in the coming year.

## 9. LOW-POWER RADIO DEVICES

Recognizing the necessity for establishing a minimum field strength figure, below which it would not require the use of radio frequency emissions to be licensed, the Commission in 1938 undertook studies resulting in the subsequent adoption of the so-called low-power rules,

presently sections 15.1 to 15.4 of the regulations. These rules provide that radio transmitters and other radiating devices, operating with a power below the standard set by these low-power rules, need not be licensed by the Commission.

Pursuant to the provisions of these sections, considerable use has been made of the spectrum, and particularly that portion now occupied by the AM broadcast band, by low-power transmitting apparatus ostensibly designed to fall within the minimum field strength standards set out in part 15. Illustrative of these uses are college campus low-powered broadcast stations, employing "carrier current" or space radiation techniques for the propagation of programs essentially broadcast in nature, industrial signalling and communication devices using carrier current techniques and employed for electrical power switching, warning, or voice transmissions; also, space radiating devices such as radio-operated baby minders, garage door openers, model aeroplane control devices, etc.

The simplicity of operating radio transmitting devices without a license or code test from the Commission has proved of interest to many persons. As a result, the Commission has received considerable correspondence regarding low-power equipment purportedly operating under part 15. In large measure, however, equipment intended to operate under these rules has proved incapable of compliance with the maximum field strength permitted. College broadcasting, in particular, has grown to such proportions that a careful examination of the problems created by such operation is required.

Accordingly, a notice of proposed rule making has been published, and comments invited regarding suggested amendments to part 15. While the Commission is cooperating with industry and users in an effort to secure all available information and data regarding the various types of low-power equipments and systems presently in operation, it is apparent that before a solution to the ramified low-power problem can be found, further intensive study by all interested groups will be required.

## 10. STATISTICS

### AUTHORIZATIONS

Authorizations in the safety and special radio services (exclusive of amateurs, citizens and special aircraft operator authorizations, which are treated in a separate chapter) exceeded 61,000 at the close of the year. This is an increase of nearly 14,000 since the previous report. Figures for different classes of these nonbroadcast services are shown in the following table:

Class of station	1948	1949	Increase
<b>Aeronautical:</b>			
Aircraft.....	17,736	23,723	5,987
Ground.....	3,122	3,504	382
<b>Total.....</b>	<b>20,858</b>	<b>27,227</b>	<b>6,369</b>
<b>Marine:</b>			
Ship.....	13,720	18,140	4,420
Coastal and Marine Relay.....	148	136	(-12)
Alaskan Coastal.....	277	302	25
Alaskan Fixed Public.....	412	480	68
Other.....	467	1,946	1,479
<b>Total.....</b>	<b>15,024</b>	<b>20,004</b>	<b>4,980</b>
<b>Public safety:</b>			
Police.....	4,137	4,759	622
Fire.....	85	124	39
Forestry.....	461	565	104
Highway maintenance.....	126	165	39
Special emergency.....	94	87	(-7)
<b>Total.....</b>	<b>4,903</b>	<b>5,700</b>	<b>797</b>
<b>Industrial:</b>			
Power.....	1,656	2,712	1,056
Petroleum.....	412	802	390
Forest products.....	32	144	112
Other.....	755	1,608	(-147)
<b>Total.....</b>	<b>2,855</b>	<b>4,266</b>	<b>1,411</b>
<b>Land transportation:</b>			
Railroad.....	204	334	130
Transit utility.....	77	80	3
Buses, trucks, auto emergency.....	24	30	4
Taxicabs.....	2,817	3,144	327
<b>Total.....</b>	<b>3,122</b>	<b>3,588</b>	<b>466</b>
<b>Experimental:</b>			
Experimental.....	527	455	(-72)
Miscellaneous.....	77	46	(-31)
<b>Total.....</b>	<b>604</b>	<b>501</b>	<b>(-103)</b>
<b>Grand total.....</b>	<b>47,366</b>	<b>61,286</b>	<b>13,920</b>

<sup>1</sup> Includes 863 ship radar.

<sup>2</sup> Includes 571 special industrial, 19 relay press, 15 motion picture, and 3 low-power industrial.

<sup>3</sup> Includes 20 buses, 8 trucks, and 2 auto emergency.

The foregoing statistics do not include associated mobile units. Mobile transmitters for the calendar year 1948 exceeded 200,000 in the following categories:

Aeronautical.....	24,695	Railroad.....	1,850
Marine.....	17,414	Transit utility.....	1,047
Police.....	43,314	Industrial.....	27,774
Fire.....	2,524	Experimental.....	74,649
Forestry.....	7,128		
Highway maintenance.....	381	<b>Total.....</b>	<b>201,212</b>
Special emergency.....	436		

Class 2 experimental stations include taxicabs, buses, and trucks which, on January 1, 1949, numbered more than 72,000:

Taxicabs.....	46,085	Trucks and buses.....	668
Limited common carrier.....	8,441	Industrial.....	68
Miscellaneous common carrier.....	1,370	Other.....	929
Common carrier highway.....	5,480		
Common carrier urban.....	9,442	<b>Total.....</b>	<b>72,483</b>

## APPLICATIONS

More than 52,000 applications were received during the year in the safety and special services previously mentioned. This was within 5,000 of the previous year's figure. Including applications pending at the close of fiscal 1948, the number disposed of in 1949 exceeded 53,000 as compared with about 35,500 disposed of in 1948. A comparison of such applications for the past 2 years follows:

Class of station	1948	1949	Increase or decrease
<b>Aeronautical:</b>			
Aircraft.....	19,021	13,524	(-5,497)
Ground.....	3,303	4,300	997
Total.....	22,324	17,824	(-4,500)
<b>Marine:</b>			
Ship.....	14,183	15,249	1,066
Coastal and marine relay.....	154	297	143
Alaskan coastal.....	492	487	(-5)
Alaskan fixed public.....	684	599	(-85)
Other.....	812	1,111	299
Total.....	16,325	17,743	1,418
<b>Public Safety:</b>			
Police.....	5,911	4,609	(-1,302)
Fire.....	182	254	72
Forestry.....	727	611	(-116)
Highway maintenance.....	147	243	96
Special emergency.....	58	110	52
Total.....	7,025	5,827	(-1,198)
<b>Industrial:</b>			
Power.....	2,389	3,167	778
Petroleum.....	394	1,166	772
Forest products.....	88	269	181
Other.....	1,463	1,249	(-214)
Total.....	4,334	5,851	1,517
<b>Land Transportation:</b>			
Railroad.....	296	401	105
Transit utility.....	173	60	(-113)
Buses, trucks, auto emergency.....	57	209	152
Taxicab.....	5,425	3,667	(-1,758)
Total.....	5,951	4,337	(-1,614)
<b>Experimental:</b>			
Experimental.....	947	549	(-398)
Miscellaneous.....	279	105	(-174)
Total.....	1,226	654	(-572)
<b>Grand total.....</b>	<b>57,185</b>	<b>52,536</b>	<b>(-4,649)</b>

<sup>1</sup> Includes 966 ship radar.

<sup>2</sup> Includes 40 relay press, 30 motion picture, 50 low-power industrial, and 1,129 special industrial.

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## CHAPTER V. COMMON CARRIERS

1. COMMON CARRIER REGULATION
  2. TELEPHONE (WIRE AND RADIO)
  3. TELEGRAPH (WIRE, CABLE, AND RADIO)
  4. STATISTICS
- 
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### 1. COMMON CARRIER REGULATION

The Commission regulates interstate and foreign communication by telephone and telegraph, whether by wire or radio. Communication which is purely intrastate in character is not, in general, subject to Commission jurisdiction.

Provisions of the Communications Act affecting common carriers reflect congressional policy that the public interest in adequate public communications services and reasonable rates is to be protected and promoted by Federal regulation.

Among the regulatory provisions of the act is the requirement that every subject common carrier furnish service at reasonable charges upon reasonable request. No carrier may construct or acquire interstate facilities, or curtail or discontinue service, without Commission approval. All charges, practices, classifications, and regulations in connection with interstate and foreign communication service must be just and reasonable and nondiscriminatory. To implement this requirement, the common carriers concerned file tariff schedules with the Commission, and those schedules are subject to review and regulation by the Commission.

The Commission regulates rates for interstate telephone and telegraph services, as well as rates for service between the United States and foreign points. At the same time, it reviews the adequacy and quality of these services.

To aid its regulation of rates and services, the Commission is empowered to prescribe the forms of records and accounts kept by the carriers. Under this authority, it has established uniform systems of accounts for them to follow. Commission regulation in this respect includes the establishment and maintenance of original cost accounting, continuing property records, pension cost records, and depreciation records.

The Commission regulates the interlocking of officers and directors of common carriers, it being unlawful for any person to hold office in more than one carrier unless specifically authorized by the Commission. The latter also passes upon applications of domestic telephone and telegraph carriers for authority to merge or consolidate.

The Commission licenses the operation of common carrier radio stations under provisions of the act which require the licensing of all radio transmitters.

The Commission receives all applications to land or operate submarine cables connecting the United States with other countries, and advises the President with respect to the granting of such licenses, after receiving the approval of the Secretary of State.

## 2. TELEPHONE (WIRE AND RADIO)

### GENERAL

The telephone industry continued the unprecedented expansion it has experienced the past several years. The addition of facilities at an average rate of more than 3 million dollars a day mentioned in last year's report continued at about the same rate in 1949. Despite this growth, the Bell system alone, which has about 82 percent of the total telephones in service, had unfilled orders for slightly over 1 million telephones on June 30, 1949, compared with unfilled orders for the entire industry of 1½ million telephones a year earlier. Over 39 million telephones were in service in this country, representing an increase of about 3 million in the past year. The plant investment of the Bell system as of June 1949 amounted to over 9 billion dollars while that of the telephone industry as a whole was estimated to be around 10 billion dollars.

The volume of telephone business kept pace with the growth of facilities and ran about 10 percent ahead of last year. The Bell system handled about 40½ billion exchange conversations and nearly 2 billion toll conversations during the year. The volume of calls reached a new high of 177 million a day.

Similar expansion continued in related telephone services. Revenues for teletypewriter exchange service and private line service of the Bell system, the principal activities other than message telephone service, likewise ran more than 10 percent ahead of last year and at the rate of roughly 80 million dollars annually. Television program transmission service, which was established on a commercial basis effective May 1, 1948, produced revenues at a rate approaching 2½ million dollars a year and present indications are that the full demand for facilities to carry television programs will not be met for several years.



## DOMESTIC TELEPHONE SERVICES

*Construction of wire facilities.*—The telephone industry requested Commission authority to construct \$38,638,919 in interstate wire and cable facilities. A number of the construction projects authorized in fiscal years 1947 and 1948 were still under construction during 1949. In addition to the wire construction, the Bell system has been authorized to provide a large number of intercity communication channels by microwave radio relay construction. There were 24 applications carried over from the preceding year and 318 applications received during the year requesting authority to construct, acquire, extend and lease wire facilities. The Commission approved 333 of these, including 313 for construction, and permitted withdrawal of three. The American Telephone & Telegraph Co. and certain associated companies filed a blanket application covering most of the Long Lines Department's construction to be undertaken during the calendar year 1949, which amounted to \$10,730,000. The following table sets forth the amount of wire and cable construction authorized by the Commission during the past 6 years:

Fiscal year	Projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944	121	\$9,582,239	574.8	0	7,968
1945	210	70,091,140	2,378.3	7,902	2,963
1946	239	78,896,450	3,193.8	16,580	12,261
1947	289	126,325,771	5,587.7	23,490	15,976
1948	348	127,162,499	2,637.5	46,080	16,373
1949	313	38,638,919	1,370.5	1,323	7,278

About 1,800,000 toll message circuit miles were added during the 1949 fiscal year to the Bell system facilities, an increase of 10.8 percent over circuit mileage in service at the beginning of the year. As during recent years, about 90 percent of the channels added were provided by carrier systems. The Bell system requested authority to use only about 15,000 channel miles of emergency Type EB carrier systems as compared to 155,000 requested during fiscal 1948.

*Planned wire projects.*—The American Telephone & Telegraph Co.'s program, which called for a total of 12,000 miles of coaxial cables to be constructed by 1950, has been modified due to the planned installation of microwave radio relay systems between various cities. The Bell system applied for only 331 miles of coaxial cable to be constructed during the past fiscal year at an estimated cost of \$9,643,000. Thus, the Commission has authorized a total of 8,028 miles of coaxial cables. Coaxial facilities, as well as microwave relay systems, are designed to transmit television programs and other communication services.

*Television program networks.*—The Bell system was granted authority to construct five additional television circuits on its coaxial cables, one channel between New York and Washington, two channels between New York and Philadelphia, and two channels between Philadelphia and Chicago. The A. T. & T. received authority to construct four additional coaxial cable television circuits—three channels between New York and Albany, and one channel between St. Louis and Memphis. Additional television terminals will be installed: four transmitting and two receiving at New York, one transmitting and two receiving at Philadelphia, one receiving at Baltimore, one transmitting and one receiving at Washington, two receiving each at Lancaster, Pittsburgh, Cleveland, and Toledo; three receiving and two transmitting at Dayton, two receiving at Erie, two transmitting and three receiving at Albany, and two receiving at Memphis.

On January 11, 1949, the New York–Boston–Washington–Richmond coaxial television network was interconnected with the midwestern network comprising Buffalo, Cleveland, Toledo, Detroit, Milwaukee, Chicago, and St. Louis.

*Microwave relay systems.*—Toward the end of the fiscal year, the A. T. & T. applied for six new microwave intercity relay systems to be constructed between Albany and Syracuse, Los Angeles and San Francisco, Richmond and Norfolk, Madison and Milwaukee, Pittsburgh and Chicago, and Chicago and Des Moines. The latter two systems are westward links in the microwave chain originating in New York City which is planned eventually to reach the west coast. These microwave systems will carry television programs besides providing communications channels for other telephone services. The A. T. & T.'s New York to Boston microwave system was in regular service throughout the year carrying television programs and, when necessary to accommodate traffic volume, was used also for long distance telephone service.

*Speed of service.*—The average time required to complete a toll board call on the Bell system was 1.7 minutes during June 1949 as compared with 2.1 minutes in June 1948. This improvement results from the increase in number of toll channels, toll board facilities, more efficient personnel and toll line dialing by the operators. The Bell system objective was an average speed of service of 2 minutes, but with toll line dialing it is expected that the average speed will be reduced to about 1 minute.

*Telephone service.*—The telephone companies have continued the rapid conversion from manual to dial operations of their exchanges throughout the country. In addition, a toll dialing network has been established centering on the toll crossbar offices in New York, Chicago and Cleveland. It includes many places not previously arranged for

toll dialing and also ties together the small, isolated dialing networks already operating in several states. Toll operators in this network now can dial numbers in nearly 500 communities faster and more accurately than before, and without the assistance of operators in the distant city or at intermediate offices. Also, an increasing number of cities now have equipment by which the customer can dial calls to nearby cities, in the same manner as he dials local calls.

*Cable landing licenses.*—The Commission received one request and had two requests on hand for a Presidential license for cable landing operations. Authority to construct a second submarine cable containing 30 pairs of conductors at Point Roberts, Wash., was signed by the President on November 22, 1948 upon recommendation of the Commission. Requests for authority to construct a telephone line across the Rio Grande River near Presidio, Tex., and to land and operate two additional submarine cables at Key West, Fla., were pending at the end of the fiscal year.

*Discontinuance, reduction or impairment of service.*—The Commission received 16 applications for authority to discontinue telephone service and had 4 such applications on hand at the beginning of the year, making a total of 20. It granted 17 applications and 2 others were withdrawn. Fourteen of these applications were filed by the Western Union Telegraph Co. to discontinue telephone service to cities connected to its long distance telephone facilities, one of which was withdrawn. There were few subscribers, if any, to Western Union's telephone service in each city involved in the authorized discontinuance, and in each case the telephone companies were providing adequate service. Five applications were filed by telephone companies to discontinue exchange or toll service in cases where another carrier planned to provide the same service. One of these applications was withdrawn.

A joint application was filed by Western Union, to discontinue its public message toll, private line, and program telephone service; by the American Telephone & Telegraph Co. and certain Bell system companies, for authority to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada, for authority to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada. Hearing upon this joint application was scheduled for October 4, 1949.

By a public notice dated June 1, 1949, the Commission invited interested persons to submit comments and proposals by July 18, 1949 on the matter of whether the Commission should promulgate rules governing the protection of employees who are adversely affected by discontinuances, reductions, or impairment of telephone or telegraph

service which are authorized under section 214 of the Communications Act.

*Rural telephone service.*—More than 330,000 Bell telephones were installed in rural areas during fiscal 1949. The total number of rural telephones connected to the Bell system as of June 30, 1949 was approximately 2,400,000, excluding rural telephones taken over into the base rate areas.

*New developments* include the "transitor," which replaces the vacuum tube in a number of cases. It is so simple, so tiny and so economical in using electrical energy that it is being tested for many uses in the telephone industry. The "Alpeth" cable, which employs a thin layer of aluminum covered with a layer of polyethylene plastic, is replacing the lead covered type of cable. Western Electric will soon start producing a new handset telephone having improved hearing and speaking qualities, an easier to read dial, and a bell that the customer can adjust for volume. The Type N1 carrier system for cable, developed by the Bell Telephone laboratories, is being tested in general service. This carrier system will play an important part in economically providing facilities in a range of distances as low as 15 or 20 miles, which is not now practical with types of cable carrier systems in use. The N1 system will provide 12 telephone channels and will operate on a four-wire basis over two pairs in a single cable. It is expected to be generally available by 1951. A new electron tube has been developed which will improve the microwave radio relay system and will increase the carrying capacity for speech and television channels. Synthetic quartz crystals are being used in place of the natural quartz, which have been limited, thus increasing the number of carrier systems available for communication service.

*Foreign attachment cases.*—A complaint of *Hush-A-Phone Corp. et al. v. American Telephone & Telegraph Co. et al.* (Docket 9189) attacks as unlawful the so-called foreign attachment provisions in the defendants' tariffs insofar as such tariffs are construed by the telephone companies to prohibit the subscriber's use of Hush-A-Phone devices in interstate and foreign telephone service. Hearing on the complaint was scheduled for August 23, 1949.

Complaint of *Walter S. Berkman et al. v. American Telephone & Telegraph Co. et al.* (Docket 9100) requested the Commission to require the defendant telephone companies to furnish a call waiting indicator device which would provide a visual or other signal when a subscriber's telephone is in use to indicate that another call was coming in on the line at the same time. The complainants' request for a hearing was denied, and the complaint dismissed March 23, 1949. A petition for rehearing and reconsideration was pending at the close of the fiscal year.

*Mobile radiotelephone service.*—Common carrier mobile radiotelephone service, whereby communication service for hire is provided primarily between fixed points and mobile units on land, continued its tremendous expansion as an experimental service. Service furnished by the telephone companies, between mobile telephones and the regular land-line telephone systems, was added in 39 cities, making a total of 146 cities so served. Likewise, the competitive mobile radiotelephone service furnished by nontelephone company carriers, which affords a telephone service between mobile units and radio terminals but does not connect with the land-line telephone systems, was being furnished in 64 cities and applications have been approved to provide such service in 58 additional cities.

In some major cities the demands for this service continued to exceed the capacities of the available facilities and the carriers reported large backlogs of unfilled orders for mobile telephone service. Moreover, in areas such as New York and Los Angeles, where several miscellaneous or nontelephone company carriers are providing a general mobile radiotelephone service on the same pair of frequencies, the problem of frequency interference developed into acute proportions. However, the Commission is endeavoring to effect a solution to these problems, as described elsewhere in this report.

The most significant development in the general mobile radio service during the year was the adoption by the Commission of its report and order in Dockets 8658 et al., dated April 27, 1949, establishing, effective July 1, 1949, rules for the Domestic Public Land Mobile Services. The new rules establish the common carrier general mobile radio service on a regular basis. Their promulgation represented the culmination of an extended rule-making process which included extensive oral argument October 6 to 15, 1948. The Commission received over 200 written comments on the rule-proposals, some 135 persons presented oral argument, and the transcript of the proceeding aggregated 1,913 pages.

It is expected that the new rules will have the effect of stabilizing operations and encouraging long-range planning. They recognize two general categories of licensees: (1) the conventional telephone company, and (2) the miscellaneous, or nontelephone company carriers. The new table of frequency allocations provides these common carrier services with 24 frequencies in the 30–44 megacycle range and 20 in the 152–162 megacycle range.

The Commission also approved a rule which provides that new subscribers to public mobile radiotelephone services shall be furnished service in accordance with designated categories of priority. This is intended to achieve a result whereby essential users will be able to ob-

tain service in preference to nonessential users, thus assuring that this valuable radio facility will be used in the public interest.

With a view to the possibility of making further provision for the expansion of this service, the Commission will consider, in the proceedings having to do with the establishment of UHF television (Dockets 8976 et al.), the question as to whether an allocation of 30 megacycles of frequency space can and should be made between 470 and 500 megacycles in order to provide for the development of a wide-band multichannel system of operation. Such a development, if achieved, might be capable of providing an adequate general mobile radio service for the foreseeable future.

Provision has been made for the operation of the "telecar" service, as developed experimentally in Baltimore by Western Union. Four frequencies in the 35-44 megacycle band are allocated for this service, which involves the pickup and delivery of telegraph messages through the use of cars equipped with facsimile equipment, by means of which the messages are transmitted to and received from the central office.

*Ship and aircraft service.*—A new coastal harbor radiotelephone station was established at Jacksonville, Fla., on January 17, 1949, by Southern Bell Telephone and Telegraph Company, in order to give more adequate service to vessels in the coastal area between Charleston, S. C., and Miami, Fla. Charges for message toll telephone service between land points and vessels or aircraft via the new station are the same as via other coastal harbor stations of the Bell system.

The number of aircraft affording public radiotelephone and telegraph service to passengers aboard such craft through coastal stations continued to increase.

*Short distance radiotelephone service.*—The use of very high frequency radio for telephone service, particularly in inaccessible areas where wire line costs would be prohibitive, continued to attract the interest of rural telephone users. The operations are presently conducted experimentally, but rules to place this service on a regular basis were in preparation.

*Coastal and Alaskan service.*—Coastal harbor, coastal telephone, and Alaskan radio communications, though largely authorized on a common carrier basis, are discussed in "Safety and Special Services" because of their close relationship to radio aids to the safety of life and property.

#### INTERNATIONAL TELEPHONE SERVICE

*Message toll telephone service.*—Message toll telephone service was reestablished with 4 countries where it had been suspended during the war and made available with 3 other countries for the first time. At the close of the fiscal year radiotelephone message toll service was in effect with 81 foreign countries outside North America. Of this

number 53 had direct circuits. Negotiations were continuing toward reestablishment of service with points formerly served, as well as with new points. The rates for service established during the year are in conformity with the rate pattern outlined in the Commission's Twelfth Annual Report. The volume of message traffic with overseas points amounted to about 580,000 calls in 1948, a slight increase over the previous year. Private line service is available to 7 foreign countries. Overseas program transmission service is furnished by the Bell companies to 56 foreign countries.

#### RATES AND TARIFFS

*Rate schedules.*—At the close of the year 183 telephone carriers had tariffs and concurrences on file with the Commission. During the year they filed a total of 19,204 tariff publications establishing or changing rates, regulations, practices, and classifications of service, including concurrences. The number of carriers subject to the Commission's tariff regulations fluctuates, principally as a result of smaller carriers changing their operating arrangements by either adding or selling interstate facilities. Each tariff publication is processed by the staff to determine whether its provisions comply with the Communications Act and with the rules established by the Commission.

*Special permissions.*—Twenty-seven applications for special permission to make changes in the tariffs, or to file new tariffs to become effective on less than statutory notice, or involving waiver of certain rule requirements, were received during the year. Of these, 26 were granted and 1 was retired to the files without action at the applicant's request.

*Unlawful use of telephone facilities.*—The Commission received requests from certain State regulatory authorities to investigate the extent to which interstate and foreign communication facilities are being used for purposes that are in violation of State laws, with a view to prohibiting such use insofar as interstate and foreign communications are concerned. The Commission has not deemed an investigation necessary in view of the fact that tariff regulations of Western Union already on file with the Commission and applicable to leased wire services appear to provide an effective means whereby State law enforcement authorities can bring about discontinuance of telegraph service to persons using such services for illegal purposes. Although the Bell system companies had not filed specific tariff regulations on the subject, it was understood that, as a matter of policy, the companies had instructed their personnel not to furnish interstate and foreign communication service to persons using the same for unlawful purposes. By letter dated January 6, 1949, the Commission requested the Bell companies to file appropriate tariff regulations

with the Commission which would reflect the policies and practices of these companies concerning this matter insofar as interstate and foreign communication service is involved.

Such provisions were filed by most of the companies to become effective during the latter part of the fiscal year. In general, the tariffs provide that telephone service will be furnished subject to the condition that it will not be used for an unlawful purpose and, further, will not be furnished if any law enforcement agency acting within its jurisdiction advises the company that such service is being or will be used in violation of law. These provisions are similar to those incorporated in the telegraph company tariffs.

*Channels for TV program transmission.*—The Fourteenth Annual Report of the Commission referred to the events leading up to the investigation and hearing, instituted by the Commission on April 28, 1948 (Docket 8963) into the rates, regulations, practices, and services of A. T. & T. and Western Union in connection with the furnishing of intercity channels and facilities for the transmission of network television programs. One of the principal issues involved is the reasonableness of the restrictions adopted by the A. T. & T. regarding interconnection of its facilities with those of others. Hearings on this issue were held in the spring, fall, and winter of 1948, and decision was pending, with hearings on the remaining issues to be held, in the future.

*Studies of Long Lines Department operations.*—The Commission instituted a series of studies directed toward the development of a comprehensive report on the results of operations of the Long Lines Department of the American Telephone & Telegraph Co. These studies will cover all phases of the company's operations, including analyses of its plant investment, revenue and expense accounts, and will provide the Commission with a more adequate basis for determination of matters involving the earnings or revenue requirements of Long Lines.

*Separation of property, revenues and expenses.*—In cooperation with State regulatory commissions, the Commission continued its studies of the procedures used by the Bell system companies to separate telephone plant investment, expenses and revenues among exchange, intrastate toll, and interstate toll telephone services for rate-making purposes. (See Fourteenth Annual Report.) Methods and procedures for telephone separations have been the subject of formal proceedings before the Commission (Docket 6328), but decision will be withheld until additional experience has been gained in the use of these separation procedures. During the past year, studies of the division of revenues and application of the separation procedures have been made on a general basis for the industry, and specific de-



tailed studies of certain companies are in progress. In connection with the study of operating results of the Long Lines Department of A. T. & T., special attention is being given to the effects of the separation procedures upon the level of Long Lines earnings. The importance of this matter and the amount of work involved in these studies may be gauged by the fact that the entire industry investment of an estimated 10 billion dollars is subject to these apportionments, of which over 1.7 billion dollars is apportioned to interstate service, and approximately 600 million dollars annual revenues are derived from interstate services.

*Western Electric costs and prices review.*—It was noted in the Commission's Fourteenth Annual Report that the Western Electric Co., Inc., which serves as the manufacturing and supply department of the Bell system, furnishes nearly all of the telephone equipment, materials, and supplies to the Bell operating companies, and that the level of prices charged by Western Electric has a considerable impact on Bell telephone exchange, intrastate, and interstate toll rates. This impact has been intensified by the volume of Western Electric sales to Bell companies running at about a billion dollars a year since 1946, resulting from the very heavy construction program undertaken during the postwar years. A cooperative committee consisting of staff members of this Commission and State commissions, appointed January 1948, continued its studies of the operations of Western Electric. Particular attention is being given by the Commission to Western Electric's sales of equipment and services to the Long Lines Department of A. T. & T. as part of the aforementioned study of Long Lines operating results. It is significant that since the initiation of these studies, Western effected a net reduction in its prices amounting to about 77 million dollars and reduced on an annual basis its pension expenses by approximately 3 million dollars.

*State telephone rate cases.*—A large number of requests were received from State regulatory commissions as well as some municipalities for assistance in connection with intrastate telephone rate cases. Assistance was rendered, to the extent possible, and consistent with available staff personnel and budget, on problems of common concern to this Commission and state jurisdictions. In general, this assistance consisted of furnishing information with respect to such matters as depreciation rates and charges, pension accrual rates and costs, procedures concerning the separation of telephone plant, revenues and expenses between exchange, State, and intrastate services and license service fees paid by Bell companies to the parent company. In several cases, comprehensive studies were conducted in cooperation with state commissions and testimony presented by Commission staff mem-

bers concerning depreciation rates, pension costs, and license service fees.

*Depreciation.*—Depreciation expense is second only to salaries and wages in operating costs of telephone companies. Depreciation charges for 53 large domestic telephone carriers reporting to the Commission amounted to \$307,755,000 for the 12 months ending April 30, 1949, an increase of \$46,470,000 or 18 percent over charges for the previous 12-month period.

While the major part of this increase is directly attributable to the vast expansion in telephone plant at current high-cost levels, some contribution also results from the upward trend in annual depreciation rates for certain classes of telephone plant. This is due largely to the fact that, in efforts to reduce the backlog of unfilled orders for telephone service, the industry in many instances expanded existing facilities of old types pending the availability of modern and more adequate equipment. This is particularly true where manual switchboard installations are expanded pending conversion to dial operation. In fact, in many instances the depreciation rate proposed for manual central office equipment is found to be entirely responsible for the over-all increase in depreciation charges. Accordingly, arrangements have been made whereby telephone companies will file with the Commission annual data designed to facilitate effective regulation of depreciation rates for manual installations during the period of conversion to dial. Data so filed will be studied in the light of the companies' plant replacement and construction programs.

Investigation of depreciation rates and practices and studies concerning the reasonableness of proposed changes in rates were continued. Some of these investigations involved field studies at the locations of the companies' properties. Based on studies completed, the Commission, pursuant to the provisions of section 220 (b) of the Communications Act, prescribed depreciation rates for the Michigan Bell Telephone Co. and for each of the operating areas (nine States) served by the Southern Bell Telephone & Telegraph Co. The prescribed rates produced total depreciation charges about 10 percent below the charges resulting from the rates previously in use or proposed by the telephone companies. Looking toward fixing depreciation rates for other Bell companies, studies with respect to several companies are in progress. In general, these studies are conducted in cooperation with State regulatory commissions.

*Allocation of depreciation reserves of multistate company.*—From time to time State public utility regulatory and tax authorities request Commission assistance in connection with determining the depreciation reserves applicable to individual States in the case of multi-State telephone companies. At the request of the Southeastern

Association of Railroad and Utilities Commissioners, representing the States served by Southern Bell Telephone & Telegraph Co., joint studies undertaken in 1948 and nearing completion at the end of fiscal 1949, will provide data on the service life expectancies and salvage recoveries for the various classes of plant which are necessary for allocating the company's depreciation reserve to the various States on an equitable basis. It is planned that a report setting forth details of the study and results of the allocation will be prepared during fiscal 1950.

*Toll rate study.*—Widening disparities between the rates for interstate toll message service and the rates for comparable intrastate service have resulted from postwar increases in intrastate toll rates. The Commission and cooperating State commissions have undertaken a comprehensive study of the telephone toll rate structure. The study is designed to develop complete data on all technical and economic phases of both intrastate and interstate toll services.

#### OTHER REGULATORY MATTERS

*Uniform systems of accounts.*—The Commission's uniform systems of accounts for telephone companies (part 31 for class A and class B telephone companies and part 33 for class C telephone companies, of the rules and regulations) were revised and reissued during the year. The revised issues included all separately adopted amendments since the last previous issues—August 1, 1946, and January 1, 1939, respectively—with appendices which set forth the several accounting interpretations adopted by the Commission. Studies are being continued on matters directly related to the uniform systems of accounts, including determinations of noncompliance by carriers, coordination of the regulations with requirements of the industry and other regulatory authorities, preparation of necessary changes in the regulations and interpretations of the regulations.

*Financing and refinancing.*—Issuance of new securities by telephone companies continued in substantial volume, although somewhat less than the previous year and a definite downward trend was noted during the first five months of the current calendar year. In addition to collaborating with the Securities and Exchange Commission by examining prospectuses filed with that Commission in the light of accounting and financial data on file with this Commission, other related matters of accounting were the subject of further study after the securities were authorized for issuance.

*Pensions and relief.*—Because of increases in the number of employees, raises in wages, and liberalization of benefits, the relief and pension costs of telephone carriers continued upward, reaching approximately 130 million dollars during the calendar year 1948 for the

Bell system alone, not including social security taxes amounting approximately to an additional 25 million dollars. Problems of pension accounting, therefore, continue to be of great significance, particularly in regard to the reasonableness of costs, the methods of determining the costs, and the accounting for these costs. During the past fiscal year an extensive analysis of the Bell system's actuarial methods was completed and studies were made with respect to the pension accrual rates and resulting charges to operating expenses of both Bell and independent companies. In these studies attention was also directed to the extent to which current payments into pension funds relate to past service of employees. Many inquiries relative to these pension problems were received from State commissions and labor groups.

*Preservation of records.*—A proposed complete revision of the Commission's rules for the preservation of records by telephone carriers, required in the exercise of regulatory functions, embracing modernized techniques such as microfilming, indexing for ready reference, and prescribing periods of retention based upon studies of the usage of records, is being developed. It has occasioned studies of appropriate descriptions and periods of retention of more than 600 individual items. Advice was sought and received from the Bureau of the Budget, the National Archives, the Bureau of Standards, manufacturers of microfilm and equipment, and the State commissions, as well as the several Federal regulatory agencies having similar problems.

*New types of plant and services.*—The development of new types of plant and services such as microwave radio relay systems, telephone recording devices, mobile radiotelephone services, and others heretofore mentioned, require studies to determine the adequacy of the records and accounts maintained by the carriers with respect to such plant and services. During the year the Bell system instituted procedures and opened subaccounts to provide the information, with respect to such activities, required for the Commission's regulatory functions.

*Restatement of plant accounts on basis of original cost.*—The Bell system companies have substantially completed, and the Commission has analyzed and approved with certain qualifications, restatements of Bell plant accounts on the basis of original cost with respect to those acquisitions of plant made since 1913 where the consideration was more than \$25,000. During fiscal 1949 a comprehensive analysis was made of reductions in the net book cost through charges to income or surplus, by telephone companies, including independents. The aggregate of these charges since the effective date of the present systems of accounts approximates 43 million dollars. This figure includes certain amounts, not previously mentioned in prior reports, which came to light as a result of the recent analysis. There are pending

several cases where adjustments have not been made because past accounting is in controversy. Current acquisitions continued to be dealt with in accordance with the provisions of the uniform system of accounts.

*Continuing property records.*—Cooperative activity with State regulatory authorities and representatives of the telephone industry continued, with the objective of providing regulations that facilitate the refinement and clarification of continuing property record procedures and to enable the achievement of uniformity throughout the industry in the form and usage of basic record data underlying the continuing property records. Field studies by the Bell companies of a proposed new method for determining average unit costs for retirement purposes were discontinued after somewhat less than 2 years' duration when results revealed that little significant economy or material improvement in accuracy over methods previously used would be gained. The committee of State and Federal representatives that had been formed to evaluate, in cooperation with industry representatives, the field studies referred to, continued to function by considering proposals to revise the Commission's rules relating to this matter. A detailed study of the continuing property records of one large telephone company was completed during the year and general studies of continuing property records of other companies were carried forward. Efforts were continued to obtain full compliance of independent telephone companies with the continuing property record regulations.

### 3. TELEGRAPH (WIRE, CABLE, AND RADIO)

#### DOMESTIC SERVICE AND FACILITIES

*Western Union modernization program.*—Substantial progress was made during the year by the Western Union Telegraph Co. in its 72 million dollar mechanization program. The principal essential of the plan is the substitution of about 140 manual relay locations with 15 high-speed reperforator-switching relay centers. Seven of these were completed and apply the principle of selective through-switching techniques for automatically and rapidly advancing telegrams from the originating office to a distant city without intermediate attention by personnel. The number of reperforator-switching centers in operation was 14. Upon the completion of changes in traffic patterns involved in this highly integrated system, it is expected that the speed and quality of telegraph service will improve.

Western Union is continuing the development of the facsimile process for terminal handlings of telegrams. One type of instrument is the "Desk-Fax", which is placed on the customer's desk for the transmission of messages in picture form between the customer and the company's office. Nearly 2,000 of these were being installed in 8

cities. Another type called "Telefax", designed primarily for hotels, office buildings, and apartment houses, was in experimental service at two Washington hotels.

*Construction of wire facilities.*—The year brought 52 requests covering wire telegraph construction and extensions. Four such applications were carried over from the preceding year, making a total to be accounted for of 56. Fifty-four applications were granted. They covered the construction of 41,926 telegraph channel miles at a cost of \$372,600 and the lease of 2,988,550 telegraph channel miles at an annual rental of \$2,966,505, and terminal equipment costing \$11,446,240.

*Speed of service.*—The origin to destination speed of service (the interval from the time a message is filed to the time it is delivered, or first attempt) during the year averaged 41 minutes where delivery was effected by telephone, 39 minutes in the case of delivery by customer teleprinter tieline, and 47 minutes for delivery by messenger. The time required to relay messages through the 25 largest Western Union offices ranged from 14.1 to 9.9 minutes—the average being 11½ minutes, or 1 minute slower than in the preceding 12-month period.

*Microwave relay systems.*—Western Union continued its experimental use of the microwave radio triangle connecting New York, Washington, and Pittsburgh. All three legs of the triangle were in limited telegraph service carrying traffic formerly routed over wire-line facilities. The microwave circuits continue to prove satisfactory from a technical standpoint and appear to offer advantages from the operating, maintenance, and economic standpoints, particularly on circuits carrying heavy traffic volumes.

During the year Western Union established a microwave circuit for transmitting television programs between New York and Philadelphia. The circuit was not used commercially because interconnection with telephone company facilities at New York and Philadelphia was not permitted by the Bell system, and it was, therefore, impossible for Western Union to supply network service to TV broadcasters. The interconnection problem is involved in the proceedings in Docket 8963 which is discussed in connection with Domestic Telephone Service—Rates and Tariffs.

*Discontinuance or reduction of telegraph service.*—During the year, 942 applications for reduction in business hours, or closure of public telegraph offices, were filed. In addition, 227 applications were pending at the beginning of the year. Most of these requests were made by Western Union. The Commission acted favorably on 928 requests and denied 3. Twenty-four were withdrawn and 214 were pending at the year's close. In most cases where hours were reduced or offices closed, alternate service was made available.

In connection with applications filed by common carriers for authority under section 214 of the Communications Act to discontinue,

reduce, or impair telephone or telegraph service, the Commission is considering whether it should adopt rules and regulations relating to the protection of employees who may be adversely affected by curtailment of service. (See Domestic Telephone Service—Discontinuance, etc., of Service.)

The Pacific Telephone & Telegraph Co. and Bell Telephone Co. of Nevada requested authority to discontinue all message telegraph service rendered by them in the States of California, Oregon, Washington, Idaho, and Nevada. This application is joined with an application of Western Union to discontinue its telephone service, and an application of certain Bell system companies to acquire Western Union's telephone business and certain telephone property. (See Domestic Telephone Service—Discontinuance, etc., of Service.)

On May 16, 1949, the Commission terminated the proceeding in Docket 7982, in which an investigation was conducted in the early part of 1947 of the over-all plans, policies, and standards of Western Union with respect to the discontinuance, reduction, or impairment of telegraph service. The purpose of the proceeding was accomplished in enabling the Commission to obtain certain information material to the performance of its duties under section 214 of the Communications Act with respect to service curtailment applications filed by Western Union.

The Commission, on April 20, 1949, adopted a proposed report in Docket 8088 proposing to grant Western Union's application to close a branch office in Dallas, Tex.

Following informal proceedings, referred to in the Fourteenth Annual Report, to determine the maximum size of Western Union's company-operated telegraph offices which, under normal circumstances, might be considered for conversion to teleprinter agency offices operated by persons engaged in nontelegraphic business, the Commission approved the standard that conversion to agencies of offices whose daily average traffic volume exceeds 46 messages is considered justified only by evidence of exceptional circumstances, but that this does not mean the Commission will necessarily authorize any proposed conversion to agency operation where traffic volume is less than the suggested traffic maximum. The applicant will be expected to make a satisfactory showing in each instance that, under the proposed agency operation, adequate telegraph service will be available to the particular community.

#### INTERNATIONAL TELEGRAPH SERVICE

*Circuits.*—Direct radiotelegraph communication was established between the United States and four countries—Saudi Arabia, Pakistan, Union of South Africa, and Formosa. Circuits via the Tangier, North Africa, relay stations of RCA Communications, Inc., and

Mackay Radio & Telegraph Co., Inc., were established to Pakistan and Saudi Arabia by those companies respectively, as well as to six other countries previously served by direct operations only.

Due to the current unsettled conditions in China, communication with Nanking, the former Nationalist capital, was discontinued by United States carriers. However, communication with Shanghai continued. To insure continuation of service to those areas of China remaining under Nationalist control, United States radiotelegraph carriers were authorized to communicate with Canton, Chungking, and Taipei, Formosa. Direct circuits to Brazzaville, French Equatorial Africa, and to Tananarive, Madagascar, were closed at the request of the French Administration of Posts, Telephones, and Telegraphs, which indicated a desire to return to the prewar practice of handling all communications to its outlying territories and possessions through Paris.

A total of 69 foreign countries and United States territorial possessions are now served by radiotelegraph circuits from the United States and most other points in the world are served through connections with the facilities of foreign carriers. Program material originating with the United Nations and the Department of State is being transmitted by United States radiotelegraph carriers to approximately 30 countries throughout the world.

*Frequencies.*—All but three of the frequencies relinquished by licensees in the fixed public service for use by the military during the war have now been returned to that service and, in addition, many new frequency assignments were made during the year. New frequency assignments are being registered with the Berne Bureau. The present crowded condition of the radio frequency spectrum makes it necessary for the majority of new assignments to be on a shared basis. Effective May 1, 1949, call letters assigned to all frequencies below 30 megacycles in the fixed public services were changed to conform with the call letter assignment plan agreed to at the 1947 International Telecommunications Conference.

*Interference.*—Fifty-eight cases of interference involving licensees in the fixed public services were handled during the year. Causes of interference included spurious emissions, long distance transmission of frequencies in the VHF range (30 to 300 megacycles), and cases involving sharing of frequencies in the HF range (3 to 30 megacycles). Interference complaints were expeditiously handled and relieved as soon as possible.

*Equipment.*—Modernization and expansion of the transmitting plants of major carriers continued with the addition of a total of 20 new transmitters and the deletion of 11 transmitters in the radiotelegraph services. In the new transmitters, emphasis is placed on im-



proved frequency stability, capability of operation on higher frequencies, and ease of change from one frequency to another.

*International conferences.*—The Commission was represented on the United States Delegation to the International Telegraph Regulations Revision Committee, which met at Geneva in January 1949, to consider what changes would have to be made in the International Telegraph Regulations to make them acceptable to countries, like the United States, which were not signatory to those regulations. The Commission, with Chairman Coy as chairman of the United States delegation, was also represented at the Administrative Telephone and Telegraph Conference which opened at Paris in May 1949. The United States participated actively in the telegraph aspects of the conference to the end that regulations might be developed to which it could become a party. (It also participated in the telephone discussions. However, it had advised the conference at an early stage that the United States did not intend to sign the International Telephone Regulations.) The United States delegation advanced various proposals for amendment of the existing telegraph regulations. These included proposals looking to the unification of rates for ordinary telegrams composed of plain language, cipher language, code language, or any mixture thereof; elimination of the deferred classification of telegrams; admission of secret language into telegrams in the letter classification; elimination of special reduced government rates; various changes in operating procedures and practices; and related matters.

In preparation for the Paris conference, the Commission held lengthy hearings (Docket 9094) to obtain the views of interested persons, including international telegraph carriers, telegraph users, and government agencies, as to the proposals to be submitted. The Commission thereafter issued a proposed report, heard oral argument thereon, and then issued a final report which contained the more important proposals which were submitted by the United States Government to the Paris Conference for Revision of the International Telegraph Regulations. The Commission, in cooperation with the Department of State, also held several informal meetings with representatives of the carriers, users, and other government agencies to study and consider detailed proposals for revision of the International Telegraph Regulations other than those involved in Docket 9094.

*Docket cases.*—Two proceedings involving possible violations of provisions of the Communications Act were instituted during the year. One of these, Docket 9093, was an investigation to determine whether the common ownership and consolidated operations of cable and radio facilities by the American Cable and Radio Corporation system, including All America Cables and Radio, Inc., The Commercial Cable Co. and Mackay Radio & Telegraph Co., were in violation of sec-

tion 314 of the Communications Act. The other proceeding, Docket 9188, was to determine the facts and circumstances surrounding the installation and operation of two transmitters by Mackay Radio & Telegraph Co. prior to the receipt of authorization therefor from the Commission, and to determine, further, whether such transmitters should be licensed. Hearings in both of these matters were held in the fall of 1948, and at the end of the fiscal year were awaiting decision.

On May 4, 1949, the Commission adopted its final report and order in Docket 7822 in which it denied applications of Press Wireless, Inc., for modification of its licenses to permit the handling of traffic in the Government classification. Press Wireless appealed to the Circuit Court of Appeals for the District of Columbia.

Action on the application of RCA Communications, Inc., for a duplicate circuit with Israel (Docket 8990), was postponed until further order, at the request of the applicant.

#### RATES AND TARIFFS

*Rate schedules.*—At the close of the year, 156 domestic and international telegraph carriers had tariffs and concurrences on file with the Commission. During the year they filed 5,931 tariff publications establishing or changing rates, regulations, practices, and classifications of services, including concurrences. Numerous irregularities in the rate schedules were corrected or eliminated through examination procedures.

*Special permissions.*—Domestic and international telegraph carriers filed 151 applications for special permission to make changes in tariffs or file new tariffs. Of these, 144 were granted, 2 were denied, 2 were retired to the files at the applicant's request, and three were pending at the close of the year.

*Western Union domestic rates.*—Western Union has conducted studies and tests to determine the changes necessary in its domestic telegraph rate structure to eliminate discriminations, particularly with respect to the relationship between rates and distances. (See Fourteenth Annual Report.) In December 1948 the Commission requested that Western Union file revised tariff schedules designed to eliminate the discriminations in its existing rate structure, the revised schedules to become effective within 90 days after the elimination or substantial reduction of the Federal excise tax on domestic telegrams, or December 31, 1949, whichever date is the earlier. The Commission is working closely with the company in this matter.

*Channels for TV program transmission.*—The rates and regulations of Western Union covering the transmission of television programs over its New York City-Philadelphia microwave radio relay system, effective May 1, 1948, are, together with rates and regulations of the Bell system for its intercity television program transmission services,

the subject of formal investigation and hearing before the Commission in Docket 8963. (See discussions of Channels for TV Program Transmission, Rates and Tariffs, Telephone.)

*Baseball-sports service by message and direct wire.*—On March 1, 1949, Western Union filed revised tariff schedules, effective April 18, 1949, providing for new and revised regulations and charges relating to furnishing of news reports of baseball and sports events by message and direct wire to radio broadcasters, newspapers, press associations, and others. Following complaint by a radio broadcaster concerning these revisions, the Commission, on its own motion, entered into an investigation of the matter, including the question of the carrier's possible violation of its tariff regulations in having permitted unrestricted network broadcasting of sports reports, contrary to the previously effective provisions of its tariffs. Hearings were held in the spring of 1949, and the matter was pending decision.

*United States-Mexican telegraph rates.*—In June 1948, the Government of Mexico announced a program of nationalization of its international communication facilities, and canceled the concessions of the Mexican Telegraph Co., jointly owned by Western Union and All America Cables & Radio, Inc., on 1 year's notice, effective June 16, 1949. Traffic between the United States and Mexico formerly handled over the Mexican Telegraph Co.'s ocean cables between Galveston and Mexico is now handled over wire telegraph land lines crossing the border, in accordance with a new contract between the Mexican Government and Western Union. Among other things, the rate zones in the United States and Mexico have been realigned in relation to distance and zone boundaries and have been conformed to State boundaries. Special rates to and from Mexican points where the Mexican Telegraph Co. had offices have been discontinued and regular zone rates made applicable. All other line charges in both the United States and Mexico have been eliminated, as has the night message classification, already discontinued for intra-United States and United States-Canada traffic. The discount for United States and Mexican Government traffic, previously applicable to Western Union's portion of through tolls, has been abolished.

*International rate case.*—In September 1948 certain of the international telegraph carriers requested that the Commission reconsider the rates theretofore authorized in the proceeding in Docket 8230 (see Fourteenth Annual Report) stating that, despite rate increases authorized in 1947 and 1948, their revenues still were inadequate, and that certain rate increases in addition to those previously authorized were necessary. The Commission reopened the proceedings and held further hearings in November 1948. On January 26, 1949, it issued an interim report in which it found that, on the basis of the record in the further hearings, only a few of the international telegraph carriers

were operating at a profit, and that most of them urgently required additional revenues. To meet this emergency situation, the Commission, effective February 2, 1949, authorized out-bound increases estimated to produce about \$2,542,000 in gross revenues annually. Increases in in-bound rates to the level of the out-bound rates are expected to produce about \$565,000 additional gross revenue.

In granting the latest increase, it was found necessary to permit establishment of rates to certain points in the world in excess of the former maxima of 30 cents per full rate word and 6½ cents per ordinary press word. The authorized rates to most parts of Africa, Asia, and Oceania now are 40 cents per full rate word and 8½ cents per ordinary press word, and to South America they are 35 cents and 7½ cents, respectively. The ceiling rates of 30 cents per full rate word and 6½ cents per ordinary press word, established with British Commonwealth points in the Bermuda Telecommunications Agreement of December 4, 1945, still were in effect, but a conference with the other parties to this agreement was to be held in London during August 1949 to discuss, among other things, the removal of those ceiling limitations.

*Multiple address press rates.*—As stated in the Fourteenth Annual Report, the Commission in June 1948 reopened Docket 8230 for investigation and hearing with respect to charges, regulations, practices, and services of the three international telegraph carriers (Press Wireless, Inc., Mackay Radio & Telegraph Co., and RCA Communications, Inc.) engaged in the rendition of multiple address press service. This investigation is an outgrowth of the general investigation, in the same docket, into international telegraph rates. Hearings were held in November and December 1948 and January 1949. The matter was awaiting decision.

*Distribution of international traffic.*—In connection with its authorization of the merger of the domestic telegraph carriers in 1943, the Commission approved a "formula" specifying, generally, the manner in which out-bound unrouted international telegraph traffic should be distributed by the merged carrier, Western Union, among the United States international telegraph carriers, including Western Union's cable system. Since that time many new circuits have been opened and carriers have reinstated service to areas which were formerly enemy occupied. These factors, in addition to the changing characteristics of international telegraph traffic, have given rise to various problems in connection with the aforementioned formula. In addition, certain of the carriers have alleged that interpretations given to various clauses of the formula deprive them of traffic to which they are entitled. Formal complaints were filed by certain of the international telegraph carriers in connection with operation under the formula and the entire matter was under consideration by the Commission.

## OTHER REGULATORY MATTERS (DOMESTIC AND INTERNATIONAL)

*Depreciation.*—In February 1948, pursuant to the provisions of section 220 (b) of the Communications Act, the Commission prescribed depreciation rates applicable to the various classes of Western Union's land lines plant. (See Fourteenth Annual Report.) Depreciation rates for radiotelegraph (ultra-high frequency radio relay) plant, which was under construction at that time, were not included in this action. By the end of 1948 investment in radio relay facilities had reached sufficient proportions so that in April 1949 the Commission fixed depreciation rates for these new types of plant. In connection with the modernization program, Western Union is retiring much of its plant before normal life expectancy and is amortizing these investments not fully provided for by normal depreciation accruals. The Commission is maintaining a continuing review of this program and is receiving semiannual reports from the company.

In connection with Commission proceedings involving rates and charges for telegraph service between the United States and overseas and foreign points (Docket 8230), it was found desirable to determine the reasonableness of annual depreciation rates and charges, as well as the recorded depreciation reserves of the international telegraph carriers. To this end a comprehensive study was undertaken relative to one large carrier and similar studies are contemplated with respect to the other international carriers.

*Continuing property records.*—The verification of the form and contents of continuing property records and the evaluation of the effectiveness of continuing property records procedures of radiotelegraph, wire-telegraph and ocean-cable carriers continued. During the year a list of retirement units for wire telegraph and ocean cable carriers was prepared for adoption by the Commission and progress was made on a similar list for radiotelegraph carriers. The three carriers that had not completely fulfilled the requirement to establish and maintain continuing property records at the beginning of fiscal 1949 still have not attained this objective because of extenuating circumstances although progress has been made.

*Pensions and relief.*—The Commission continued its general studies of the carriers' pension arrangements. Several changes in pension plans that were introduced during the year were analyzed in detail, particularly to determine their effect upon operating expenses.

*Uniform system of accounts.*—Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, of the Commission's Rules and Regulations, was amended during the year to conform the accounts with simplified reporting requirements concerning maintenance expenses. Conferences were also held with the carriers with a view to modernizing the prescribed accounting for revenues. At the end of the year rule-making procedures were in process which, upon

adoption by the Commission, will provide uniform accounting and reporting treatment of revenues of the wire, cable, and radio carriers.

*Preservation of records.*—The development of revised rules for the preservation of the carriers' records that are required in the exercise of regulatory functions was in advanced stages at the close of the fiscal year. These rules enumerate over 500 items specific to the telegraph industry and fix the retention periods therefor.

*Reclassification of Western Union plant accounts.*—The matter of the reclassification of the plant accounts of Western Union was continued into fiscal year 1949, and completed to conform to the currently effective requirements of the uniform system of accounts, except for minor adjustments which may be necessary with respect to certain plants located in foreign countries.

*New types of plant and services.*—The development of microwave circuits in the domestic telegraph field, and new types of switching equipment, occasioned the need for studies to determine the adequacy of the accounts and records maintained by the carriers with respect to such plant and service, as well as the adequacy of the Commission's effective rules. In the international telegraph field the institution of new services such as the program transmission service also developed the need for studies to determine the adequacy of the present rules of the Commission.

#### 4. STATISTICS

##### TELEPHONE CARRIERS

Annual reports were filed by 132 common carriers and 27 controlling companies for the calendar year 1948. Of these, 106 were from telephone carriers. Financial and operating data relating to telephone carriers for the calendar year 1948, as compared with 1947, are shown in the following table:

Item	1947	1948	Percent increase
Investment in plant and equipment (as of December 31).....	\$7,788,162,429	\$9,108,408,570	16.95
Depreciation and amortization reserves.....	\$2,513,997,977	\$2,665,101,862	6.01
Net investment in plant and equipment.....	\$5,274,164,452	\$6,443,306,708	22.17
Local service revenues.....	\$1,354,984,904	\$1,598,952,274	18.01
Toll service revenues.....	\$908,363,760	\$1,061,661,716	16.88
Total operating revenues <sup>1</sup> .....	\$2,398,317,527	\$2,820,088,577	17.59
Operating expenses <sup>1</sup> .....	\$1,935,995,020	\$2,235,184,804	15.45
Taxes.....	\$260,829,709	\$310,718,568	19.13
Net operating income after all taxes.....	\$201,492,613	\$274,186,145	36.08
Net income.....	\$170,271,710	\$228,596,769	34.25
Dividends declared.....	\$203,519,238	\$218,806,027	7.51
Company telephones:			
Business.....	10,301,919	11,146,019	8.19
Residential.....	20,499,920	22,609,910	10.29
Average number of calls originating per month:			
Local <sup>2</sup> .....	4,390,078,430	4,835,601,447	10.15
Toll <sup>2</sup> .....	180,202,249	182,480,596	1.25
Number of employees at end of October.....	556,889	585,702	5.17
Male.....	153,686	198,841	8.25
Female.....	373,203	386,861	3.66
Total pay roll for the year.....	\$1,435,902,570	\$1,667,054,353	16.10

<sup>1</sup> Intercompany general service and license fees and rents, amounting to approximately \$45,000,000 for 1948 and \$41,000,000 for 1947, have not been eliminated.

<sup>2</sup> Partly estimated by reporting carriers.

## LAND LINE TELEGRAPH

Annual financial and operating reports were received from 26 wire-telegraph, ocean-cable and radiotelegraph carriers for the calendar year 1948. Statistical data compiled from the reports of Western Union for the calendar year 1948, as compared with 1947, are given in the following table. The figures pertain to the land line operations of that carrier; data concerning its cable operations are included in another table relating to ocean-cable carriers:

*The Western Union Telegraph Co.<sup>1</sup>*

Item	1947	1948	Percent Increase or (decrease)
Investment in plant and equipment (as of Dec. 31).....	\$314, 275, 030	\$310, 295, 071	(1. 27)
Depreciation and amortization reserves.....	\$142, 664, 085	\$136, 267, 016	(4. 48)
Net investment in plant and equipment.....	\$171, 610, 945	\$174, 028, 055	1. 41
Transmission revenues.....	\$183, 834, 397	\$165, 595, 812	(9. 92)
Total operating revenues.....	\$199, 654, 193	\$183, 429, 431	(8. 13)
Operating expenses, depreciation, and other operating revenue deductions.....	\$185, 313, 959	\$185, 362, 154	. 03
Net operating revenues.....	\$14, 340, 234	<sup>2</sup> \$1, 832, 723	(113. 48)
Net income.....	\$905, 970	\$1, 264, 578	39. 58
Dividends declared.....		\$1, 228, 428	-----
Revenue messages handled.....	<sup>3</sup> 220, 154, 500	<sup>3</sup> 197, 915, 842	(10. 10)
Number of employees at end of October.....	53, 572	48, 997	(8. 60)
Total pay roll for the year.....	\$138, 976, 008	\$140, 900, 964	1. 39

<sup>1</sup> Represents data for land line operations. Figures covering cable are included in another table.

<sup>2</sup> Deficit.

<sup>3</sup> Includes domestic haul of cable and radio messages (9,851,556 in 1947 and 8,896,985 in 1948).

## RADIOTELEGRAPH AND OCEAN-CABLE CARRIERS

Financial and operating data compiled from the annual reports of radiotelegraph and cable carriers engaged in international traffic for the calendar year 1948, as compared with 1947, are set forth in the accompanying two tables:

*Radiotelegraph carriers*

Item	1947	1948	Percent Increase or (decrease)
Investment in plant and equipment (as of Dec. 31).....	\$36, 614, 331	\$37, 369, 529	2. 06
Depreciation and amortization reserves.....	\$17, 828, 421	\$17, 472, 588	(1. 99)
Net investment in plant and equipment.....	\$18, 785, 910	\$19, 896, 941	5. 91
Message and other transmission revenues.....	\$20, 682, 509	\$21, 186, 729	2. 94
Total operating revenues.....	\$21, 741, 440	\$22, 423, 542	3. 14
Operating expenses, depreciation, and other operating revenue deductions.....	\$23, 611, 828	\$23, 009, 343	(2. 55)
Net operating revenues.....	<sup>1</sup> \$1, 870, 388	<sup>2</sup> \$585, 601	-----
Income taxes.....	\$262, 494	\$624, 709	137. 99
Net income.....	<sup>1</sup> \$1, 573, 781	<sup>2</sup> \$453, 748	-----
Dividends declared.....	\$5, 000	\$2, 000	(60. 00)
Revenue messages handled: <sup>3</sup>			
Domestic-service classification <sup>3</sup> .....	63, 558	59, 998	(5. 60)
Foreign-service classification <sup>3</sup> .....	11, 204, 102	10, 148, 439	(9. 42)
Marine.....	857, 030	905, 332	5. 64
Total.....	6, 261	5, 782	(7. 65)
Number of employees at end of October.....			
Total pay roll for the year.....	\$19, 368, 961	\$18, 452, 422	(4. 73)

<sup>1</sup> Deficit.

<sup>2</sup> Excludes domestic haul of foreign, insular, and marine messages to avoid duplications.

<sup>3</sup> International messages (primarily Canadian and Mexican) transmitted in accordance with carriers' rules governing domestic traffic are included under Domestic Service Classification. Insular messages are included under Foreign Service Classification.

*Ocean cable carriers*

[Including cable operations of The Western Union Telegraph Co.]

Item	1947	1948	Percent increase or (decrease)
Investment in plant and equipment (as of Dec. 31).....	\$96,061,650	\$98,256,204	2.28
Depreciation and amortization reserves.....	\$61,522,573	\$64,614,333	5.03
Net investment in plant and equipment.....	\$34,539,077	\$33,641,871	(2.60)
Transmission revenues:			
Domestic service classification.....	\$812,228	\$608,664	(25.06)
Foreign service classification.....	\$20,755,463	\$20,896,317	.68
Total operating revenues.....	\$23,772,389	\$23,856,903	.36
Operating expenses, depreciation, and other operating revenue deductions.....	\$24,357,552	\$23,024,993	(5.47)
Net operating revenues.....	\$585,163	\$831,910	41.50
Income taxes.....	\$301,933	\$211,219	(30.04)
Net income.....	\$1,141,364	\$324,288	(71.70)
Dividends declared.....	\$1,381,005	\$706,936	(48.81)
Revenue messages handled:			
Domestic service classification.....	663,491	535,089	(19.35)
Foreign service classification.....	11,511,512	10,468,017	(9.06)
Number of employees at end of October.....	6,247	5,973	(4.39)
Total pay roll for the year.....	\$14,309,199	\$13,265,006	(7.30)

<sup>1</sup> Deficit.

**INTERNATIONAL TELEGRAPH TRAFFIC**

Reports relating to international traffic filed by cable and radio-telegraph carriers show that an aggregate of 562,118,333 paid words were handled during the calendar year 1948. The out-bound traffic amounted to 282,327,827 words, and in-bound 279,790,506 words. A break-down of the traffic with the principal countries is shown in the following table:

*International telegraph (radio and cable) traffic, 1948*

Country	Number of words		Country	Number of words	
	Out-bound from the United States	In-bound to the United States		Out-bound from the United States	In-bound to the United States
Europe, Africa, and the Near East:			West Indies, Central, North, and South America:		
Austria.....	1,506,963	1,831,081	Argentina.....	10,007,187	9,702,062
Belgium.....	6,070,402	5,525,101	Brazil.....	11,629,818	12,782,549
Czechoslovakia.....	1,367,585	1,651,467	British West Indies.....	2,889,793	2,650,143
Denmark.....	1,912,469	1,625,969	Canada.....	6,842,081	9,388,917
Egypt.....	2,429,144	2,205,424	Chile.....	2,290,223	2,555,625
France.....	18,293,256	14,196,364	Colombia.....	4,945,793	4,027,336
Germany.....	5,939,901	8,818,384	Costa Rica.....	1,068,863	915,776
Greece.....	2,667,885	2,934,375	Cuba.....	8,890,916	11,432,527
Iran.....	1,067,946	1,125,259	Dominican Republic.....	1,214,655	1,450,223
Israel.....	1,456,787	2,142,884	Ecuador.....	1,422,124	887,892
Italy.....	9,629,766	7,721,344	Guatemala.....	1,252,668	1,257,933
Morocco.....	1,108,845	1,061,276	Mexico.....	2,073,456	2,187,925
Netherlands.....	7,061,184	6,321,705	Netherlands West Indies.....	1,025,689	1,228,122
Norway.....	2,830,737	2,117,846	Panama.....	2,294,244	1,960,303
Palestine.....	1,153,340	1,129,225	Peru.....	1,953,636	1,620,773
Poland.....	1,033,902	711,686	Puerto Rico.....	3,258,831	3,010,941
Portugal.....	2,066,570	1,366,252	Uruguay.....	1,733,731	1,364,290
Spain.....	3,434,849	2,462,393	Venezuela.....	7,054,211	7,993,310
Sweden.....	4,048,263	3,526,016	All other countries.....	4,820,521	3,931,573
Switzerland.....	8,726,640	6,748,815	Total.....	78,635,440	80,297,220
Turkey.....	1,310,610	970,898			
Union of South Africa.....	4,464,087	4,403,191	Asia and Oceania:		
U. S. S. R.....	7,286,653	3,830,006	Australia.....	3,405,577	3,278,627
United Kingdom and Eire.....	52,005,747	54,226,734	China.....	7,963,950	6,834,423
Yugoslavia.....	1,474,874	1,165,753	Hawaii.....	5,763,631	5,746,095
All other countries.....	9,070,171	9,025,612	India.....	6,831,567	6,288,565
Total.....	159,448,576	148,865,060	Indonesia.....	734,581	1,000,319



*International telegraph (radio and cable) traffic, 1948—Continued*

Country	Number of words		Country	Number of words <sup>SS</sup>	
	Out-bound from the United States	In-bound to the United States		Out-bound from the United States	In-bound to the United States
Asia and Oceania—Con.			Unknown destination or origin.....	1, 552, 213	2, 640, 480
Japan.....	3, 928, 640	5, 448, 088	Grand total.....	282, 327, 827	279, 790, 506
Korea.....	477, 289	1, 254, 822			
Malay States.....	1, 603, 965	1, 614, 402			
Philippines.....	8, 548, 245	10, 502, 453			
All other countries.....	5, 414, 153	6, 019, 712			
Total.....	44, 691, 598	47, 967, 746			

## COMMON CARRIER RADIO STATIONS

Authorized radio stations in the common carrier services now exceed 1,000, not counting associated mobile units. Figures for base stations for the past two fiscal years follow:

Class of station	1948	1949	Increase
Fixed public telephone.....	27	26	(-1)
Fixed public telegraph.....	56	57	1
General mobile (experimental).....	785	795	10
Other experimental.....	128	174	46
Total.....	996	1, 052	56

## COMMON CARRIER APPLICATIONS

The Commission received nearly 3,200 common carrier applications of all types and disposed of nearly 3,300, which included some that were pending at the start of the year. Here is a summary:

Class of station	Pending July 1, 1948	Received 1949	Disposed 1949	Pending June 30, 1949
Fixed public telephone.....	13	194	150	57
Fixed public telegraph.....	66	400	407	59
General mobile (experimental).....	160	830	944	46
Other experimental.....	21	298	257	62
Wire service extensions.....	25	376	389	12
Wire service reductions.....	238	1, 067	1, 147	158
Total.....	523	3, 165	3, 294	394

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## CHAPTER VI. RADIO OPERATORS

1. GENERAL
  2. COMMERCIAL RADIO OPERATORS
  3. SPECIAL AIRCRAFT RADIOTELEPHONE AUTHORIZATIONS
  4. AMATEUR RADIO SERVICE
  5. CITIZENS RADIO SERVICE
  6. STATISTICS
- 
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### 1. GENERAL

This separate chapter is devoted to all those who personally operate radio transmitters—the professionally paid radio operator, the amateur, the civilian flyer who uses radiotelephone in his plane, and the ordinary citizen who finds radio convenient to his every day activities.

The 645,000 operators and private stations authorized in these categories constitute the largest group with which the Commission has to deal. More than 61,000 new authorizations were issued during the year, typifying the growing interest in radio for individual use. The opening of the Citizens Radio Service is expected to add greatly to these figures.

The administrative problems involved in the regulation of radio operators are unique in the number of persons directly affected and the amount of paper work entailed. The latter is not limited to applications received and granted but covers a huge volume of individual correspondence of a type not common to any of the other services.

The law requires the Commission to approve operators of radio transmitting apparatus as well as stations as such. Under the Communications Act, the Commission prescribes the kinds and classes of radio operators and the technical and other qualifications which they must possess as a basis for licensing. Examinations for the various operator licenses are given regularly at the Commission's field offices, and at quarterly and semiannual intervals at nearly 100 examination points conveniently located throughout the country.

### 2. COMMERCIAL RADIO OPERATORS

The term "commercial radio operator" is used by the Commission to include all persons holding radio operator licenses which authorize

the operation of radio stations as a part of their livelihood or vocation, as compared with the "amateur radio operator" whose interest in radio technique is solely with a personal aim as an avocation and without pecuniary interest. "Commercial Radio Operator", therefore, embraces the thousands of license holders who are employed, either full-time or part time, for the operation of radio transmitters in broadcast stations, in ship and coastal radiotelephone and radiotelegraph stations, in aircraft stations, aeronautical ground stations, in state and municipal police, fire or forestry stations, etc. The nearly 380,000 commercial radio operators thus constitute, numerically, the largest single group of license holders with which the Commission is concerned in administrative and regulatory matters, and possibly the most complex because of the individual problems which they present.

The duties of a commercial radio operator, with respect to any licensed station, include not only the handling of communications, the manipulation of on-off controls, and the keeping of station logs (if required), but also, in a larger sense, the performance of any technical duties which may affect the station's operation in compliance with the terms of its license and with the Commission's rules and regulations. In some classes of stations, the operators on duty and in charge do not need to be qualified or authorized to perform all of those duties, but in other classes of stations a fully qualified operator, authorized to perform all of those duties, is essential. Accordingly, the commercial radio operator licenses issued by the Commission are graded in accordance with the technical or nontechnical level of duties and responsibilities they are expected to perform.

There are two basic classifications of the commercial radio operator licenses—radiotelephone and radiotelegraph—and several grades within each classification, each conferring a different degree of operating authority in accordance with the demonstrated qualifications (and in some cases experience) of the operators. This grading varies from authorizing limited and nontechnical operation of simple "push-button" transmitters to authorizing unlimited operation, including installation, servicing, and maintenance of the most complicated and powerful installations. The matter of licensing, and thus of examining the qualifications of radio operators, expands with each new development in the use or technique of radio, and requires that the commercial radio operator license and examination structure be constantly reviewed and be brought up to date when necessary.

Between 1939 (the date of the last major revision) and 1948, the wartime and postwar demands upon the Commission prevented revising the commercial radio operator rules, licenses, and examinations to keep step with the rapid advances then taking place in electronic methods, uses, and techniques. As a result, it was necessary early in

1948 to concentrate on a complete revision of the existing commercial radio operator examinations. This project was completed during fiscal 1949, and the scope of the examinations for the higher grades of licenses has been broadened so that they now contain, for the first time, such matters as microwave, television and frequency modulation techniques, radar and loran methods, and radio-navigation systems. A continuing schedule has also been set up to review these examinations periodically and to make such additional changes as may be necessitated by radio's future developments.

In keeping with modernizing the commercial radio operator license and examination structure, several related projects were accomplished, others were under consideration, and still others were in preparation or projected at the end of the fiscal year. One such change which has been made effective is a complete revision of the rules defining the scope of operating authority under the various classes of operator licenses to include in that authority, wherever applicable, permission to operate stations when transmitting by frequency-modulated and pulsed techniques. The scope of the operating authority under the various classes of radiotelephone operator licenses was also broadened to permit the holders to operate, under certain conditions, stations transmitting signals technically classified as telegraphy but which do not involve or require a knowledge of the Morse code.

Another change, made near the end of the fiscal year to become effective January 3, 1950, provides for a special examination and a special endorsement to be placed on radiotelegraph first- or second-class licenses to certify to the special qualifications of the holders to operate radiotelegraph stations on board aircraft in accordance with recommended standards of the International Civil Air Organization. A similar proposal, still pending, would provide for a special examination and a special endorsement for first- or second-class radio operator licenses to certify to special qualifications to perform installation, servicing, and maintenance duties in connection with ship radar stations. A 2-day hearing and oral argument intended to inquire into the need and justification for such an endorsement, and a corresponding limitation on all persons not holding licenses bearing the endorsement, begun in January 1949, was due to resume in September 1949. Accordingly, the questions involved in this proposal may not be resolved until late 1949 or early 1950.

When an applicant for a commercial radio operator license successfully completes the required examination, the license which he receives is valid for 5 years, after which he is required to again qualify for that license if he desires its renewal. In lieu of examination, however, he is permitted to demonstrate his continued qualifications by submitting proof of radio operating experience during the term of

the license. At the present time, the relevant rules of the Commission permit the acceptance of 3 years of service as a radio operator, in the aggregate during the license term, in lieu of reexamination in qualifying the holder of a commercial radio operator license for renewal without examination. They also permit the acceptance of 2 years of service if the last year has been continuous and immediately prior to the date of the application. This has resulted in considerable hardship in the cases of certain radio operators who have been unable to meet either of the above requirements because of irregularities of employment. Accordingly, the Commission has proposed that the rules be changed to permit the acceptance of 2 years of service as a radio operator in the aggregate during the license term, in lieu of a reexamination in qualifying for renewal.

Coincident with the above proposal, the Commission also proposed that an applicant for renewal of a commercial radio operator license, who was unable to qualify for a renewal without examination but who had served under that licensee for an aggregate period of 1 year during the last 3 years of the license term, would be required to successfully complete the entire examination as for new license, but would be issued a renewal upon successful completion of a specified abridged renewal examination. This proposal, which contemplated an increase from 3 months to 1 year in the service required to qualify the applicant to take the renewal examination, attempted to equalize the relative value of service under a license as compared with an examination in demonstrating an operator's continued qualification to hold a license.

Both of the above matters, published as proposed rules, were pending at the close of the fiscal year because of continuing discussions of the subject with interested parties.

In accordance with its obligation to determine the qualifications of every radio operator before issuing him a radio operator's license, it has been necessary in the past that all applications submitted by persons having serious physical disabilities be reviewed by the Commission en banc prior to the issuance of such licenses. This has resulted in a delay, in addition to increasing the work load of the Commission. Because of this, the Commission has proposed to simplify the issuance of such licenses by revising its rules, to clearly set forth those classes of physical disabilities (complete deafness or complete muteness) which disqualify an applicant for any commercial radio operator license and to specify that applicants having other physical handicaps may be issued any operator licenses for which they otherwise qualify, subject to certain conditions intended to insure that the public interest will be served. Thus, in those cases where the operator himself, by virtue of the class of license which he holds, might become personally involved in an emergency affecting a station devoted to the

safety of life and property, such as at a compulsorily equipped ship station, the operator license would be endorsed to prohibit the performance of normal operating duties at such stations if his physical handicap clearly prevents his performance of all operating duties under emergency conditions. At the close of the year this project was awaiting final action by the Commission.

The growth in the number of licensed commercial radio operators corresponds closely with the general growth in the number of licensed radio stations. However, under its statutory authority the Commission has waived, in some circumstances and under certain conditions, the basic requirement that the operation of every licensed radio station be performed by a licensed radio operator.

It is of interest to note that, although the trend in the total number of licensed radio operators has continued upward since the end of the war, the rate of increase has declined and has now apparently stabilized to a near parallel to the increase in the number of stations at which those operators might be employed. It should also be pointed out that the number of holders of the higher classes of radiotelegraph operator licenses decreased from 22,352 at the end of fiscal 1947 to 19,104 at the end of 1948 and to 14,687 at the end of 1949. On the other hand, holders of the higher classes of radiotelephone operator licenses increased from 46,292 in 1947 and 49,116 in 1948 to 50,996 in 1949. This indicates an expanding need for technically qualified operators for the operations and supervision of radio transmitters in the expanding use of radiotelephone communications in the industrial and commercial fields.

### 3. SPECIAL AIRCRAFT RADIOTELEPHONE AUTHORIZATIONS

A special form of radio operator's authorization is available to private flyers who desire to use radiotelephone in their planes. It is issued by all Commission field offices and, as a special convenience, at the airfields through approximately 2,400 aircraft pilot examiners of the Civil Aeronautics Administration delegated for this purpose. More than 100,000 special aircraft radiotelephone authorizations were outstanding at the close of fiscal 1949, an increase of nearly 25,000 from the year previous.

### 4. AMATEUR RADIO SERVICE

The Amateur Radio Service is internationally recognized as a service carried on by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest. Accordingly, this service provides all interested and qualified citizens with a means of obtaining purely voluntary technical training and communications experience in the field of radio. In the United States it is one

of the largest and most active of the radio services authorized by the Commission. Thus, at the close of the fiscal year there were more than 81,600 amateur station licenses and over 80,700 amateur operator licenses outstanding, which reflected a normal addition during the fiscal year of about 6,000 new operator and station licensees.

The Amateur Radio Service has no age limits. It interests the young as well as the old. Though the average age of self-styled "hams" is about 34, teen-agers are numerous. During the year 2 youngsters—one 9 years old and the other aged 11—qualified for licenses.

The amateur field, besides being a boon to the invalid, and even the blind, is an appropriate outlet for radio-conscious youth to pursue an engaging and instructive hobby. The parents of a boy or a girl holding an amateur license have little cause to worry about where these young people are spending their spare time and evenings. They are usually in air communication with other "hams" or helping a neighbor re-rig his set.

Although nominally a personal hobby, the nature of the Amateur Radio Service is such that it has a high degree of public value. Thus, the service maintains a pool of self-trained radio technicians upon which the country can draw in case of need. For example, during the fiscal year the National Military Establishment created an organization known as the Military Amateur Radio System for the purpose of fostering interest in military radio communication. Although operating as a military organization, on military frequencies, using military call signs, this system is staffed principally by personnel holding amateur licenses issued by the Commission.

Another aspect of the public service value of the Amateur Radio Service was illustrated in 1949 when amateurs furnished emergency means of communication during the failure, because of natural disasters, of normal communication facilities in various parts of the United States. Thus, during the winter months of 1948-49 when a large portion of the Far West was snowbound, gaps in communication lines were bridged by amateur radio thereby aiding rescue work. Amateur radio performed a similar important function in connection with the major hurricanes that struck Florida during September and October of 1948. Arrangements were effected during the year for closer coordination between amateur emergency communication activities and the disaster service of the Red Cross.

With a view to further fostering the development of the Amateur Radio Service, the Commission on April 20, 1949, adopted a notice of proposed rule making which attempted, by setting forth an over-all plan, to provide express scope and direction for the immediate and long-range development of this service. To achieve this purpose,

a number of major and minor amendments to the amateur rules were proposed. The Commission invited comments from all interested parties and set July 20, 1949 as the final date for filing. Hundreds of amateurs submitted comments, both pro and con, attesting to the deep interest of the amateur in the service in which he operates.

During the fiscal year the interim authorization for use at amateur stations of narrow band frequency or phase-modulation in the bands 3,850 to 3,900 kilocycles, 14,200 to 14,250 kilocycles, 28.5 to 29.0 megacycles and 51.0 to 52.5 megacycles was extended to July 31, 1949. Other rule amendments clarified the prohibition against "broadcasting" by amateurs; authorized mobile and portable amateur operation in the United States, its territories or possessions on all amateur frequency bands; shifted the 27 megacycle band from 27.160-27.430 to 26.960-27.230 megacycles (to become effective July 1, 1949); and made certain frequencies in the band 1,800 to 2,000 kilocycles (160-meter band) available to amateurs on a geographical basis provided no harmful interference is caused to the loran system of radio navigation.

The growth of television presented a challenge to many amateur licensees to reduce radiation by their transmitters of harmonics and other spurious emissions which result in interference to TV receivers. Some radio amateurs, with facilities to do so, made extensive tests which indicated that reduction of such interference could be satisfactorily accomplished on the part of amateur station licensees within the normal service areas of television stations.

A comparatively new amateur activity, the use of "radio printers," is making rapid strides due to the availability to amateurs of surplus radio-teletype equipment. Two-way "radio printer" contacts between amateur stations in the United States and Japan have been reported.

##### 5. CITIZENS RADIO SERVICE

The Citizens Radio Service was established on a regular basis on June 1, 1949, at which time newly adopted rules governing its operation also became effective.

The Commission allocated the frequency band 460-470 megacycles to the Citizens Radio Service in 1945, and until the effective date of the new rules stations using this frequency band were operated on a temporary basis under experimental class 2 radio station licenses.

It is the purpose of the Citizens Radio Service to provide for private short-distance radio communication, radio signaling, and the control of objects or devices by radio, with a minimum of licensing requirements, and to provide procedure whereby manufacturers of radio equipment to be used or operated in this service may obtain "type approval" of such equipment.



Any citizen of the United States 18 years of age or over is eligible to apply for a citizens station license. Pending further study of the eligibility regulations, applicants such as police, municipalities and other government agencies which might be eligible for license in any other radio service, must make a satisfactory showing of need before they may obtain licenses in the Citizens Radio Service.

The present Citizens Radio Service rules provide, among other things, a simplified licensing procedure for users of equipment approved by the Commission; operation under certain conditions of citizens radio stations without the necessity of securing a radio operator's license; two classes of stations dependent upon the power input and frequency stability; and engineering standards, technical specifications and procedural requirements for obtaining Commission type approval of equipment.

Under the simplified licensing procedure, an applicant for a citizens radio station license intending to use type-approved equipment may submit application on a single card form to the Commission's engineering field office for the area in which the applicant is located, and receive a station license without delay. Proposed users of equipment not type-approved must submit applications, including technical data regarding the equipment, to the Washington office of the Commission, where a determination will be made regarding the technical acceptability of the equipment.

In addition, the new rules outline the types of communication that are permitted, station identification requirements, station locations, etc.

The Commission has endeavored to allow the widest possible latitude of activity in the Citizens Radio Service commensurate with provisions of treaty, law, and regulation. Studies were completed during the year of information and technical data regarding station operation obtained during the experimental period of this service, and many of the findings resulting therefrom are reflected in the new rules.

The public interest in the Citizens Radio Service increased considerably during the past year and, with the service established on a regular basis, greater interest is anticipated. It is expected, too, that an increased number of manufacturers will provide equipment for use in this new service. As of this date, the transmitter of one manufacturer has received approval from the Commission under the Citizens Radio Rules.

## 6. STATISTICS

### AUTHORIZATIONS

Authorized amateur stations and amateur operators, citizens and special aircraft radiotelephone authorizations increased by more than 61,000 during the year, bringing their total figure in excess of 645,000. Below is a comparative table for the past 2 fiscal years:

	1948	1949	Increase
<b>Stations:</b>			
Amateur.....	78,434	81,675	3,241
Citizens.....	48	122	74
<b>Total.....</b>	<b>78,482</b>	<b>81,797</b>	<b>3,315</b>
<b>Operators:</b>			
Amateur.....	77,923	80,721	2,798
Aircraft.....	180,000	104,569	24,569
Commercial.....	347,803	378,500	30,697
<b>Total.....</b>	<b>505,726</b>	<b>563,790</b>	<b>58,064</b>
<b>Grand total.....</b>	<b>584,208</b>	<b>645,587</b>	<b>61,379</b>

<sup>1</sup> Estimated.

**APPLICATIONS**

During fiscal 1949, applications in these operator groups collectively totaled more than 162,000. By service, these applications were as follows: Amateur, 33,604; citizens, 488; commercial radio operators, 102,606; special aircraft radiotelephone authorizations, 26,136, and about 200 applications to act as issuing agents in the latter connection.

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## CHAPTER VII. FIELD ENGINEERING AND MONITORING

1. GENERAL
  2. FIELD OFFICES
  3. DISASTER EMERGENCY COORDINATION
  4. MONITORING
  5. INSPECTIONS
  6. OPERATOR EXAMINATIONS
  7. INVESTIGATIONS
  8. TECHNICAL OPERATIONS
  9. FIELD STATION LOCATION CHANGES
  10. STATISTICS
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### 1. GENERAL

The Commission's field engineering and monitoring activities tie in with the technical aspects of radio regulation. Their chief function is to maintain watch over the use of the radio spectrum to see that frequency allocations, station assignments and equipment performance specifications are adhered to. In this respect the field force constitutes an ether traffic patrol.

The field work is decentralized into nine regions for the United States and its possessions. Within these regions are 23 district offices, 6 suboffices and 3 ship offices, supplemented by 10 primary monitoring stations and 10 secondary monitoring stations. (See listing in appendix.)

### 2. FIELD OFFICES

Field engineering offices are located in 33 cities in the United States, Puerto Rico, Alaska, and Hawaii. Their duties include monitoring to see that stations operate on the frequencies assigned to them; inspection of all types of radio stations to insure that equipment is properly installed, particularly on ships and aircraft where safety of life and property is a major consideration; tracing and closing down illegal operation; investigating interference complaints which arise in connection with radio transmission; making engineering surveys and measurements for use of the Commission in allocating frequencies; conducting examinations for radio operators; and, on occasion, furnishing directions to lost airplanes and providing bearings on ships in distress.

Field offices function as "on the spot" representatives of the Commission in supplying information, both general and technical, to persons desiring to apply for construction permits or licenses and, further, to assist them to operate their stations in compliance with Commission rules and regulations. This is particularly true in areas located at considerable distances from Washington. After the applicants have received their permits, field office files and records are established. Then follows inspection, monitoring, investigation and technical survey work which is necessary to regulation.

### 3. DISASTER EMERGENCY COORDINATION

The nine regional managers maintain contact with organizations concerned with safety of life and property, such as the Coast Guard, Naval Reserve, Army amateur nets, Army engineers, and with municipal and state police organizations normally in control during times of emergency and disaster. Regional managers are also perfecting organizations in their respective regions whereby there will exist throughout the various states reliable amateur contacts who will take charge of and be responsible for dealing with the Commission in requesting a declaration of a state of communications emergency when conditions warrant.

These arrangements involve close collaboration with the American National Red Cross, which has established both fixed and mobile disaster communication facilities in various sections of the country, interconnected by wire and radio circuits. A TWX machine has been installed by the Red Cross in the field net control for direct communication with the Commission's Washington office for emergency purposes.

FCC assistance was given, through regional managers, in 5 communication emergencies during the past fiscal year: The Florida hurricane, September 20 to 22, 1948; Midwest ice storm, January 12, 1949; Midwest blizzard, January 29, 1949; levee break at Port Allen, La., March 24, 1949; and West Virginia flood, June 19, 1949.

### 4. MONITORING

Radio monitoring is the key to policing radio transmissions. A station slightly off frequency or one overmodulated, as examples, can cause serious disruption to other radio services. Another important monitoring service is the gathering of data for use in frequency allocations, assignments of stations, and in international conferences. This work is supplemented by station inspections by the field offices. The latter correct many discrepancies, such as enforcing proper tower lighting for the protection of air travel, measures for the safety of operating personnel, and compliance with other rules and regulations.

Of the Commission's 20 monitoring stations, 17 are located in the continental United States, 1 in Puerto Rico, 1 in Alaska, and 1 in Hawaii. By means of radio circuits and private line printers, these ears of the ether are welded together in a network which operates 24 hours a day.

The Commission has two kinds of monitoring stations—primary and secondary. Primary monitoring stations engage in general surveillance and enforcement, detection of improper or unauthorized operation, direction finding, engineering surveys and analysis. Secondary monitoring stations work on a more localized scale in such matters, bringing into use mobile units and direction finders.

#### SERVICE PERFORMED BY MONITORING

Direction finding activity at each monitoring station is necessary to locate illegal stations or operators transmitting improperly, to assist lost aircraft and locate ships in emergencies, and to trace interference.

The Commission does not ordinarily monitor broadcast programs. Its monitoring work is largely concerned with the control of the external effects of radio stations of all types. This requires trained engineers using highly sensitive apparatus to make accurate measurements of emitted waves. In this manner, violations of the act, treaties and regulations are detected and corrected.

Interference to safety services demands prompt attention. Sometimes such interference originates with foreign stations. This requires the compilation of sufficient data to enable the Department of State to make representation to the country in question. In other cases interference can come from electronic devices which, though not used for communication, emit spurious energy which can disrupt radio services if not controlled. The list includes diathermy, industrial heating apparatus, and commercial and home gadgets such as new types of electric signs and remote-control devices. The total installed tube power capacity of such contrivances exceeds that of all kinds of radio stations operating in this country today. Also, the spread of television has brought many complaints from set owners who, generally unfamiliar with the many potential sources of interference to visual broadcast, seek assistance when any disturbance to the picture is observed.

Activity on the very high and ultrahigh frequencies has been expanding so rapidly that there is continuing and increasing need for information on the characteristics of these frequencies, especially for television and some other of the newer services. These data can be obtained only by making field intensity recordings on various frequencies at a number of locations at varying distances from the signal sources.

The 1,738 major monitoring cases handled during the year, compared with 1,445 in 1948, illustrate the growing dependence upon the Commission's listening posts for policing the ether and enforcing radio traffic regulations.

Because of its efficient system, the monitoring network performs an incidental service in helping locate lost planes. Systems operated by the military, which were set up for such work in the United States during the war, are no longer in operation, and the Commission's monitoring facilities constitute the only large system now available for performing this service. During the past year 141 requests were received in this connection as compared with 170 in 1948. To some extent, this decrease reflects increased air safety measures. However, requests for such aid will continue. Among instances of monitoring assistance given during 1949 were those resulting in the rescue of a plane forced down in the Caribbean, aid to a famous transoceanic flyer, and getting a planeload of cadets back on the beam.

Representatives at recent international conferences have requested information concerning the Commission's monitoring system. International planning organizations continue to require its assistance in collecting data on occupation and use of frequencies. With such information, the United States representatives are aided materially in their participation in world-wide planning for efficient use of the spectrum.

These and other monitoring services depend upon a highly coordinated interconnecting teletypewriter and radio communication system which handled more than 46,000 messages (over 1,600,000 words) last year.

#### ENFORCEMENT ARM OF MONITORING

Enforcement work is an integral part of monitoring operations. Enforcement is required by the Communications Act and by international treaties to which the United States is a party. Additionally, the Commission issues regulations based upon its authority under the act and many of these require monitoring for enforcement.

Practical administration must concern itself with the effect of a radio signal and its characteristics. Monitoring stations, by scrutinizing the signals of radio stations, fill this practical need. They employ highly accurate frequency measuring equipment, and perform signal analysis through the use of special analyzing devices developed by the Commission.

During the fiscal year all monitoring stations except one were equipped with a device for converting radio printer signals into actual printed messages, which has enabled the Commission to propose relaxing the requirement that such stations employ old-fashioned and costly hand-sending methods to identify themselves. This is an ex-

ample of the manner in which the Commission cooperates with industry in lessening requirements when radio progress makes it possible to do so. With respect to ships, the situation in regard to maintaining frequency within the allowable tolerances has greatly improved, and it is believed that this improvement resulted largely from monitoring findings.

The world continues to experience unstable conditions and one of the fields of instability is in radio. While many nations are pledged to cooperate in the submission of information concerning their operations and to adhere to established standards of operation, some of these promises are not always met. As a result, there come to notice many unlisted foreign radio operations which not only cause interference but often operate contrary to agreed international procedure. By means of monitoring an elaborate identification file and "knowing how," the Commission has been enabled to identify many of these stations and report their improper performance to the Department of State.

The public was recently acquainted with the effects of "jamming" the broadcasts of the United States intended to reach the nationals of another country. The Commission's monitoring stations played an important part in collecting evidence upon which the United States position was predicated and made public.

As far as our own country is concerned, the policing of hundreds of thousands of radio signals is a huge task. Stations which operate with technical deficiencies such as off-frequency, broadness beyond that necessary, and poor quality of signals, are advised and required to correct the condition. A follow-up is provided so that actual correction results in practically all cases.

As a result of the necessity of employing monitoring personnel in other more pressing work, the number of men who could devote their attention to enforcement has been reduced. This is reflected in a drop in advisory notices sent to offending stations from 15,064 in 1948 to 11,679 in 1949.

## 5. INSPECTIONS

### BROADCAST STATION INSPECTIONS

Commission engineers made 1,966 inspections of broadcasting stations in fiscal 1949, which were 210 less than the previous year. AM stations led with 1,663 inspections, while 267 inspections were made of FM stations and 36 inspections of TV stations. Inspections are made on an irregular basis—once during the station's license period—to assure that the station is rendering a satisfactory broadcast service in compliance with the terms of its authorization. Numerous technical requirements such as tower lighting, safety devices, and

maintenance of directional characteristics are checked during these inspections.

Included in the above figures are initial inspections of new broadcast stations. These were made while the stations were on equipment tests preliminary to commencing regular operation. The break-down of initial inspections was 329 AM, 73 FM, and 8 TV stations. Upon being found satisfactorily constructed and operated, these stations were certified for regular programming.

#### SHIP STATION INSPECTIONS

Since 1910, when the United States first enacted laws requiring radiotelegraph installations on ships, the inspection and enforcement activities of the Commission and its predecessors have been directed toward achieving the most reliable and efficient operation of such equipment. As a result of regular, thorough inspections and the strict enforcement of essential regulations, the efficiency of radio in safeguarding the lives of the thousands of people who travel by sea, and in preserving millions of dollars in property, has been maintained in a very high degree.

However, the enforcement of safety radio standards on board United States and foreign merchant ships, under the provisions of the Communications Act of 1934, the International Convention for the Safety of Life at Sea and various other international treaties, was relaxed somewhat during the year due to the transfer of field engineers, normally assigned to ship inspectional work, to the solution of problems created by the rapid growth of other radio services. Despite the shortage of adequate personnel, more than 11,000 ship radio station inspections were completed. A comparison of the number of ship station inspections conducted during the past five fiscal years is provided by the following table:

*Number of ship inspections*

	1945	1946	1947	1948	1949
United States ships.....	13, 843	12, 765	11, 717	10, 117	7, 991
Foreign ships.....	1, 888	1, 023	2, 231	2, 364	3, 041
Total.....	15, 731	13, 786	13, 948	12, 481	11, 032

It will be noted that though the number of foreign ship inspections increased by 29 percent during 1949, the number of United States vessel inspections decreased by 21 percent. This was due in part to the fact that for several months during that year domestic shipping was at a standstill because of seamen's and longshoremen's strikes. This was reflected in the number of discrepancy notices served. Comparable figures for the last 5 years were:



*Number of discrepancy notices served*

	1945	1946	1947	1948	1949
United States ships.....	8,677	8,365	8,040	10,519	8,244
Foreign ships.....	714	404	1,190	1,688	1,752
Total.....	9,391	8,769	9,230	12,207	9,996

A total of 3,556 violations of safety radio standards were detected and remedied during the inspections of ship stations in 1949. This compares with 4,433 in 1948. Statistics for the last five fiscal years are here shown :

*Violations cleared during inspections*

	1945	1946	1947	1948	1949
United States ships.....	7,590	6,630	4,673	3,925	3,000
Foreign ships.....	229	129	455	508	556
Total.....	7,809	6,959	5,128	4,433	3,556

## INSPECTION OF OTHER RADIO STATIONS

The tasks in which radio may be employed and the benefits to be derived from its many uses continue to increase with each year. New services and new stations call for an increase in the scope and complexity of other than broadcast and ship inspections. In 1948 a total of 14,605 inspections were made of land stations other than broadcast, while in 1949 the figure was 10,534. In 1948 technical deficiencies numbering 4,308 were reported; in 1949 there were 4,212.

## 6. OPERATOR EXAMINATIONS

Unabated interest in obtaining radio operator authorizations of various kinds was attested by the growing number of applications (see chapter on "Radio Operators").

Operator examinations are largely given in the field. In the commercial radio operator classes, there were 20,874 new applicants for radiotelephone and 2,032 new applicants for radiotelegraph. Of these, 9,746 failed the radiotelephone examination and 816 failed the radiotelegraph code test. However, 4,949 were issued restricted radiotelephone operator permits by virtue of having obtained a passing grade in element I, while 71,986 applicants obtained this permit on declaration of their familiarity with rules and regulations pertaining to small station nonbroadcast and nonamateur operation. Renewal licenses numbering 5,988 were issued. Amateur radio operator applicants totaled 4,829 for class A privileges and 17,229 for class B. Special

aircraft radiotelephone authorizations issued by the field offices amounted to 663.

## 7. INVESTIGATIONS

The Commission's field engineers were increasingly active in investigating cases of interference between the various radio services, as well as interference caused to broadcasting by various electrical devices. During the year, 7,618 cases required their attention. This was 778 more than in 1948.

Besides the licensed radio stations involved, 155 unlicensed stations were located in 1949 as compared to 153 in 1948. The latter were promptly taken off the air and their operators advised of their liability to prosecution under the Communications Act.

Nine of these cases were referred to the Department of Justice for appropriate action. Three convictions were obtained during the fiscal year and fines of \$100, \$50, and of 1 year's probation were imposed, respectively. Additionally, 4 defendants scheduled to be tried in October 1949 were at liberty on \$1,000 bond each, and 3 defendants involved in another unlicensed operation were under \$1,500 bond each pending trial set for August 1949.

The Commission does not, in all cases, seek the conviction of illegal operators. Some offenders have no previous violation record and are admonished about the menace of unauthorized transmission to regular radio services—particularly those used for the protection of life and property—as well as the possible penalties which may incur to themselves. In the case of thoughtless or reckless minors, the latter and his parents are not only reminded of these consequences but are advised about approved ways for youth to take up radio operation as a profession or as a hobby.

The fact that intruders on the ether lanes are speedily detected, and can be run down by fixed and mobile monitoring apparatus, is a deterrent to would-be violators generally. It is usually a person unaware of this who attempts to engage in unauthorized operation.

One unusual case during the year was the tracing and closure of a nonlicensed transmitter, hidden in a store in a West Virginia municipality, which was used by a local faction to broadcast derogatory statements about the city officials. Commission investigators also halted the operations of several "bootleg" stations which charged for time but caused interference to regular broadcast. Each year the Commission apprehends unlicensed individuals who invade the bands assigned to amateurs. One such operation was traced to a crew member of a ship far at sea, and he was made aware of his transgression before the vessel reached port.

As in previous years, action had to be taken against unlicensed radio operation in connection with betting on horse racing. Bookmakers in some States, prevented from receiving results by leased wire, actually set up and attempted to operate long- and short-range transmitters to flash track results to their establishments on the outside. On the other hand, some individuals and groups sought to obtain an advantage over certain bookmakers by radioing indications of the winning horse so that confederates could place almost "sure" bets. An example of the bookmaker's use of clandestine radio is contained in a Commission case pending in the Federal court at Las Vegas, Nev. The other category is reflected in an indictment obtained against 3 individuals who resorted to the same means in an effort to "beat" bookmakers in Seattle, Wash.

#### 8. TECHNICAL OPERATIONS

The number of stations operating in higher frequency ranges has increased the need for precision types of measuring equipment at the field offices and monitoring stations. As a result, a considerable quantity of new apparatus was procured, including frequency measuring and field intensity measuring equipment, which will permit more complete surveillance of the technical operation of stations in all frequency ranges. For example, equipment has been purchased which will permit accurate frequency measurements on all frequencies up to 10,000 megacycles.

The number of requests for engineering measurements from within the Commission and from other Government agencies increased about 10 percent over the previous year. Field offices and stations engaged in 118 engineering projects involving engineering studies, investigations and measurements requiring a total of 8,685 man-days for completion as compared with 6,276 man-days for similar work for the previous year, an increase of 35 percent. Examples were:

The directional patterns of 99 different standard broadcast stations were checked to determine whether the stations were operating their antenna systems according to the specifications set forth in their licenses. In addition, 14 projects involving field intensity measurements were initiated.

The long-range broadcast signal intensity recording programs are being continued at the monitoring stations and at the Baltimore district office. These programs now include field intensity recording on AM, FM and TV broadcast stations and on atmospheric radio noise. Information obtained is used in connection with frequency allocation studies and in determination of range of coverage to be expected.

Measurements and observations were made for the Bureau of Standards to determine whether the new standard frequency station now operated in Hawaii materially improves the standard frequency service rendered by the Bureau. All monitoring stations were engaged in this project.

Measurements were made for the Coast Guard for the determination of the interference capabilities of a new transmitter for use in the loran navigation system.

Plans were completed and equipment installation begun on 10 cars which are to be used to test field intensity measurements, frequency measurements and make other technical determinations. These mobile units will also be employed to make various engineering measurements which cannot be accomplished at the fixed monitoring stations.

Other field activities involved construction of special monitoring and other equipment which cannot be procured in the required form, and modification of commercially available equipment to meet specific applications. Extensive improvements were made to the VHF field intensity recording installations at the nine monitoring stations engaged in this activity.

#### 9. FIELD STATION LOCATION CHANGES

The Cleveland, Ohio, suboffice was closed December 31, 1948, due to lack of funds, and Cleveland was established as a quarterly examination point. Budgetary limitations also closed the Juneau, Alaska, secondary monitoring station, as of June 30, 1949, and the Alaskan area will be served by the remaining Anchorage station, which was moved to a new local site.

The Livermore, Calif., primary monitoring station was moved to a new local site and the work for placing it in operation was proceeding. The Hawaiian primary monitoring station moved to Fort Hase from Punch Bowl when the latter site was taken over by the Army. Encroachment of construction caused the secondary monitoring station at Broken Arrow, Okla., to move to Muskogee, and local relocation of one at Bay St. Louis, Miss. Another moved from Navy property at Richmond, Fla., to Commission property at Fort Lauderdale. Inability to renew a lease caused the Searsport, Maine, station to shift to another local site.

A list of field offices and monitoring stations appears in the appendix.

#### 10. STATISTICS

The extent of certain engineering field activities is indicated in the following tabulations for the calendar year 1949 which pertain only to work done outside of Washington:

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**Inspections:**

United States Ships.....	7,991
Notices served.....	8,244
Violations cleared during inspection.....	3,000
Foreign ships.....	3,041
Notices served.....	1,752
Violations cleared during inspection.....	556
Land stations.....	12,500
Notices served.....	4,212

**Monitoring:**

Cases.....	28,307
Notices served.....	11,679

**Investigations:**

Licensed stations.....	4,887
Unlicensed stations.....	3,368

**Examinations:**

Commercial, new.....	23,722
Commercial, renewals.....	247
Amateur.....	17,229

**Licenses issued:**

New.....	90,734
Renewals.....	6,446

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## CHAPTER VIII. TECHNICAL STUDIES

1. GENERAL
  2. TECHNICAL INFORMATION DIVISION
  3. LABORATORY DIVISION
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### 1. GENERAL

The technical research staff of the Commission is a radio regulation what the mechanical and civil engineer is to material construction. Unless the foundation of a structure is sound, the ultimate job—be it building, bridge, or frequency allocation—will collapse. Continuing research is essential to radio's future, and its benefits are shared by the public and industry.

Probably the most difficult task of the Commission is the allocation of spectrum space to specific radio services. A workable and lasting allocation plan requires a detailed knowledge of propagation characteristics and their impact upon service ranges, interference potentialities, channel separations, power limitations, and other inter-related matters. Such scientific knowledge is best obtained through practical field measurements and careful engineering analysis of the resulting data. This scientific approach is laborious and time consuming, but there is no satisfactory substitute.

The same considerations apply to principles of radio engineering and technical operation, such as those embodied in the Commission's Standards of Good Engineering Practice. The technical staff must furnish the best available answers to the complex problems involved before allocation plans and engineering standards can be adopted by the Commission.

### 2. TECHNICAL INFORMATION DIVISION

The Technical Information Division acts as an operational group and technical consultant to the Commission. For this purpose it organizes projects for the collection of data by the Field Engineering and Monitoring and the Laboratory Divisions and for obtaining data from other organizations. It also participates in the technical studies incident to international conferences and treaties, and represents the

Commission in the coordination of radio research, standardization and instrumentation with government and industrial organizations.

During the thirteenth year of its operation, the Technical Information Division continued work on its long term projects, inaugurated new projects, and tailored its general sphere of activities to the requirements of a rapidly changing and expanding industry. The year was marked by a large number of engineering conferences arising largely from the technical problems invited by the development of new radio services. The TID continued to carry on special studies and to collect and analyze basic data concerning radio wave propagation as well as other communication problems, and to make the resulting scientific information available to the Commission for guidance in the promulgation of new rules and the determination of technical limitations and practical engineering standards.

A factual knowledge of equipment capabilities and limitations and of radio wave propagation characteristics is fundamental to frequency allocations. The whole structure of radio regulation depends on the soundness upon which this framework of frequency allocation is built.

A judicious allocation of radio frequencies to the various radio services presupposes a knowledge of many highly technical and complicated things, including ionosphere and troposphere propagation terrain effects, useful intensities of signal as related to various sources of interference, geographical and frequency separations necessary to alleviate interference in accordance with various requirements, equipment capabilities and limitations, new developments and their possibilities, etc.

The Commission requires a detailed knowledge of the propagation characteristics of radio signals throughout the spectrum in order that the most economic and practical allocation of facilities may be achieved. The propagation characteristics of the band of frequencies allocated to a particular service must be consistent with the operating requirements. The allocation of stations within a service, i. e., the determination of cochannel and adjacent channel distance separations, service ranges and power limitations must be founded on a knowledge of propagation. Such knowledge is best obtained from deductions arrived at through the study and analysis of long-term field intensity measurements involving the use of carefully calibrated recording equipment and requiring the attention of experienced engineers. It is the primary function of the TID to obtain such data and furnish highly reliable solutions to the technical problems involved.

The following problems were among those under study during the past year :

## MEDIUM FREQUENCY PROJECTS

*Sunspot cycle recordings.*—Solar activity has a profound effect upon radio wave propagation. During daytime hours, standard broadcast stations are only heard over relatively short distances. At night, skywave signals may be heard from distant States as well as from Mexico and Canada. The sunspot cycle covers a period of about 11 years. The Commission's sunspot cycle project was inaugurated in 1938 and is still active. Continuous recordings of broadcast signals are being made at Baltimore, Md.; Grand Island, Nebr.; Portland, Oreg.; Powder Springs, Ga.; and from time to time at other points.

These data are needed to supplement that taken in previous years. Additional recording must be done to cover the full cycle. Coordination of this information with similar data recorded in Canada was started during the year and will be continued for some time to come.

*Meteorological conditions and their effect upon field intensities.*—The study of the relationship between field intensities and weather conditions was continued at a decelerated pace. The signals from WCAU, Philadelphia, were recorded at Baltimore and correlated with simultaneous recorded weather data. Too little information is at hand to make any firm conclusions concerning the physical causes involved. The data, however, serve to illustrate the extent to which groundwave signals, and the radio service dependent thereon, vary in time. The work is being continued.

*Atmospheric noise.*—Continuous field intensity recordings of atmospheric noise between 200 and 1,600 kilocycles were continued as in previous years. This information is analyzed and correlated with thunder-storm data and the results are used in the preparation of a series of noise maps to show characteristic variations with the time of day and a percentage of time for each frequency band and for various latitudes. These maps are used in estimating the signal level required to provide an acceptable radio service in the presence of atmospheric noise and, hence, the possible service ranges when interference from other stations is absent. Because of the pressure of other duties, analyses and map preparation could not be undertaken during fiscal 1949.

*Skywave pulse transmissions.*—Radio signals which travel from the transmitter to the receiver by the way of the E or F layers of the ionosphere are characterized by multiple reflections of different relative amplitudes and phases, depending on the distance or range of reception. To determine action and effect, pulses transmitted by certain broadcast stations which have volunteered their assistance are received simultaneously on loran receivers at distances of 500 to 2,000 miles. The pulses appearing on the oscilloscopes of each receiver are



photographed at equal intervals of time. The results are then analyzed to determine the signal intensities exceeded for various percentages of the time for the components arriving by way of one, two, three or more reflections or "hops" from the ionosphere. Due to the pressure of other projects, collecting this field data has been delayed. Additional measurements will be needed before any definite correlations can be determined.

*Performance of directional antennas.*—A government-industry conference was held in preparation for the September NARBA session and several subcommittees were appointed to deal with specific engineering tasks. The division collaborated with one committee in testing the performance of about 29 operating directional antennas. The chief object is to determine whether the restriction of skywave interference provided by directional antennas is properly measured by the minima produced in the groundwave radiation pattern or whether any additional precautions are desirable.

#### TECHNICAL STUDIES AND STANDARDS

*General.*—The rapid increase in the number and kinds of new radio services has produced a whole new crop of technical problems. Each new service requires the preparation of specific rules including technical definitions, equipment requirements, and operational limitations. This often requires intensive studies involving formation of committees representing other agencies as well as industry. Whenever technical difficulties are encountered, the various divisions of the Commission turn to the Technical Information Division for assistance. During the past year the number of such requests increased to a point where the limited TID personnel was able to handle only those of the very highest priority.

*Low-power rules and restricted radiation devices.*—The Commission's low-power rules became the subject of serious consideration, partly because of complaints of interference in the broadcast band from certain low-power systems and devices, and partly from the demand of the industry for a clarification of the present rules. The TID sponsored a committee to study the problem and make recommendations to the Commission. During the year this work was organized as a joint effort in which government agencies and the electronics industry participated. One industry-wide meeting and several subcommittee meetings were held. A multiplicity of problems and policy matters have arisen regarding these matters. The study is in its initial stages.

*The TVI (television interference) problem.*—Television receivers are unusually susceptible to interference. With their rapid manufacture and sale during the past year, the number of complaints of interference received by the Field Division increased far beyond

anything anticipated. A study was undertaken to determine the technical phases of TVI. This is in conjunction with certain analysis work being performed by the Laboratory Division. The problem is complicated and will require much testing and study before a solution can be reached.

*Receiver radiation.*—The radiation of radio-frequency energy from receivers, especially TV receivers, has also become a serious matter. The rapid development of this new entertainment service and the constant effort to build cheaper and cheaper receivers has made the problem a difficult one. The TID is represented on the joint RMA-SAE Committee dealing with this problem. The Division has conducted studies and furnished technical advice. To date only slight progress has been made. The work is of a continuing nature.

*Coordination of technical rules.*—With the large number of new radio services recognized by the Commission, the problem of coordinating the various technical phases of the rules for one service with those of other services has become a necessity. The responsibility for such coordination with a view to uniformity throughout all services has been charged to the TID. This work will be continued and expanded during the year.

*Single side band suppressed carrier studies.*—With the ever-increasing demand for frequency space, engineers have turned to the single side band suppressed carrier method of operation because it offers a saving in the band-width requirements. Many technical questions have arisen concerning the actual band width needed for various types of modulation, the methods of calculating and specifying power, etc. The study of these problems was started early in the year but, due to the pressure of other work, was left for future attention.

*Carrier current radiation measurements.*—With the proposal to write rules and prescribe technical limits of operation for carrier current systems, it became necessary to investigate the actual nature of the field radiated from a power line or other conductors along which carrier current communications are being propagated. Almost no practical knowledge regarding this matter was available, even from those large commercial organizations where extensive systems are in operation. It therefore was necessary to make comprehensive plans for widespread carrier current field intensity measurements. They have been advanced to the formative stage and the cooperation of the industry and other governmental agencies has been solicited. This project is expected to receive increased attention during the coming year.

#### VHF AND UHF PROPAGATION STUDIES

*VHF television project.*—The rapid growth of radio has stimulated development in and increased the demand for higher and higher

frequencies with the result that the Commission has had to establish services and license stations in many parts of this newly developed region. The lack of knowledge regarding propagation and technical standards has made the Commission's problem a difficult one. The study of television allocations alone has constituted a momentous task. During fiscal 1949, the TID devoted the full time of seven employees for a period of approximately 8 months to the television problem and its allied Ad Hoc Committee work. This joint FCC-Industry committee was appointed during the October 1948 television hearing (Docket 8736 et al.). The chief of the TID served as chairman. The television industry and various government agencies were represented. During the period October 1948 to July 1, 1949, the Ad Hoc Committee held 28 formal meetings. The number of informal conferences and subcommittee meetings was not recorded but ran well into three digit figures and involved a large number of man-hours.

The information from Commission field intensity projects was integrated with that obtained from the published work of other authorities on radio-wave propagation. Additional data were furnished by the various representatives of the industry who served on the Ad Hoc Committee. All of this material was analyzed and studied in order to determine, as nearly as possible, the effects of variations in transmitter and receiver antenna height and directivity upon coverage, the amount of transmitter power required for satisfactory service over any given area, the extent of service degradation caused by tropospheric and ionospheric propagation, the amount of variation in signal strength with different types of terrain, and the relative effects of frequency on the above factors.

Under the general direction of the Ad Hoc Committee, the TID cooperated with the General Radio Propagation Laboratory of the National Bureau of Standards in completing a large volume of complex statistical and analytical work in a minimum amount of time. It was only through the close collaboration maintained with the Central Radio Propagation Laboratory as well as with the industry that this momentous job was finished in the time allotted.

The findings of the Ad Hoc Committee appeared in technical reports released by the TID. The whole series include over 130 pages of highly complicated calculations, derivations and extrapolations with resulting formulae, charts, tables, curves, etc. These reports probably represent the most highly scientific study which the Bureau of Engineering has ever undertaken. They are destined to have a profound and far-reaching effect upon the future development of the television industry.

*Projects in the FM band (88 to 108 megacycles).*—The VHF field intensity recording projects inaugurated during the previous year

were continued. Recorders were in operation at Millis, Mass.; Laurel, Md.; Powder Springs, Ga.; South Miami, Fla.; Allegan, Mich.; Grand Island, Nebr.; Portland, Oreg.; Livermore, Calif.; Honolulu, Hawaii; and Trinidad, British West Indies.

*The WBAM-W2XCT project.*—The charts obtained in the WBAM-W2XCT project of the previous year were further analyzed with a view to expanding the general propagation knowledge in the VHF and UHF bands. These charts, recorded over a period of about 12 months at four separate locations on 47.1, 106.5, and 700 megacycles, yielded the best data available for analysis on a statistical basis.

*The Trinidad project.*—Signals from WWV on 35 megacycles were recorded throughout the year at Trinidad, British West Indies. This project is being conducted on a joint basis with the Bureau of Standards. Equipment and supplies are being furnished by the Commission while plant facilities, electric power and personnel are being supplied by the Bureau of Standards. Due to changing conditions in the F2 layer of the ionosphere at this frequency, usable signals were received during only part of the year. However, this negative information is almost as useful as is positive information. The project is being continued.

*Other VHF and UHF projects.*—In addition to the projects previously described, the following problems received preliminary study and general plans formulated for the inauguration of separate studies:

1. A study of the effects of variable hydrographic conditions on wave propagation.
2. A study of terrain effects upon wave propagation.
3. A study of surface coverage (trees, shrubs, etc.) and their effect upon propagation.
4. Analytical studies of tropospheric interference.
5. Tropospheric interference studies for the UHF band.
6. Tropospheric interference standards for the VHF fixed and mobile services.
7. A study of "scatter effect" and its probable impact upon VHF and UHF services.
8. The development of automatic devices to scale field charts and analyze the resulting data.

*Technical cooperation with Government and industry.*—The Commission is represented by its Technical Information Division on a number of important standing committees of government and industry. Among these are executive groups of the Central Radio Propagation Laboratory, the URSI (International Radio Scientific Union) and CCIR (International Radio Consultative Committee), committees of the Institute of Radio Engineers and the Radio Manufacturers Association, and panels of the Committee on Electronics.

The Chief of the TID also served as an alternate to the chairman of the Commission on the President's Scientific Research Board.

In addition to furnishing technical advice to the Commission, the TID is called upon to answer technical questions of other government agencies, industry, and private engineers. During the past year demands of this nature increased far beyond those of any previous period, and backlogs in routine work developed.

### 3. LABORATORY DIVISION

#### GENERAL FUNCTIONS

The Laboratory Division operates a laboratory at Laurel, Md., for technical research and investigation to assist the Commission in allocating frequency bands and establishing and revising engineering standards and regulations for new as well as existing radio services.

Examples of the Laboratory Division's activities are (1) investigation of various methods of transmission and reception to determine which method permits the most efficient utilization of the spectrum, (2) tests of types of transmitters to determine whether interfering signals are emitted on other than the frequency actually employed, and (3) tests of receivers to determine how close together the Commission might place stations without the listener receiving several stations at the same time.

Laboratory testing concerns type of equipment rather than individual units. Attempt is made to anticipate interference problems and to have remedial measures taken at the manufacturing end rather than to make individual investigation after interference occurs. If this procedure is not followed while a system is developing a multitude of units may be placed in operation, after which the only remedy may be of a "patchwork" nature.

For example, a manufacturer intending to make many identical units submits to the laboratory a sample of those he intends to produce. At the laboratory this model is subjected to tests to determine if its operation is in keeping with engineering standards and will not cause interference to other services. If the equipment proves to be satisfactory, it is type approved. This assures the manufacturer and the Commission that the public interest will be protected by the use of similar equipment.

Following is a summary of particular laboratory activities engaged in during the year:

#### TELEVISION

A great amount of effort has been devoted to television studies. These studies have been centered on television interference problems since this is a no-man's land in which far too little effort has been

expended. In television broadcasting interference is one of the major problems.

To illustrate the basic reasons why television is so subject to interference: An ordinary voice broadcast channel is only 10 kilocycles wide. At 1000 kilocycles this channel width is 1 percent of the operating frequency. A television channel is 6 megacycles wide. At 60 megacycles this is one-tenth of the operating frequency. So the probability of interference to the TV channel is 10 times as great. In addition, at the frequencies employed in TV, oscillator radiation is a much more important interference factor.

Both laboratory and field tests were made on unsynchronized operation, synchronized operation and off-set carrier methods of interference reduction. In addition, laboratory tests were conducted with the use of FM video modulation within a 6-megacycle channel. Numerous demonstrations of the various TV methods just outlined were conducted at the laboratory for the Commission and for interested industry representatives.

Studies also were made covering the TV receiver oscillation problem, the problem of interference to standard broadcast stations by TV receiver synchronizing circuits and the performance of TV converters to permit the reception of UHF signals on a VHF receiver.

#### INDUSTRIAL HEATING, DIATHERMY, AND MISCELLANEOUS EQUIPMENT

Radio-frequency heating for industrial, medical, and other miscellaneous uses has expanded to such an extent that the kilowatts of equipment used by this group exceed the total transmitter kilowatt power required for radio communication. Such equipment employs the same frequencies used by the communications industry and, if not properly designed and operated, will emit severe interfering signals. Some of these units use power far in excess of the 50 kilowatt maximum permitted broadcast stations.

To cope with the interference situations, the Commission adopted part 18 of the Rules and Regulations covering Industrial, Scientific, and Medical Service, effective June 30, 1947. Many devices employing radio-frequency energy and capable of serious interference were not clearly within the industrial heating or diathermy classification, so they are covered by the subsequent Miscellaneous Devices section of part 18. Included in this group are electric signs which employ radio-frequency power for excitation of gases, also radio cookers and welding equipment. The welding equipment industry has been granted several extensions of the effective date of the application of part 18 to permit reduction of the emission of interfering signals to the permitted limits.

The Laboratory Division has maintained contact with the industrial heating industry, having representation on a number of committees of the American Institute of Electrical Engineers and the Institute of Radio Engineers. Standards of measurement techniques and interference reduction procedures are presently under consideration by these committees.

Diathermy apparatus used for medical therapy involves a large number of units of identical type. During the fiscal year manufacturers made 50 submissions of models for laboratory type testing. Approval was recommended for 26 types found to meet the Commission's requirements.

The steps taken to control radio interference from noncommunication users of radio devices are of great importance not only to the rapidly developing television service and other civilian radio communication services but are also a great protection to the frequencies utilized by the armed services. This aspect merits particular consideration in view of the importance of the industrial heating devices to production of military material.

#### STRATOVISION

The Laboratory Division made observation and measurements of the television transmissions made from aircraft flying at high altitudes in experiments by the Westinghouse Electric Corp., in cooperation with the Glenn L. Martin Co.

#### SERVICES OTHER THAN BROADCASTING

Studies and observations both in the laboratory and in the field were made on the problem of intermodulation which severely limits the use, in the same geographical area, of a large number of stations employed in the various mobile services on the frequencies near 150 megacycles. A number of types of equipment were tested and the problems pointed out to the equipment manufacturers.

The effect of assignment of 540 kilocycles or other lower extension of the standard broadcast band upon the operation of existing autoalarm (distress) receivers on shipboard was subject to laboratory investigation in conjunction with certain measurements in the field by the Field Engineering and Monitoring Division. As a result of these studies the limitation upon the use of these additional frequencies was delineated.

A number of proposed units for distress use on radiotelephone equipped ships were tested during the year. Several units for this purpose were designed and constructed by the laboratory and furnished the Marine Radio and Safety Division for field testing.

**PROPAGATION**

The laboratory operated a 400-megacycle transmitter at Dans Rock, near Frostburg, Md., for several months during the summer and fall of 1948 and May and June 1949. Recordings were made at Laurel, and other measurements at fixed and mobile locations. These findings add greatly to the information so far available regarding the interference conditions at distances of the order of 125 miles on frequencies near the low end of the proposed UHF television band.

In addition, the laboratory made both laboratory and field observations of the 500 megacycle and 850 megacycle transmissions made by RCA in the Washington area.

**CALIBRATION OF APPARATUS**

The Field Engineering and Monitoring Division uses a large amount of technical equipment. The Laboratory Division must calibrate this apparatus for accuracy. For this purpose the laboratory must maintain its own instruments in a highly accurate state. In addition, some equipment used by others in obtaining data submitted in applications was compared on the accuracy of the measurements. These latter tests covered only items for which the National Bureau of Standards was not prepared to calibrate at the time. During the year 3 field intensity sets and 12 signal generators were calibrated.



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## APPENDIX

1. FIELD OFFICES
  2. PUBLICATIONS
  3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS
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### 1. FIELD OFFICES

The Commission has 70 field offices and associated installations in more than 50 cities throughout the United States, including Alaska, Hawaii, and Puerto Rico. The great majority (64) are engaged in engineering pursuits and consists of 9 regional offices, 23 district offices, 6 suboffices, 3 ship offices, 20 monitoring stations, and 3 common carrier offices. The Bureau of Accounting has 4 field offices and the Bureau of Law. 2. A complete list follows:

#### BUREAU OF ENGINEERING

##### FIELD ENGINEERING AND MONITORING DIVISION

<i>Regional offices</i>	<i>Headquarters</i>
North Atlantic.....	506 Federal Bldg., New York 14, N. Y.
South Atlantic.....	411 Federal Annex, Atlanta 3, Ga.
Gulf States.....	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific.....	323 A Customhouse, San Francisco 26, Calif.
North Pacific.....	801 Federal Office Bldg., Seattle 4, Wash.
Central States.....	878 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes.....	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian.....	P. O. Box 1142, Lanikai, Oahu, T. H.
Alaskan.....	52 Post Office and Courthouse, Anchorage, Alaska.
<i>District offices</i>	<i>Address</i>
1.....	1600 Customhouse, Boston 9, Mass.
2.....	748 Federal Bldg., New York 14, N. Y.
3.....	1005 U. S. Customhouse, Philadelphia 6, Pa.
4.....	508 Old Town Bank Bldg., Baltimore 2, Md.
5.....	402 New Post Office Bldg., Norfolk 10, Va. (ship office) 106 Post Office Bldg., Newnort News, Va.
6.....	411 Federal Annex, Atlanta 3, Ga. (suboffice) 214-218 Post Office Bldg., Savannah, Ga.
7.....	312 Federal Bldg., Miami 1, Fla. (suboffice) 409-410 Post Office Bldg., Tampa 2, Fla.
8.....	400 Audubon Bldg., New Orleans 16, La. (suboffice) 324 Courthouse & Customhouse, Mobile 10, Ala.
9.....	324 U. S. Appraisers Bldg., Houston 11, Tex. (suboffice) 329 Post Office Bldg., Beaumont, Tex. (ship office) 406 Post Office Bldg., Galveston, Tex.
10.....	500 U. S. Terminal Annex Bldg., Dallas 2, Tex.

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11-----	539 U. S. Post Office & Courthouse Bldg., Los Angeles 12, Calif. (suboffice) 230 U. S. Customhouse and Courthouse, San Diego 1, Calif. (ship office) 326 U. S. Post Office and Courthouse, San Pedro 1, Calif.
12-----	323-A Customhouse, San Francisco 26, Calif.
13-----	307 Fitzpatrick Bldg., Portland 5, Oreg.
14-----	801 Federal Office Bldg., Seattle 4, Wash.
15-----	521 Customhouse, Denver 2, Colo.
16-----	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17-----	3200 Fidelity Bldg., Kansas City 6E, Mo.
18-----	246 U. S. Courthouse, Chicago 4, Ill.
19-----	1029 New Federal Bldg., Detroit 26, Mich.
20-----	328 Federal Bldg., Buffalo 3, N. Y.
21-----	609 Stangenwald Bldg., Honolulu 1, T. H.
22-----	322-323 Federal Bldg., San Juan 13, P. R.
23-----	7-8 Shattuck Bldg., Juneau, Alaska (suboffice) 53 Post Office and Courthouse, Anchorage, Alaska.

*Primary monitoring stations*

Allegan, Mich.  
 Grand Island, Nebr.  
 Kingsville, Tex.  
 Millis, Mass.  
 Santa Ana, Calif.  
 Laurel, Md.  
 Livermore, Calif.  
 Portland, Oreg.  
 Powder Springs, Ga.  
 Lanikai, Oahu, T. H.

*Secondary monitoring stations*

Searsport, Maine  
 North Scituate, R. I.  
 Spokane, Wash.  
 Twin Falls, Idaho  
 Fort Lauderdale, Fla.  
 Lexington, Ky.  
 Muskogee, Okla.  
 Bay St. Louis, Miss.  
 Anchorage, Alaska  
 Point Maldonado, P. R.

**COMMON CARRIER DIVISION FIELD OFFICES**

Atlanta, Ga., 515 First National Bank Bldg.  
 New York, N. Y., 604 Federal Office Bldg.  
 San Francisco, Calif., 316 U. S. Customhouse.

**BUREAU OF ACCOUNTING FIELD OFFICES**

Atlanta, Ga., 733 Hurt Bldg.  
 New York, N. Y., 624 Federal Office Bldg.  
 St. Louis, Mo., 334 Old Customhouse.  
 San Francisco, Calif., 316 U. S. Customhouse.

**BUREAU OF LAW FIELD OFFICES**

New York, N. Y., 604 Federal Office Bldg.  
 San Francisco, Calif., 100 McAllister St.

## 2. PUBLICATIONS

In general, the Federal Communications Commission's printed publications are sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Following is a list of Commission publications which are available from the Superintendent of Documents, at the prices noted, unless otherwise indicated:

<i>Title</i>	<i>Price</i>
Communications Act of 1934, with amendments and index, revised to September 1, 1948.....	\$0.20
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 2, July 1935 to June 1936.....	2.00
Volume 3, July 1936 to February 1937.....	2.00
Volume 4, March 1937 to Nov. 15, 1937.....	1.50
Volume 5, Nov. 16, 1937 to June 30, 1938.....	1.50
Volume 6, July 1, 1938 to Feb. 28, 1939.....	1.50
Volume 7, Mar. 1, 1939 to Feb. 29, 1940.....	1.50
Volume 8, Mar. 1, 1940 to Aug. 1, 1941.....	1.50
Volume 9, Aug. 1, 1941 to Mar. 31, 1943.....	1.25
Volume 10, Apr. 1, 1943 to June 30, 1945.....	2.00
Volume 11, July 1, 1945 to June 30, 1947.....	3.75
Volume 12, July 1, 1947 to June 30, 1948.....	(1)
Annual reports of the Commission:	
First Annual Report—Fiscal year 1935.....	.15
Twelfth Annual Report—Fiscal year 1946.....	.20
Thirteenth Annual Report—Fiscal year 1947.....	.25
Fourteenth Annual Report—Fiscal year 1948.....	.30
Fifteenth Annual Report—Fiscal year 1949.....	(1)
Statistics of the Communications Industry:	
For the year 1939.....	.25
For the year 1940.....	.20
For the year 1942.....	.35
For the year 1943.....	.30
For the year 1944.....	.40
For the year 1945.....	.50
For the year 1946.....	.55
For the year 1947 (sections A and B).....	.75
Section B (Broadcast only).....	.25
Report on Public Service Responsibility of Broadcast Licensees, 1946.....	.25
An ABC of the FCC, 1949.....	.05
Radio—a Public Primer.....	.10
Telephone and Telegraph—a Public Primer, 1949.....	.10
An Economic Study of Standard Broadcasting, 1947.....	.40

<sup>1</sup> In the process of printing—available at Government Printing Office at a later date.

<i>Title</i>	<i>Page</i>
Study Guide and Reference Material for Commercial Radio Operator Examinations, revised to July 1, 1948.....	\$0. 25
Digest of Radio Regulations and Instructions for Restricted Radiotelephone Operators.....	. 05
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to Oct. 30, 1947....	1. 00
Section 26, Sunrise and Sunset Table.....	. 10
Concerning FM Broadcast Stations, revised to Jan. 9, 1946.....	. 10
Concerning Television Broadcast Stations, revised to Dec. 19, 1945....	. 15
Rules and Regulations:	
Part 0, Organization, Delegations of Authority, etc.....	(1)
Part 1, Practice and Procedure, revised to Jan. 26, 1949.....	. 15
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to Apr. 27, 1949.....	. 15
Part 3, Radio Broadcast Services, revised to Jan. 6, 1949.....	. 20
Part 4, Experimental and Auxiliary Broadcast Services, effective Sept. 10, 1946.....	(2)
Part 5, Experimental Radio Services, revised to Jan. 16, 1948.....	. 10
Part 6, Public Radiocommunication Services, revised to Apr. 27, 1949.....	. 10
Part 7, Coastal and Marine Relay Services, revised to Sept. 30, 1945.....	(3)
Part 8, Ship Service, revised to May 31, 1943.....	. 15
Part 9, Aeronautical Services, revised to July 1, 1947.....	. 10
Part 10, Public Safety Radio Services, revised to Apr. 27, 1949.....	. 10
Part 11, Industrial Radio Services, revised to Apr. 27, 1949.....	. 10
Part 12, Amateur Radio Service, revised to Nov. 18, 1948.....	. 15
Part 13, Commercial Radio Operators, revised to Mar. 30, 1949.....	. 05
Part 14, Radio Stations in Alaska (other than amateur and broadcast), revised to Apr. 2, 1942.....	. 05
Part 15, Restricted Radiation Devices, recodified July 21, 1948.....	(3)
Part 16, Land Transportation Radio Services, revised to Apr. 27, 1949..	. 10
Part 18, Industrial, Scientific and Medical Service, revised to Apr. 30, 1948.....	. 10
Part 19, Citizens Radio Service, effective June 1, 1949.....	. 05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948.....	. 35
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948.....	. 25
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, effective Jan. 1, 1940.....	. 25
Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Aug. 1, 1947.....	. 45
Part 41, Telegraph and Telephone Franks, revised to Dec. 4, 1947....	. 05
Part 42, Preservation of Records, revised to May 27, 1943.....	. 10
Part 43, Reports of Communication Common Carriers and Their Affiliates, revised to July 21, 1948.....	. 10
Part 51, Classification of Telephone Employees, effective July 25, 1944	. 05
Part 52, Classification of Wire-telegraph Employees, effective July 11, 1944.....	. 05

<sup>1</sup> Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

<i>Title</i>	<i>Page</i>
<b>Rules and Regulations—Continued</b>	
Part 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to Aug. 1, 1946.....	\$0.10
Part 62, Applications under Section 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944.....	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to Dec. 30, 1946.....	(')
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948.....	.10

Purchasers of the Commission's Rules and Regulations are furnished a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles the purchaser to receive any future amendments to the part or parts purchased, until a complete revision thereof is reprinted. In the event any exception is made in this procedure, rule purchasers will be advised by letter where the amendments may be obtained. All Standards of Good Engineering Practice and most of the rule parts are printed on 8-by-10½-inch pages and punched to fit standard three-ring binders.

The Commission is no longer able to supply lists of radio stations but, on request, will furnish a fact sheet about commercial sources of such lists, also one on commercial radio publications and services.

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<sup>2</sup> Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

### 3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

Federal laws, international treaties, arrangements, agreements, etc., which were in force as of January 1, 1949, are listed below for reference. Unless otherwise indicated, copies of these documents may be purchased from the Government Printing Office, Washington 25, D. C. (TS relates to Treaty Series, EAS to Executive Agreement Series, and TIAS to Treaties and Other International Act Series.)

Date	Series	Subject
1910.....		Ship Act of 1910 as amended in 1912. (Radio communication on the Great Lakes.)
1925.....	TS 724-A.....	Arrangement with Great Britain, Canada, and Newfoundland to prevent broadcast interference by ships.
1928-29.....	TS 767-A.....	Arrangement with Canada concerning private experimental communication.
1929.....	TS 777-A.....	Arrangement with Canada, Cuba, and Newfoundland relating to high-frequency assignments.
1929.....	TS 910.....	Safety of Life at Sea Convention (London).
1930.....	TS 921.....	Amendment to Regulation XIX of Annex 1 of Safety of Life at Sea Convention.
1934.....	EAS 62.....	Arrangement with Canada concerning amateur and private experimental communication.
1934.....	EAS 66.....	Arrangement with Peru concerning amateur communication.
1934.....	EAS 72.....	Same, with Chile.
1937.....	EAS 109.....	Agreement with Canada concerning issuance of radio licenses.
1937.....	TS 962.....	North American Regional Broadcasting Agreement (Havana).
1937.....	TS 938.....	Inter-American Radio Communications Convention (First Inter-American Conference, Havana).
1938.....	EAS 142.....	Agreement with Canada concerning radiocommunications between Alaska and British Columbia.
1938.....	TS 949.....	Regional Radio Convention (Guatemala—in behalf of the Canal Zone).
1938.....	EAS 136.....	Arrangement with Canada concerning broadcasting.
1939.....	EAS 143.....	Arrangement with Canada concerning civil aeronautical services.
1940.....	EAS 231.....	Inter-American Radiocommunications Agreement (Second Inter-American Conference, Santiago, Chile).
1940.....	EAS 196.....	Agreement with Mexico concerning broadcasting.
1941.....	EAS 227.....	Supplementary North American Regional Broadcasting Agreement (Washington).
1944.....	EAS 400.....	Wartime agreement with Canada re broadcasting stations in Northwestern Canada.
1945.....		Inter-American Telecommunications Convention (Third Inter-American Conference, Rio de Janeiro). (Not yet ratified by United States.) (Not available from Government Printing Office.)
1945.....	TIAS 1518.....	Telecommunications agreement with certain governments of the British Commonwealth (Bermuda).
1946.....	TIAS 1553.....	North American Regional Broadcasting Interim Agreement (Modus Vivendi), Washington.
1946.....	TIAS 1527.....	Agreement with U. S. S. R. concerning commercial radio teletype communication channels.
1947.....	TIAS 1726.....	Agreement with Canada concerning FM broadcasting in 88-108 Mc.
1947.....	TIAS 1670.....	Interim arrangement with Canada concerning mobile transmitters.
1947.....		International Telecommunication and Radio Conferences, Atlantic City. (Copies available through International Telecommunication Union, Geneva, Switzerland, pending printing by the Government Printing Office.)
1947.....	TIAS 1652.....	Agreement with Great Britain concerning standardization of distance measuring equipment.
1947.....	TIAS 1676.....	Agreement with the United Nations concerning its headquarters' use of radio.
1948.....	TIAS 1802.....	Arrangement with Canada on engineering standards applicable to allocation of standard broadcast stations.

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In addition, the United States is bound by certain treaties wherein some of the contracting countries did not become parties to subsequent agreements, thereby binding the United States to the original document. These include:

Date	Series	Subject
1912.....	TS 581.....	International Radiotelegraph Convention (London).
1927.....	TS 767.....	International Radiotelegraph Convention and General Regulations (Washington).
1932.....	TS 867.....	General Radio Regulations annexed to the International Telecommunications Convention (Madrid).
1937.....	EAS 200.....	Inter-American Arrangement concerning Radiocommunications and Annex (Havana).
1938.....	TS 948.....	General Radio Regulations (Cairo Revision, 1938); annexed to Telecommunications Convention (Madrid, 1932).

There are also some treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Commission insofar as they involve communications. Among the most important of these are the following:

Date	Series	Subject
1944.....	TIAS 1591.....	International Civil Aviation Agreement, Chicago.
1946.....	.....	ICAO Communication Division, Second Session, Montreal. <sup>1</sup>
1946.....	.....	Special Radio Technical Meeting, Montreal. <sup>1</sup>
1946.....	.....	} ICAO Regional Air Navigation Meetings, Communications Committee, Final Reports. <sup>1</sup>
1947.....	.....	
1948.....	.....	} ICAO Communication Division, Third Session, Montreal. <sup>1</sup>
1949.....	.....	
1949.....	.....	ICAO Communication Division, Third Session, Montreal. <sup>1</sup>

<sup>1</sup> Available from Secretary General of ICAO, Dominion Square Bldg., Montreal, Canada.



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**Harlow, Alvin.**

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**Radio Today: The Present State of Broadcasting. 1942.**

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**Economics of the Radio Industry. 1925.**

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**Radio and the Printed Page. 1940.**

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**Measurement in Radio. 1934.**

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**Rose, Cornelia B., Jr.**

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**Studies in the Control of Radio: Nos. 1-6. 1940-1948.**

**Summers, Harrison B., editor.**

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**A Thirty-Year History of Programs Carried on  
National Radio Networks in the United States, 1926-1956. 1958.**

**Waldrop, Frank C. and Joseph Borkin.**

**Television: A Struggle for Power. 1938.**

**White, Llewellyn.**

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**World Broadcast Advertising: Four Reports. 1930-1932.**