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Radio World®

Vol 15, No 2 | Radio's Best Read Newspaper | January 23, 1991

STL Action On Hold at FCC

by John Gatski

WASHINGTON The FCC has yet to adopt new rules regarding use of aural STL equipment because of a pending TV STL rulemaking that finally will define "congested" and "non-congested" frequency areas.

Under a recent notice of proposed rulemaking (NPRM), the FCC is considering new STL guidelines that will clearly define "frequency congested areas" (category A) and "non-frequency congested areas" (category B).

If approved, a proposed aural STL rule regarding antenna size and other technical specifications can be approved, according to the FCC.

The congested area definition NPRM for TV STLs was released in November and is the result of a request SBE made last February. At the time of its filing, SBE said the current FCC congested area definition was too ambiguous.

In January 1990, the SBE also proposed the rule that would require specific antenna types, minimum frequency tolerance, power limit and minimum path length for aural STLs.

The FCC, however, will not act on that aural STL proposal until the congested area definition is adopted, according to FCC Engineering Policy Branch Engineer Hank Van Deursen.

SBE said it is likely the FCC's TV STL definition will be applied to aural STLs as well.

"Whatever congested area criteria adopted for the TV STL bands would presumably also be used for the aural STL band," SBE Board of Directors member Dane Ericksen said.

Based on the NPRM, a potential congested frequency area will be defined as any Standard Metropolitan Statistical Area (SMSA), except noted exceptions.

The FCC recognized that all SMSAs will not be frequency congested and a exception list will be compiled that will itemize those SMSAs not considered frequency congested.

The FCC also will enact a system to take into account non-SMSA areas, such as mountaintops or tall structures, which could be considered congested areas and

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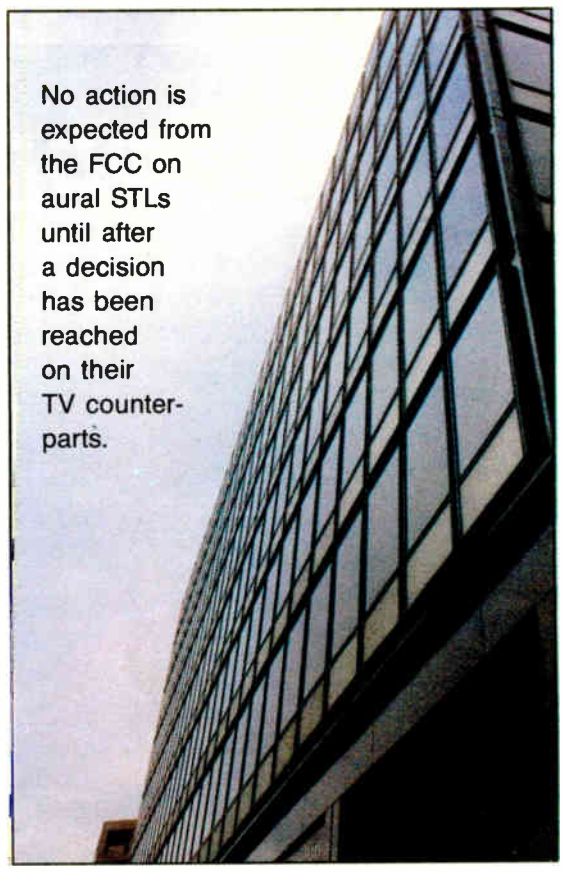

No action is expected from the FCC on aural STLs until after a decision has been reached on their TV counterparts.

RadioSat Stage Set

by Alan Carter

LONG BEACH, Calif. Radio Satellite Corp. said the stage is being set for broadcast of its digital audio car radio service, with contracts now finalized for construction of a high-powered mobile satellite (MSAT) scheduled for launch in 1993.

American Mobile Satellite Corp. (AMSC) and Telesat Mobile Inc. (TMI) executed contracts worth $100 million each with Hughes Aircraft Co. and Spar Aerospace Ltd. Hughes will supply the spacecraft bus; Spar will supply the communications payload.

RadioSat plans to lease capacity on the AMSC satellite, described as one of the most powerful ever built for commercial mobile communications. The FCC has allocated it in the 1.6 GHz L-band. AMSC and TMI will provide each other satellite backup capacity.

While RadioSat digital audio broadcasting (DAB) with quality comparable to FM requires an effective isotropic radiated power (EIRP) of about 5 kW/channel, the MSAT satellite has an EIRP of 500 kW.

With an operational life of 10 to 12 years, the AMSC and TMI satellites will cover the U.S., including Alaska and Hawaii, Canada, Puerto Rico, the Virgin Islands, 200 miles of U.S. and Canadian coastal waters, and have the capacity to reach through out Mexico.

The commencement of satellite construction "strengthens the eight-year lead" of RadioSat over other DAB proponents who propose new satellites limited to audio broadcasting, according to RadioSat.

The AMSC MSAT also is designed for mobile telephone, radio and data service to land, aviation and maritime users.

The FCC authorized AMSC to construct and operate a mobile satellite system in 1989. NASA plans to launch the satellite, in return for use of a portion of the capacity by government agencies in early years.

AMSC is financed by stockholders including subsidiaries of Hughes Aircraft; McCaw Cellular, the largest cellular telephone company; and Mtel, the largest nation wide paging company.

NAB Dues Increased

by Alan Carter

WASHINGTON Effective Jan. 1, the NAB raised associate membership dues from 11 percent to 20 percent, depending on the size of the organization.

The NAB Executive Committee voted to raise the dues from $450 to $500 a year on the lower end of the scale, and from $2,500 to $3,000 on the higher end. NAB Associate members are broadcast-related organizations that aren't U.S.-based broadcasters.

Also effective Jan. 1, a new associate membership category was established for international radio and television broadcasters.

The bulk of associate members will see their dues increase in the $50 range, according to NAB Conventions and Exhibitions Senior VP Rick Dobson. Those with a $500 increase will be "only a very, very small number," he said.

Included among those with the higher increase, however, are some of the NAB's largest convention exhibitors.

Dobson said that a reimbursement incentive for associate members that buy convention floor space offsets the dues increase. Associate members save $600 on their exhibit space for every 100 square feet they purchase.

"For virtually all, the savings is much greater than the cost of their dues," Dobson maintained.

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World Radio History

Canadian Radio Survives

by James Careless

TORONTO Canadian radio stations were left untouched by the $108 million budget cut recently absorbed by the Canadian Broadcast Corporation, the country's national broadcasting service.

Beyond having $1.2 million shaved off its funding, CBS Radio survived the cutbacks with only a one percent cut in its operating budget.

Canadian radio's survival is no accident, according to CBC Radio Program Operations Director Bill Terry, who called it a "division of labor" devised by CBC managers, one intended to maintain overall service while cutting a costly part of it.

CBC's television network did not fare as well radio.

CBC's television network did not fare as well radio. About 1,100 jobs were cut from the CBC. Three TV stations were closed, and eight others downgraded to news bureaus. Also, the CBC's two Parliamentary TV channels and the shortwave service Radio Canada International are faced with extinction, unless the government takes over paying for them by April 1, 1991.

And CBC Television has pulled out of local broadcasting altogether, a move that will save the corporation $46 million. Other items, such as the loss of RCI and various other belt-tightening measures, make up the rest of the $108 million savings.

With the de-emphasis in local TV broadcasting, this means that "radio is now responsible for local, regional (and) national broadcasting," Terry said.

The mild budget cut, however, is only a qualified blessing for CBC radio, according to Terry, because the network has to contend with a continual nibbling away of its budget.

Because of this persistent specter, there is the possibility of resuming advertising on the service, which was eliminated in 1974.

Terry is convinced that advertising won't be resumed, even though he admitted commercial CBC Radio could make money.

"One of the elements of being distinctive as a public broadcaster is being non-commercial. And that is a value which has been maintained. Putting radio back into commercials is simply not on the table as a means of coping with the corporation's budget problems," he said.

STL Rules Delayed

(continued from page 1)

classify them as such, according to the proposed rulemaking.

If eventually approved, SBE's aural STL proposal would cover several technical areas. For the first time, stations would have to use minimum antenna sizes for either Category A (congested area) and Category B (non-congested).

Stations not meeting the minimum antenna size requirement would be "grandfathered" for three years from the time the rules were adopted, according to the proposal.

In contrast, TV STL users have until October 1991 to upgrade to appropriate antenna sizes, the result of a 1981 rule that grandfathered stations for ten years.

Other specific items the FCC will consider under the aural STL proposal include a frequency tolerance plus or minus .0005 percent, a 10-watt power limit (but no limit on radiated power) and a minimum path length requirement.

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World Radio History

BBC Tests Eureka 147 System

by Alan Carter

LONDON The British Broadcasting Corp. (BBC) reported that the Eureka 147 digital audio broadcasting (DAB) system satisfied "stringent requirements" in experiments here earlier this year for high-quality reception in car, or mobile, radios.

The findings of the tests, some of which are still ongoing, were released in a recently finalized BBC engineering report.

The paper noted that the system offers the prospect of high spectrum efficiency. However, optimum system parameters still have to be established, some of which are highly dependent on the availability of spectrum for such a service.

At 531 MHz

The tests were conducted on channel 28, which is at 531 MHz in the U.K. (531 MHz is channel 24 in the U.S.)

The BBC engineering report, prepared by C.P. Bell and J.H. Stott, noted that 531 MHz is midway between co-sited television transmissions on channels 26 and 30, so particular care had to be taken with regard to filtering at both transmitter and receiver.

The maximum radiated power was 140 watts, limited by the need to protect a co-channel and co-polarized television relay some 60 kilometers to the southwest. The transmitting antenna was 120 meters above ground, and comprised four tiers of vertically polarized log-periodic antennas directed at 180 degrees ETN.

In evaluating frequency planning considerations for a terrestrial DAB network—findings that can be applicable to the U.S.—the paper suggested that the planning of terrestrial UHF networks would be more complex, and possibly less effective, than at VHF because of the greater variability of broadband shadowing with location.

Noting that when DAB coverage fails, it is "total" as opposed to conventional FM, which tends to be a more graceful degradation. "In planning terms, this means that much greater attention would be required to determining the precise position of coverage limits," the paper stated, "because although degradation of quality over small areas may be acceptable, a complete loss of service is not."

Different from TV

The assumption made in TV planning that those living in fringe areas will make special efforts to receive adequate signal is, of course, not valid for car radio reception, the writers continued.

For conventional planning, in which overlapping main stations use different frequency blocks (and are not required to carry the same programs), and relays use different blocks from their parent stations, some form of automatic retuning of receivers at coverage limits would seem essential.

The BBC research also concluded that there are planning constraints on a single frequency network (SFN).

The ability to reuse the same frequency block, either to fill a "hole" or extend coverage, results because the system is designed to make constructive use of delayed signals. This basically is due to the incorporation of "guard intervals" between successive symbol periods, the paper noted.

"An important element in planning is to ensure that the guard interval is sufficiently long to accommodate signals received from neighboring and, in the cause of abnormal propagation, more distant transmitters."

Other considerations

An appropriate balance also must be struck between transmitter spacings, operating frequency, and maximum vehicle speed for which the network is planned, the paper maintained.

Transmitter spacing and operating frequency are linked, in that propagation factors dictate a denser transmitter network with increasing frequency. "Possibly a tenuous inverse relationship also holds between transmitter spacing and vehicle speed, in that the former tends

(continued on page 7)

Nevin Is BE's CEO

QUINCY, Ill. Broadcast Electronics President Lawrence J. Cervon has named former Glenayre Electronics VP John J. Nevin as BE's new Chief Executive Officer (CEO).

Nevin replaces company sales VP Curtis Kring, who was interim acting CEO.

Nevin has worked in the electronics and telecommunication industries for more than 30 years. He previously served as senior VP/GM of Glenayre Electronics, Ltd., and president/CEO of Plexsys Corp.

John Nevin

Nevin also has worked for Quintron Corp., Celwave Corp. and Phelps Dodge Corp. as well as several overseas companies.

Cervon will remain as BE president. He will focus his efforts on long-term planning for BE and its parent company, Cirrus Technologies, Inc.

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World Radio History

Nightmare in Copyland, Part II

by Judith Gross

FALLS CHURCH, Va. Ah, those silly recording industry folks. They aren't really trying to **stop** a new technology, or are they?

Recording industry reps were out in force, as far as **filing comments** on a non-FCC inquiry into **DAB**. They made it plain that they consider digital a much greater threat than analog ever was, as far as **home recording** is concerned.

The **Recording Industry Association of America** (RIAA), among others, took the opportunity of the **Copyright Office's** inquiry into DAB to outline a number of **horror fantasies** concerning what might happen when **digital radio** becomes a reality.

Say your favorite radio station goes digital, with a **CD-quality** signal, and you happen to own a digital recorder and some interface between the receiver and the recorder. The station plays the new **Madonna CD** in its entirety, you hit the button and, bingo: instant perfect copy!

Or how about the **cable music services**? One is already offering a "user friendly" recording hook-up when you sign on.

OK, so you don't have a suitable **digital recorder**. I mean, recordable CDs are a ways off and DAT, well, DAT is tape. How about a **direct-to-computer** digital audio recording? The cable services might offer such a deal. So might your radio station of the future.

You simply **download** the latest CD from your modem to your computer and play it back at full frequency on your digital gear.

The RIAA folks are steamed because how does the **artist** get his or her cut from this? They say it violates copyrights, or "performance rights."

The Copyright office doesn't have the **clout** to make and enforce regulations about these kinds of things. So the RIAA wants to see **Congress** get involved in the controversy.

They want to force services that broadcast or cablecast music digitally to transmit all **subcode information** and they want to **limit the number** of selections from one artist or album that can be played in a specified time period.

That first idea, the one about the subcodes, is a little **scary**, because such data could eventually be used to begin some sort of **forced royalty** system, although the recording reps say they aren't asking for that.

They also aren't going as far to ask for **encryption** of digital material. I think that would be a little far-fetched even for them. And somehow, they gotta realize that **legislation** prohibiting the playing of multiple artist/album cuts would be a **violation** of a station's right to program its own format.

So what do they **really** want? I think you can almost guess this one. Let somebody suggest a new system of **financial compensation** for the artists and let's see if they turn it down. That's right. Moola. Greenbacks. Lettuce. Cabbage. Shekels. Rubles. Pesos. OK, you get the idea.

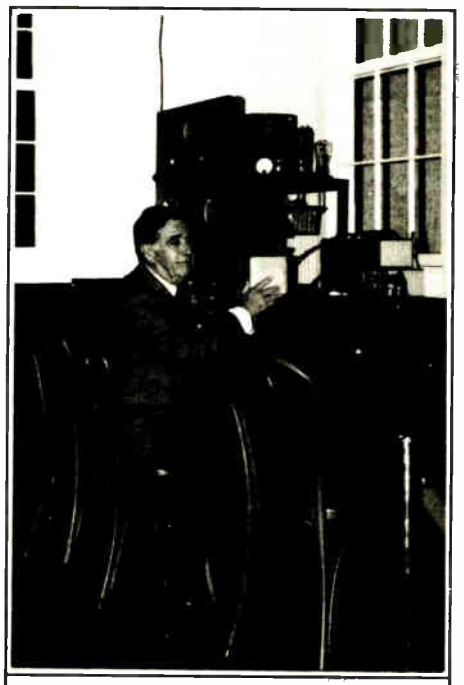
☆☆☆

Well. Something **BIG** is definitely on the agenda down in Naples, Florida where the **NAB Board** will be meeting next week.

Geez, here it is, all snowy and slushy in Washington, D.C., and youse guys have to choose a **balmy, tropical spot** with an abundance of golf courses to meet.

Anyway, the topic will be **DAB**, and what's going on is so **hot**, that all lips have been zippered at NAB until the meeting takes place. It's so hot, in fact, that just prior to the meeting, NAB has invited CEOs of **radio broadcast companies** to a special, hush-hush meeting to **reveal** its DAB policy.

What's being **rumored** is that NAB will try to **become the licensor** of the European **Eureka 147** DAB system. Can't tell you yet if that is indeed what's being proposed, but let's hypothesize that it is. If it all falls into place, **anyone** interested in using the Eureka 147 DAB technology would have to **go through NAB first**.


Take me back to the birth of commercial radio.

Kind of **mind-boggling**, isn't it? Stay tuned and we'll keep you posted.

It would be real interesting if the whole **DAB question** boiled down to a battle royal between **Eureka** and the **Standford Telecom/Satellite CD** plans. I already see the "battle lines being drawn," as Steven Stills said way back in his *Buffalo Springfield* days. (OK, so I'm pinpointing my age. SC&POI: Sixties Child and Proud Of It.)

Speaking of DAB, now that those commenting on the **WARC spectrum planning** have pretty much ruled out the higher power slices of bandwidth, say around **2400 MHz**, because of higher power requirements and all, there's another reason it's **not** a good idea.

Microwave ovens. Yes. You find them at the center of 2450 MHz. If WARC were to allocate **DAB spectrum** up there, all those happy homemakers would have no place to burn the rump roast.

Could you just imagine the **confusion**? "Honey, was that the new *Tiffany* release or did your souffle just fall?" But don't worry, nobody really wants to put DAB up that high so go ahead, pop some **Orville Rickenbacker** for me.

☆☆☆

Oh, yes, and I'm remiss in an important **anniversary** that I let slip by. I was doing some research into radio's history, and I plum forgot that on **November 2** just past, **KDKA** in Pittsburgh turned 70.

The nation's first **commercially licensed** station went on the air on that date in **1920** from the roof of the **K-Building** of the Westinghouse Electric Manufacturing Company's east Pittsburgh plant with a power of **50 watts** and a horizontal wire antenna.

Well, the **building itself** is still there, but not much else from that first day is. No matter, the **Pittsburgh Antique Radio Society** recreated the original 10×10 shack complete with a replica of the **original transmitter**, kindly loaned by the Smithsonian Museum.

Leo Rosenberg was the **voice of KDKA** on that historic evening and in the picture son Warren celebrates the anniversary with the antique gear.

The **Roaring '20s**, huh? All that's missing is the Charleston and bathtub gin.

Heard a juicy tidbit? Spill your guts to **Earwaves** *by faxing JG at 703-998-2966, writing to PO Box 1214, Falls Church VA 22041, or calling 703-998-7600. Who knows, you could win a coveted* **RW** *mug.*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World Radio History

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RNI talks back

Dear **RW**,

I am concerned about some misinformation and questionable conclusions published in your paper's article "FCC's Mansbach Scuttles Pirates" (**RW**, December 12).

The article would lead your readers to believe that Judah Mansbach was in charge of the FCC 1987 raid against the radioship MV Sarah. The raid was in fact led by the head of the FCC's New York field office, Alex Zimny. Mr. Zimny is the bureaucrat who, in past years, worked to see that our organization was denied every broadcast license we applied for in his office's region.

The article questions the validity of the Sarah's registry to the country of Honduras. The Sarah was not "dubiously" but duly registered in Honduras. Had our registry been invalid, the FCC would have not had to go through the State Department for permission to board our vessel.

The author then states that "within minutes" we were hit with a restraining order enjoining us from broadcasting from our ship. The fact is, the restraining order against us was not issued until 15 months after the July, 1987 raid, in October, 1988.

The legality of the raid, that Mr. Mansbach is so proud to have participated in, has never been proven in a court of law. The charges under which the raid was conducted were dropped within one month after the raid without any concessions by the defendants.

The FCC did not have a valid case and simply wanted to get RNI off the air any way they could. For this reason, the FCC raiding party, under the direction of Mr. Zimny, dismantled and caused damage to the shipboard radio station while under the "protective custody" of the U.S. Coast Guard.

One statement by Mr. Mansbach is accurate. If RNI had been allowed to continue, we would have been successful.

Radio New York International returned to the air Sunday nights on 7520 kHz shortwave via WWCR, Nashville, Tenn., in September, 1990. To date, every advertiser we have signed has renewed with us because, they tell us, advertising on RNI gets them results.

This demonstrates the public's desire for programming that the FCC's selected licensees don't see fit to provide. The FCC should spend the taxpayers' money to improve the technical state of radio and the responsiveness of its licensed broadcasters, rather than wasting it on egotistical pseudo-police actions to try and justify its bureaucratic existence.

If it did so, FM radio would not be so stagnant; AM radio would not be dying; shortwave radio would be more developed and the public would be much better served.

Randi Steele, Ops Mgr
Radio New York International
Flushing, N.Y.

Engineer-commissioner explained

Dear **RW**,

This is in regard to your Nov. 21, 1990 **RW** editorial, "More Say, Not Laws," opposing the Society of Broadcast Engineers, Inc. (SBE) proposal to require that at least one FCC commissioner be an engineer. While I certainly respect **RW**'s absolute right to voice its opinion, I was disappointed that it was not an informed opinion.

Your editorial indicated that one reason for your opposition was the difficulty in defining the term "engineer." You asked what type of engineer would be required: "civil; PE; practicing; one skilled in computers, telephone, video, or an infinite number of other classifications."

An "engineer" would be defined as one holding "Senior" or "Fellow" status in any nationally recognized engineering society, such as the SBE, The Institute of Electrical and Electronics Engineers (IEEE), the Society of Cable Television Engineers (SCTE), the National Association of Radio and Telecommunications Engineers (NARTE), the Society of Motion Picture and Television Engineers (SMPTE), The National Society of Professional Engineers (NSPE), etc.; or possessing a four-year or higher engineering degree from any ABET accredited school of engineering; or registration as a Professional Engineer in any discipline in any state. I can therefore only come to the distressing conclusion that **RW** printed an editorial opposing a proposal that it had not even read.

Your editorial went on to question whether it was reasonable to ask Congress to focus so narrowly on one aspect of the regulatory scheme. The SBE is not asking that all FCC commissioners be engineers, it is only asking that one commissioner be an engineer. While I agree with your suggestion that more comments before the FCC from engineers should occur, such comments do little good if there is not a fundamental understanding of the technical issues and trade-offs involved by those who ultimately must make telecommunications policy decisions.

Since the FCC was created by Congress in 1934, there have been 64 past and present FCC commissions. Only eight have been engineers. The last FCC commissioner with an engineering background was Charles D. Ferris, who served as chairman from 1977 to 1981. The other seven "engineer" commissioners all served prior to the mid-1960s.

The SBE finds it ironic that an agency created primarily as a technical regulatory agency should have such a dearth of engineering talent at its highest level. The FCC is mandated to regulate the radio frequency spectrum so as to make available a "rapid, efficient nation-wide, and world-wide wire and radio communication service."

In the 56 years that have passed since the creation of the FCC, the technical sophistication and complexity of radio spectrum regulatory issues have increased tremendously. Yet proceedings involving technical issues tend to languish when circulated at the commissioner level, in favor of proceedings which do not require engineering decisions.

Although the Communications Act gives each commissioner the right to appoint three professional assistants, one or more of whom could be engineers, only Commissioner Quello has seen fit to do so. Even if all of the FCC commissioners had engineering assistants, the SBE believes that a non-technical commissioner may never fully comprehend technical complexities and trade-offs.

There are numerous regulatory aspects—economic, legal and, of course, political—with which FCC commissioners must deal. Yet the basic mission of the FCC is as a technical regulatory agency. The SBE believes that requiring at least one FCC commissioner to be an engineer would not unreasonably restrict the appointment prerogatives of the president.

There is surely precedent for "allocating" commissioner slots. The Communications Act has always placed a limit on the number of commissioners who could be from the same political party. It is a common practice to mandate certain qualifications for membership on a regulatory board or committee. For example, the Judicial Performance Commission in California is required to consist of two justices from the Court of Appeals, two judges from the Superior Court, one Municipal Court judge, two practicing attorneys, and two public members.

In light of the above points, I hope **RW** will reconsider its opposition to the SBE proposal. An FCC with at least one commissioner as an engineer would foster the regulatory goal of the most efficient use of the radio spectrum. Some lawyers are among the smartest people I know, but even they could use the help of a fellow commissioner with the technical background to understand tomorrow's technology.

Dane E. Ericksen, SBE board member
Hammett & Edison, Inc.
San Francisco, Calif.

Choosing Action

Some say that a choice not to decide is still a choice. But, applied to the realities of policy-making, choosing not to decide—read: deregulation—is not always the best approach.

This was proved recently in an FCC decision to return to a stricter payment policy for withdrawal of petitions to deny in comparative renewal hearings. Prior to the deregulatory Commissions of Mark Fowler and Dennis Patrick, the FCC held such payments to no more than the expenses incurred in filing the petitions.

Unfortunately, after deregulation, allegations of abuse of process became frequent—many believed that unscrupulous parties were filing petitions to deny simply to be paid for withdrawing them. Such charges ultimately led the Commission to step in again with its recent ruling.

What has taken place in comparative renewal underscores the need for periodic re-evaluation of deregulated FCC issues—for technical, as well as non-technical matters.

After all, if the effects of deregulation went too far in a non-technical area like comparative renewal, then some of the technical matters from which the FCC has tried to distance itself may likewise have gone too far.

Areas in which more, rather than less, Commission involvement may have been helpful are obvious. AM stereo, for example, has floundered because of the FCC's willingness to let the marketplace decide.

The elimination of First and Third Class Radio-Telephone Operator licenses as a requirement for operating a broadcast station also is a cause for concern. Although the FCC requires a designated chief operator (DCO) for each facility, these DCOs do not need to have any technical background.

While this situation may seem to benefit the station owner, a DCO can put a station's license in jeopardy by interpreting the rules without a technical experience base from which to draw.

This is not to advocate the re-regulation of any area of the broadcast industry *in particular.* Nor is it a recommendation for big government. But times change, and decisions need to be re-examined as to whether they continue to act in the best interest of the greatest number.

The Commission ought to continue to re-evaluate its deregulatory decisions when the result wasn't as planned. And, as it has in the case of comparative renewal, let's hope it will re-regulate when necessary.

—**RW**

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Radio World
February 6, 1991

World Radio History

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World Radio History

Using a Technical Consultant

by Steve Crowley

WASHINGTON Broadcasters can go for years without using the services of a technical consultant, especially when there are no major changes made to their facilities. A consultant, however, can provide many valuable services that complement those of the station's own engineering staff.

Some technical problems are not part of the day-to-day experience of the station engineer. These can include the selection of frequencies and the development of allocation plans for new communications services—either in one city or across an entire country.

A technical consultant can also provide an unbiased, independent technical opinion. For example, though an equipment manufacturer may be responsible for the design and installation of a broadcast facility, a technical consultant can review the manufacturer's plans for completeness and economy.

Sometimes, a broadcaster seeks multiple proposals from several firms. The technical consultant can help select the best one by providing an evaluation of the relative merits of each proposal.

Services rendered

Each communications service has its own unique considerations, and the technical consultant you hire should be experienced in your specific area of concern. Some technical consultant services, however, are applicable to all communications areas.

Such services include determining the best areas for transmission facilities, taking into account population and area to be served as well as the potential to cause interference to (or receive interference from) other facilities, based on technical and government standards.

In many cases, the technical consultant can design or specify a directional antenna system that will provide more efficient coverage by concentrating radiated power toward desired coverage areas and reducing necessary transmitter power and operating costs.

Directional antennas also can be used to reduce the potential for interference. Antenna system design can include radiating elements and feed networks. Combining systems can be designed for all broadcasting and communications services. Filters can be specified to resolve interference problems.

Of concern to many governments is human exposure to radio frequency radiation. A technical consultant can predict exposure levels and establish compliance with applicable standards. These predictions can be supplemented with actual on-site measurements.

Established broadcast facilities can also benefit from a technical consultant's services. The consultant can help with training of technical personnel and the development of operational and maintenance procedures. Inspections can be conducted to assess the condition of equipment and compliance with government rules.

An existing broadcasting facility may develop new problems with coverage or interference. Coverage problems can mean an antenna breakdown. Interference problems can be caused by transmitter malfunction or a new radio service in your coverage area. Because of his or her experience, the technical consultant may have experienced the same type of problem before.

Experience preferred

Once it has been decided to seek the advice of a technical consultant, the next matter is deciding which one. A most important consideration are the quality of the firm's engineers—their depth and skill.

The experienced firm should be knowledgeable with medium frequency, high frequency, FM, and TV techniques. With the increasing trend of telecommunications toward the digital domain, the firm should be at the forefront of the latest digital technologies including those used in digital audio broadcasting, high definition television and spread spectrum communications.

The firm should also have adequate facilities to support its work. This includes technical reports, test equipment, and computing facilities. If the firm is in another country, it should have a record of service in foreign countries. The firm should also be willing to supply a list of clients for whom work has been performed.

Cost is always an important consideration. A simple comparison of hourly rates can be misleading. Those firms with higher hourly rates usually have the expertise to complete your job at a lower overall cost. It's the bottom line that counts.

Technical consultants will never replace the local engineer. For those uncommon technical problems, however, the technical consultant can do the best job at minimum cost.

■ ■ ■

Steve Crowley is a technical consultant with the firm of du Treil, Lundin & Rackley, Inc., 1019 19th Street, N.W., Suite 300, Washington, D.C. He can be reached by telephone at 202-223-6700 or by facsimile at 202-466-2042.

CONSULTANTS CORNER

BBC Studies Eureka

(continued from page 3)

to be positively correlated with population density, whereas the vehicle speeds are likely to be greater in areas of thin population."

The writers concluded that the UHF bands are less suitable for the terrestrial SFN concept than VHF.

Adoption of the SFN principle, the paper stated, for terrestrial DAB will present certain problems of program distribution throughout the network because of the need for precise synchronization. "Satellite distribution may afford the solution," the writers added.

Among the subjective assessment findings, reception was described as uniformly high, except close to the coverage limit.

The coverage limit appeared to be determined solely by lack of field strength, according to the paper. The result was expected because previous propagation tests carried out from the site on the same frequency had indicated an almost complete absence of significant long-delay multipath. The system was capable of operating satisfactorily in multipath conditions causing in-band amplitude variations exceeding 20 dB in the RF spectrum.

For information, contact Henry Price, head of engineering information department at the BBC: telephone, 071-927-5437; FAX: 071-927-5503.

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World Radio History

dbx's Cost-Cutting Hiss Reducer

by Ty Ford

BALTIMORE So, you can't afford a total digital production environment this year? Join the club. But even if you could . . . even if every nanosecond of your "house audio" was pristine beyond belief, you'd still have to deal with the spectre of "Nasty-Outside-Source-Audio" (NOSA). That is, stuff that appears at your door sounding horrible. Although digitoids may find it hard to believe, there still are some programs that are duplicated and sent out on very bad quality cassettes.

If money were no object, you could order the "Computer Enhanced Digital Audio Restoration" (CEDAR) digital noise reduction and EQ system to go after all the nasties that came from other less pristine recording environments. If the full-blown system price of around $190,000 is a bit pricey for you, join me as I take the dbx 563X Hiss Reducer on a test spin for this month's edition of "Producer's File."

At a list price of $219 for a half-rack mono unit, the dbx 563X's impact on your budget will be significantly reduced. Of course, for that price you can't expect it to do the same job, but I was able to get it to perform nicely on a number of hiss reduction jobs. The 563X is a type of single-ended noise reduction.

Highs scraper

Unlike double-ended systems that use separate encode and decode circuits, the 563X simply "scrapes off" a certain amount of high-frequency information based on its ability to detect an audio signal that occurs above a constant hiss noise floor.

There are two things to keep in mind when using this type of simple noise reduction: The more the signal is buried in hiss, the harder it is to clean up; the harder the noise reduction works, the more it removes high-frequency information from the signal. At some point in your attempt to reduce the hiss, you may find that noise modulation is more objectionable than a certain amount of constant hiss.

This kind of noise modulation is particularly noticeable on spoken-word-only recordings. Each time a word or phrase is spoken, the detector opens up, allowing the signal to pass, and then closes. If the voice is buried in too much noise, you can hear both noise and voice when the detector opens, the "pumping" of noise created by the spaces between words and syllables, and finally a diminishing rush of hiss after the last word is spoken.

In many "voice only" cases I was able to find an acceptable balance between noise reduction, pumping and high-frequ ·ncy loss. However, the degree of success vith which the 563X performs has a lot to do with the amount of noise in which the voice is buried. For little to moderate amounts of tape and circuit hiss, no problem . . . but don't expect it to gate air-conditioning noise out of a studio mic.

PRODUCER'S FILE

The music test

Because most music is more continuous than the spoken word, the noise modulation is much less apparent when the dbx 563X is processing voice-over material or straight music.

Even so, if the music is so poorly recorded that it's buried in hiss there's only so much that can be done. The 563X is quite good at minimizing tape hiss and circuit noise when you need to bounce analog tracks that were recorded properly in the first place.

In the studio

If you've been using MIDI gear in the studio, maybe you've noticed that some synthesizers and tone boxes (like my Roland MT-32, for example) can have pretty noisy outputs. Even when they're not playing, the innards are still generating low-level audible hash that can be annoying and distracting. The dbx 563X did a great job of getting rid of the hash without knocking the highs off the music.

If you're airing programs direct from audio cassette, the simple controls of the 563X make it a likely candidate for use in the air studio. There's only one slide fader and a bypass switch to worry about.

As you adjust the quieting fader, a row of 12 LEDs shows the frequency response range of the incoming signal, and how the amount of quieting affects range. Incidentally, parts of the 563X remain in the circuit even when the bypass is activated. If that makes you nervous, consider a hard-wire alternative.

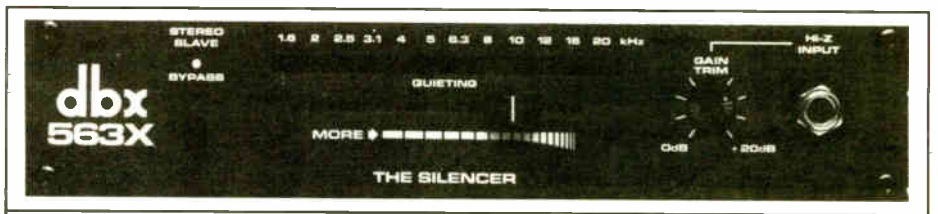
Stereo operation, of course, requires two units and a simple three conductor 1/4-inch TRS jumper cable, but the half-rack size allows you to mount them side by side in the same rack space. Inputs and output are single-ended unbalanced. The two outputs on the back panel are 0 dB and −20 dB respectively.

In addition to the back panel 0 dB input, there's a Hi-Z front panel input with a 20 dB gain trim pot for direct connection of low level instrument pickups and (perish the thought) Hi-Z mics.

For more real-life adventures with the dbx 563, give me a call. Or call Scott Heineman, dbx Product Manager, at 415-351-3500.

■ ■ ■

Ty Ford is an audio producer/voice talent. Reach him by phone at 301-889-6201, via MCI mail (#347-6635), or via America Online (Tford).



dbx's 563X Hiss Reducer: "The Silencer"

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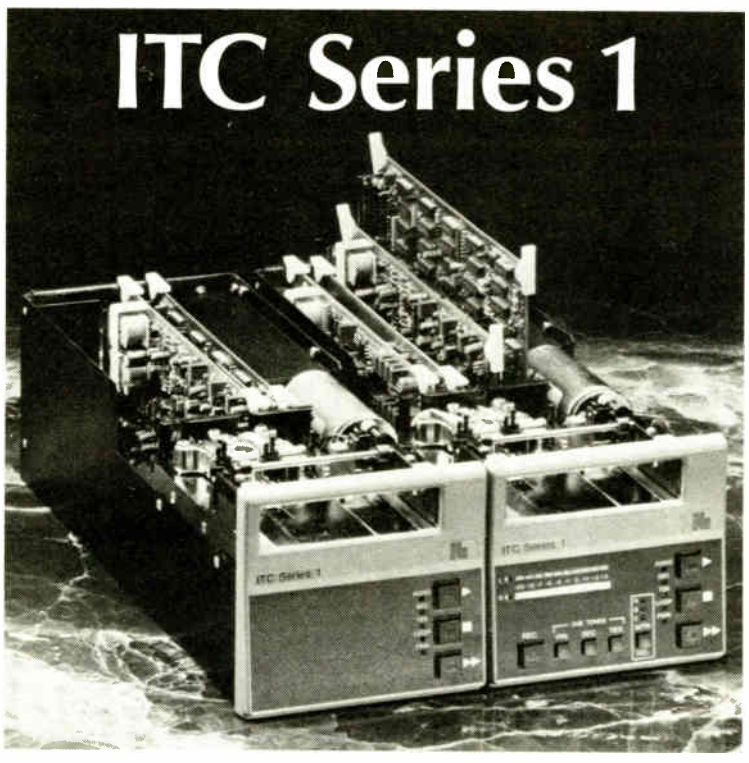

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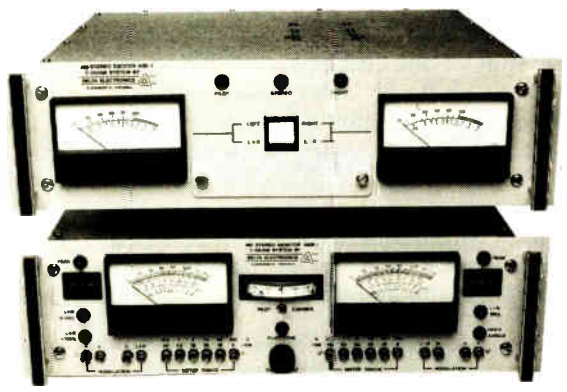
AM Splatter Monitor—Spectrum analyzer performance at a significantly reduced price! An inexpensive means of verifying FCC and NRSC spectral compliance. This frequency agile instrument tunes from 1700 kHz down to 450 kHz, with 9 or 10 kHz channel spacing. The monitor also measures incidental phase modulation (IPM). Designed to be rack-mounted or operated from a vehicle's 12 volt supply using an optional antenna.



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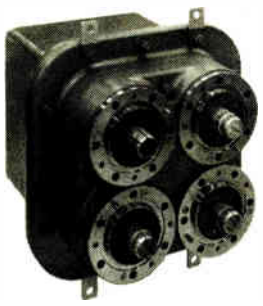
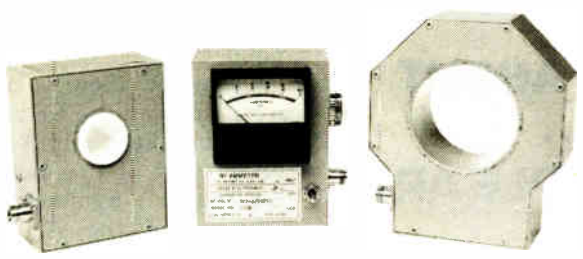
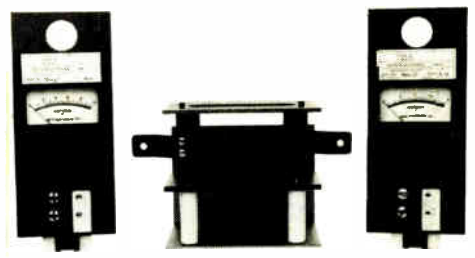


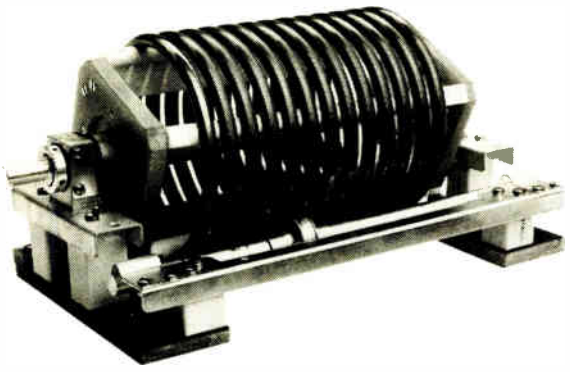
Coaxial Transfer Switches—These 1⅝" and 3⅛" motorized four port switches are designed to switch between antennas, transmitters, or dummy loads both quickly and efficiently. The switches can also be operated manually and are fully interlocked.



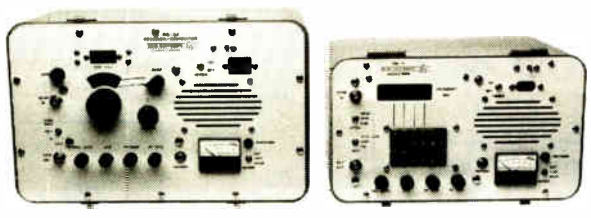
RF Ammeters and Sampling Toroids—Precision toroidal current transformers (TCTs) provide stable antenna monitor sampling while eliminating the problems associated with loops. TCTs also work well in supplying additional modulation monitor or test sample RF outputs. The transformer coupled ammeter (TCA) offers stable base or common point current readings, independent of modulation. The dual and single scale meters also provide remote DC outputs.



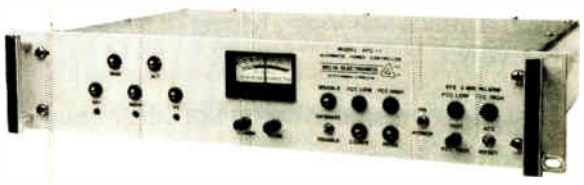
Low Power RF Ammeters—When every milliamp of current counts, depend on the accuracy of the TCA-Jr. This portable RF ammeter is designed to plug into either a Delta MJ-50 Meter Jack (pictured above), or a standard J-plug jack. Two current ranges are available: 0.2 to 1.0 Ampere, or 0.4 to 2.0 Amperes.



Rotary Variable Inductor—Where long life and high reliability are required, specify the RVI. Designed to provide long life, even under continuous rotation, the RVI is available in either 12 μH or 10 μH versions (maximum inductance). Other values by special order.



RF Receiver/Generator—A rugged, high output (2 watts) generator and correlation detector receiver virtually eliminate false nulls caused by interfering signals. The RG-3A operates from 0.5 to 1.65 MHz, and the expanded range of the RG-4 generates signals from 100 kHz to 30 MHz.



Transmitter Power Controller—Your insurance against over- and under-power citations. Continuously monitors transmitter power levels, compensating for AC power line sag by adjusting the transmitter to 100% power.

Digital Controlled Processor—This inexpensive, stereo tri-band processor boasts user-friendly controls and an aggressive sound. Mono stations can take a step toward AM Stereo, at a price that won't break the budget.

Impedance Bridges—At last, a means of measuring your impedance under full power. Both portable and in-line bridges are available, with a variety of features, for both AM broadcast and HF applications. The in-line Common Point Bridge can be supplied with a TCA RF Ammeter to permit precise current and impedance measurements.

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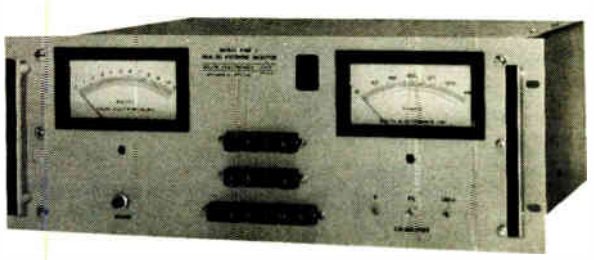

AM Antenna Monitors—These are true ratio monitors which deliver a ratio reading without the need to continually reset the reference tower to 1.000. This simple operation reduces errors by non-technical personnel and makes tuning an array easier.

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World Radio History

Better AM Array Performance

by Tom Osenkowsky

Part II of III

BROOKFIELD, Conn. Basic AM theory tells us that for 100 percent modulation, equal sideband powers of 25 percent must exist in the upper and lower sidebands.

For a 1,000 W RF signal, 500 W of audio power are necessary to produce 100 percent modulation. If the complex sideband relationships to the carrier become altered during transmission, distortion in the received signal will occur.

The sideband relationships can be affected by: the impedance slope of the tower(s); the phase shift of the ATU(s); the phase shift of the feeder line(s); the line phase shifter(s) and power divider; the common point matching network; and the transmitter output network.

If the radiation pattern of a directional antenna changes with frequency, the sideband relationships will be disturbed. This is because the amount of carrier versus audio will be different at each sideband than it was at carrier.

For example, if a certain pattern minima produces 5 mV/m at a monitor point at a 1,000 kHz carrier frequency and the minima changes to 2.5 mV/m at 990 kHz and 7.5 mV/m at 1010 kHz, distortion will result. This effect is commonly heard while driving through nulls of a DA station.

An optimally adjusted array will have a "graceful degradation" of its signal and not a tearing, screeching sound when passing through a null area. This is why pattern bandwidth is an important consideration.

Sideband symmetry

Over the years, numerous presentations have been made regarding bandwidth of non-d antenna systems. Many have described the technique of "line stretching" to achieve symmetrical sidebands. The one and only correct location for sideband symmetry is at the final amplifier. This would be the plate of the final amplifier tube(s) or at the RF transistor combiner common point bus.

Ordinarily, there is an output network between the RF amplifier(s) and the transmitter output terminals. The phase shift of this network must be considered. Symmetrical sideband response at the ATU terminals or transmitter output terminals may result in a very poor load to the final amplifier(s).

Most older plate modulated transmitters have a –225 degree output network. Harris MW, SX and Gates transmitters also have a –225 degree output network (–45 degree Smith Chart phase rotation). Nautel and Continental transmitters have different output networks that change design with power level.

The –225 degree network provides optimum isolation between plate tuning and plate loading. For a –225 degree network, the transmitter antenna terminals should see either a perfect load (constant 50+j0) or one that has higher resistance at the upper sideband, lower resistance at the lower sideband and capacitive (–j) reactance at each sideband.

A non-directional station can be analyzed for proper bandwidth rather easily. The transmitter is modulated 50 percent with a 10 kHz sinewave. Choose a suitable monitor point about one mile or so from the antenna. Be sure there are no obstructions to the reading. Verify this by rotating your FIM 360 degrees. There should be at least a 20 dB maximum-to-minimum field intensity ratio.

Measure and record the carrier frequency field intensity. Next, measure and record each 10 kHz sideband field intensity. A properly adjusted system will exhibit symmetrical sidebands equal to one-quarter of the carrier field intensity. If, for example, the carrier field intensity measured 10 mV/m, each sideband should read 2.5 mV/m.

Impedance symmetry

If this was not the case, some iteration of the coupling unit design is necessary. Remember, we are not so concerned with sideband symmetry at the ATU input terminals or at the transmitter antenna terminals. We must concern ourselves with impedance symmetry at the final amplifier inside the transmitter.

A DA system is not so readily analyzed. Improper sideband relationships can be caused by shifting of the pattern size and shape as well as improper symmetry at the final amplifier.

The pattern bandwidth of a DA system can be checked using an RF oscillator. Substitute the transmitter's RF oscillator with a variable frequency RF signal source. Run the transmitter with as little power as necessary to obtain a reading of 100 percent loop current as displayed on the antenna monitor with the reference tower selected and

(continued on page 12)

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World Radio History

Enhancing Your AM Antenna Operation

(continued from page 10)

increase the sensitivity pot on the antenna monitor.

Record the antenna monitor values at carrier frequency. Next, move the oscillator frequency to ±10 kHz and record the antenna monitor readings for each sideband. Good pattern bandwidth is evidenced by minimal change in ratio/phase angle with change in frequency.

If the pattern and/or impedance bandwidth tests did not meet your expectations, it's time to consider what options are available to ensure optimum signal delivery to your audience. For those who are serious about attaining the optimum reception in the field, a phasor redesign may be in order.

Careful choice of system phasing and proper selection of matching networks can yield excellent bandwidth. System phasing refers to the amount of phase shift present in the selected reference tower compared to the common feed point.

Infinite combinations

Since there exists an infinite number of combinations of system phasing, there usually will be only one choice that will produce a near constant pattern shape and fairly uniform impedance characteristic across the bandpass. A relative phase close or equal to an odd multiple of 90 degrees for the highest power tower in the array often can yield the best results.

In addition, the design of the power divider and choice of ATU design can provide optimum performance.

There is often a temptation to effect a cure for an ailing DA by readjusting the various system arms to produce a value of 50+j0 at the transmission line and phase shifter input terminals. In some instances, an intentional mismatch can produce acceptable results while eliminating some phasor components.

If the system phasing is not of an optimum value, retuning for 50+j0 can yield disappointing results. In one instance, a three tower dog-leg array was modeled using −100 degrees of reference phasing as opposed to −90 degrees. The −100 degree value produced ±10 kHz feedline VSWR values for tower one and tower three of 84.1:1 and 14.7:1 respectively. The −90 degree value produced 1.65:1 and 1.89:1 respectively.

As a practical matter, one of the downfalls I have witnessed in numerous instances is power divider misadjustment. Under normal conditions, the reference tower (highest power) does not require a power control. The exception here is where the next lowest power tower is close to the reference power.

Especially in shunt (Ohm's Law) dividers, moving the reference tower down towards ground can drag the common point resistance down to the single digits.

An array's signature

Be advised that each array has its own "signature" that is unique unto itself, presenting the designer with a different set of criteria than any other. Techniques such as compensation circuits, split power division, load shunting, traps, multiplexing, phantom networks and voltage-fed loads have not been addressed due to the limited scope of this paper. A variety of networks and feed methods can be used to treat even the most severe arrays.

It's important to understand that there is more to a good antenna system than just matched transmission lines. Every component from the signal generation point (final amplifier plate) to the radiator(s) plays a very important role in how well the signal is demodulated at the receiver.

Proper design and maintenance considerations may yield dramatic results compared to arbitrarily tuned systems. Certain physical constraints (element spacing, orientation, height) may limit the engineer's ability to fully realize an optimum transmission facility.

In Part III, we will examine an actual design to illustrate the points raised.

■ ■ ■

Tom Osenkowsky is CE at WLAD and an occasional contributor to **RW**.

Problem Checklist for AM Antennas

Having problems with your non-d and DA arrays? Here are some things to look for:

- ✔ Poor or non-existent ground strap between ATU cabinet, main ground base ring, phasor and transmitter. Do not depend on transmission line outer sheath for grounding.
- ✔ Older phasor design not considering power divider phase shifts and inaccurate driving point impedence predictions.
- ✔ No attention paid to optimizing array phase distribution for best pattern/impedence bandwidth.
- ✔ Symmetrical arrays not pattern moded to take advantage of optimum power distribution and driving point resistances.
- ✔ Impedence broadbanding attempt places symmetrical load at common point or transmitter output and not at final amplifier.
- ✔ Improper power divider design or adjustment.
- ✔ Mismatched transmission lines due to improper adjustments and unoptimized phasing. 70 Ohm lines replaced with 50 Ohm lines or RG/6 lines replaced with hardline (different velocity factors) without network redesign.
- ✔ High L-C ratios used in networks to ease adjustability, resulting in high Q which can impair bandwidth and stability.
- ✔ Antenna monitor configured for older 70 Ohm sample line when 50 ohm line is presently in use.
- ✔ On some occasions, toroid transformers have had leads internally reversed resulting in 180 degree phase error.
- ✔ Ganged phase shifter arms wired out of phase.
- ✔ Uncalibrated FIM or switch in LOG position.
- ✔ Wrong ATU placed at tower base during initial installation.
- ✔ Use of compensation networks in DA ATUs. This practice results in very flat impedence loads, but extremely poor pattern bandwidth and unacceptably high IQM for ATM stereo.

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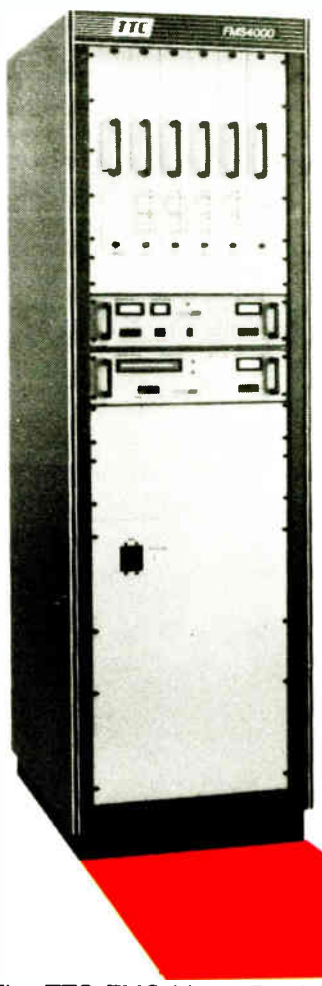

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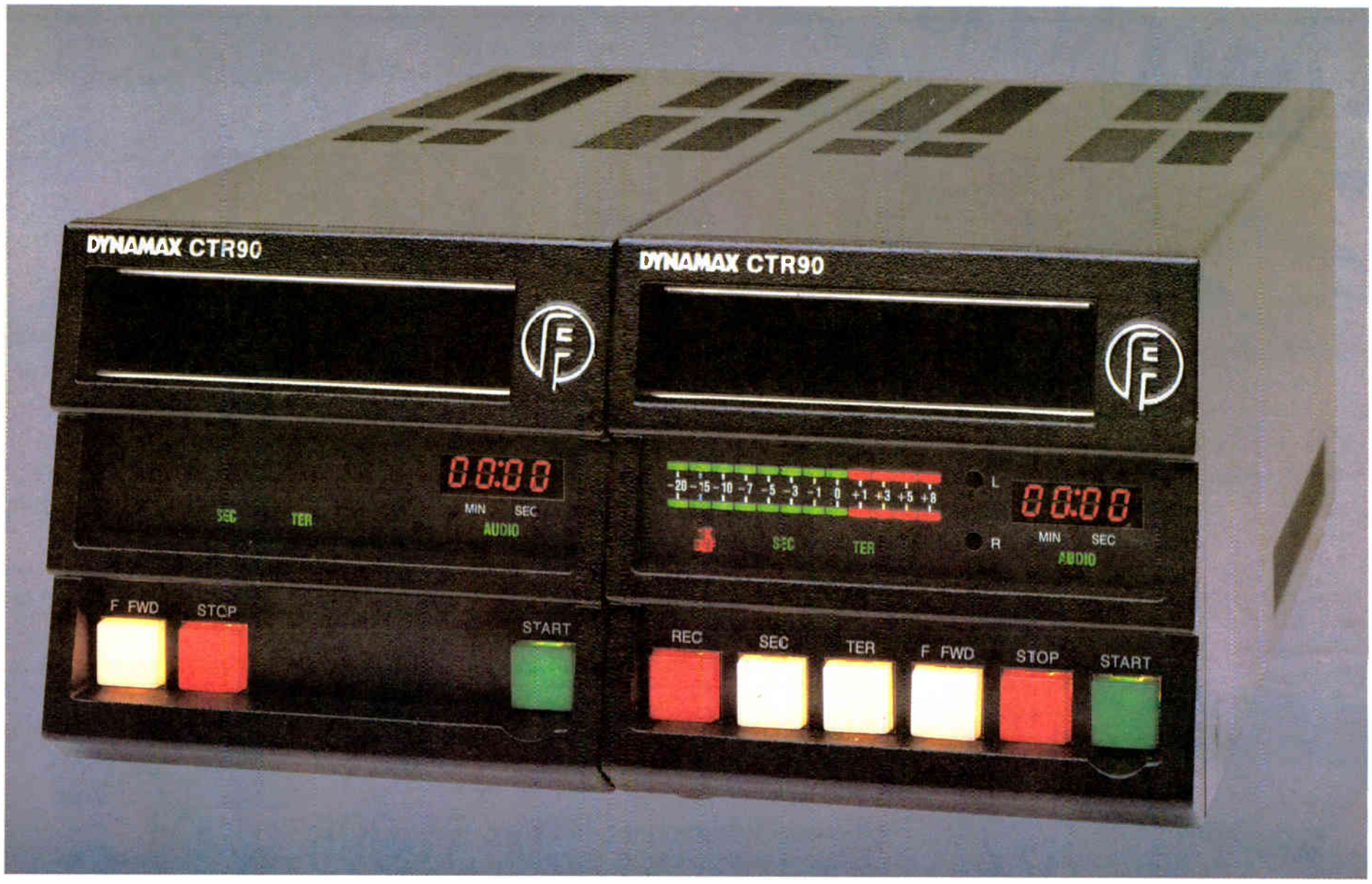

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Circle 65 On Reader Service Card

World Radio History

Understanding RF Amplifiers

This is the tenth in a 12-part series called Amplifier Fundamentals. *Northern Virginia Community College will offer 1.2 CEUs (continuing education units) to registered students who successfully complete the course and an examination mailed at its conclusion.*

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by Ed Montgomery

Part X of XII

Annandale, Va. Radio frequency amplifiers are "frequency selective" in their design. They are capable of passing a specific bandwidth.

Figure 1A.

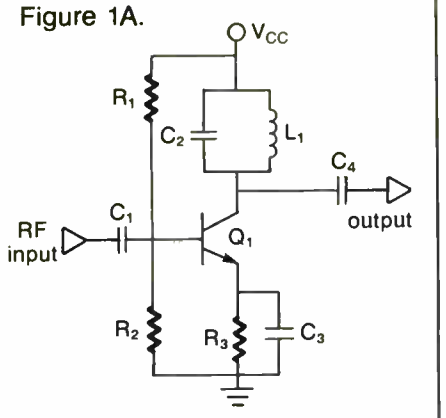
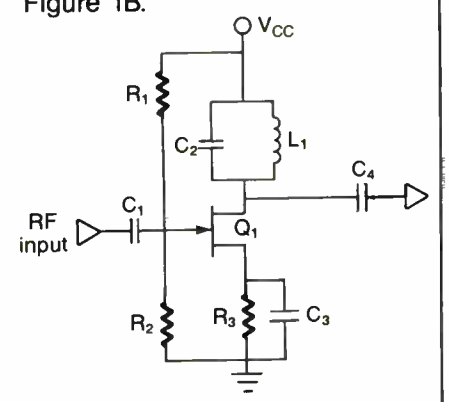


Figure 1B.



A single-tuned bipolar transistor amplifier is illustrated in Figure 1A. To a degree, this amplifier resembles audio amplifiers previously discussed.

The major difference is in the amplifier's load. In this illustration the load consists of the resonant circuit L_1 and C_1. This parallel resonant circuit produces its highest impedance at the radio frequency to be amplified. All other frequencies will yield a lesser output.

Figure 1B is an example of the same type of RF amplifier employing a field-effect transistor (FET). FETs are often used in solid state RF amplifiers because of their lower "interelectrode capacitance." This property occurs in all active devices.

The voltage that builds up between the collector and emitter of a bipolar transistor can make it act as a capacitor when operating in the radio frequency spectrum. This could cause the device to act as a short circuit rather than as a device that can amplify a signal.

For many years after the development of bipolar transistors, vacuum tubes were used in numerous radio frequency amplifier applications. When the FET was developed, it had characteristics similar to vacuum tubes and it soon replaced the vacuum tube in many applications. FETs are often the choice of RF circuit designers because they offer high impedance and better dynamic range.

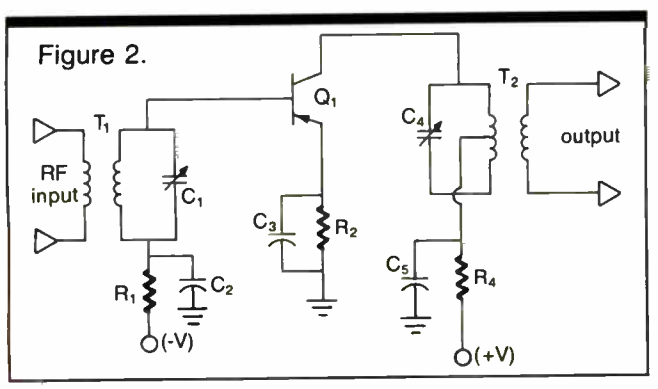
Radio frequency amplifiers can be divided into the same two classes as audio amplifiers: small-signal and large-signal designs. Small-signal amplifiers usually operate Class A while power amplifiers (large-signal) operate Class C.

Figure 2 is an illustration of a common-emitter RF amplifier. This design employs transform coupling for signal input and output. T_1 combined with C_1 and T_2 combined with C_4 created parallel resonant circuits to handle the radio frequency.

In this design C_1 and C_4 are tunable permitting the frequency of the amplifier to be adjusted to the desired operating frequency. This could also be accomplished with a tunable coil and a fixed value for a capacitor.

Figure 3 is an illustration of a broad-banded RF amplifier. Section A is the input with resonant circuits acting as a bandpass filter permitting only the desired frequencies to reach the transistor. The output is across T_2, which adjusts the impedance for the next stage. Again note that in an RF amplifier, the input and the output loads are resonant circuits, often referred to as "tank circuits" when L and C are in parallel.

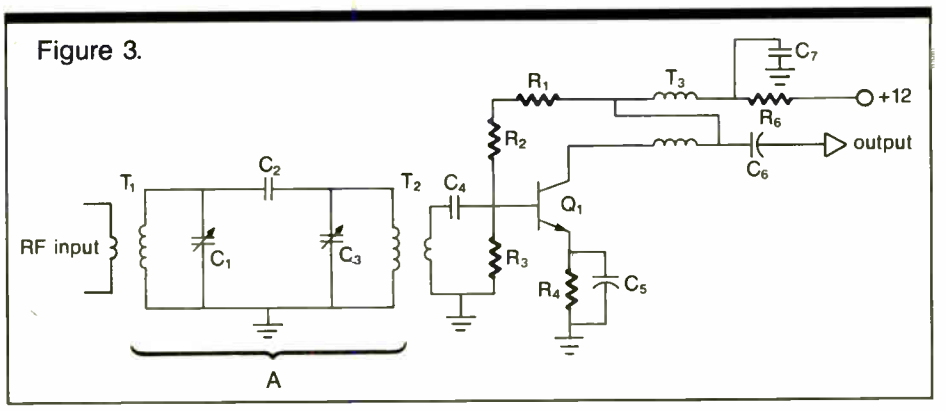
Figure 2.



In modern transmitters, modulation, or the encoding of data on the radio frequency, is performed at a low level, in the small-signal stages. This permits the driver and power amplifiers to operate in the highly efficient class B, C, or even D range, consuming far less electricity for a desired power output. To date, many power amplifiers still require vacuum tubes to deliver the radiated power that is required.

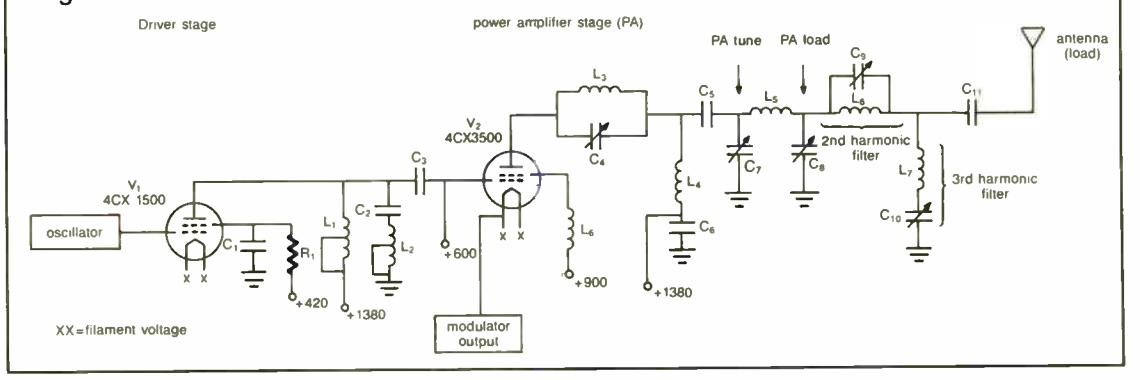
Figure 4 is a simplified illustration of a driver and power amplifier of a pulse-duration modulation transmitter. Note that the operating voltages are much higher than those required for transistors. This is because vacuum tubes are thermionic emission devices requiring a large voltage potential necessary to make electrons travel through free space from the cathode to the plate.

Figure 3.



The driver and power amplifier tubes are also conducting much more current than any single power transistor can handle. Tetrode tubes are employed to reduce interelectrode capacitance within the vacuum tube.

Figure 4.



Both tubes are operating in a non-linear fashion drawing current for only a portion of their cycle. The power amplifier is described as operating class "D". This is a very efficient form of operation with the tube drawing a large amount of current for only a few degrees of the sine wave cycle.

This type of operation is possible within radio frequency amplifiers because of the resonant circuits used to tune amplifier inputs and outputs. Bursts of non-sinusoidal energy injected into a resonant circuit will be turned into sine waves at the the circuit's output. This will be discussed in greater detail in the next installment.

■ ■ ■

Ed Montgomery currently is an electronics teacher in the Fairfax County school system. He has taught broadcast engineering at Northern Virginia Community College and worked as broadcast engineer for several radio stations. He can be reached at 703-971-6881.

This news report ran in Radio World and we received many inquiries. We're pleased to run it again:

Silver Plating Ploy

by Jim Wenstrom, CE KFLS/KKRB

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World Radio History

WYHY Sheds Its '70s Image

by Dee McVicker

NASHVILLE, Tenn. Until recently, Nashville's WYHY-FM appeared to be caught in a '70s time warp. Although it was broadcasting the contemporary hits of the '90s, its facility of wall-to-wall shag carpeting gave off another image.

The building's shoddy construction, hastily built in six months in 1973, was also dampening spirits at the station. Said WYHY's Chief Engineer Cameron Adkins, "There was a lot of water damage behind the walls. Water had been dripping in for years. The damage was severe. WYHY-FM's facility needed more than just a facelift; it needed to be completely renovated."

Production A at Y-107 (WYHY)

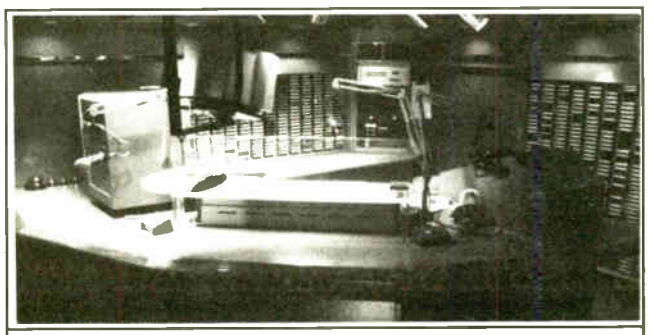
Originally designed for radio station WMAK-AM, a CHR legend in the market, the building pre-dated the science of sound isolation. In order bring the studios up to '90s soundproofing standards, Adkins added another layer of drywall and isolated the drywall from the building's concrete.

Building renovation was done with what many consider to be a month's engineering budget. Reported Adkins, "We had $15,000 to $20,000 for renovation of the rooms. We did five rooms with that—and we did it with basically drywall and acoustic ceiling tiles."

Next, Adkins tackled the layout of WYHY's on-air control room. With a confined 15'×15' space to work with, he reasoned that a U-shaped layout was poor use of the studio's space. After experimenting with several layouts, Adkins came across a unique design that he has since fitted for one of the two production studios as well.

"Basically, it's shaped like a 'J,'" he said. "As you walk into each one of these studios, you're looking at the console setting at an angle to the room. The candy-cane layout, with long cabinetry parallel to the studio's wall and wrap-around cabinetry that curls to the center of the room from an adjacent wall, offers easy reach to all studio gear."

Because the facility once was occupied by an AM station with newsbooths feeding its two news studios, WYHY's on-air studio and one production studio have small adjoining rooms. One became an office for the station's production director and the other was retrofitted into a mini programming/conference room for the on-air studio.



The control room at Y-107 has a J-shaped work area.

On-air flexibility

A computer monitor in the on-air studio acts as a prompter for announcements and liners. Mounted from the ceiling for easy viewing and to maximize space, the monitor also provides a quick reference of recordings in the station's cart library.

To open up space even more, Adkins also hid non-essential and seldom-adjusted equipment such as turntables in fold-out racks. Especially in the on-air studio, Adkins aimed to keep flexibility and expansion an integral part of the design. Recently, this was put to the test when a new Otari MX50 reel-to-reel recorder was added to handle some of the load carried by the studio's Otari MX5050 recorders.

FACILITIES SHOWCASE

"The way this furniture was built, I can pretty much add another equipment rack wherever I need it—just remove a panel and have some rack rails put in. The new MX50 was mounted directly behind the board operator for secondary traffic reporting and other recordings that rarely need editing. This real estate was originally used for the EBS and remote control gear, which were moved elsewhere in the building."

With the exception of a new Otari CTM-10 cart machine, Adkins elected to employ existing ITC SP series cart machines in the studio. His reason: "Since the CD singles are becoming more prevalent, especially for our CHR format, we decided to invest our budget in CD technology.

"The station is currently 80 percent cart driven, but two new Denon DN-950FA CD players in the on-air studio are likely to change that percentage in the coming year."

Adkins did, however, upgrade the on-air studio console from a Continental Rock 10 to a new Auditronics 212. In WYHY's eight-track production studio, he also selected an Auditronics console.

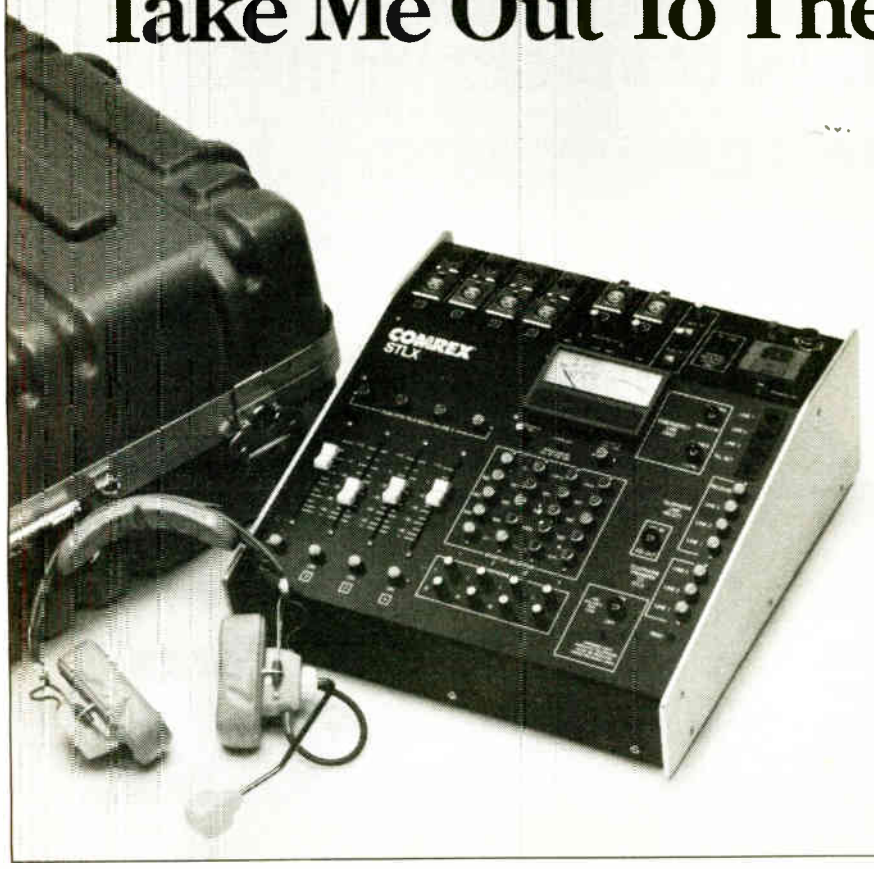
WYHY's new Auditronics 400 console for the eight-track was, according to Adkin's recollection, one of the first boards in the new model's production run. He is particularly impressed with the console's LED meter overbridge, and built-in mic EQ.

For CD production, the eight-track was given an SL-P1200 Technics CD player, which Adkins modified for balanced output. He also fitted an existing Yamaha Rev 7, Yamaha SPX1000, and Orban graphic equalizer into the eight-track studio's cabinetry.

More special effects equipment, such as an Eventide Harmonizer, are anticipated in this year's budget. But until that time,

(continued on page 18)

Take Me Out To The Ball Game



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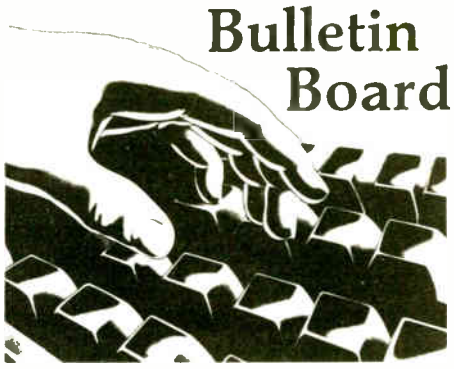

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World Radio History

WORKBENCH

The Splice Is Right

by John Bisset

FAIRFAX, Va. Bill Croghan, the CE at KCEE/KWFM in Tucson, writes how he came to dread a discrepancy report that said, "The ITC 99 is not finding splices again . . .," especially since every time he'd check on it, the machine would find the splice every time. The problem persisted, even after following all of the helpful suggestions from ITC customer service.

Bill finally came to the point of examining carefully everything he was doing. To watch the splice go by, he slid the cover back on the top of the machine. At first he thought the cover was somehow causing the problem, but went on to find the real culprit.

When he slid the cover back, he also slid back a digital timer, which was sitting on the cover. The ITC Splice Locator uses a fixed coil and a magnet attached to the capstan wheel arm that moves slightly when the splices go by. This movement creates a slight change in voltage in the coil, which is detected by the machine.

Experiments soon showed that the timer was putting out enough of a magnetic field to block the action of the splice sensor—even through a metal cover. Merely finding another location for the timer solved the problem. Bill reports, however, that the jocks still think he practices witchcraft. Bill Croghan can be reached at 602-623-7556.

★★★

Bill's "witchcraft" story reminds me of a similar problem that beset many of us who serviced MCI reel-to-reel machines. At some point in time, the machine would fail to operate. We worked late into the night, finally tracing the problem to what we thought was a faulty "tape load" sensor.

This LED/phototransistor arrangement would signal to the machine that tape was properly loaded when the tape passed through its slot, breaking the LED's beam of light. When the tape was in place, the machine was ready to operate.

In our case, however, the tape *was* in place, but the machine would not work. Figuring the photocell assembly was bad, we left the studio. It was late, and we decided to order a replacement in the morning. As we left, we flipped off the studio lights and—*kerchunk*—out came the familiar "tape's in place, and I'm ready to run" sound from the MCI.

It seemed the photocell had a filter that rejected fluorescent or incandescent light, and through thorough cleaning over the years, the filter film had dislodged from the photocell surface. Without the filter, any light would trip the photocell—whether it came from the LED or the lights over the machine.

You can imagine the look on the production director's face as we showed him his new remote start controls—a light switch across the room.

★★★

A few issues back, we were told about a frequency jitter problem that was noticed by Ed Burkhardt of Burkhardt Monitoring Service.

In that column, a means of disabling the bargraph on one exciter was discussed. Ed informed me that TTC Wilkinson offers a free Field Modification Kit to correct the center frequency shift in their 8090X FM Exciter.

Tim Geist of TTC's customer service department says the modification is very simple, and involves grounding a module. The field mod can be obtained by calling Tim at 303-665-8000, extension 280. Or, you can circle **Reader Service 72**. Hats off to TTC/Wilkinson for their prompt solution to this problem.

★★★

Does the electrician in you yearn to find out what's new in electric accessories? If so, you'll want to get a copy of the Caddy Fasteners catalog. This pocket-sized booklet has a wide variety of fasteners that can be adapted to hanging rigid coaxial cable or plumbing transfer switches.

Caddy's Bridle Rings are great for training mult cables on their way to punch blocks, and their open-end offers superior performance over plastic wire ties since you can add to the bundle at any time. The rings come in a variety of sizes. Caddy Fasteners are manufactured by Erico Products Inc., of Solon, Ohio. For a copy of your catalog, circle **Reader Service 106.**

■ ■ ■

John Bisset recently left Delta Electronics to concentrate on Multiphase Consulting, a contract engineering company. He can be reached at 703-379-1665.

WYHY Gets a New Look

(continued from page 17)

said Adkins, the SPX1000 provides production with nominal pitch effects similar to a Harmonizer.

Four-track still in vogue

Four-track production, however, is still very much in vogue at WYHY. The four-track production studio inherited much of the old, but very functional equipment from the renovation. In addition, refurbished Studer recorders are in use as well as a Technics SL-P1200 CD player.

A testimony to the four-track's usefulness is that it is still in use by the venerable Bumper Morgan, the station's production director and the voice behind liners for some 100 stations nationwide. Said Adkins, "This studio has basically become his baby. He does recordings in this production room for all those stations across the country, and they're always impressed by the sonics of it."

Even in retrospect, Adkins claims he would change very little in his renovation of WYHY. "I think if I did it again, it would be very similar to this," he said. "There are others who agree. Recently, WYHY-FM's group owner, Jacor Communications, modeled another of its stations after WYHY-FM."

■ ■ ■

Dee McVicker is a free-lance writer and regular contributor to **RW**. *To inquire about her writing service, call 602-899-8916.*

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World Radio History

FROM THE TRENCHES

by Alan Peterson

A Remote from Hell

Dear *AZ*,

From the look of things, the promotions calendar is set for 1991. Once again, the most memorable remote of all time is conspicuously absent: the Mountain Park Remote from Hell. Things have never been the same since this dropped off the calendar.

Mountain Park was once a very old amusement park cut into the side of a mountain in Holyoke, Mass. It wasn't flashy or glitzy with singing robots or space rides, but it did have nearly everything a park could want: midway, Ferris wheel, bucketride and a magnificent carousel with a genuine band organ.

Every summer, my old station (Cousin Brucie's one-time pride & joy WHMP-FM) would broadcast live from the park with a van full of goodies, providing freebie admissions for the family. Lots of fun, but under the thin veneer of frivolity and jocularity lurked the dreaded Remote from Hell.

As the ad copy says, "Getting there is half the fun." By name, it's not hard to discern the uphill drive it takes to get to the park. At this time, WHMP's HuMPmobile was one of those zaftig GMC jobbies combining camper, motorhome and aircraft carrier—about 800 feet long.

Putting a cinderblock on the gas pedal and getting out to push was about the best way to move the van up the hill to Mountain Park. Then, this monstrosity had to be backed into a notch between the carousel building and the concert stage. Tight squeeze.

And who thought up the location? The van against the carousel was a great idea for visibility, but hardly a sonically-acceptable one. When the calliope picked up the beat, you couldn't hear talkback on the two-way.

Broadcast lie #255: "We did it last year and it sounded fine." So how come it doesn't this year? Up went the Marti antenna (same as last year), aimed right at our studios (same as last year). They couldn't hear a peep. Too many mountains in the way. Sacrificing one mic stand, we climbed the van roof and hiked the mast an extra eight feet. Noisy but airable.

By this time, you'd think it'd be getting a little warm in that van, right? GMC saw fit to put A/C in the HuMPmobile, but that meant firing up the old onboard generator which hadn't been cranked in about a year's time (cobwebs on the "start" rockerswitch—always a giveaway). If we touched the forbidden button, would we be mercifully awash in refreshing cooling air?

Not by a long shot. Two "choogas," a "ping," and the generator went back to bed. This meant covertly stealing juice from the workshop basement under the carousel house next door. It worked, but that extension cord was running a bit warm by the end of the day.

After a while it was decided the Marti shot was just too noisy to continue with, so we sent someone back to the station for a spool of shielded twist-pair and a Shure minimixer and we'd finish the day over a phoneline; we'd sacrifice the Marti's bandwidth but it would resolve the noise and the PA system's problems. There was a multiline phone down in the workshop to wire into, so it would be a breeze, right?

Enter Mountain Park's #1 mouser: a ragged, brown, fat old tomcat about the size of a bowling bag, living under the desk in the workshop. I, with my cat allergies and he with his interest in seeing a new face in the shop ...

Visualize this for a moment: Me under a greasy old wooden desk that's buried under old tools and paperwork from 1900, trying to take apart a telephone with a garmongulous screwdriver obviously designed to torque a Ferris Wheel, as a carousel booms and jangles overhead, and all the while the world's least desirable cat is giving me the old "Hi-Al, love-your-show" rubdown, making me swell up and sneeze just in time for our next breakaway in 10 minutes.

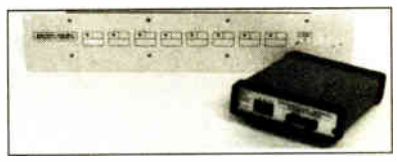
Lessons learned from this paid debacle: Always test a remote several days in advance, always carry the right tools, bring a cheapie clip-on phone for emergencies and never, *ever* trust the phrase, "It sounded fine last year."

And in this day 'n' age, check ahead

(continued on page 26)

SINE SYSTEMS

DIAL UP REMOTE CONTROL



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Circle 15 On Reader Service Card

World Radio History

Playing the PC Name Game

by Barry Mishkind

TUCSON, Ariz. My mother hates coming to my house.

Actually, what frustrates her is my den. You see, the floor of my den is habitually covered with piles of papers.

Less a filing system than an effort to have my most used materials close at hand, my den often is useless for entertaining friends. Sure, I clean those piles up from time to time. But it's usually easier to spread them out where I can see everything.

The parallel between my filing "system" and your computer's hard disk is not that far off.

You've got 10, maybe 20 programs loaded. Each utilizes a number of files to operate. Then there are the hundreds of files you've created: letters, memos, spreadsheets, databases, phone lists, etc.

Some users create a series of menus and batch files to try to keep on top of their files. But as the sheer number of files increases, the eight-place alphanumeric titles become somewhat arcane.

For example, everyone has been here: You're looking for the budget for the new transmitter—is it under XMBDGT2.WK1 or BUDXMTR3.WK1 or PROPXMT4.XLS, or did you forget to save it in the first place? And that memo for the DJs? Was it JOXMEMO1.DOC or CRMEMO.890 or CRMEMO.TXT?

KEYBOARD CONNECTION

Right now, there are approximately 3,500 files on my computer's hard drive. I often need help in wading through this mess to find an important file.

Fortunately, there are a number of useful utilities available that can save the day. Last time out, we considered some programs that can list every file on your drive. Several of these disk managers will do everyting from displaying and copying files to showing you what's in the file, even compressed files.

Others add to these abilities, locating specific files you may have trouble locating.

Lotus' Magellan, for example, not only has the ability to view virtually all your files in their "native" format, but it can do a "fuzzy search" of every file on your hard drive, searching for any word or word pattern you specify.

That way, if you can't remember where the letter to the consultant is, or even what his name was, you can find it by searching for a phrase like "proposed transmitter upgrade." Each file with any of those words in any pattern is listed and displayed for you in a few seconds exactly as you composed it. That really helps save those of us with poor memories or arcane filenames.

Magellan also can excerpt material from any of the files and build a new file, allowing you to create a document on the fly from several sources. It's great for quick presentations.

Golden Bow has a similar program, designed primarily to find and edit files, and includes a built-in text processor. Vq™ even has a feature that allows you to return to the place you were working when you ended the last session, a great aid in coping with power losses or when you can't remember where you left off last Friday.

Of course, there are times when simply finding files and manipulating them is not enough. Sometimes you erased a file by mistake and then discover you need it. Or you need to repair a directory after a glitch or crash has put gibberish on the screen.

While a frightening task at first, there are several hard disk utilities that can virtually walk you through problems and get you back up and running quickly. Ready for some familiar names?

Norton Utilities now in version 5.0, Mace Utilities™ version 1990, and PC Tools™ version 6.0 are among the best programs to call upon when your computer seems darkest.

All three will perform many tasks with simple commands. Norton, though, adds a second book to the package, The Norton Utilities Disk Explorer. If you want to understand what is going on inside the hard drive, this is a great resource,

(continued on page 22)

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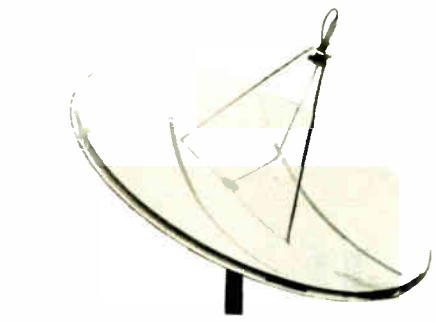

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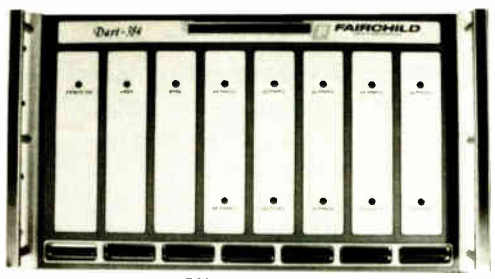

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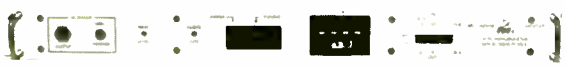

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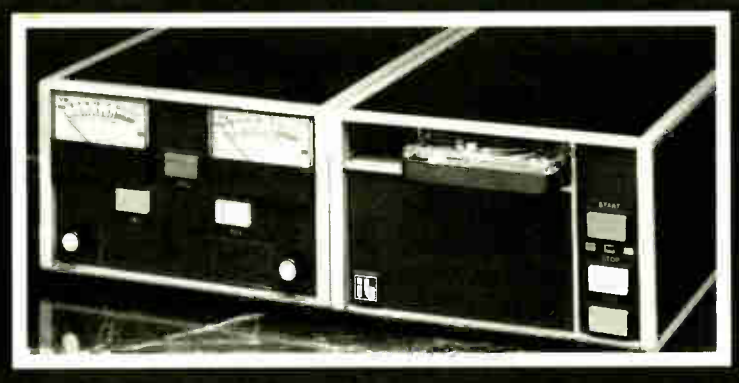

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Circle 115 On Reader Service Card

World Radio History

A Guide to Translator Coverage

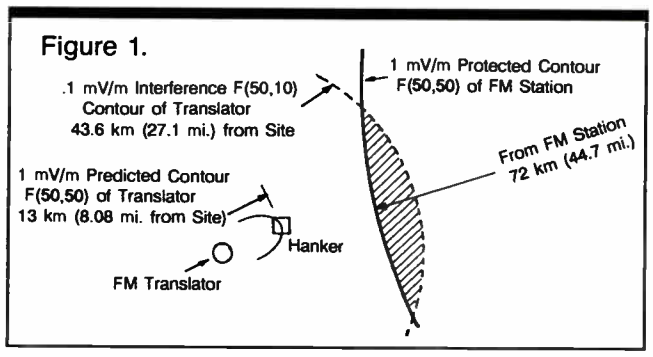
by Howard L. Enstrom

MOUNT DORA, Fla. With new FM translator rules effective March 1, the Commission is sure to be swamped with NCE (non-commercial educational) applications. The same kind of thing will happen after May 1, with the thaw on commercial translators.

In the new ballgame, rule changes chiefly affect permitted coverage, to protect full service FM stations from interference, according to their class. Overall, the rules are more liberal toward non-commercial service. In order to discuss signal coverage, class contours, and interference, we need to define what we're talking about.

I won't get into theory of induced wave energy across a conductor having a length of one meter. But calculations are based on study findings in the 1970s, led by the Television Allocations Study Organization (TASCO). Its recommendations have been adopted by the NBS and FCC.

Figure 1.



LOWPOWER LOWDOWN

The calculations consider a multiplicity of measurements of an FM signal's field intensity, expressed as a median value, exceeded for at least 50 percent of the time at the best 50 percent of receiving locations, using a receive antenna nine meters (30 feet) above ground level. The phenomenon is portrayed by the well-known "F(50,50) curve."

When wave energy is measured with a field strength meter using a half-wave test dipole, readings are corrected for factors, and expressed as volts-per-meter, millivolts-per-meter (mV/m) or microvolts-per-meter (μV/m).

FCC rules, under Part 73.333, include the F(50,50) FM channels graph chart. The chart shows field strength as a function of variables, such as radiated power, antenna HAAT and distance. Using the curve information (these days, in a computer), we determine the distance to points forming a "predicted contour."

If a perfectly circular signal were radiated through atmosphere of constant characteristics over perfectly flat terrain, its field strength would be the same at every equidistant compass point.

If the radiation had a directional pattern, any field contour would have an identical shape. But in practice, field patterns may be distorted, due to elevation changes in terrain over which a signal traverses.

ERP and antenna height above average terrain (HAAT) along a particular radial from a site are ingredients used to predict the distance to a point, used to form a signal contour. Expressed as a service grade for a principal city, the field is at least 70 dBu (3.16 mV/m, or 3,160 μV/m). For urban areas, the field is 60 dBu (1.0 mV/m, or 1,000 μV/m).

In FM service, there is an important predicted contour called the "protected contour" of an authorized station. Specified contours of other services, including FM translators, cannot overlap them.

The degree of protection entitlement hinges on a station's classification. Commercial B stations' entitlement is 0.5 mV/m, and commercial B1's are entitled to 0.7 mV/m. All other classes are afforded 1.0 mV/m.

Thus far, we've considered contour levels using F(50,50) curves to predict distances. What's the F(50,10) curve for? The answer is to figure interference contours more than 16 kilometers (about 10 miles).

Let's say, as shown in Figure 1, that a certain Class C1 FM station in Kansas operates with 100 kW ERP and non-directional antenna 980 feet HAAT. Its F(50,50) predicted 1.0 mV/m contour is 44.7 miles out, and is to be protected.

Further west across the plains lies the community of Hankers. People listen to the station, but some support a plan to add another service with a translator. There's a 500-foot tower about eight miles southwest of town, and the owner has OK'd putting up a directional transmit antenna at 325 feet.

Hearing about the new rules, the translator group wants maximum ERP—250 watts—because they'd like to reach small communities beyond Hankers. However, there's a problem.

While geographically legal to use such ERP and antenna parameters for radiation of 1 mV/m at 8.08 miles, the F(50,10) interference curve used for the .1 mV/m contour shows a distance that overlaps the FM station's protected contour. So radiation has to be pulled back by reducing translator power output, antenna gain or antenna height.

If a site east of Hankers could be used, suitable also for receiving the primary station, this problem could be avoided. It's possible, however, that another one would be created. So much for co-channel considerations, addressed under Part 74.1204(a) of the new rules. But there's more . . .

FM translators also must protect contours of first, second and third adjacent channel stations, above and below its frequency. As earlier stated, a station's protected contour is .5, .7 or 1 mV/m, depending on classification.

Part 74.1214(a) also defines adjacent channel interference, by tabulation for classes of stations. For all classes of stations, the ratio of maximum interference contour level/protected contour level may be stated simply, as shown in Figure 2.

Figure 2.

Channel Separation	Translator Interference Contour
Co-channel	1/10 of
1st Adjacency	1/2 of
2nd Adjacency	10 times
3rd Adjacency	100 times

The rules address TV Channel 6 interference protection under Part 74.1205, dealt with under part 74.1235. FM translator coverage is to be discrete, not something attained by throwing more dollars for hardware to be heard at greater distances.

The emphasis belongs on optimum design, to legally radiate maximum energy to illuminate a specific area—in a direction that does not interfere, and not at a uselessly high angle toward the upper atmosphere.

Sometimes it takes several translators to do what some think a single one can do.

■ ■ ■

Howard L. Enstrom is president of FM Technology Associates, Inc. He can be reached at 904-383-3682, or by FAX: 904-383-4077.

PCs: What's In a Name?

(continued from page 20)

explaining many of the esoteric matters that power users can appreciate.

Using the Norton Utilities, you can, for instance, do a low-level, non-destructive format. Why is that important? While you continually read and write files as you use the computer, the sector markings themselves are not rewritten.

After a period of time, the sector markings on the hard drive become weak, causing read errors. Periodic reformatting prevents data loss.

Mace Utilities also is aimed at those needing assistance in emergencies. In fact, its reputation initially came from restoring files that users had feared were lost.

Mace's detailed instructions lead you through the proceedures to recover from many disasters, and additional reference sections explain many of the mysteries of your hard drive.

PC Tools handles many of the same tasks as Norton Utilities and Mace Utilities, but as we mentioned last time, includes a wider range of utilities, including a text editor and disk manager.

One of these packages belongs in your computer "toolbox." It will pay for itself the first time you restore lost files or prevent downtime from read/write errors.

■ ■ ■

Barry Mishkind is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797, or on FidoNet 1:300/11.

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World Radio History

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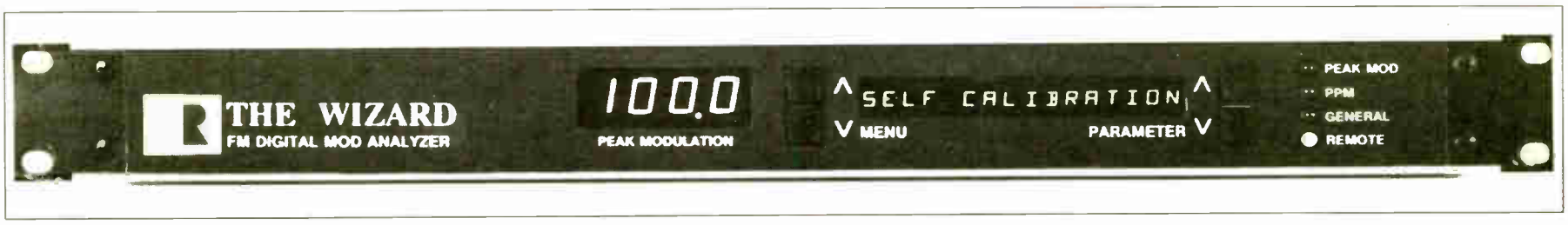

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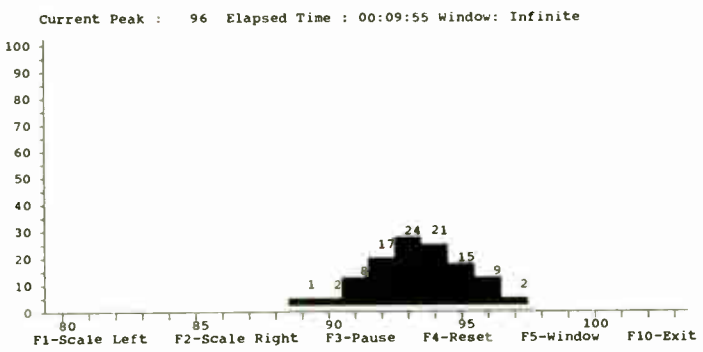
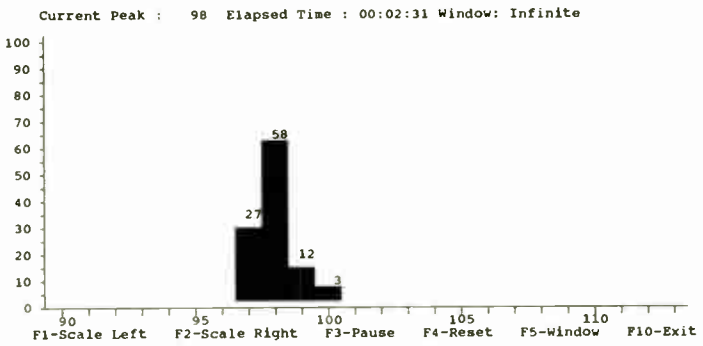
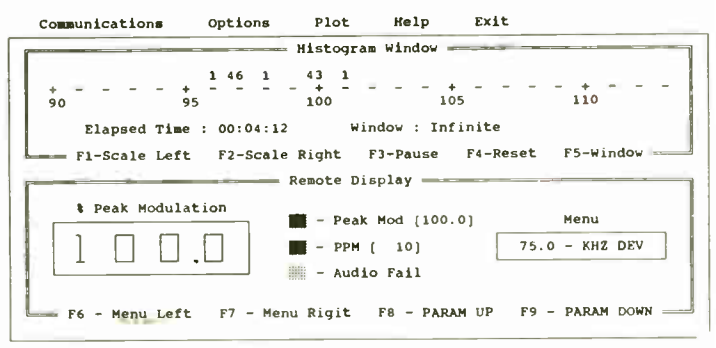
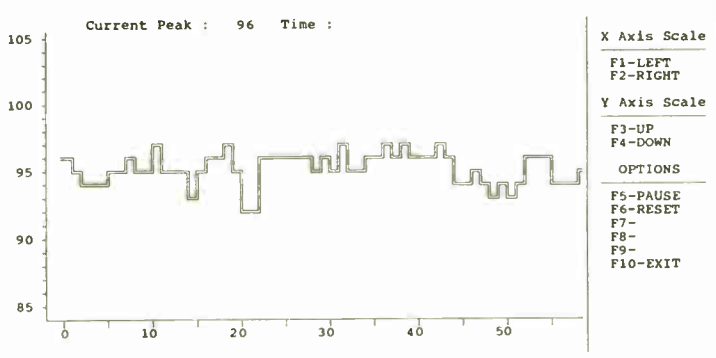
- Pre-set PPM–adjustable from O to 100 PPM
- Variable peak hold time–adjustable in O.5 second increments
- Peak weighting mode–time constants are menu selected
- Real time mode or past time mode
- Provision for pilot injection measurement from FMS-2
- Provision for pilot modulation measurement from FMS-2
- Provision for SCA injection measurement from SCM-2
- Silent sentry alarm–adjustable in time and threshold
- Will accept external alarms–such as off frequencies from FMM-4A
- Alarms read on menu–menu will cycle if two or more are present
- Modulation adjust on two ports–adjustable in O.5% increments
- RS-232 port–provides computer graphs and remote operation
- Three level password protection–look only, change, and manager
- Either infinite window histogram or sliding window histogram
- Optional FM precision demodulator that will remotely self calibrate
- One rack height panel space–including precision demodulator

Sample PC Output

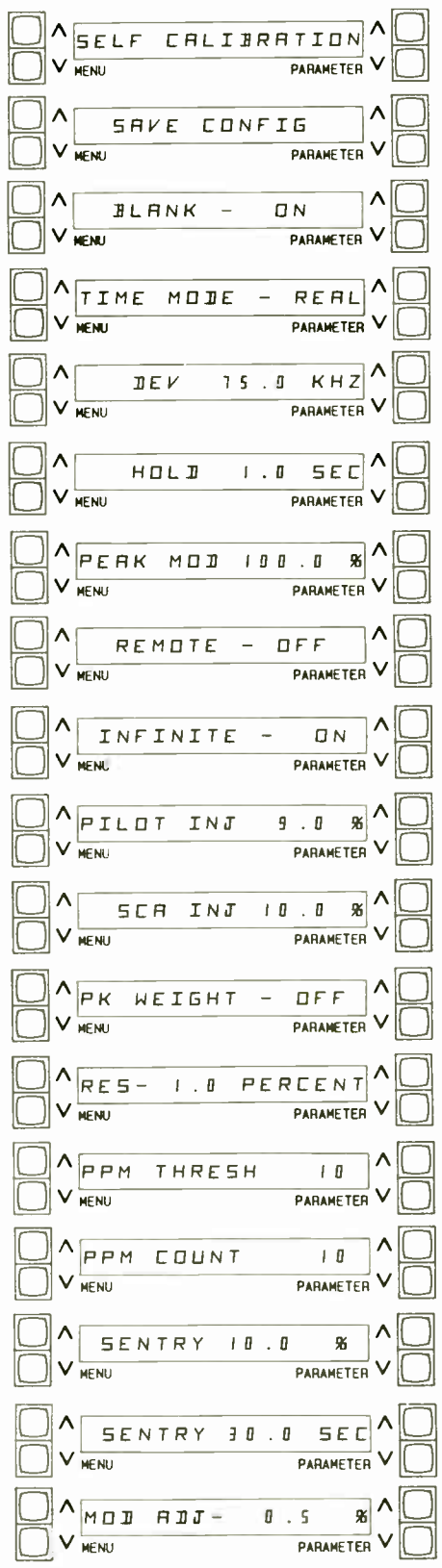








Sample Setup Menus



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World Radio History

Embracing the New Year's Possibilities

by John Cummuta

DOWNERS GROVE, Ill. Once a year, the magical opportunity arrives to bulk erase the scratches and black marks on the passing year's performance, and take our newfound wisdom and experience into another 12 months of challenges.

I'd like to suggest that, as you consider how to best use this new year of 1991, you concentrate on developing three important areas of opportunity: new ideas, your resources and yourself.

ENGINEERING MANAGER

New ideas are the cornerstones of greatness. History is ripe with people who catapulted into high levels of success because they came up with a great new idea. But many of us erroneously go through life admiring these people, thinking that they had enjoyed some mystical experience that we could never hope for. That's just not true.

First of all, if you look below the surface of most great ideas, you'll find that they're not *new* ideas at all. They're usually just slight improvements on existing concepts. Or they're frequently the transposing of a common idea in one industry into another. The old "Chocolate and Peanut Butter" combination is a good example.

Neither chocolate nor peanut butter was new, but them putting together was a successful "New" idea.

Sitting around the cracker barrel discussing the issues of life was not new. Neither was radio broadcasting. But putting them together a few years back created Talk Radio, and a whole new use was created for those AM properties that people were getting concerned about.

Heaven knows how many other great combinations are waiting to be put together by anyone who lets his or her mind flow without boundaries. What if someone sees the dramatic growth of "Info-mercials" on TV and adapts the concept to radio? What if someone sees the growth of cable TV home shopping and tries the idea on radio as a "Home Swapping Network?"

The creative two-step

These are just simple (maybe goofy . . . maybe not) ideas, and I arrived at them by a simple two-step process: a capability analysis and an application brainstorming session. Sound complicated? It's not.

Step one is simply an inventorying of what your medium, company, department, personality, or whatever is capable of doing. What are its strengths? For example, AM radio. One of its obvious strengths is its ability to cover a lot of real estate. Nothing that can reach half of the U.S. could ever be obsolete.

Step two is just letting your mind fly and seeing how many crazy and not-so-crazy ideas it comes up with to use that capability. Write them *all* down. Review them a few days later and watch more ideas and applications flow.

Try this simple process to develop ideas for any area of your life. Once you get started on it, you'll find ideas popping into your conscious mind all times of the day and night, because your subconscious mind will be chewing on them 24 hours a day.

Develop your resources

Once you have a great idea to work on, you'll need the resources required to pursue the opportunities it will present.

In broadcasting, your resource will fall into a few predictable categories: money, equipment, air time, and most importantly, people.

You can develop your financial resources by doing solid budgeting and reporting. Let upper management know that you have sound reasons for every penny you plan to invest into the station's performance and growth. Then, as you spend the money, show through reporting how it is being used compared to your forecast during the budget planning process.

To see the money resources entrusted to you grow, *you must be accountable.* Authority never comes without responsibility.

Developing your people resources may (depending on the size of your station) be more important than the money. We all know that a chain is only as strong as its weakest link, and your people can either prove to be your strongest or weakest links. In either case, it's management's fault. You can take the credit or the blame, depending on which applies.

To develop your people resource, you must invest in your people. That does not necessarily mean money, but it is tough to get commitment from people who know they are underpaid. So if that

(continued on page 28)

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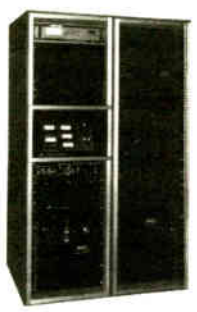

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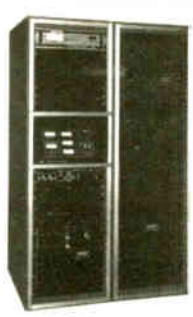

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World Radio History

Settling the Settlement Issue

by Harry Cole

WASHINGTON Our texts today: Barrett Strong's "Money," The Beatles' "We Can Work It Out," and Benny and Bobby Troup's "It's All Over Now." We are talking about settlements and the comparative hearing process.

Historically (that is, up until the early 1980s), the FCC refused to let a competing applicant profit from the dismissal of its application. If one applicant was willing to dismiss in return for payment from another applicant, the cap on such payment was the dismissing applicant's reasonable and prudent out-of-pocket expenses. Big deal. Where's the incentive to settle if the most you can get is back to square one?

COLE'S LAW

Then, in the early days of Reaganism (or was that Reaganitis?), that pesky little restriction was removed.

The result was a flurry of settlement activity—some observers estimate that as many as 80 percent of all comparative cases over the last few years have ended in settlements.

But there was a catch. By removing settlement caps, the FCC encouraged applicants who really didn't have a chance of winning on the merits of the case to file anyway. Such applicants figured that either they could "buy" the permit by offering all the other applicants big chunks of money, or they could merge with other applicants and get a piece of the permit. Or they themselves could get paid off with a big chunk of money by one of the other applicants.

So all of a sudden, where you used to see proceedings with only five or six competing applicants, you started seeing comparative proceedings with 20, 30 or 40 applicants.

Then it turned out that a fair number of the applicants appeared to be shams of one sort or another, seemingly put together not so much to get a broadcast station as to shake down bona fide applicants for cash. And, since these cases tended not to settle until at least the hearing had cranked up, the Commission still had the administrative burden of processing the applications and conducting at least the preliminary stages of hearings.

Sensing that its processes might be being abused, the Commission now has taken steps to stop those abuses. Those steps include not only a return to the "expenses only" settlement cap, but a more drastic prohibition against any payments once the hearing starts. If applicants decide to settle at any time before the actual hearing starts, the most that can be paid for the dismissal of an application will be documented out-of-pocket expenses. After the hearing starts, forget about any reimbursement at all.

Adding further pressure on applicants is the fact that the Commission has accelerated the date for paying the $6,760

(continued on page 28)

Live from Mountain Park

(continued from page 19)

of time on phone-in remotes that you're not connecting up to one of those mutant computer-based multis that's impossible to connect to (except at the block); we got stopped in our tracks once like this an hour before showtime.

For Mountain Park and me, I'll always remember the highlight of the day: getting stopped at the top of the ferris wheel and divebombing John Baibak (our promotions director) with my snowcone. If Dante was right, there's a corner in the netherworld waiting for me with no A/C, an Eico phono oscillator to broadcast over and carousel music blasting through a wall lined with Crown amplifiers. Down there it's considered eternal punishment.

Up here, it's another day on the job.

Three Pitches for a Quarter,

—Al

■ ■ ■

Al writes from WLAD/WDAQ, Danbury, Conn., and invented the word "garmongulous" just for this article. Write and tell him of your favorite remote tale.

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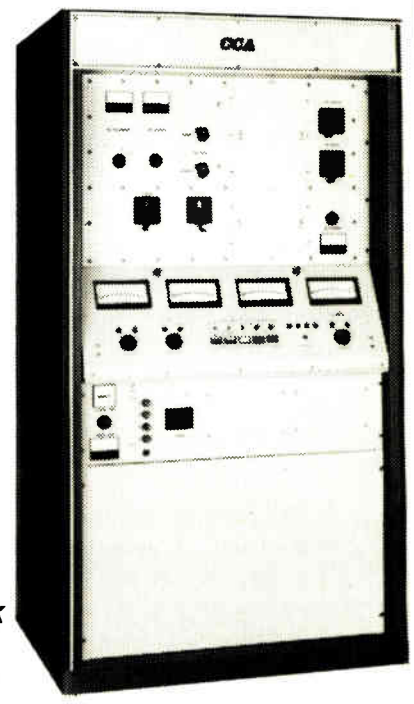

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World Radio History

We Can Work It Out

(continued from page 26)
hearing fee. That fee has been required to be paid when the hearing is designated—nowadays that would be about two years after the application is filed.

In other words, you filed your application and didn't have to worry about paying the ante to sit at the hearing table for some two years, until the game was about to begin. Under the new rules, the hearing fee will have to be paid approximately 30 days after the deadline for petitions to deny—probably less than a year after the application is filed.

As with most things, the Commission's new regime has some good points and some bad ones. On the plus side, it may discourage unqualified (or marginally qualified) applicants from filing. There has been considerable abuse of the comparative process, with clearly inferior applicants gumming up the works waiting to get paid off. Reducing (if not eliminating) the number of such applicants would be useful.

Another arguable plus is that the elimination of big money settlements may return the focus of the comparative process to the applicants' respective qualifications, and not just their financial statements.

But the new system still suffers some serious flaws. F'rinstance, by eliminating *all* payments once the hearing starts, the Commission has effectively resigned itself (and its applicants) to prolonged, expensive litigation.

After all, if the new system *is* effective in eliminating most of the sham applicants, all that will be left will be serious contenders, each of whom, presumably, will have strong qualifications and some notion that it can and should prevail on the merits. And once the hearing has started and no payment at all is possible, each such applicant has no choice but to undertake knock-down, drag-out litigation in the hope of winning.

This is not to say that there is any easy answer for this problem (or other similar problems inherent in the new system). Almost certainly, creative applicants and their counsel will study the new procedures and come up with some means of softening the harder edges without defeating the procedures entirely.

In the meantime, the Commission certainly hopes that many applicants currently on file will elect to cut their losses by dismissing now. Such applicants probably should take a long hard look at their situation and decide whether it makes sense to proceed under the new regime.

■ ■ ■

Harry Cole is a partner in the Washington, D.C.-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

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Seizing the New Year

(continued from page 25)
is a problem, get it out of the way so you can get to the important things.

Things like training and proper assignment. Training can be expensive seminars, books, cassettes, night school, or whatever other continuing education that enthuses an employee. Of course, there must be some connection between the training and the job, but a little latitude here is appropriate. People respond well to employers who are willing to help them improve themselves.

The other important people development tool is proper assignment. Strive to find out what parts of your department's responsibilities are most interesting to a given employee and try to put them to work in that area.

People perform best at things that interest them. It's that simple. Of course there will be times when such consideration is impossible, but as much as possible try to follow this track as a manager.

Developing yourself

A bright new year is a great opportunity to make a self-assessment and see what needs work. Look in two areas: outside and inside.

Outside means your body. If you need to finally admit that your feet did not recede backwards, but your stomach moved outward, try tackling the problem now. They you'll be in fine shape by swimwear time. Plus you'll have more self-confidence, you'll be more attractive, and you'll just have more enthusiasm for life. It's worth the struggle.

Inside is your mind and your heart. You can either fill your mind with positive thoughts and information in 1991, or you can pollute it with garbage and negative attitudes. I submit that you'll enjoy 1991 a lot more if you take the former path.

As far as your heart is concerned, try the Golden Rule. Treat people the way you'd like to be treated—regardless of how different they are from you. You'll be amazed at how much nicer those other people will get if you do.

■ ■ ■

John Cummuta is president of Advanced Marketing Concepts, Inc., a broadcast management and marketing consulting firm. He is also a regular **RW** *columnist. He can be reached at 708-969-4400.*

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World Radio History

BUYERS GUIDE

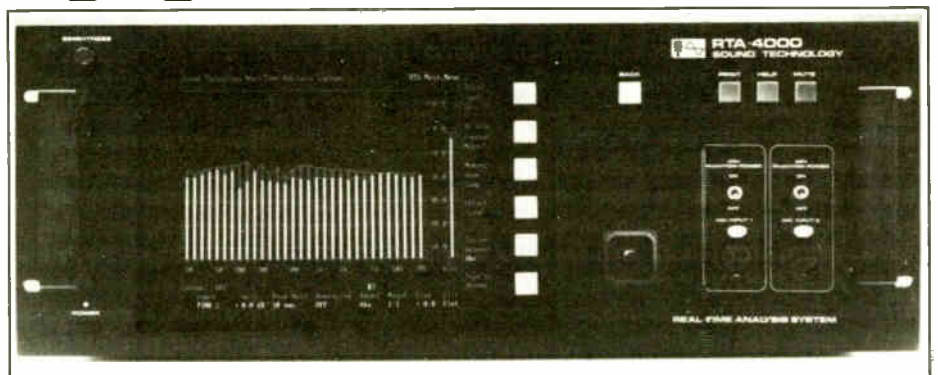
Test & Monitoring Equipment

KBIG Applauds RTA-4000

by Dennis J. Martin, Maint. Eng.
KBIG-AM

LOS ANGELES "The audio interpretation tool of the 1990s" is how Sound Technology describes the RTA-4000 Real-Time Program/Acoustic Analyzer, the newest addition to its family of advanced test and measurement equipment.

A featured product at the AES Convention in Los Angeles, the microprocessor-based device uses 31 1/3 octave filters to analyze the audio spectrum from 20 Hz to 20 kHz.



Sound Tech's latest test and measurement piece is the RTA-4000.

USER REPORT

Unlike its LED-based counterparts, the RTA-4000 uses an internal CRT to display the level in each band over a 60 dB range with a resolution of 0.3 dB. Designed for rack mounting, the unit has two balanced phantom-powered mic inputs, four line-level inputs with matching parallel outputs, and two pink noise outputs.

The analyzer will directly interface to dot-matrix printers, drive an external EGA color monitor and can be controlled by an outboard PC via its RS-232 port.

The front panel of the RTA-4000 is simple and uncluttered, concealing—at first glance—the analyzing power that can be unleashed at the push of a button. Operation is controlled entirely by four fixed-function switches, six soft keys, and a joystick (a soft key is a switch whose function changes).

Main menu appears

On power-up, a main menu appears on the CRT that defines the first set of functions for the soft keys. From this menu, you can select the RTA (Real-Time Analysis), RRC (Real-Time Response Calculation), Memory and RT-60 modes, plus view and select system options and pink noise output setups.

Choosing the RTA mode reveals a submenu from which you can access two additional menus. In all, 28 different menus redefine the operation of the six soft keys.

Confused? Never. Context-sensitive on-line help is available by simply pressing the Help button. As you navigate your way through the menus, help screens describe the changing functions of the soft keys.

Operating modes in action

In the Real-Time Analysis mode, the unit functions as a 31-band spectrum analyzer well-suited for examining the nuances of program audio. Using the RTA-4000, it's easy to verify whether a piece of source material is deficient at the high or low end, and how much EQ is necessary. That, though, is just one application of this truly multifunction measurement tool.

Using its internal pink noise generator as a source, the RTA mode is the perfect and only reliable method for testing program-controlled audio devices like multiband limiters and companders.

The unit functions as a 31-band spectrum analyzer well-suited for examining the nuances of program audio.

Connecting the RTA-4000 to the output of a distortion analyzer reveals the harmonic components and the noise floor. Adjusting tape machines, measuring loudspeaker response in a room and documenting entire system frequency response are just a few applications of pink noise combined with real-time spectrum analysis.

The RTA mode takes full advantage of the internal CRT. By using two intensities, the analyzer can simultaneously display average versus peak levels across the spectrum. In addition, a "master EQ curve," or other reference, can be superimposed on-screen to serve as a visual limit line.

The Real-Time Response Calculation mode—response mode for short—is probably the most powerful feature of the RTA-4000. Setting it apart from other real-time analyzers, this mode makes it possible to plot the response difference between any two points in an audio chain.

One practical application is to compare the output of the air console with the off-air signal. The result is a highly detailed frequency response graph that shows the effects of limiting and other processing under actual dynamic conditions. This type of setup proves invaluable when adjusting multiband limiters.

Or, using your off-air signal as a reference, you can generate a comparison

(continued on page 37)

BUYERS GUIDE INDEX

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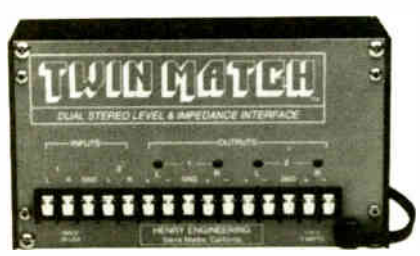

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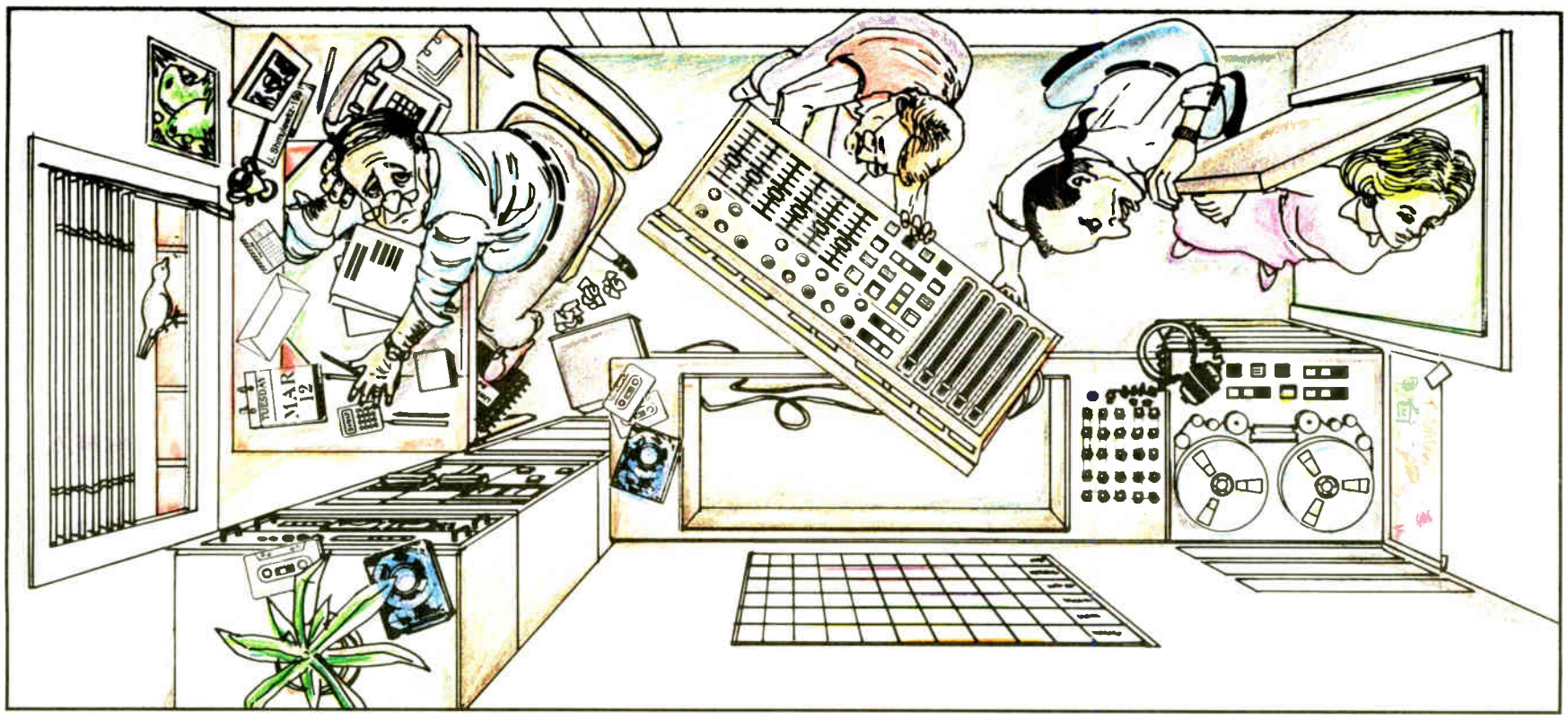
World Radio History



There's no room in your operation for an ordinary production console.

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If you're trying to build an extraordinary production room on an ordinary budget, Productionmixer delivers the creative power you need in an efficient, easy to use format. For more information and your copy of the color Productionmixer brochure, call us direct at 619-438-3911.

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Circle 14 On Reader Service Card

World Radio History

Alpha Aids KFRC Remotes

by George Zema, Engineer
KFRC-AM

SAN FRANCISCO Since 1980, KFRC has dedicated itself to doing quality remote broadcasts.

USER REPORT

For quite a while, we used a touch-tone decoder at the repeater site, which allowed us a flexible and easy-to-use system. When our second site came along, we wanted the additional capability of being able to control and monitor it from anywhere there was a PC and a modem.

We wanted the additional capability of being able to control and monitor it from anywhere there was a PC and a modem.

We got our wish in the form of a handful of cards from Alpha Products of Darien, Conn. One card has eight relays, one has eight analog inputs and one is an RS-232 board that shuttles information to and from the other boards via an external modem.

The system is controlled using the BASIC computer language. If you're adept at writing BASIC, you'll probably be OK. If not, you'll need to hire someone to do it for you. Due to time constraints, we hired Whitcomb & Associates of Foster City, Calif., so there now is a demo program available.

Briefly, here's how the system works. Of the eight analog inputs, only two have a changing value. The inputs need a DC voltage from 0 V to 5 V; a reference +5 V and ground are available on the board. We feed the +5 V to the rotor's direction pot, then take the output and feed that to one of the analog inputs.

Signal level readout

BASIC takes that information and converts it to a compass heading from 000 to 360. The other variable reading is the receiver's limiter current sample. It varies between zero (squelched) and about 2 V DC.

In this case, we elected to not use any BASIC conversion factor because a 100 μV signal into the receiver ended up with a signal level readout on the screen of just about 100. The remaining analog inputs are used as tally indicators, getting their information from the associated relay drivers.

Referring to the "System Status and Control Menu" (Figure 1), it's obvious how simple the program is to operate. Selections 1 to 5 are OFF/ON type choices. Selection 6 updates the screen only. Selection 7 allows the operator access to the antenna rotor. Selection 8 is for engineering use only and is protected with a password so the operator can't inadvertently create havoc with a non-operator function.

Entering a 7 takes you to the "Antenna Control Menu" (Figure 2). On this menu, selection 2 allows you to enter the azimuth heading to which you want your receive antenna to point. The program takes over at this point by first determining where the antenna is pointing now, decides which way it needs to turn, then pulls in the proper relay.

Selection 3 brings up a list of locations with predetermined azimuth headings. The operator finds the city from where the remote is originating and enters that azimuth. The program then takes over as in the previous example.

Selection 1 is totally manual control. Once selected, you're taken to a screen (Figure 3) where the receiver's signal strength is shown in real time. As the engineer at the mobile studio spins the transmit antenna, the signal strength will rise, peak and fall. Hitting any key brings you to "Antenna Manual Control" (Figure 4).

Entering a 1 sends the rotor counterclockwise, a 2 sends it clockwise. Once the rotor is swinging, you're sent to a new screen (Figure 5) that gives a real-time readout of the azimuth heading and the signal strength as they're changing. When the peak is found, hitting any key stops the swing.

The weird variety

The problems we've encountered have been mostly of the weird variety. The modem at one of the sites suffered a power glitch, even though it was

(continued on page 38)

Figure 1.

```
System status and control menu
                                Site = Wolverton Mt.
                          Status
1. Rcvr frequency         F1
2. Antenna                YAGI
3. Repeater               Disable
4. Xmtr test              Off
5. Xmtr freq              F1
6. Update status
7. Enter antenna control menu
8. Enter restricted menu
.  Exit program
                                Asimuth = 225
                                Signal = 0
Enter item # to change
```

Figure 2.

```
Antenna control menu
                                Site = Wolverton Mt.
Available control menu
1. Manual
2. Azimuth
3. Location
4. Return to system status/control menu
Select control method
```

Figure 3.

```
Mobile studio-to-site signal
                                site = Wolverton Mt.
This option reports the signal strength at the receive
site.
                                Signal =0
Hit any key to enter antenna manual control
```

Figure 4.

```
Antenna manual control
                                Site = Wolverton Mt.
                                Azimuth =225
                                Signal =0
Enter 1 to start CCW
Enter 2 to start CW
Enter 3 to return to signal strength program
Enter 4 to exit to status menu
Select action
```

Figure 5.

```
                                Azimuth =201
                                Signal =28
Hit any key to open relay and stop swing
```

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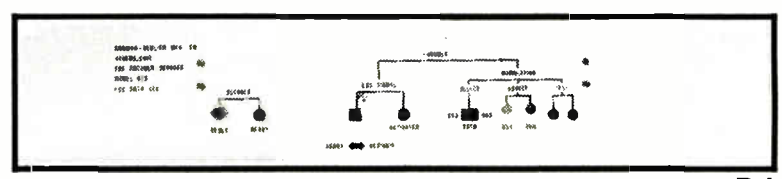

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Circle 114 On Reader Service Card

World Radio History

The Audio Bench in a Box

by Tom Mintner, Dir. of Sales/Mktg. Audio Precision

BEAVERTON, Ore. How many audio test instruments can you carry with one hand?

With the introduction of the Audio Precision Portable One, the answer is 10 or more—depending on how you count.

Audio test sets have been around for sometime. Many older designs (and some newer ones) are little more than a single voltmeter and generator combination with an appropriate termination and interconnection panel. Some can be "optioned up" to include various facilities for measuring THD+N and IMD.

Portable One is the most recent product from Audio Precision's engineering staff, which has been designing successive generations of state-of-the-art audio test equipment continuously since 1978. Although Audio Precision is now well-known for PC-based automated test sets, the Portable One was designed to fulfill other goals.

TECHNOLOGY UPDATE

We saw a clear need in the market for a high-performance manual test set offering comprehensive facilities while meeting the goals of simplicity, portability, ruggedness, high performance and an affordable price.

Quality on a budget

Unfortunately, for many prospective purchasers the last-mentioned factor of price must sometimes be the first to be considered. Engineering test equipment needs often are prioritized very low in the station budget.

For this reason, the Portable One has been built for an affordable price without sacrificing either audio performance quality or comprehensive features. Highly efficient circuit topology and component selection provide these comprehensive capabilities and high performance.

A key example is the two-channel analyzer. We live in a stereo world, yet most portable test sets lack real two-channel measurement capability. Portable One's true two-channel architecture includes Two-Channel Level measurements, as well as Ratio and Crosstalk measurement modes.

Audio Precision has introduced the Portable One audio test system.

Portable One also includes standard measuring instruments not always found in portable sets. The full-time frequency counter and phase meter measure frequency and inter-channel phase respectively. The Portable One also measures THD+N or SINAD, amplitude, noise, wow & flutter, as well as two-channel level, ratio and crosstalk as mentioned above. Intermodulation distortion measurement capability (IMD) is available as an option.

Square wave output

Also included are built in "A" and CCIR weighting filters and a convenient monitor loudspeaker and headphone jack. The Portable One generator supplies a full +30.6 dBu sine wave output, and also provides square wave output.

The Portable One also features two new and practical measurement modes. The Gen Load function measures the input resistance of your device. An AC Mains Check permits measurement of the voltage, frequency and distortion of the power line. This function may be combined with the bargraph memory to make a poor man's recording line monitor.

All of the measurements are displayed on a high-contrast supertwist back-lighted display, with adjustable contrast and a display invert switch. Use of this type display allows maximum flexibility in providing large readable digits as well as bargraphs, with readable and intelligent display of measured units selectable at the push of a button.

The Portable One is housed in a durable and rugged polycarbonate enclosure, with an inner metal chassis for further structural integrity and RF immunity. The package features an integral disappearing protective cover. Options include a soft transport case and a connector adapter kit.

The Portable One is easy to use. The philosophy is "press a button, take a measurement." Frequency selection can be made either with the knob or with the automatic increment and decrement steps set at ISO standard frequencies, with multiplier steps also available.

Similarly, while it's easy to set a precise amplitude with the knob, convenient 1 and 10 dB steps are available at the touch of a button.

The Portable One is available now and was designed to bring a high-quality two-channel audio test set within the reach of many more potential users.

■ ■ ■

For information on Audio Precision products, contact Tom Mintner at 503-627-0832; FAX: 503-641-8906, or circle **Reader Service 109.**

World proven. And improved.

First, there was the original TEX-20 FM exciter from BEXT. It was bulletproof. It was priced right. It found its way into over two thousand FM stations around the world. Owners raved.

Next, this popular exciter was redesigned.

Front panel frequency selection, a BEXT advantage, is now accomplished in 10 kHz increments. Custom phase locking is provided for compatibility with external references. The TEX-20's internal layout is now completely modular, so testing and service are accomplished easily and quickly. The capacity to run on 24 volt DC is added. Main operating parameters are brought out to the back panel for remote control, including remote raising and lowering of output power. Specifications are enhanced.

Now, stations have found the TEX-20 "flawless" and "perfect in every way" (we're not making this up). Nearly three thousand are in the field, in most cases with BEXT amplifiers at the output. More and more FM's are finding that they don't need to spend more to get more reliability, features, or performance from their transmitters.

The TEX-20 is a phase locked loop exciter with continuously variable output power from 2W to 20W - other BEXT exciters produce up to 80W. Our FM amplifiers are available from 100W to 30,000W (the solid state, broadband, 250W and 500W are our most popular). Delivery is prompt, direct from our San Diego offices.

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World Radio History

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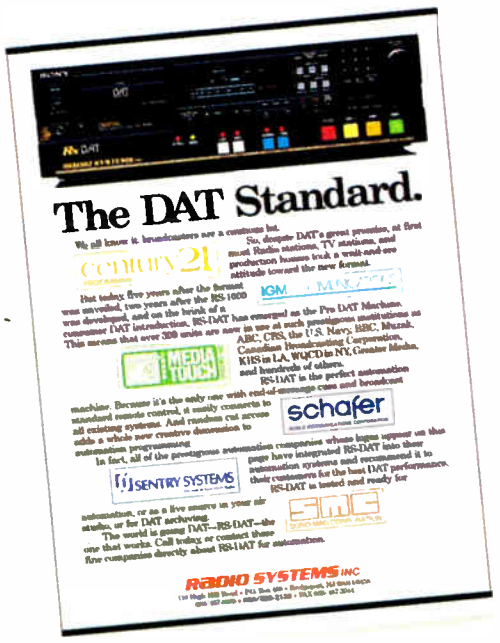

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(3) RS-2002 Play Stereo	$7,185.	$0	$252.
Console & DAT Package:			
(1) RS-12 Console	$6,495.		
(2) RS-1000 DAT	$7,990.	$0	$362.

Lease prices are approximate; rates may vary. Rates are based on five-year lease with 10% buyout. Customer makes no payments for the first six months. Credit approval required; simple form application for packages under $15,000.

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Circle 80 On Reader Service Card

World Radio History

Schmid Makes Testing a Snap

by Sergio Moreno, President
Schmid Telecommunication America

NEW YORK Consumers have come to expect quality audio. Besides Surround Sound theaters and multi-compact disc changers in the home, radio drive time now competes with customized digital audio tapes and compact disc "jukeboxes" in the car.

TECHNOLOGY UPDATE

As a result, radio stations, which were first to get CD players and did much to promote them, now see digital's superior quality as a threat.

While the NAB forges ahead with an investigation of digital audio radio, current broadcasters must maintain optimum signal quality with existing systems, or risk losing audience share or advertising as sponsors invest heavily in pristine digital masters.

Current broadcasters must maintain optimum signal quality with existing systems, or risk losing audience share or advertising.

But a soft market has spurred radio to thin the ranks of engineers. And stations now broadcast around the clock to shore up revenue and profits. So how does today's broadcaster balance the seemingly conflicting needs of providing superior audio quality through complex testing, while staying on the air around the clock with minimal personnel?

Making a difference

We think the Short Interval Audio Test (SIAT) system from Schmid Telecommunication is making a difference. The SIAT system was first employed by the Canadian Broadcasting Corp. It now is used in more than 17 countries around the world.

The concept is simple. Schmid's SZ316 test generator sends a five-second tone pattern down the audio path. This is fast enough to be used in-service during a short program break without bothering listeners or breaking program continuity. You can test stations or networks running 24 hours a day.

The test can be recorded on tape and aired together with the program material to allow automatic testing at preprogrammed stations and to test the broadcast path right to the consumer. Test tones can be sent from remote broadcast locations and even news vehicles, testing both the quality of the hop and alerting engineers to the audio quality received.

The first tones automatically wake up and trigger the companion SZ346 receiver/test device at the other end of the system. The 346 then measures subsequent tones for up to 10 of the available 19 tests—all within the five seconds.

Stereo or mono tests available include: absolute level, diminished level, terminated noise, dynamic noise (S/N), expanded noise, total harmonic distortion (THD), second harmonic distortion, third harmonic distortion, intermodulation distortion, stereo crosstalk (left-right, right-left), gain frequency response, stereo interchannel gain and phase difference and channel transposition.

No go condition

Users can program the 346 to seek specific tolerances for each of the selected tests. The SZ346 immediately prints out a "go" or "no go" statement based on system performance. A "no go" condition is reported to an external alarm system for automation purposes. It is accompanied by a printout of each parameter test level with the tolerance failures highlighted.

The SIAT system can be used in multiple receiver configurations with SZ346s at each crucial link in the transmission chain, for example, testing audio just before and just after a contracted satellite hop. In addition, a single generator at the network level can perform end-to-end testing at each affiliate through the use of individual receivers.

An engineer at master control can test the entire network with a single keystroke. Secondary program providers can check their path by addressing the same affiliate receiver.

The data allows engineers to immediately identify any system weakness, while giving management printed failure verification to redress carrier bills. It also allows testing to be scheduled into regular work shifts at the staff's convenience with results comparable to normal after-hours manual testing, but taking into account actual conditions such as higher daytime RF interference levels.

Using Schmid's new network software, the entire SIAT system can be automated through a personal computer and modem combination via an RS232 serial interface, allowing a remote setting of each receiver.

Additional modules allow further customization of the SIAT system. SIAT can become the centerpiece of your network management program, without interrupting your broadcasts. The reason, we think, is simple: SIAT is fast. Very fast.

■ ■ ■

For information, contact Sergio Moreno at Schmid at 800-955-9570; FAX: 212-779-7305, or circle **Reader Service 42.**

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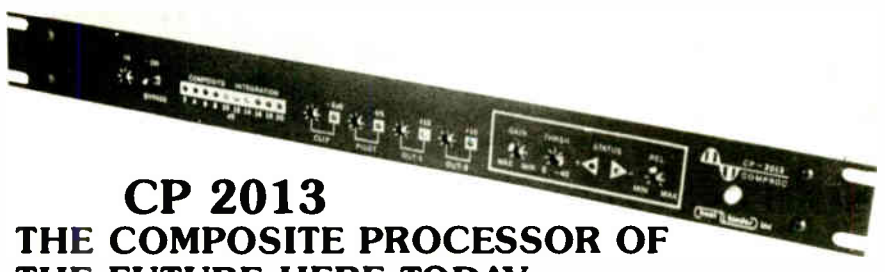

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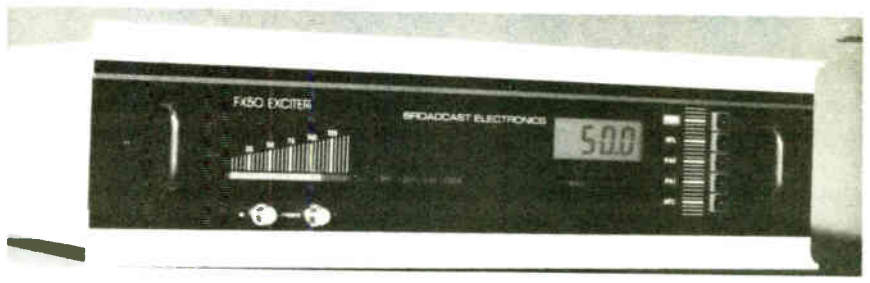

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Circle 70 On Reader Service Card

World Radio History

Wizard Answers Test Wish List

by Arno Meyer, President
Belar Electronics Laboratory

DEVON, Pa. With loudness wars raging fiercely in many of the nation's radio markets, a lot of factors play into measuring and maintaining the various levels that keep a station in check with FCC rules while sounding good enough to remain competitive.

First, a station CE must accurately measure the peaks of frequent recurrence in order to stay in compliance with FCC rule 73.1570. As important, he or she must analyze the modulation data to provide a comparison of modulation density that enables an FM station to determine why a competitor sounds louder than others.

In addition, the station may want to quantify the "garbage" around the stereo pilot that is produced by excessive composite clipping while measuring the amount of clipping. The CE (or PD) may want to "touch up" the clipping level or even the modulation level from his home.

Then again, there's always the possibility that, from the home office, he may want to spot check what the stations in his chain are doing—to check peaks according to FCC rule 73.1570.

He might want to . . .

He might want to check modulation density, changing the time constants of the peak weighting function from 100 microseconds to 2 milliseconds (1 to 20 cycles of a 10 kHz tone burst).

He could want to choose between a sliding window histogram or an infinite window histogram to display the history of a sound bite. Or he may prefer to look

TECHNOLOGY UPDATE

at the peaks per unit time display to check the distribution of the peaks of frequent recurrence. He might want to check pilot injection and pilot modulation.

He may want to make sure the SCA injection is not too high or to scan the alarms to ensure that everything is in order. Best yet, he may want to do these things from his microcomputer—at any time.

These were some of the functions that inspired Belar to develop The Wizard, an all-inclusive FM digital modulation analyzer.

Its front-panel 16-character alphanumeric display allows the user to scan and set parameters for more than 25 menus. Eight different time constants of a peak weighting function may be selected from the front panel. Display accuracy may be set to 1 percent or 0.1 percent deviation.

Real-time mode or past-time mode also may be selected. Display peak hold time may be set in 0.5 second increments. Pre-set peak mod indicator is adjustable in 0.5 percent increments. A preset PPM (peaks of frequent recurrence) alarm is adjustable from 0 to 100 PPM, while self calibration to an external calibrating signal may be made.

Internal precision demodulator

With the optional internal precision demodulator, The Wizard will self-calibrate, including remotely, to a 0.1 percent accuracy. Peak weighting time constants may be menu-selected at 1, 2, 3, 5, 7, 10, 15 or 20 cycles of a 10 kHz tone burst corresponding to 100 microseconds to 2 milliseconds.

Provision for pilot injection, pilot modulation, and SCA injection measurements are provided, as well as a "loss of program" alarm adjustable in percent modulation and time out. The Wizard will accept external alarms such as "off frequency" alarms from the FMM-4A.

Two wideband level adjusting loop-throughs adjustable in 0.5 percent or 1.0 percent increments for controlling modulation levels remotely are provided, while an RS-232 port provides graphing functions and remote operation through a 2400-band modem.

Displays include an infinite window histogram, a sliding window histogram, and peaks-per-unit time that stores in a 15-minute window. The peaks-per-unit time may be stored to disk for a 24-hour record that may be recalled in a given time segment.

Three-level password protection is provided for security—"look only," "change parameters" and "manager."

All this, mind you, in a one-rack height panel.

■ ■ ■

For information on The Wizard, contact Arno Meyer at Belar Electronics Lab: 215-687-5550; FAX: 215-687-2686, or circle **Reader Service 146.**

Harris DX Series Digitally Modulated Solid State AM Transmitters

What makes DX Series transmitters the first choice of competitive AM broadcasters around the world? Simplicity, reliability, ruggedness—and significant performance breakthroughs in AM technology. No other AM transmitter offers all these DX Series features:

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- ColorStat™ front panel signal flow diagram with red/green LEDs shows status at a glance
- Harris power supplies are designed for continuous duty operation with 100% sine wave modulation
- Modular construction with readily available FET output devices
- Bandpass filter and output matching network for effective lightning protection
- 100% solid state design totally eliminates tube replacement costs and reduces maintenance costs sharply
- Output impedance matching controls provide tuning flexibility for non-standard or changing loads

AM stations around the world have already discovered the competitive advantage of DX Series transmitters in 10, 25, 50 and 100 kW power levels*. Isn't it time you did too? Call Harris Allied today at 217-222-8200, Ext. 3408 for more information on digitally modulated DX Series AM transmitters.

* Contact us for applications to 500 kW and beyond.

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Circle 67 On Reader Service Card

Lindos Makes Its Mark in London

by Stephen Sykes, Bdcst. Eng.
London Broadcasting Co.

LONDON The Lindos Electronics' LA100 offers numerous test modes, programmable sequence testing and tolerance checking. It is portable, affordable and accurate.

Therefore, it is not surprising that London Broadcasting Co. and many radio stations throughout the U.K. have chosen the system as their primary audio test equipment.

The LA100 essentially is a microprocessor-controlled oscillator and measuring set, available as separate units or together in a rack-mount box.

The front panel of each unit features a LCD dot matrix display, and a crop of push buttons. In/Out is via B-gauge jacks on the front or XLRs on the back, along with a serial data port and a scope output. The measuring set has a built-in loudspeaker.

USER REPORT

The matrix of 14 multi-function push buttons on the front of the LA100 controls every aspect of its operation. At first glance, the myriad of buttons appears confusing, but I was surprised at how quickly I came to know and like the layout.

On the oscillator, spot frequencies and levels are available with a single press, along with frequency and level up/down controls that make life easy. The display shows level and frequency in outrageously large letters, as well as wave shape, battery status and so on.

The measuring set has five major modes, for measuring signal level and phase, noise, crosstalk, distortion and wow and flutter. Each of these support up to 15 variations, allowing a total of more than 60 possible measurements.

But it is capable of a great deal more.

Soon after we first got our unit, I found myself using its automatic sequences and tolerance checking in my everyday testing and fault-finding. I now can't imagine how I lived without these facilities.

The test sequences consist of a string of measurement segments (frequency sweeps, set levels, etc.) that are sent by the oscillator. Short bursts of FSK identify the tests and the measuring set responds accordingly.

When a sequence is complete, you can page through your results. The LA100 displays nicely tabulated figures, pass or fail markers and a useful frequency response graph. You can store your results in the non-volatile memory for later perusal or they can be printed out for posterity.

At LBC, our previous test equipment had no automation; it is this aspect of the LA100 that has really revolutionized the speed with which I can work.

I can go out into the studios and check frequency responses or line up tape machines and store test results to be printed out later. With more than 30 tape machines and more than 60 cart machines to look after, it really helps.

Finally, I have to say that the level of customer support from this company is nothing short of astonishing. Aside from free software updates and manual supplements, help is always friendly and plentiful if you have queries, or if your LA100 develops a (rare) fault.

■ ■ ■

For information on the Lindos Electronics LA100, contact Paul Skirrow in London at 44-394-380307; FAX: 44-394-385156; or circle **Reader Service 95.**

World Radio History

Tests Made Simple by Dorrough

by Scott Horner, CE
KMRO-FM, KKUR-FM

VENTURA, Calif. As an independent consultant involved with two FM radio stations and various sound reinforcement companies, the Dorrough Stereo Signal Test Set enables me to perform many tests relatively quickly.

USER REPORT

At KMRO-FM and KKUR-FM here, problems in a rack of equipment can be searched out easily. As well, I can check the audio processing chains almost effortlessly by analyzing all points from input through to outputs.

Discrepancies with phase, separation, overall level checks and specifications of individual pieces of equipment in the chain can be verified and adjustments made. Setting up an audio processing chain with several pieces of equipment often can be less than ideal; with the Dorrough test set, however, each piece of processing equipment is individually checked.

No need to shut down

I checked level and phase at the two stations from board outputs through all signal processing to stereo generator inputs. Levels and headroom were tested dynamically. Because of the 40K bridging of the test set, the necessity of shutting down the system for noise, crosstalk and distortion analysis from start to finish no longer is necessary.

After transmission systems were tested and adjusted, the studio equipment was checked. Cart machines and tape decks were aligned by using a mono reference tape of pink noise. A reference level was established on the left and right meters of the test set, the function switch was adjusted to Sum/Dif, and the azimuth and equalization were trimmed for parity.

Proved very handy

The headphone monitor on the front of the unit proved very handy. Not only can you observe on the meters the various levels, available headroom, noise floor, crosstalk and the 6 dB rise of a correctly phased audio signal, but you also can hear these selected signals and functions. The 1 W amplifier has acceptable distortion specifications, though we used the jack at the rear of the unit for more critical measurements.

I can check the audio processing chains almost effortlessly by analyzing all points from input through to outputs.

When the test set is hooked up to the output of a good tuner, you can see the relative loudness of competitive radio stations. The test set gives a consistent reference of loudness and is not dependent on the ear of the program director or the jock on the board. Overmodulation can be seen on the peak portion of the meter. The loudness factor is seen on the bargraph section, which is riding under the crest of the audio waveform.

By simply switching from station to station, a comparison can be seen between our two FMs and the competition. When referencing different signals on this constant source audio meter, the program director can actually see which station is loudest by either excessive processing or overmodulation.

The instruction manual is well written. Each function is illustrated along with a step-by-step text. Stereo audio tests are now easy to perform. Quality assurance can be done more frequently at radio stations when equipment like this is available.

■ ■ ■

For information on Dorrough Electronics products, contact Kay Dorrough at 818-999-1132; FAX: 818-998-1507, or circle **Reader Service 53.**

The Dorrough Model 1200 Stereo signal set.

RTA-4000 a Winner

(continued from page 30)

graph against the competition's signal. Using long-term averaging, an accurate picture of differences in processing, including EQ, can be garnered.

Other features

The Memory mode is a separate function all to itself, and a sub-function of the RTA and RRC modes. Sixteen different graphs can be saved in battery-backed memory and manipulated in a variety of ways. Graphs can be added, subtracted, inverted, averaged or overlaid, and labeled with up to eight characters.

These graphs can then be printed on a dot matrix printer directly from the rear panel Centronics-compatible port. For long-term archiving, it's a simple procedure to transfer a graph to a PC for storage on a floppy disk.

An option is RT-60 reverberation analysis. RT-60 is a measure of how long it takes a signal to decay to 60 dB. This test, with RTA, helps develop a true profile of the sound "character" of a studio or other room.

The Sound Technology RTA-4000 Real-Time Analyzer is uniquely capable of analyzing a single device or an entire facility, without interruption, under dynamic conditions. By using actual program material, downtime for testing often is not needed. Without sacrificing measurement accuracy, the RTA-4000 makes it possible to save money both in terms of engineering time and valuable air time.

■ ■ ■

For information on the RTA-4000 Real-Time Analyzer, contact Kent McGuire at Sound Technology: 408-378-6540, FAX: 408-378-6847, or circle **Reader Service 12.**

Circle 112 On Reader Service Card

World Radio History

EBS Analyzer Passes the Test

by Bill Ellis, Contract Engineer

CENTERVILLE, Iowa Attention. For the next few paragraphs, this article will conduct a test of the Gorman-Redlich, Model CEB EBS encoder/ decoder.

USER REPORT

OK, I know EBS equipment is old hat, but if you ever have a need to replace or install one, then give the CEB serious consideration.

I have been around since before the two-tone was introduced, and in that time I've seen many different types of EBS encoder/decoder systems, from home brew to expensive modular systems. If your station is looking for low cost, low maintenance, high reliability and serviceability in an EBS unit, then look at this one.

A look at installation

Let's look at installation first. The encoder/decoder unit takes up only one rack unit of space; all connections are easily accessible via a barrier strip on the back of the unit.

Any type of AM or FM receiver may be used with the decoder. This is accomplished by connecting the speaker output of the receiver to the decoder's barrier strip terminals. An internal relay normally connects the speaker line to a dummy load. When the decoder is activated, the relay closes and de-mutes the receiver by reconnecting the speaker.

Auxiliary relay contacts also are provided for connection to external alarms, audio switching, etc. About the only criticism I have of this unit is that the screening on the back for the barrier strip could have been clearer. But a quick glance at the schematic will clear up any connection questions.

Connecting to the encoder section is simply audio in/audio out, if you use the internal audio switching relay. If you choose to send the encoder output to a console pot, routing switcher or external audio relays (in the case of stereo), just connect to the audio output terminals.

Design and maintenance

Let's talk about the simplicity of design and maintenance. All of the parts, except for the master oscillator crystal, are easily obtainable off-the-shelf items. There are no exotic crystal filters or custom ICs. The decoder uses a very stable Superhet design with one master oscillator serving both the encoder and decoder.

The ICs are common MC1458, LM13080 opamps and the logic is standard CMOS chips. What could be simpler?

This concludes our test of the Gorman-Redlich EBS encoder/decoder. In my opinion, it passed with flying colors. It's priced right, it rarely fails and if it does, you can repair it in a very short amount of time.

■ ■ ■

For information on the Gorman-Redlich EBS encoder/decoder, contact Jim Gorman at 614-593-3150; FAX: 614-592-3898, or circle **Reader Service 129.**

KFRC Remotes Enhanced by Alpha

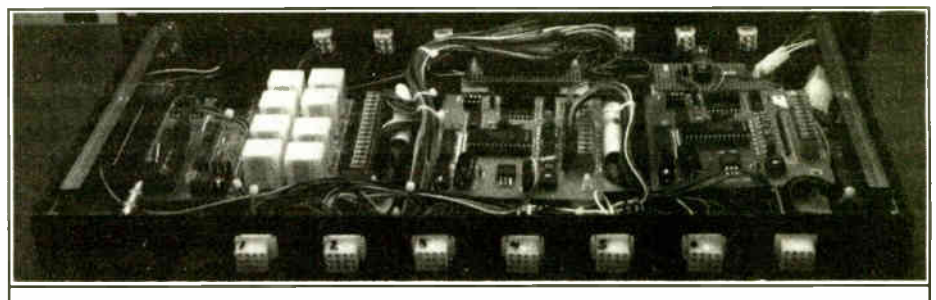
(continued from page 32)

plugged into a surge protector and began playing "Home on the Range" through its speaker—over and over.

Another problem was bad data at the analog board, apparently caused by RF getting into the 20 VAC rotor motor control lines. Installing solid-state relays between the control lines and the Alpha relays cleared that trouble and a UPS has silenced the modem's attempts at a singing career.

We installed the Alpha cards into a modular cabinet and brought the relay contacts, analog inputs, +5 and +12 VDC, ground and modem communication lines to the back panel. The front panel has eight toggle switches that mult off the relay contacts so the system can be tested without having to use a PC.

The Alpha system is expandable and can be used to monitor and control a variety of systems. DC voltages above 5 V (up to 100 V) can be sent to the analog board through a voltage divider and holes are provided on the board for this purpose.



Alpha Products test and monitoring system is controlled with BASIC computer language.

All in all, the system has worked just fine and, on more than one occasion, has proven itself invaluable when we've been able to call the site from a PC at home and know instantly if there's a real problem or if the operator at the station needs to find a different line of work.

■ ■ ■

For information on Alpha Audio products, contact Kathy Wynne or Bobbi Winn at 804-358-3852; FAX: 804-358-9496, or circle **Reader Service 121.**

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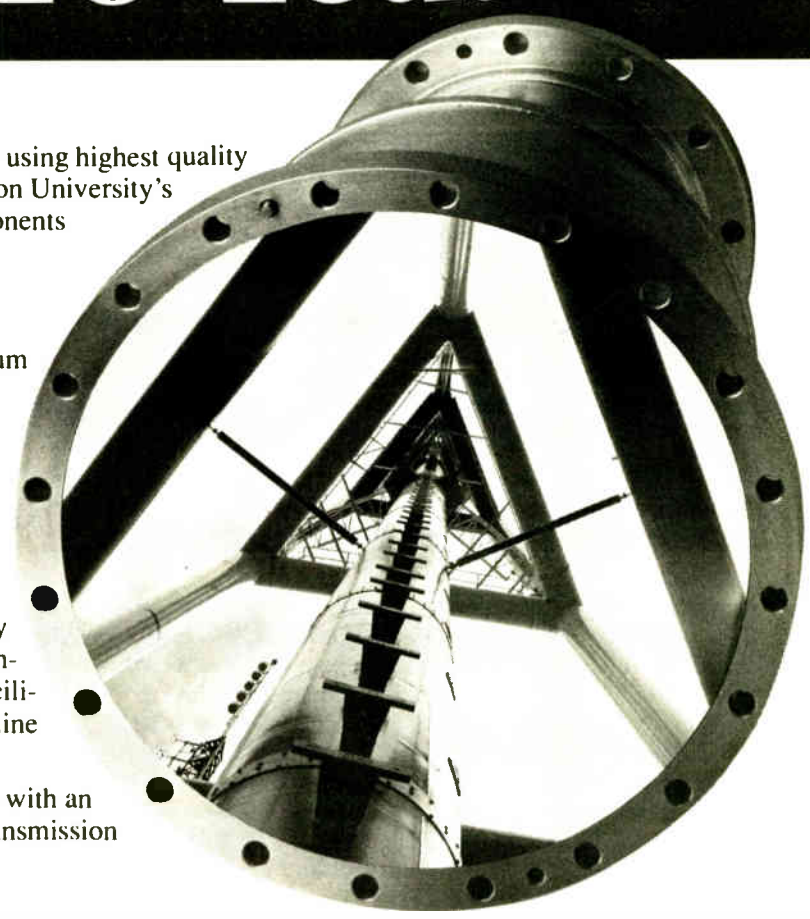

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Circle 125 On Reader Service Card

World Radio History

Amber 3501B: Two Uses in One Box

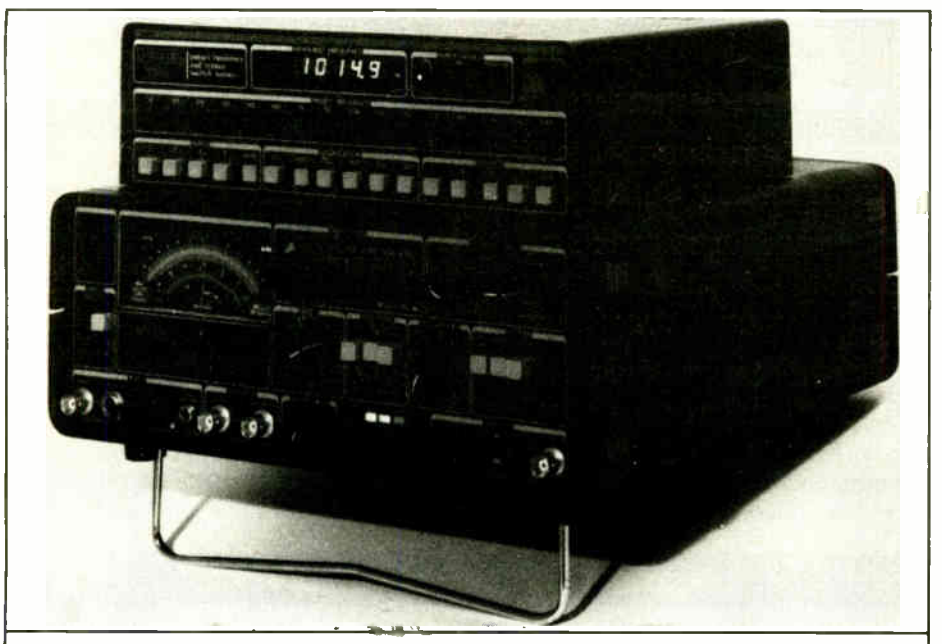
by Matt Meaney, Sales Engineer Broadcast Supply West

TACOMA, Wash. Radio stations today use equipment with specifications that seemed unobtainable 15 years ago.

For setup and maintenance of modern audio gear, test equipment with comparable specifications is vital. It is meaningless to check equipment with a noise level approaching −100 dBm using yesterday's meter that measures only down to −70 dBm.

The Amber 3501 Distortion and Noise Measuring System meets the challenge. The basic unit is a combination signal generator and analyzer in one package. To that, Amber Electro Design Inc. of Quebec, and Broadcast Supply West of Tacoma, Wash., added features of particular interest to the broadcaster, resulting in the 3501B.

The most obvious addition to the basic 3501 is the preset frequency and stereo switch matrix. This provides a bank of buttons for choosing generator output frequency.



BSW's Amber 3501B has new features for broadcast applications.

Additions to the 3501

The most obvious addition to the basic 3501 is the preset frequency and stereo switch matrix. This provides a bank of buttons for choosing generator output frequency. Use the variable 10 Hz to 100 kHz controls on the main unit, or from one of 15 standard test frequencies —50, 100, 200, 250, 300, 400, 1K, 2K, 2.5K 3K, 5K, 7.5K, 10K, 12.5K and 15K.

There is a choice of six output levels to choose by push button. Calibrate at 100 percent output level, then check 95, 85, 75, 50 and 25 percent.

The matrix adds input and output flexibility to the 3501B. Besides having the standard balanced or unbalanced inputs on the front panel of the 3501, another four inputs have been located on the back of the matrix. These either are balanced bridging (100K) ohms or terminated (600 ohms).

TECHNOLOGY UPDATE

With the output you can choose from the standard front panel balanced or unbalanced, L, R, L+R, or L−R jacks. The matrix outputs are terminated (600 ohms), while the front panel either is terminated or balanced bridging. The generator is capable of +28 dBm output mono, or +24 dBm stereo, into 600 ohms.

Along with this is an autoranging frequency counter that measures from 10 Hz to 100 kHz.

The 3501B is a joy to use. With the generator and analyzer in one box, just tune the generator frequency to measure THD+N. The analyzer follows automatically. Push a button and adjust the meter scale, then take your reading. If for some reason you do use an external signal source, there are two red arrows to help you tune quickly. The 3501B can measure THD+N to below 0.0008 percent.

Standard low frequency

Measuring IMD is just as quick. The 3500 generates a standard low frequency of 60 Hz. The high frequency may be selected using the vernier control from 2 kHz to 100 kHz, including the SMPTE standard 7 kHz.

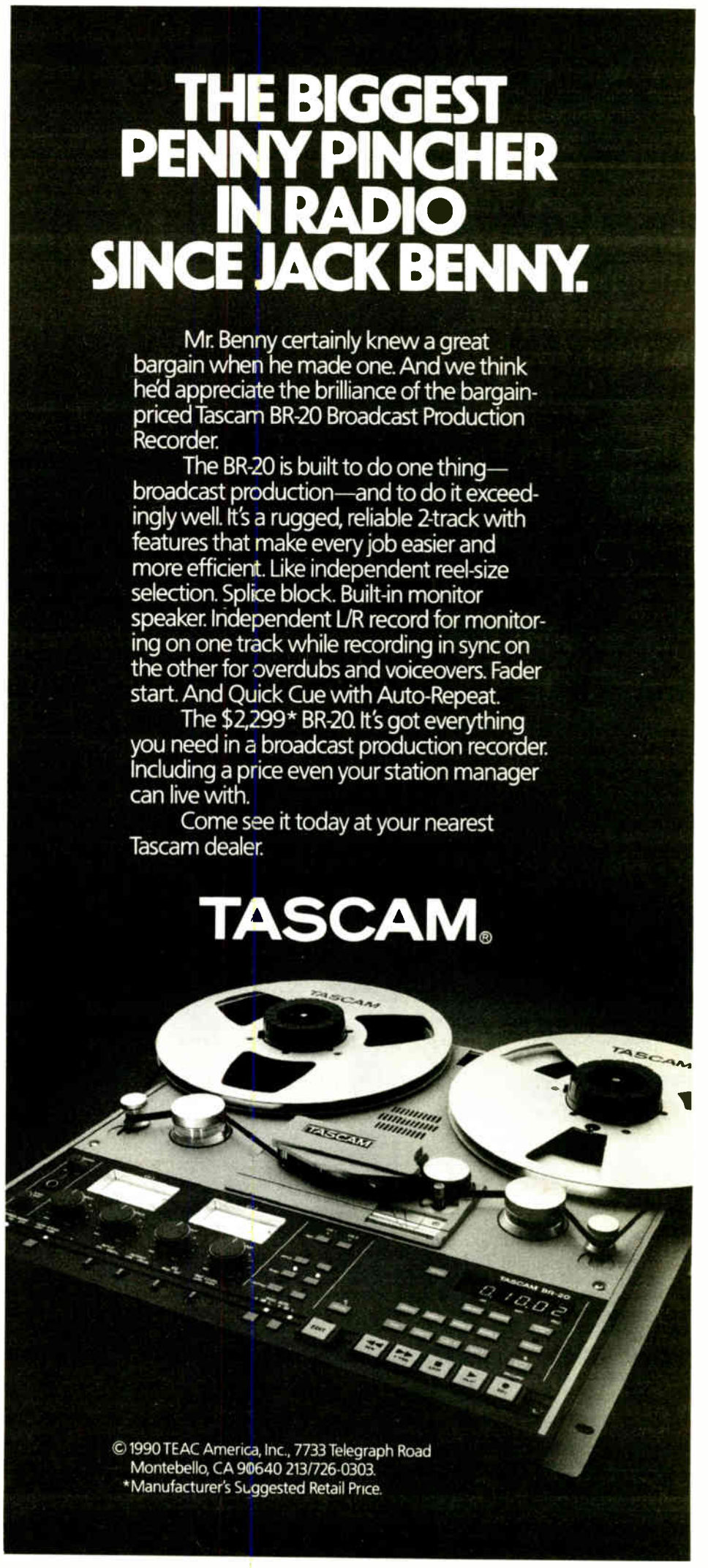
Measuring signal-to-noise ratio can be done with precision. The 3501B will measure wide band noise (to over 300 kHz), narrow band and A-weighted noise below −120 dBm. To aid in accurate measurements, the 3501B comes with a 400 Hz lowpass, 30 kHz and 80 kHz high pass, and A-weighting filters.

The only drawback may be the fact that the generator and analyzer cannot be split to do a station proof. But by using the mod monitor for frequency response, this really isn't a problem. You still can do your distortion measurements off the air. In most cases, this will tell you what you need to know.

What else can I say about the 3501B? It's easy to use, accurate and it's good. The Amber 3501B is an investment you'll be glad you made.

■ ■ ■

For information on the Amber Electro Design 3501B, contact Matt Meaney at BSW: 800-426-8434; FAX: 206-565-8114; or circle **Reader Service 136.**



Circle 23 On Reader Service Card

World Radio History

The Little Board That Could

by Eric Small, VP Eng.
Modulation Sciences, Inc.

BROOKLYN, N.Y. Do you really know what your FM's peak and average modulation levels are?

Before you answer, consider the uncertainties created by any or all of the following: using an instrument that must be recalibrated every time you take a measurement; trying to set modulation and processing levels that almost, but not quite, light the peak flasher; and measuring modulation off the air.

If you're a really competitive station licensed within a loudness war zone, add your "guess-timate" of how much over 100 percent you can really get away with. Would you feel comfortable with a plus or minus of, say, 20 percent?

In developing ModMinder, our primary goal was to give FM CEs a measuring device for peak deviation that would provide something more than best-guess accuracy. ModMinder's advanced circuitry uses the latest digital microunits to measures peak deviation within plus or minus 1 percent.

That is at least three times more accurate than conventional modulation measurement devices. Moreover, this unprecedented degree of accuracy is maintained over a temperature range of 0 degrees to 50 degrees without user adjustments or calibration of any kind—another leap ahead of the previous generation of monitors.

In developing ModMinder, we realized that the most accurate data in the world is useless if it can't be read by the operator. So we gave ModMinder digital readouts that eliminate many of the human error factors created by ordinary modulation monitors. The Peak Deviation and OverMod Event Counter readouts give positive indications of modulation, making it easy to set levels precisely.

The DeMod Board is an optional feature of Modulation Science's FM ModMinder.

DeMod Board option

With all of its advances, however, ModMinder alone cannot eliminate one of the most important causes of modulation mismeasurement: inaccurate demodulators. That's why we developed the internal DeMod Board option.

TECHNOLOGY UPDATE

The DeMod Board can be retrofitted to any ModMinder or ordered with new units. It maintains ModMinder's measurement accuracy and stability with a frequency synthesis front-end design (no more crystals). When retrofitted or originally installed by the factory, ModMinder board comes with the calibration control sealed—and with MSI's certificate of calibration, valid for 13 months.

This eliminates the "calibrate before each measurement" routine of conventional modulation monitors. Calibration is traceable to the National Institute of Standards and Technology (formerly known as the NBS, National Bureau of Standards).

With the DeMod Board, ModMinder becomes even easier to set up and use. The DeMod Board will measure peak deviation on any RF level from 1 mW to 1 W. It does not require calibration for the RF level that you're measuring. In fact, it requires no user adjustments whatsoever. If you need to keep track of the competition, an external front end will permit off-the-air monitoring and modulation analysis of local stations.

Field tests

In our field tests, modulation readings taken at the transmitter's RF sample port differed from off-the-air readings of the same signal by 5 percent to 20 percent. In each case, the off-the-air readings were higher than those taken at the transmitter. Needless to say, we designed ModMinder and the DeMod Board to be connected to an RF sample port at the transmitter.

Do you then have to visit the transmitter site every time you need to read modulation? Not at all. Readings can be transmitted to the studio using ModMinder's remote control interface, or with a 1200 bits/second modem and a PC.

For computer users, we offer two software packages. ModMinder Remote software (standard with every ModMinder) gives you full control of ModMinder's front panel functions from any PC, and lets you analyze modulation with a unique Modulation Histogram.

Advanced Remote software adds even more powerful modulation analysis capabilities, including 2-D and 3-D graphic presentations of modulation data.

If you're uneasy about adjusting critical operating parameters like processing without really knowing the results, ModMinder can give you peace of mind. With the internal DeMod Board option, ModMinder gives more useful information than a conventional modulation monitor, more accurately and at substantially lower cost.

■ ■ ■

For information on the ModMinder DeMod Board, contact Eric Small at Modulation Sciences at 908-302-3090; FAX: 908-302-0206, or circle **Reader Service 141.**

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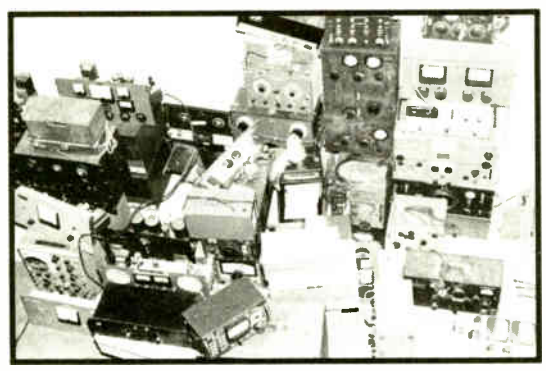

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World Radio History

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Digital multimeter

Leader Instruments Corp. has a bench-top digital multimeter Model 856 featuring comparison of measurement results, frequency measurements and calculation functions.

The Model 856, an auto-ranging, multi-function, 4.5 digit unit, is capable of measuring waveforms with crest factors up to 3.

For information, contact **Joe Fisher at Leader Instruments Corp.: 516-742-2022; FAX: 516-741-3966; or circle Reader Service 54.**

FM exciter

The FX50 Exciter from Broadcast Electronics was type accepted under Part 74 of the FCC's rules, and may now be used legally in booster configurations for coverage and fill-in applications.

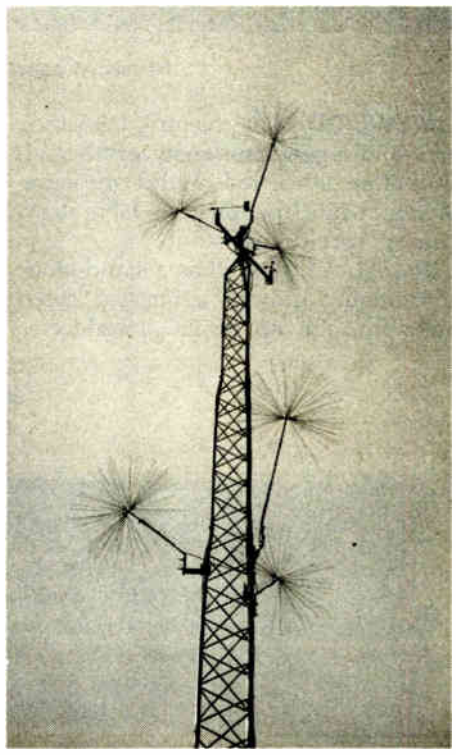
For information, contact **Bill Harland at Broadcast Electronics: 217-224-9600; FAX: 217-224-9607; or circle Reader Service 32.**

Spline ball ionizer

The Spline Ball Ionizer (SBI) from Lighting Eliminators and Consultants Inc., is a lighting protection device using strike prevention technology.

SBI also features a low wind profile.

For information, contact **Ralph Auer at LEC: 303-447-2828; FAX: 303-447-8122; or circle Reader Service 147.**



Mobile remote studio

Vision Mobile Studios offers a self-contained mobile broadcasting unit available in customized satellite versions or turnkey electronics to lease or buy.

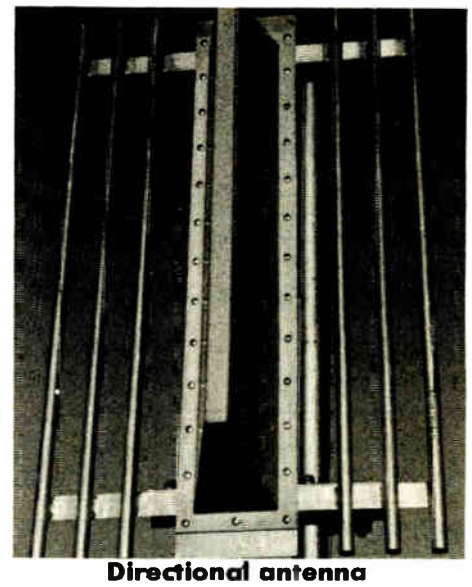
For information, contact **Dave Wertman at Vision Mobile Studio: 708-537-1770; FAX: 708-537-1899; or circle Reader Service 6.**

Stereo utility mixer

The Micromixer from Henry Engineering is a four-input, two-output stereo mixer that will take up to four line level input signals and mix them to a stereo output.

"Micro-assign" switches allow inputs to be assigned to any combination of left, right, or both outputs. Micromixer can combine stereo or mono signals from stereo or mono sources.

For information, contact **Hank Landsberg at Henry Engineering: 818-355-3656, FAX: 818-355-0077, or circle Reader Service 76.**



Directional antenna

Mark Antennas now offers a Directional Cell-Site Antenna, model FG-1044. The antenna uses an all-welded aluminum reflector with a radiating element in a UV-protected white ABS case.

A gain of 10 dBd and horizontal beamwidth of 105° is provided with the antenna, which meets or exceeds EIA Standard 329.

For information, contact **Mark Antennas at 708-298-9429; FAX: 708-635-7946; or circle Reader Service 60.**

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Circle 63 On Reader Service Card

It's hard to stop.
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- Mono/stereo input switch (on stereo consoles)
- Components and connections clearly labeled for painless installation and easy maintenance

Chances are, it's all of the above. But whatever the reasons, leading stations and engineers across the country demand Signature III's "unstoppable" performance. In fact, they've made it one of the most popular consoles ever built. If you've been spending too much time inside your console lately, contact your broadcast equipment dealer or call LPB for full information and specifications at (215) 644-1123.

LPB Signature III audio consoles are available in 6,8,10 and 12 channel stereo and 6,8 and 10 channel mono configurations.

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World Radio History

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For information on the A1, call Neutrik USA at 908-901-9488; FAX: 201-901-9608 or circle **Reader Service 36.**

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For information, contact Consultronics at 416-738-3741; FAX: 416-738-3712, or circle **Reader Service 57.**

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COMMUNICATIONS: The ICM-500 module is part of a completely integrated intercom system; a family of modules available for all Wheatstone broadcast and production consoles. It even includes a rackmount version for your equipment room or remote hook-ups. It allows direct communication between 8 locations in your facility. Your intercom needs are handled by simply plugging in this module set.

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The A-32EX console features modular construction, a fully regulated rackmount power supply, logic follow, full machine control and of course, an all-gold contact interface system. It has two mic channels and fourteen stereo line modules, each with A/B source select and Program/Audition bus assign, plus Cue switches on the line modules. Standard features include Program and Audition VU meters, digital timer, and a monitor module for control room and headphone functions. The console is also available in a smaller version (the A-20) with two mic channels and eight stereo line input modules.

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