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# RadioWorld®

**DAB**  
International  
Updates,  
See pp. 12-15

Vol 19, No 19

Radio's Best Read Newspaper

September 20, 1995

## In-band Slammed by EIA Testing Process

*Proponents Outraged over Lab Simulations After Months of Questions; EIA to Investigate*

by Lucia Cobo

**NEW YORK** Long-awaited digital radio laboratory test results could be meaningless because of flaws alleged to be in the methodology used for major portions of the testing process.

"We hope that the field tests can supplement what is missing from the models," said AT&T's Nikil Jayant. "We should look at these (lab results) with a grain of

salt and move forward."

As early as November 1994, the Electronic Industries Association (EIA)'s Ralph Justus received letters from at least two proponents stating that there was a problem with the concept of the multipath simulation tests.

But EIA would not listen to the in-band proponents, said sources involved in the testing, who implied the EIA favored the L-band Eureka-147 system.

"The only people EIA respected were the Canadians (who are adopting Eureka-147)," one source said. "Our opinion did not matter at all to them."

### About face

In a reversal of its initial stance, EIA revealed at its press conference releasing the test data that it would review data collected for the multipath simulation section of the lab tests, and perhaps re-issue or qualify that portion.

Speaking at the press conference, Al Resnick, co-chairman of the NRSC DAB Subcommittee, backed EIA's position to recheck the data.

But Resnick said, "The committee is

happy with the testing process." The committee supports "further study" into the questions raised by proponents, he said.

As early as November 1994, at least two of the proponents raised objections with the EIA about the validity of the model being used (see RW, Dec. 14, 1994). At the time, Justus said about the issue: "It's closed."

The controversy over the simulation method flared up again at a two-day tutorial held in Monterey, Calif., in August when all the tests results were released together for the first time. Enough questions were raised about the alleged inherent flaws in the multipath simulation segment of the tests to lead EIA to label the test results a "draft" version.

According to several

sources attending the DAR workshop, EIA in fact agreed not to release the text  
continued on page 3 ▶

## Space Grows Short with HDTV Debut

by Lynn Meadows

**WASHINGTON** Be ready and beware of HDTV — especially if your FM antenna is mounted in one of the major markets.

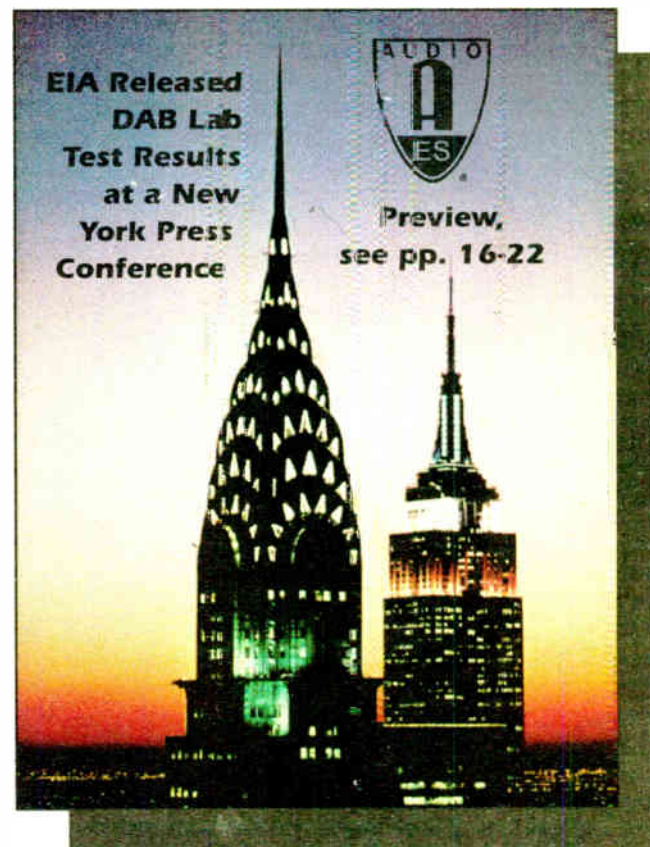


If the Federal Communications Commission (FCC) requires TV stations to simulcast their high-definition and analog signals as expected next spring, FM broadcasters leasing space on towers owned by TV stations could find themselves without homes for their antennas.

In most urban areas, tower space is already tight for the wireless industries, thanks to the avalanche of antennas required for paging systems, PCS, mobile phones, and other technologies.

Although not all markets have been affected, stations in cities like New York and Los Angeles have seen their rental options dwindle. "I think it's obvious that the available rental space

continued on page 9 ▶



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## Eureka Asks For More Power

by Lynn Meadows

**SAN FRANCISCO** A Eureka-147 proponent requested permission to add extra transmission sites for the Digital Audio Broadcasting (DAB) field tests, but in-band developers are screaming foul.

The proponent of the L-band Eureka system said it needs two sites operating in a Single Frequency Network configuration and ideally one off-air repeater in order to meet the coverage requirements set by the Electronic Industries Association (EIA) in the hilly city.

If Eureka's request is granted, the two sites will be located on Mt. Beacon and Mt. San Bruno, and each will have a maximum Effective Radiated Power (ERP) of 19.3 kW. The repeater site would be located on Round Top Mountain and have a maximum ERP of 7.67 kW.

continued on page 3 ▶



# NEWSWATCH

## Hassinger Retires from FCC

**WASHINGTON** Bill Hassinger, assistant bureau chief for engineering, retired in August after a 23-year career at the FCC.

Hassinger started in the Los Angeles Field Office in 1972 and came to Washington, D.C., in 1974 to work in the Field Bureau. In 1980, he transferred to the Broadcast Bureau where he remained.

Although Hassinger said his retirement is "not a result of restructuring," it will help Chairman Reed Hundt meet the personnel ceiling goals he announced last month.

"I've always thought the commission had an important role to play," said Hassinger. He said that the emphasis has shifted through the years and now digital is the current focus.

"I do wish I'd paid more attention to digital when I was in school," he laughed.

Along with addressing domestic communications issues, Hassinger's career has taken him around the world to many international conferences and made him part of history.

In Budapest, for instance, he met with new Hungarian broadcasters to talk about the United States' broadcasting system. He spoke at the Karl Marx Institute in

front of a bust of Marx himself.

He expects the next challenge radio stations need to contend with will be digital audio satellite services. He said the new services would not destroy radio, but will mean another choice for listeners and "fewer ears listening" to AM and FM radio.

"I don't see its demise in any way," he said. He added that as the weaker of the two bands, AM would be more vulnerable to the satellite-delivered systems.

"AM's big virtue that it has had since the beginning is very wide area coverage," said Hassinger, pointing out that satellite radio will also have that advantage.

Hassinger has followed the tests the Electronic Industries Association is doing with Digital Audio Broadcasting. He pointed to results that "suggest conflict"

between in-band on-channel digital broadcasting and the subcarrier used to transmit radio data systems.

"There will always be something to miss no matter how long you stay around," Hassinger said when asked how he could leave now with so much happening.

As for parting words of advice to station engineers, Hassinger refrained from platitudes.

Asked about retirement plans, Hassinger says he will move to a new home in Asheville, N.C., next summer. He said his most immediate plans are to throw away his watch, calendar and Metro commuter rail card.

## Larry Eads Retires from FCC

**WASHINGTON** After 27 years with the FCC, Larry Eads, chief of the Audio Services Division, is scheduled to retire at the end of this month.

continued on page 6 ►

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# Tests Mired in Conflict

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of the results until after the issue was revisited.

In a letter to Justus, in-band, on-channel (IBOC) proponent USA Digital Radio President Bernee L. Strom wrote, "USA Digital Radio has identified significant errors in the test procedures designed to evaluate multipath performance. The mean power output signal level of the Hewlett Packard 11759C multipath simulator in Rayleigh mode was not set to the signal level specified in the EIA Unified DAR Laboratory Test Procedures.

"The effect of this error was to reduce this output signal level ... which put all IBOC proponents at a significant disadvantage."

## Unable to simulate

EIA's test results (Volume 1, section F, pages 3-4) confirm that the simulator could not reproduce the real-world conditions of the Salt Lake City multipath model: "It was decided ... that the direct control of the simulator was not possible."

It also states in the results: "The channel characterization project and the channel simulation in the laboratory has again confirmed the immense variability that exists in an R.F. propagation path which can not (sic) be carried to and totally duplicated in laboratory simulation."

USA Digital Radio was not the only proponent protesting that portion of the testing. Another proponent questioned the procedures from a mathematical standpoint.

AT&T's Jayant agreed that there are some trouble spots in the test results.

"There are a couple of ways of looking at this. A lot of work has been done. An ambitious task like this — trying to test a complex system — you can never do it perfectly. You have to use models, which are less than perfect," he said.

Jayant stressed that the field tests would reveal the true performance of the systems and urged proponents to move forward.

"There is enough experimental evidence that has come out that we can draw some broad conclusions," he said.

AT&T, however, is not "100 percent happy with the results."

Said Jayant: "The current report is a vast collection of raw data. What is missing is the interpretation: qualifications are needed on every page; what is solid versus what is not so solid.

"We should try hard to interpret the results and point out to EIA and NRSC where the results can be further clarified."

Jayant went on to say that AT&T already has sent documents to EIA based on an initial reading of the test results, and that his colleagues are pouring over the tests results page by page and will send a more detailed response to EIA shortly.

## Compatibility surprise

Also at issue are the compatibility tests between DAR and the analog host signal. In another letter to Justus, Strom again took exception to the EIA results.

"USA Digital Radio takes strong exception to the EIA results of the compatibility tests between DAR and its analog host. ... These recorded results run

counter to our own field experience and are not representative of USADR's system performance. USADR has implemented its IBOC DAB system on actual operating FM radio stations in Chicago, Las Vegas, Los Angeles, Urbana, New Orleans, and Monterey. The USADR

## Eureka Asks For Upgrade

► continued from page 1

Even with the additional facilities, the Eureka proponent said the signal will cover only five of the six routes the test van will travel. The "North Bay Route" will not be included.

"We objected. The route was picked specifically to find problem areas," said Jeff Andrew, project manager for USA Digital Radio. USA Digital has three in-band, on-channel (IBOC) systems being tested including an AM system. "They should test as originally intended," he said.

The other DAB proponents plan to use only one transmitter in the tests. "It would be an unfair contest if one proponent gets multiple transmitters," said Nikil Jayant, head of advanced audio technology for AT&T. AT&T has three systems being tested.

Both Jayant and Andrew said if the EIA allows changes to the Eureka system, the other proponents should be allowed to modify their systems.

"If Eureka-147 has to be tested that way, I think then it is fair to afford similar or identical ways to the other proponents of enhancing their system," said Jayant.

Andrew concurred. "If they want to add to their system, we should be able to make changes in our system as well," he said.

The original intent of the tests was to compare the systems in the lab and in the field. Now that the lab tests are finished, modifying the field systems could make comparisons difficult.

This is the second major hurdle for the European-based Eureka-147 system. Earlier this summer, the National Telecommunications Information Administration (NTIA), which controls the L-band, opposed granting frequency space to test Eureka. In the United States, the L-band is reserved for aeronautical telemetry and the military.

The EIA argued that Eureka needed to be field-tested for a variety of reasons. Since then the EIA and NTIA have tried to work out an agreement.

Sources now say the two sides have "agreed in principle" that the tests will proceed but still are working out details as to when the band can be used for tests.

Field tests, previously scheduled to begin this month, are slated to start in October after the National Radio Systems Committee (NRSC) meets to discuss the request. ☐

IBOC DAB system has logged thousands of on-air hours with *no* complaints from either station operating personnel or the general listening public."

To prove its point, USA Digital Radio set up a live demonstration of USADR IBOC DAB in Monterey during the workshop on KQRC-FM at 92.7 MHz.

Workshop attendees were invited to listen to the over-the-air signal and A/B comparisons of analog signal with and without the digital signal.

Strom wrote: "The consensus of the attendees who listened to this test was that it was in stark contrast to the EIA recorded results presented earlier. Any noted change was consistent with our laboratory measurements."

Jayant agreed that the compatibility test results were unexpected.

"The compatibility results with the analog host were a surprise," he said. "The compatibility results need to be understood better so that we can know where to look at IBOC very critically."

## Ranked prematurely

And lastly, proponents were uncomfortable with an inadvertent ranking that came from the Canadian Research Centre in Ottawa. The CRC conducted

the subjective listening tests portion of the DAR lab tests. The tests were performed to assess audio quality of the DAR systems submitted for testing.

Data was gathered at the Lewis Research Center in Cleveland and sent to CRC for assessment.

The problem is that systems were not to be ranked; data was only supposed to be collected, not rated in comparison to one another.

Proponents were concerned that the ranking would be misinterpreted, as the portion being ranked was but "one small piece of the evaluation," said one proponent, who declined to be identified. "It was a terrible mistake done by the Canadians on the basis of one dimension — and — one that has no bearing on real world radio."

Proponents are looking to the field tests for more representative data to be collected. Slated to begin in October, the field testing portion is poised to get under way pending proper government permits and resolution of proponent requests (see sidebar).

Missing from the laboratory test data is further information on the AM IBOC system (digital and compatibility results) and the upcoming field test data. ☐

**The effect of this error was to reduce this output signal level ... which put all IBOC proponents at a significant disadvantage.**

— Bernee L. Strom  
USA Digital Radio

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# EIA Testing Process Needs Some Work

**WASHINGTON** What a mess. My office looks like it's been hit by one of those tropical storms lurking over the Atlantic Ocean.

Truth be known, it's been hit by a week's worth of stories, phone calls and all the stuff that goes into putting an issue together. As you read this, you've probably just returned from World Media Expo in New Orleans.



As I write this, I'm two days away from getting on an airplane to head for the show.

I'm looking forward to World Media Expo and its associated conferences ... but I'm dreading it a bit too. This issue's front page story will probably ruffle some feathers and make me *persona non grata* in certain camps, but I have to call them as I see them.

It is time to stop politicking and get down to brass tacks. The U.S. government and the radio broadcast industry want an in-band solution to digital audio radio. We have various proponents with a variety of test-platforms for different systems that have demonstrated the viability of an in-band solution (be it on-channel or adjacent channel).

The EIA's Gary Shapiro went on the record in the July 12 issue of *RW*: "The tests by EIA and the NRSC are *not* (emphasis added) to determine which spectrum is best suited for digital audio radio, but rather to hold serious, objective, impartial, comparative evaluations of *all* (emphasis added) proposed DAR

technologies. At this stage, EIA believes all options must be considered.

"Regardless if the United States does not use L-band for DAR, other countries are and will. If we want U.S. manufacturers to be able to develop and manufacture DAR products for those markets, they must be able to test products in realistic conditions throughout the design process."

That is all well and good for the members of EIA. What is supposed to be happening, however, is an evaluation of which system can best work for the United States given our political position and the realities of our spectrum allocation process.

I would like to urge the NAB to take a tougher approach in ensuring that this agenda dominates the procedures.

★ ★ ★

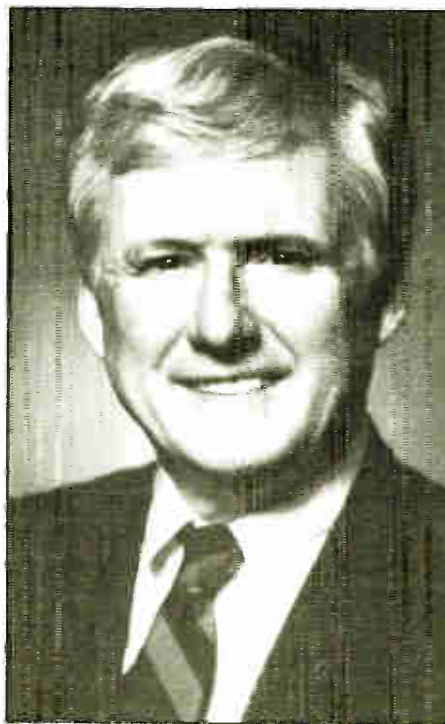
All of the proponents are eager for the chance to prove what they can do in the field tests. It would be unwise of the EIA to grant Eureka-147 the power upgrades it is requesting (conveniently designed to blanket the field test route with perfect coverage) without allowing the other proponents an equal opportunity to enhance their signal coverage.

Attendees of the DAR Subcommittee meeting in Monterey, Calif., were dismayed to hear Eureka-147's reaction to their concerns about the testing process. One source, present at the meeting, reports that Thomson's Clint Pinkham declared their complaints, "Nothing but the political flailings of poor losers."

If this were a case of "sour grapes," then I would agree. But after talking to everyone at length and studying the text of portions of the results, I have to agree with the in-band proponents: there are problems that need to be addressed. And the fact that EIA finally agreed to investigate the matter (after months of stonewalling) is tacit admission that there must be something wrong.

Back to Eureka-147. EIA better satisfy

the in-band proponents about the value of the tests and its desire to treat all proponents fairly. Allowing Eureka-147 such



Gordon Hastings

an upgrade would cast further doubts on EIA's impartiality.

Further discussions and presentations of the test data will be happening on Sept. 22, at the Institute of Electrical and Electronic Engineers' (IEEE) Fall Broadcast Seminar here in D.C., on Oct. 3, at the EIA digital audio/video workshop in Philadelphia, and at the Audio Engineers Society (AES) Oct. 6-9 in New York.

★ ★ ★

Other news expected to come out of the show is the appointment of Gordon Hastings to the CEO/president post of FM Superhighway Inc. Hastings, formerly president of the Katz Radio Group in New York, was scheduled to unveil plans for the newly formed company in New Orleans.

FM Superhighway Inc. was created to develop a worldwide wireless communications network that utilizes SEIKO Communications Group's ACTIVE sub-carrier technology for datacasting, group and personal messaging and information services such as news, sports and weather. I'll keep you posted on any new developments.

★ ★ ★

There was other news happening this last week besides the controversy surrounding DAR. Leaders of four women's media organizations joined forces last month to determine the best way to pursue their common interests.

American Women in Radio and Television (AWRT), Women in Cable and Telecommunications, Women in Communications Inc., and Women of Wireless defined four priority issues for women including research, financing, competitive opportunities and ownership opportunities.

The group hopes to come up with effective ways to educate government agencies, foundations and the media about women's issues.

★ ★ ★

And long-time radio personality Stephen Dunifer was fined by the Federal Communications Commission to the tune of \$10,000 for operating an FM Broadcast station without a license.

Dunifer had filed an Application for Review contending that the FCC rules constitute a complete ban on low power audio broadcasting and violate the First Amendment right to free speech. He also argued that an earlier \$20,000 forfeiture assessed against him was excessive.

In its decision, the commission responded that it was within its rights to regulate intrastate and inter-state communications. The commission yielded slightly on its forfeiture amount noting that the maximum fine per violation is \$10,000 per day and Dunifer was only charged for one violation.

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### PBS Defense

Dear RW,

I think Fred Weinberg's letter (RW, July 12) was offensive.

Can the budget seriously be balanced by cutting a few low-cost programs such as PBS, CPB and the NEA? I think it would take a million years! The deficit has been higher in the past and was paid off in time and will be again. Would you advocate selling the house to pay off the mortgage and live in the street?

But the worst of this letter suggests that we have no right to speak or give our opinions unless we own the typewriter or microphone. Carried to the next step this logic would prohibit you from speaking on property not your own. You could be arrested if you stepped onto a public sidewalk or highway.

Public radio gets only a small percent from taxes. Does that entitle one to a percentage of opinion?

PBS may bore Mr. Weinberg and he may think it's all "liberal" drivel, but John Kasich was on the radio four hours at a forum he controlled not long ago, and only his "approved" opinions were allowed.

I doubt that Mr. Weinberg has ever listened to the PBS he criticizes.

Donald Bisbee  
Columbus, OH

### Ham Radio

Dear RW,

Paul Courson makes interesting points about the relationship between Ham radio and broadcast radio (RW, June 28) provoking these comments from me.

First, Mr. Courson incorrectly refers to Ham radio as a *hobby*. Certainly it is not that although too many perceive it as such or as a form of psychotherapy.

Amateur Radio, or Ham radio as it is commonly called, is a federally licensed and regulated radio communications *service* focusing mainly on the technical and emergency communications aspects of radio. It is this aspect of the service which primarily differentiates it from the Citizens' Radio Service (CB radio).

Stamp collecting, kite flying, quilting, etc., are hobbies.

Then, Mr. Courson says that "there are not as many places a would-be broadcaster can polish the skills needed to do a job in (broadcast radio)." Technically true, but I would guess that there are many broadcast stations all over the country that would welcome interns or apprentices for the broadcasting business. Let them learn there and thus.

If you want to learn how to hit a baseball, don't practice fly-casting.

Abelardo J. Massa - W5VSR  
Wireless Institute of New Orleans  
Metairie, LA

### No Substitute

Dear RW,

Thank you for R. Morgan Burrow Jr.'s excellent article "Closer Look at Tower Regulation" (RW, June 14). Mr. Burrow points out the importance of competent engineers and accurate engineering data in an age when radio is dominated by expedient, bottomline oriented, bean counters.

To these owners and managers, engineering is a bothersome, esoteric expense that is counter to what they feel is their primary responsibility of maximizing profits and minimizing expenses. Many managers fail to see the benefit and necessity of good engineering or any engineering at all except when the station is off the air.

If a newspaper publisher was told that his newspaper would be barred from being distributed to subscribers and advertisers in several nearby communities, be subject to stiff fines and expensive repairs, and have his right to publish jeopardized, the publisher would probably be upset and concerned to put it mildly.

In radio, potential coverage problems caused by a new communications tower erected near an AM site and shoddy engineering with resulting inaccurate data submitted to government authorities could have a similar effect.

As all good engineers know, the least expensive way to solve a problem is to do it right the first time. That avoids the expense, time, frustration and embarrassment of having to correct a problem again later.

Given the time spent, difficulty and frustration all of us have experienced in trying to locate and park at a street address, it is hard to understand how a measurement point would be easier or quicker to accurately locate from a brief description sometimes made two years ago by another engineer.

I also doubt accurate field strength measurements can be made and checked in just seconds considering the time it takes to calibrate the field strength meter and the difficulty, at times, of finding the null. Overhead power, telephone, and TV

## In-band: The Only Choice

Confirmation that the EIA/NRSC lab test results on the proposed digital radio systems are flawed is quite disturbing. Even more alarming is the fact that EIA knew from the get-go that part of the lab tests would not simulate real-world conditions but refused to address the situation after considerable prodding by proponents.

The end result is a mess. The situation, however, can be rectified.

The focus should be redirected at finding which in-band system fits the bill for U.S. radio. Broadcasters maintained from the onset they did not want the out-of-band system, Eureka-147, that many countries abroad are adopting for transmission at L-band.

Eliminate the distraction. Eureka-147 requires a cost-prohibitive reallocation process and disrupts the traditionally tiered broadcasting system already in place here.

More significantly, the spectrum is not available in the United States. Period. The NTIA has stated emphatically that L-band will not become available, and at no point during any spectrum allocation processes on the international level has the U.S. government led anyone to believe this will change.

EIA should stop confusing the issue by stacking the deck in favor of Eureka-147. The test procedures did that, for example, when EIA ignored requests from in-band proponents to re-evaluate the multipath model. In another instance, preliminary test results ranked proponents even though all parties had agreed that would not happen.

EIA's stance of serving the interests of U.S. receiver manufacturers does not hold up this time. Two of Eureka-147's driving partners are Europe-based Thomson and Philips — both members of the EIA.

The NAB must step up its efforts to protect the interest of U.S. broadcasters and take a leading role in the evaluation process. There needs to be a better system of checks and balances, particularly during the critical field tests set to start in San Francisco. This is a joint project through the NRSC; make it equal, too.

Conclusive field test results combined with the undisputed results of listening tests should provide enough data for the best in-band system to be recommended to the FCC for U.S. radio.

—RW

cable lines can often give false, inaccurate readings. Suspect "underwater readings" made at high tide in just seconds in areas that are now flooded or in the middle of an artificial lake.

Some engineering firms might convince you that they can walk on water for peanuts, but I doubt it. Few carry an instantly deployable boat, driving gear, wading boots, and a waterproof field strength meter.

AM interference and noise can only grow as these new communication towers distort the licensed directional patterns of stations not willing to assure proper engineering workmanship. This can only accelerate the decline of AM radio.

In short, "the bitterness of poor quality lingers long after the sweetness of low price."

Thank you for this opportunity to concur with and amplify the importance of Mr. Burrow's article.

Richard A. Franklin  
Super Sound Studios  
Norristown, PA

### Diagram Gets B-

Dear RW,

I read Tom Vernon's recent article, "Efficiency Modulation Transmission" (RW, July 12), with great interest. It is nice to see vacuum tubes continue to show up on the pages of RW.

Figure 2 of the article shows a simplified suppressor grid modulation diagram with B+ going through the secondary of the modulation transformer and an RF choke to the suppressor grid of the final amplifier tube.

Please note that applying B+ to the suppressor grid of a pentode tube is incor-

rect; the suppressor grid should have a B-voltage applied to it instead.

This B-voltage does several things: 1. It controls the plate current of the final amplifier tube (the voltage is set so that the plate current in AM service is 50 percent of that typical for CW service); 2. It allows the use of a much smaller modulator tube.

Thanks for the opportunity to comment on this and keep up the good work.

Mark Starin KB1KJ  
Manchester, NH

### DAB Idea

Dear RW,

As a 23-year AM radio veteran that thoroughly loves radio and your publication, I am closely following all the new DAB technology that is now being tested and its strong implications to our industry. Recently I had a profound thought that has never been entertained in the press regarding DAB.

DAB technology enables each radio station to broadcast a separate digital audio channel with the normal analog one. After the implementation of DAB to the marketplace and a period of receiver saturation, it is quite possible that each radio station could become two stations, with separate programming on the analog and digital signals. Receivers would, hopefully, have analog/digital switching. This definitely would further the pluralism of local radio and be a possible boom to satellite syndicators.

Just another DAB radio thought for the future.

Dan Sheets  
Program/Music Director, KCCS  
Salem, OR

# Radio World

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Next Issue of  
Radio World  
October 4, 1995



# 'Cybercasters' Explore New Medium

by Lynn Meadows

**NEW YORK** Making the move to broadcast in real time on the Internet is sending stations into uncharted territory.

No one is certain when or how people will listen to Internet stations let alone how much revenue can be made from them. Then there is the issue of how to license music on the 'Net.'

The technology is very new. Progressive Networks introduced its RealAudio software packages at the NAB show in Las Vegas in April. And it was not until early August that Xing Technology Corp. began selling software and hardware that allows stations to transmit audio over the Internet in real time.

## Licensing

The new technology has left music licensing companies trying to decipher how their music is used on the Web and how to charge for it. The new world wide audience means more money to music licensing companies.

When EZ Communications announced its plan in August to put all of its 21 stations on the Internet, planners admitted they were still working out the licensing agreements with ASCAP, BMI and SESAC.

While BMI offered the first Internet music license for browse, listen, and buy services in February, according to Assistant Vice President for Licensing/Legal Joe DiMona they "haven't set the policy" for radio stations yet. He said that a number of stations have contacted BMI and he expected to have an agreement drawn up "shortly" for radio on the 'Net.'

## Developing ideas

At press time, SESAC was also in the "process of developing a licensing agreement for the Internet" said Pat Collins, senior vice president of licensing. The company had a first draft and

expected to finalize it within two months.

ASCAP released its license structure in June. Bennett Lincoff, director of legal affairs for new media, said he studied the structure of various web sites and bulletin boards that use music.

The company decided to come up with one license agreement with four options for determining fees. It will cover every site that uses ASCAP music including sites with music throughout, those with music only on the home page, those with connect time charges or subscriber fees, those with a download charge and Internet radio stations.

## The 'go ahead'

The message for stations considering Internet broadcasting even from BMI and SESAC is: "Go for it." If a station is going on-line tomorrow, DiMona said that it should send a letter of intent to BMI and the license will be

worked out later.

Collins echoed DiMona's comments about stations now ready to broadcast on the 'Net.' He said the licensing company would work out an understanding retroactively.

**The new technology has left music licensing companies trying to decipher how their music is used on the Web and how to charge for it.**

Part of the affection Internet users feel for the medium is the absence of regulation and commercialism. But Lincoff from ASCAP is not concerned about music pirates on the Internet. He said ASCAP has account executives who will locate services using music as part of their site and educate them about licens-

ing and offer them a license.

Collins said he does not expect companies using music without a license to be a problem. While music uploaded from people's homes might be hard to track, he said that the major companies using music to attract Web browsers have announced when they are going to use music.

Xing Technology President Howard

Gordon said the company hopes to have 100 stations using its StreamWorks software package on the 'Net.' by the end of the year. At press time, nearly 15 stations were broadcasting on the Internet and 35 more were waiting for the software.

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## NEWSWATCH

► continued from page 2

Eads started as an economist in 1968 in the Research Branch of the Broadcast Bureau. He served in a number of positions in different divisions including assistant chief of policy and rules and chief of the broadcast facilities division before he took his present position in 1982.

During his tenure with the commission, Eads said he has observed two major shifts in the FCC's role. The first came in the early 1980s. Up until then, the commission's focus had been on protecting broadcasters from competition. With deregulation and the 80-90 docket, Eads said the agency began promoting competition as an alternative to regulation.

Eads said that the initial wave of

deregulation and the 80-90 docket was one of the most interesting periods of his career. In his various positions, Eads helped design the new deregulatory policies and then had a chance to implement them.

The second major shift in the FCC's role according to Eads came with the explosion in digital technology. In the early days, the FCC was "more of a sleepy agency" concentrating on handing out licenses and monitoring Ma Bell's rates, said Eads.

The digital explosion shifted the agency into "high gear," he said, hurrying to develop ground rules for new technologies and coming up with novel ways to allocate frequencies like using auctions.

Eads expects satellite digital radio to be

here within five years. He said he hopes terrestrial digital radio will be here by then, too. Broadcasters "have to live in the digital world," said Eads. He acknowledged that may make some broadcasters anxious, but added it will bring opportunities.

Broadcasters will also be influenced by the pending telecommunications legislation, Eads said. "Radio in particular will live in a world without ownership limits," he said.

Eads said that in larger markets, broadcasters who are not part of larger groups will need to compete in more narrowly defined niches.

When asked for parting advice, Eads said he would not presume to give advice to broadcasters. "The only thing I would say is to look for the opportunities." He said broadcasters need to look at how changes might create opportunities and used examples of Internet broadcasters and Radio Broadcast Data Systems.

Owners will be able to "move beyond traditional broadcasting," he predicted echoing the opinions of many industry watchers.

## End of Century Outlook Excellent

**NEW YORK** Investment bankers Veronis, Suhler & Associates are predicting that the U.S. Communications industry will become the fourth-fastest growing industry by 1999.

The ninth annual Veronis, Suhler & Associates Communications Industry Forecast indicates that the communications industry has grown at an annual compound rate of 10 percent over the past two decades.

According to the Forecast, in 1975, the industry earned \$40 billion in revenues. Today it is a \$240 billion a year business. The company credits the growth to the diversity of major spending sources, the impact of new technology, and the high-margin characteristics of the industry.

"We project industry growth to reach 6.8 percent, compounded annually over the 1994-1999 period, outpacing overall economic growth and out-performing the gains of the previous five-year reporting period," said President John Suhler. ◉

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# Antenna Space Shrinking

► continued from page 1  
on existing towers is slowly eroding," said Brown Sanders, vice president of sales for PiRod Inc.

Ron Gibbs, president of Lodestar Tower Inc. said "not every market is going to be affected the same way" once HDTV becomes a reality.

"There will certainly be some shuffling around in the industry," he said, as towers are restrengthened to hold more antennas and FMs move to make room for HDTV antennas.

## HDTV

Broadcasters may first feel the squeeze when the FCC finally determines how the switch to High Definition TV (HDTV) will take place. The expectations are that TV stations will have to broadcast their digital signal within three miles of the analog signal and provide the same coverage with both.

Because each digital television channel will require another antenna and transmission line, television stations will also require more tower space.

**When a tower proposal comes up, residents repeatedly send the "not in my backyard" message to their local officials.**

Television stations are already planning for HDTV. According to Gibbs, in many markets FMs have already been told by the TV stations that own their towers that once their lease expires they will need to find another space.

In Wisconsin, the Milwaukee Area Technical College is building a new tower that will be capable of supporting both analog and HDTV antennas signals for all the TV stations in the market plus some microwave antennas. Ben Evans of Evans Associates Inc. said the project was started because of the anticipated shortage of space for HDTV antennas.

## Zoning Laws

But building towers is not necessarily a quick and easy way to accommodate displaced antennas.

"Getting a tower approved these days is not nearly as easy as it used to be," said Evans.

"It has mainly to do with economics and zoning," said Peter Starke, vice president of sales and marketing for Stainless Inc. In urban areas, the Federal Aviation Administration (FAA) and local regulations combined with community resistance can stall tower construction for years.

One of the concerns residents who live near towers have is RF radiation.

"Very often that issue alone can kill a lot of tower proposals," said Evans.

Urban sprawl means more and more communities are worried about property values and aesthetics. When a tower proposal

comes up, residents repeatedly send the "not in my back yard" message to their local officials.

As an example of that, Starke used the case of a local AM station that wanted to increase its tower's height. The neighbors complained that the new height would hurt property values. Ironically, the tower was erected before those nearby homes. The AM station wound up suing and incurring more expense.

## Solutions

Renting tower space is a lucrative business.

"Anybody specifying a new tower should definitely be thinking rental

space," said Sanders of PiRod Inc. For 15 to 20 percent more, said Sanders, a tower will have the ability to take on a lot of rental business. He added that a station can pay for its tower that way.

"Price has become a big issue," said Alex Perchevitch, vice president/sales manager at Jampro Antennas. The tower alone for a Class A AM station can run \$60,000 according to Starke. With the line, antenna, land, and permits added, that price tag increases to around \$200,000. Estimates on the total cost for a 1,000 foot FM tower reach one to two million dollars.

That is why, according to tower and antenna manufacturers alike, it makes sense in the midsize and major markets to build one multi-user tower. It is easier to get approval from

the local zoning board for one tower that holds several stations than for several towers.

With improvements in panel antennas, owners of stations can consider sharing an antenna. In Minneapolis, according to Ed Ritz, manager of technical services for the LeBlanc Communications group, nine high-power FMs are sharing one antenna. Each station has its own room in a common building and the transmission lines run into the basement into a combiner room.

Manufacturers expect an antenna shuffle to take place among broadcasters when an HDTV standard is accepted. How seriously that will affect FMs will vary from market to market. In cities where tower space is at a premium, using sharing facilities and antennas may look increasingly attractive. ☐

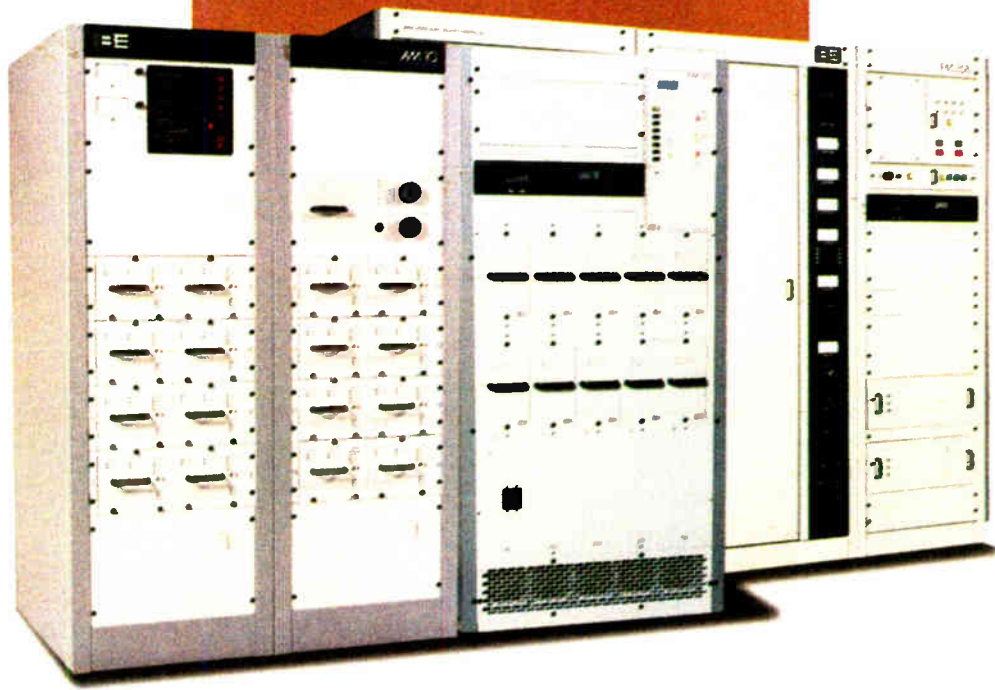
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# Petition Calls for FCC EEO Policy Re-evaluation

by Lynn Meadows

**ARLINGTON, Va.** A law firm filed a petition last month requesting the FCC initiate a rulemaking to review its current EEO policy.

Haley, Bader & Potts wants the Federal Communications Commission (FCC) to prove there is a connection between employment practices and programming diversity. The firm is also asking the FCC to review whether the current EEO requirements are "narrowly tailored to achieve a compelling goal."

It was just a matter of time. In its June decision on *Adarand vs. Peña*, the Supreme Court ruled that "strict scrutiny" should be used to analyze all "racial classifications imposed by whatever federal, state or local government."

Further, the court noted that "such classifications are constitutional only if they are narrowly tailored measures that further compelling governmental interests."

After the high court's decision, FCC Chairman Reed Hundt ordered an in-house review of FCC EEO policies. The FCC currently reviews the hiring record of stations during license renewal. Stations found failing to recruit from minority sources have been fined forfeitures of up to \$20,000.

John Crigler, partner in Haley, Bader & Potts, said the decision to file was prompted by both the recent *Adarand* decision and the fact that license renewals are beginning.

The Rainbow Coalition has already filed Petitions to Deny licenses against 11 stations in Norfolk, Va., for the FCC to take a closer look at their EEO programs. David Honig, executive director of the Minority Media and Telecommunications Council, is representing the Rainbow Coalition.

He disagrees with the petition filed by

**"It is a cowpie."**

Haley, Bader & Potts.

"It is a cowpie," he said pointing out that no broadcasters had signed onto it.

Honig said that the *Adarand* case applies to set aside programs and quotas.

"The FCC will not sanction you for not having the numbers," he said, adding that the FCC focuses on "affirmative recruitment."

Crigler said his firm is filing the petition for the benefit of its broadcast clients, although not on behalf of any one broadcaster. He said he hopes the petition will "attract support from the broadcast community."

Part of the question, said Crigler, is whether the commission's current EEO rule actually accomplishes its goal of increasing programming diversity. If it is effective in diversifying programming, Crigler said, the question is whether it is the most effective way to accomplish that goal.

If the commission does not hold a rulemaking, Crigler said he thinks the existing rules will be challenged "sooner or later," probably by litigation. He said the petition is a "non-antagonistic mechanism" and added that this was not an issue he wants "raised in a hostile environment."

## Charting a New Medium

continued from page 6

Gordon said between 10,000 and 20,000 people had access to the software that would allow them to listen to the stations. That leads to the question of how people will use Internet radio.

"When music is available, people tend to turn it on," said Collins at SESAC. Collins said he thinks if people can listen and do their primary work at the same time, they will.

Right now, it appears the novelty is attracting listeners. In Ottawa, news station 580 CFRA can attest to that. CHUM Limited began broadcasting its talk station on the Internet in mid-August. By the end of the month, the station Web site was getting 1,000 hits a day.

### 'Spooky'

People from as far away as South Africa have signed a "Guestbook" at the site. One 'Net' listener wrote, "Spooky, I'm listening to CFRA at the moment from Cape Town in South Africa — over your new Xing StreamWorks hook up. Right now, there are some guys talking about PC problems!"

Station Manager Mark Maheu expected to broadcast talk radio for now.

"Currently the sound is half-way between telephone and AM radio quality," he said in an announcement. "At this point, music delivery at a low bit-rate is probably not practical."

Maheu said plans were to begin broadcasting an all business station on the 'Net' in early September using programs from the Business Radio Network. In what may be a sign of things to come, the station will be an Internet-only station not accessible by radio.

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## FCC Accelerates Revamping

**WASHINGTON** Chairman Reed Hundt accelerated the pace for reorganizing the budget-battered Federal Communications Commission (FCC) in August. Hundt's proposals include personnel cuts and office closings.

The chairman's goal for the average employment level is 2,050 employees, about 10 percent less than the current level. The FCC offered buyout and early retirement options to over 130 employees to help meet this goal.

The cuts will affect 120 positions in field and regional offices. Hundt said that approximately 50 of the trimmed positions will be "involuntary separations."

Hundt lowered the permanent employment ceilings of several Washington offices, including the Mass Media Bureau and the Office of Engineering and Technology.

"None of these ceiling adjustments will require employee terminations," said Hundt.

Hundt expects a national automated monitoring network to be in place by next summer with a central station in Laurel, Md. He proposed closing all of the current monitoring stations once electronic monitoring begins.

Hundt also recommended closing nine of the 25 field offices by July 1996 and retaining two technical staff in each location as "resident agents." Offices in Buffalo, N.Y., Miami, St. Paul, Minn., Norfolk, Va., Portland, Ore., Houston, San Juan, Puerto Rico, Anchorage, Alaska and Honolulu would close.

The chairman called for closing half of the FCC's regional offices. He said offices in Atlanta, Boston and Seattle would close while the Chicago, Kansas City and San Francisco offices took on the extra workload.

The FCC will add a centralized Call Center.

"Members of the public anywhere in the United States will be able to call one toll-free number to reach the FCC for information or assistance," Hundt said. He expects to staff the center with about 12 dislocated employees.

Commissioner James Quello was dismayed by the timing of Hundt's announcement. "I believe any reductions should have been discussed with commissioners in advance of a one-day notice, particularly while Congress is in recess and some commissioners are on vacation," he said.

— Lynn Meadows

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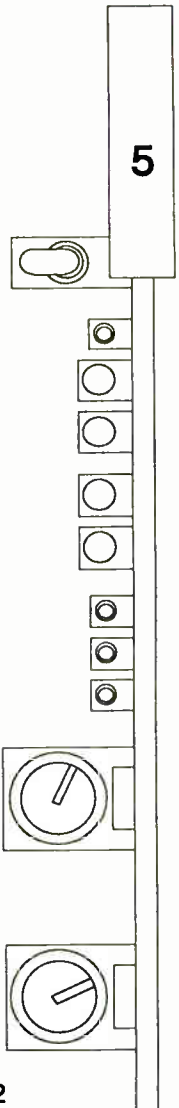
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## INTERNATIONAL UPDATE

# Mobile Tests Verify Satellite DAB

by Gabriel Sosa Plata

**MEXICO CITY** The first mobile tests of the satellite version of Eureka-147, the European Digital Audio Broadcasting (DAB) system, proved more successful than engineers expected.

The private demonstrations were performed here by government agencies, including Telecomunicaciones de Mexico (TELECOMM) and the Mexican Communications Institute (IMC), along with the BBC, one of the driving forces behind DAB in Europe.

Tests of a satellite-based Eureka system were conducted previously in Australia. Those tests were performed using only a fixed receiver.

The Mexican tests are a significant step

forward in the development of satellite-based Eureka-147, as they were the first tests in L-band using a mobile receiver.

These tests increase the possibility of worldwide satellite-based DAB using a frequency close to the L-band segment approved for DAB at the 1992 World Administrative Radio Conference (WARC) of the International Telecommunications Union, held in Torremolinos, Spain.

## Why Mexico?

Tests were carried out July 17-21, at the TELECOMM Telecommunications Complex located east of Mexico City where master control for the Mexican satellites Morelos 2, Solidaridad 1 and Solidaridad 2 is headquartered.

Mexico was chosen as the test site

because of its conveniently available satellite space, according to BBC representatives. Solidaridad 2 did have open L-band space available for the tests.

BBC also stressed the importance of testing the system at L-band, as it plans to use satellite DAB to offer FM radio stations its international radio broadcasting service.

Satellite broadcasts of the Eureka-147 system were tested daily for 240 minutes. The transmissions were sent alternately to a ground receiver and to a mobile vehicle from a distance of 22,500 miles (where the Satellite Solidaridad 2 is located), at 1529.15 MHz.

Event organizers explained that the chosen frequency was slightly higher than the one agreed at WARC-92, which allocated 1452 to 1492 MHz for DAB broadcasts in L-band, because other services offered in Mexico already are allocated to this space.

They noted, however, that if the tests had been conducted in the WARC-92 allocation range, the results would have been similar, as the signal performance at such close frequencies is very similar.

## Broadcasting test

During the broadcasting test, two CD players were used. Each of the audio signals was individually coded. Error correction codes were added, and they were time-locked. Mixed signals were simultaneously transmitted (multiplexed) on a common channel.

At the same time, the multiplexed output was time-locked with the frequency and mixed with information and ancillary services. Synchronization signals were added before the COFDM encoding.

Finally, the signal was converted to 70.15 MHz, effective for ground station Ku-band transmissions to the satellite. At that point, the signal conversion to L-band (1529.15 MHz) was made.

A Yagi antenna was used for receiving the fixed broadcasts. This antenna was installed outdoors to avoid blocking the line-of-sight connection with the satellite.

The antenna was connected to an amplifier and a filter that sent the transmitted signal through a low-loss cable to a frequency converter. The frequency converter sent the signal simultaneously to the DAB receiver and to a spectrum analyzer. The receiver output was connected to a DAT recorder and an audio amplifier.

For the mobile test, BBC engineers affixed a 20-centimeter dish antenna to the roof of the test vehicle. Distances traveled averaged 6.25 miles.

## Good reviews

Though the tests were considered just "lab tests" they were hailed as a success.

"What we have accomplished has been a real success," said John T. Zubrzycki, assistant director of the BBC Research and Development Division. "Good results were obtained during the tests at a speed of 60 kilometers per hour (37.5 miles)."

"The work has been exhausting, but I think that the effort was worth the effort," said Miguel Angel Gama, TELECOMM mobile operations and communications coordinator.

"The digital signal that we sent to the satellite returned with the same audio quality. This demonstrates the power of

the Solidaridad 2 satellite," Angel said.

"BBC engineers were expecting a propagation loss due to the power of the satellite," said Jaime Roblero Romero, technical manager of the CIRT, the Mexican National Radio and Television Industry Chamber. "But this was not so. The results were positive with the band used."

"I was aware of the existence of satellite digital broadcasting, but I had never seen nor heard of it," said TELECOMM Manager José Viveros Roa. "I am really impressed with the audio quality. It is very similar to that of a compact disc."

All the people interviewed agreed that it is necessary to prove the efficiency of the system as quickly as possible. Specifically, further tests of mobile receivers operating under more difficult conditions are needed.

continued on next page ►

## ABC Adopts DG Systems Technology

by Lynn Meadows

**SAN FRANCISCO** Digital Generation Systems and ABC Radio Networks formed an alliance that will allow the delivery of ABC Radio Network's programming and advertising to radio stations using a new digital audio distribution system.

DG Systems and ABC Radio Networks will integrate existing satellite and landline communications, server and switching technology and station traffic and automation systems in the new distribution system.

Forty of ABC's 3,400 affiliate stations have been tentatively chosen to try the new system beginning in October. Each station will use an Audio Affiliate Server that can receive satellite feed from ABC and advertising from DG Systems. The two-way server can also be used to send electronic affidavits back to advertisers and automate other office procedures.

The system is expected to save stations money and bring additional revenue.

"I think this is something radio stations really need," said Bob Donnelly, vice president of engineering for ABC Radio Networks. He mentioned that the electronic affidavit will help stations cut costs since it will make them much less labor intensive.

Ann Marie McGee, marketing director for DG Systems, said that the system will also increase revenue for network radio by providing more commercials. She said the national advertisers can still buy the entire network, but regional advertisers will be able to target certain areas.

ABC and DG Systems hope to begin bringing all ABC affiliates on-line in April 1996.

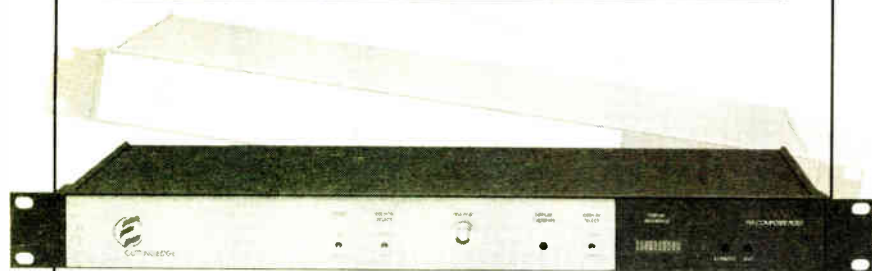
"The emphasis is that this is a pilot," said Bob Donnelly, vice president of engineering for ABC Radio Networks. "It is important to get really good feedback from stations."

DG Systems already delivers advertising to its radio station affiliates over landline communications. At the end of July, DG Systems was electronically linked with 3,000 stations.

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## INTERNATIONAL UPDATE

# DAB Complicated Issue in Europe

by Michael Lawton

**COLOGNE, Germany** While Eureka-147 — the preferred Digital Audio Broadcasting (DAB) system in Europe — was defined and promoted largely by national public broadcasters, commercial broadcasters are accepting the technology by default but with some criticisms and concerns.

"If Eureka-147 and IBOC had arrived on the same day, both fully functioning, IBOC would have had a better chance," said Mike Thome of NTL, a major supplier of transmission services to U.K. commercial radio.

But he added, "It is very hard to see how IBOC, or even more IBAC, could work here. It is technically difficult but philosophically better."

## Differences surface

While developers of the various digital radio systems argue how theirs is technically better than another, the issue that divides the radio world is the philosophical difference in radio as a business and radio as a service.

That difference was the driving force for developing the alternative in-band, on-channel (IBOC) and in-band, adjacent-channel (IBAC) systems in the United States.

U.S. radio operators were not willing to give up their tiered approach to broadcasting and allow parity in both coverage area and frequency strength. Only later did it become apparent that finding new frequency would be a major stumbling block, when the U.S. military refused to give up use of L-band.

## Mobile DAB Tests Well

► continued from previous page

They insisted upon the need to test the system in a vehicle traveling greater distances, at higher speeds and in an area surrounded by obstacles, such as buildings and mountains.

A direct broadcasting satellite with more power than Solidaridad 2 was also recommended. This would let the tests be carried out in closer-to-real-world conditions.

## The Mexican position

Robledo explained that although the tests fulfilled their purpose, and that they were organized by Mexicans too, it does not mean that Mexico has not decided on a system.

"Our goal is to continue supporting and closely monitoring these tests in order to remain up to date about the latest technological developments," Robledo said.

"Moreover, Mexico's plans do not include the promotion of satellite DAB because it could be dangerous for the economic stability of traditional radio."

Nevertheless, the CIRT is awaiting the BBC's final technical results from the tests to analyze the possibilities for satellite-based Eureka-147 DAB alongside the competing systems.

□ □ □

Gabriel Sosa Plata covers the industry in Mexico for Radio World. Contact him by telephone at 52-5-597-7288.

The developers of Eureka-147 promote the advantages of no multipath distortion, single frequency networks and a substantial capacity for data transmission.

But as U.S. broadcasters saw, there also are some disadvantages — especially for stations operating in the existing marketplace.

For one thing, several stations, usually six, have to share one transmitter, so all will have exactly the same transmission coverage area but not necessarily coinciding with current coverage.

That leads to strange solutions such as the pilot project in North-Rhine Westphalia, Germany, where each private

station broadcasting a common sustaining program currently has a monopoly in its respective market.

To copy that on Eureka-147 would mean 44 transmission blocks, each carrying just one station.

## Markets developed

Instead, several neighboring stations will broadcast on one block so that listeners will hear the stations from their neighboring towns as well. Because they are all the same, except for local news and reports, it is not expected that the market structure will be affected.

But in more competitive markets, the

situations are different.

As James Galpin, research officer with the British Association of Independent Radio Contractors, said, "You can simply say 'We've spent 20 years building a relationship with our listeners, but what the hell!' and tear up the old maps."

Galpin said that British stations are only interested in delivering what they deliver now — in better quality with a few extras. The extra data services are not that interesting. You can run endless weather and traffic services, but these services attract healthy sponsoring anyway.

Mark Thomas, head of engineering at the U.K. Radio Authority, Britain's private radio regulator, recognizes that British independent radio is slow to take up DAB.

Stations are happy when they have sown up a particular market on FM, he said,

continued on page 14 ►

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World Radio History



# DAB Not So Simple in Europe

► continued from page 13

and do not want their standing to be challenged.

Tom Turcan, business development executive of Capital Radio in London, confirmed that impression. He said that Capital had not yet decided whether to be involved.

Turcan said he did not hear much difference in signal quality when he took part in a mobile demonstration, but it might be an advantage to AM stations. It would make a difference if regulators or the government were to offer advantages — like longer license periods or tax breaks — to stations that got involved.

"There's not enough of a carrot," he said, "but if there were a carrot, private stations might embrace it quite enthusiastically."

Even Virgin 1215, a national station that suffers from only having an AM signal, showed no public enthusiasm, saying there was no one at Virgin who could make any public statements about DAB.

CLT, the Luxembourg broadcasting giant that runs RTL and other stations in Luxembourg, France, Germany, Ireland, Belgium, the Netherlands and the Czech Republic, also is only partly enthusiastic about DAB.

Remy Sautter, head of CLT radio, said that he was very much aware of the advantages of single frequency networks. RTL used to broadcast on long wave across Europe — and it was now much harder to impress a multiplicity of FM frequencies on the market.

## Advantages exist

Although two of CLT's three French networks broadcast local optouts, they would happily give them up in exchange for the single frequency. But he said he was not sure if DAB would succeed commercially, since by the time DAB had a good market penetration, direct digital broadcasting by satellite might be available and operators might skip over DAB.

But CLT would be involved in all DAB developments, just in case.

In all of these European responses, the words IBOC and IBAC did not surface.

Nobody interviewed thinks the two American systems are likely to be as good as Eureka-147, even though they have certain advantages in that they allow the current market to be exactly reflected.

But with a Berlin pilot project starting in August and the BBC starting transmissions in the fall, there is little chance of changing the system now.

German private stations flirted with the idea of IBOC quite seriously approximately two years ago, but now they are firmly on the Eureka bandwagon and have insisted that they should be involved from the start in any pilot projects.

The German DAB Platform, including public and private radio, manufacturing industry, government and regulators, just signed a Memorandum of Understanding defining the exact conditions for the introduction of DAB.

But Karlheinz Hörhammer of Antenne Bayern, like Sautter of CLT, is still skeptical mainly because the development of DAB is so slow that alternatives might be available before DAB has really settled in.

## Future is data

He said that better transmission quality is not enough reason to introduce DAB. The future lies with the data services, he suggested. Antenne Bayern is part of a consortium with Radio Hamburg, Radio NRW and German Telekom, working on defining standards and uses for data services.

Thorne also said that if the British commercial industry does not do something similar, it may find that standards not in the British private radio's interests will be established by foreign broadcasters or by the BBC.

The issue of financial support is a major one for many stations. They said that with limited license periods of five or eight years, they do not want to invest in a new technology that may start to deliver returns at a time when they may no longer be license holders.

The public stations, commercial operators argued, can afford to take the long view, but they cannot.

All the same, Tom Mulder of Radio 10 Gold in the

Netherlands said his station expects to pay for everything itself if it decides to go ahead.

In Sweden, private radio is relatively new, and, as Sten Johanson, president of Radio City in Stockholm, said, they only just discovered the Internet. But the government is giving away the concessions, although the stations will have to pay for the transmissions, and Radio City cannot afford to miss out.

Surprisingly, the chairman of the Swedish Commercial Broadcasters Association, Christer Jungerid, criticizes the giveaway. He said he would rather see an auction similar to the one by which the FM frequencies were distributed, since he would rather let the market decide, than have it left to a "beauty contest" in which the regulators are the judges.

It is not surprising that it is the national networks who have the greatest benefits from a system designed by them.

Although Eureka-147 works well in big cities with several stations, no one has quite solved the problems in markets that only support one or two stations.

Steve Buckley of the World Association of Community Radio Broadcasters argued that small, low-power stations — whether community based or commercial — which used to simply buy a cheap FM transmitter now will be forced into a structure dominated by transmitter providers.

Who will fill the remaining five channels on the frequency block? Paul Ratliff of BBC Research and Development, who is responsible for standardization on the Eureka-147 Working Group, responded that, while local stations may not benefit as much as national networks, they will still be better off than they are now. Transmission costs will become an even smaller part of total costs than they were before, Ratliff said. Even one station per block would not be very uneconomical, he said.

And it would be possible, for example, to use five channels on a single frequency national network for national stations, while using the sixth for local stations on every other transmitter site. That would not be as spectrally efficient as broadcasting another national network but still much more efficient than with FM, where the gaps between stations with the same frequency have to be much larger. ☺

## INTERNATIONAL UPDATE

# Receivers Key For DAB Future

by Jeff Cohen

**LONDON** Broadcasters from around the world are telling receiver manufacturers that the success or failure of Digital Audio Broadcasting (DAB) now is firmly in their hands.

Delegates at a conference this July in London repeatedly criticized set makers for not making clear commitments to DAB receiver production, a situation causing great uncertainty at a time when broadcasters are making major financial commitments to the new transmission technology.

A more upbeat assessment of the prospects for the new medium came from John Clemens of Continental Research, who was commissioned by Touche Ross to survey audience interest across Europe in DAB.

## Willing to pay

He said evidence was needed to show that consumers would like to have DAB and would pay the premium price it will cost in the early years. "On balance the answer is yes to both questions, if the product fulfills user expectations and if the premium is acceptable," he said.

## The greatest appeal of DAB is the elimination of interference and fading.

The answers to the survey showed the greatest appeal of DAB is the elimination of interference and fading, ease of tuning and CD-quality sound.

With up to 25 percent of radio listening now in cars, he said he believed the advantages for drivers weighed heavily. Lower in the rating by potential DAB consumers was the ability to hear local stations nationally and national stations across Europe, but the multilingual Benelux and Scandinavians rated this point considerably higher than others.

Overall, great interest in having DAB was shown by 24 percent of those surveyed with the highest figures in Germany at 33 percent, Spain at 27 percent, the United Kingdom at 24 percent and France at 18 percent.

Of importance to potential DAB set makers was a question on what premium over current price tags would consumers pay, and the average answer was 35 percent.

David Witherow, DAB project director for BBC Radio, outlined details of the world's first public service due to begin operation on Sept. 27, by the BBC.

Apart from simulcasts of existing BBC networks, the service will provide additional coverage of sports, parliament and foreign language programs for minorities. There also will be a "briefing" channel that will guide listeners to programming, along with its own news, sports, weather and financial information.

On a more global scale he said the BBC had commissioned research in India and found interest similar to that in the U.K. with the concept of DAB seeming to have intrinsic appeal and evoking strong interest and curiosity to know more.

continued on page 21 ►

## 63 Years Ago

Reprinted from Radio World Oct. 1, 1932.

Editor's note: The RW of old,

printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

### 7-Prong Tube Offers a Variety of Uses

W. L. Krahl, Chief Engineer of the Arcturus Radio Tube Company, Newark, N. J., said:

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"Here is a definite example where a multi-element tube, involving difficult manufacturing processes, results in improved performance of a radio receiver."

### NEW CALIFORNIA STATION

Washington

The Federal Radio Commission has granted H. H. Hanseth, Eureka, Calif., a permit to construct a new broadcast station to be operated on the 1,2210 kc channel with a power of 100 watts in the day time. It had been found that the people living within a radius of 40 miles of Eureka were inadequately served in the day time because of their isolated location on the Humboldt Bay.



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# AES Show Preview



## New York Gets Wired with AES Show

**NEW YORK** The 99th Annual Audio Engineering Society Convention is a go for Oct. 6-9, at the Jacob K. Javits Convention Center here.

"Audio in an Interactive World" is the theme of this year's convention, with a number of sessions and workshops applicable to the broadcast professional. Many of the seminars are on the subject of digital audio, but several deal with tra-

ditional analog processes as well.

Along with the workshops and presentations, more than 300 exhibitors will be assembled in the Javits Center, forming what may possibly be the largest exhibition of audio technology and equipment anywhere in the world.

The convention's opening ceremonies begin at 11:30 a.m., featuring an all-star lineup of people and events, with awards

honoring those who have made significant contributions to audio. The keynote speaker will be producer Phil Ramone. Of course, the AES convention will not be all work and no play. After-hours entertainment for AES Convention participants will be first-class, with IMAX theater presentations, organ recitals and the USAF Glenn Miller Band in performance.

### Friday, Oct. 6

Even before the opening ceremonies officially start the convention, the very first technical paper sessions and workshop/seminars begin at 9 a.m., Friday, Oct. 6.

Session A is devoted to "Wavelets": a mathematical principle applied to signal processing now finding its way into audio. Topics include an introduction to wavelets and their use in displaying electro-acoustic data.

Session B addresses "Audio in Interactive Media" with discussions on sound drivers for multimedia and encoding for entertainment applications.

The second series begins Friday at 1:30 p.m., after the opening ceremonies, with Session B: "Analog Electronics." This session is of particular interest due to the presence of guest speaker Rupert Neve (of Neve console fame). Of special note to broadcast engineers will be Rob Silfvast of Euphonix Inc., discussing a new solution to the balanced-to-unbalanced interconnect problem.

Also at 1:30 p.m., Session C: "Multimedia and Networking" with representatives from Microsoft, the MIDI Manufacturers Association, QSC Audio and Pioneer, among others. Topics include audio in Windows, computer controlled sound systems, audio and MIDI for the World Wide Web and applications of a new high-density optical disc for audio.

While these papers are being presented, the first of the workshop/seminars gets underway at 9 a.m.

"Jitter: Is it a Problem?" addresses the subtle effects of timing errors (jitter), and revisions made to the digital audio interface standard to include specifications on jitter.

A workshop on "Computer Tools in Audio Research" begins at 2 p.m., discussing the use of computer tools in designing transducers. Also at 2 p.m., "Archiving Audio in the Digital Age": which will address microphone techniques, environmental difficulties, and the problems of storage space, retrieval and deterioration of recordable media.

### Saturday, Oct. 7

The technical papers sessions continue at 9 a.m. with Session E, "Transducer Directivity and Arrays," with representatives from Shure Brothers Inc., Mark IV Audio and McIntosh Labs, among others. Topics covered will include microphone performance measurement and directivity controlled loudspeaker systems.

Session F is in two parts. "Low Bit-Rate Audio, Part 1" presents an overview of MPEG audio, the AT&T Perceptual Audio Code (PAC) and evaluations of audio coding systems. This session also begins at 9 a.m., with Part 2 on Sunday.

Broadcasters should take note of Session G, "Recording Systems and Production," for elements on radio drama production with networked digital audio workstations, as well as a multiformat transportable recording system. Other elements include fiber optics for

continued on page 19 ►

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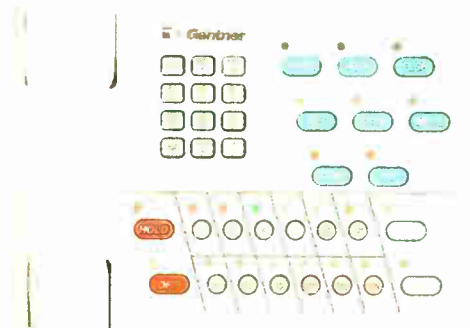
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# AES Interactive in NY

► continued from page 16

professional audio and combining multiple formats for pro audio applications. Session G begins at 2 p.m.

Of like interest will be Session H, "Signal Analysis and Noise Reduction" for attention given to processing old audio recordings, signal processing to improve speech intelligibility and a noise reduction system for automotive audio.

Again, while the technical paper presentations continue, workshops and seminars are taking place. Saturday at 9 a.m., the topics include "Mastering in the 20-Bit Domain" and "Professional Audio in the Interactive World"; notable for its detail on construction of an interactive CD-ROM project and the importance of quality digital audio throughout.

Afternoon workshops (2 p.m.) focus on the "Subjective Evaluation of Low Bit-rate Coders"; discussions on data reduction and procedures to assure audio quality, and "Sound Transmission Via Infrared Radiation"; concentrating on applications for IR transmission of audio.

A special forum takes place at 9 a.m. Saturday: "Professional Audio in Latin America." This will be a two-part session devoted to presentations and demonstrations specific to activities in Latin America. This forum will be conducted primarily in Spanish.

## Sunday, Oct. 8

At 9 a.m., Session I is devoted to the technical paper "Loudspeaker Distortion and Measurement," featuring representatives of Bang and Olufsen and Kenwood, among others. Topics presented include precision measurement and distortion mechanisms of loudspeakers.

Session J also begins at 9 a.m.: "Low Bit-rate Audio, Part 2" will complete topics begun during the Saturday session.

Afternoon technical paper presentations continue at 2 p.m. with Session K, "Perception and Subjective Evaluation, Part 1" and include imaging and loudspeaker directivity, interaction of factors in a home theater system and variations in loudspeaker sound quality among four typical domestic rooms. The second half of this paper is presented on Monday.

Session L, "Digital Signal Processing" will appeal to production engineers. Topics covered in this paper include the hardware and software behind large digital mixers, bandpass filtering in music synthesis and parametric digital filter structures. This presentation begins at 2 p.m.

Workshops and seminars meeting Sunday include "Professional Audio in Cyberspace" at 9 a.m.; discussing the advantages of using the Web and Internet to transmit and distribute audio program material, possibilities of audio/video transmission and the issue of copyrights and ownership of material transmitted.

At 2 p.m., two important workshops will get underway. The first, "Out of the Box Audio: Do New Computers Really Deliver?" discusses whether professional grade audio quality is possible with consumer computers, along with future developments in that direction.

The second 2 p.m. seminar will be of great interest to broadcasters: "The ISDN Studio." This workshop will demonstrate

various ways a studio professional can use ISDN, emphasizing actual use of real equipment over ISDN phonelines. Discussion will include audio codec algorithms and the public world telephone system, and will also include a mock project demonstrating studio/artist integration with ISDN.

Special forums to be conducted on Sunday will include "The Education Fair" with Roy Pritts of the University of Colorado hosting a tables fair for schools, universities and programs offering audio education opportunities. This begins at noon.

Other special programs include "Computer Control of Sound Systems" with the leaders of SC-10 (the Standards Committee on Computer Control of Sound Systems) discussing the current state of the AES24 standard and a likely future direction, and the "7th Annual NARAS Recording Forum"; featuring a Who's Who list of the top practitioners of the recording arts. A partial list at press time includes producers Phil Ramone, Hugh Padgham and legendary engineer Bruce Swedien.

## Monday, Oct. 9

The AES Convention concludes on Columbus Day with the final presentation of several technical papers.

At 9 a.m., Session M addresses "Conversion Technology", and features representatives from Sony, AT&T Bell Labs and Analog Devices. Theory-intensive topics covered will be methods of A/D and D/A conversion.

Session N, "Auralization and Room Acoustics," also begins at 9 a.m. Discussion will include effects of performance halls, new methods of generating artificial reverberation and an improved stereo "head" model.

Monday afternoon, the final technical paper presentations commence at 2 p.m. The first is Session O, "Perception and Subjective Evaluation," and concludes the session begun Sunday afternoon. Finally, Session P: "Acoustic Diffusion," concentrates on diffusor design, effects and measurements, and tackles near-field acoustic holography and modulated phase reflection gratings.

A special forum, "Women in Audio: Project 2000," will be held today at 10 a.m., chaired by Carol Bousquet of Ferrofluidics Corporation. Under the auspices of the AES Education Committee, this forum seeks to increase opportunities for women in the audio industry. Of note will be the presence of artist/composer Laurie Anderson on the panel.

Two workshop/seminars are being held on the final day of the convention. "Project Studio Maintenance" is a must for any engineer responsible for the care of broadcast studio equipment. This will center on maintenance of digital eight-track and DAT machines, console care and proper equipment rack grounding. Studio budgeting and management of technicians will also be addressed.

The final workshop, "Art and Science of Record Mixing" will feature award-winning engineers and producers discussing techniques and technologies used on current album projects. A question-and-answer period is included for specific information.

Both concluding workshops begin at 9 a.m.

# AES Tours Broadway, Visits Edison's Lab

**NEW YORK** In addition to the workshops and exhibitions at the 99th AES Convention, technical tours of facilities and institutions unique to the greater New York area will be conducted all weekend.

To be eligible to participate in the tours, it is necessary to register for the full four-day program and sign up at the tours desk.

The "Rogers and Hammerstein Archives of Recorded Sound" tour is scheduled for Friday, Oct. 6, at 2:30 p.m. The Archives chronicles the history of recorded sound from its origins to the present day. This is one of the largest sound collections in the world, with more than 500,000 recordings on a number of media dating back to early cylinders. Chief Engineer Adrian Cosentini will lead the tour, including a visit to the center's state-of-the-art preservation and restoration studios.

Two tours are scheduled for Saturday, Oct. 7. The first at 10:30 a.m. is to the Metropolitan Opera at Lincoln Center, recognized as one of the most technically advanced opera houses in the world today. Attention will be devoted to the Met's acoustical construction and the impressive network of workshops and technical facilities located within the center. Use of the facility for live broadcast will also be discussed.

The second Saturday tour begins at 11:30 a.m. at New York's Palace Theater for "Beauty and the Beast." Disney's Broadway production employs unique live and automated mixing systems, special submix locations for control over voice and orchestra and more than 34 wireless performance microphones. The tour includes discussions on integration of video with sound and visual effects, and visits to the various submix stations within the theater.

The first tour on Sunday, Oct. 8, will be of particular interest to radio broadcasters: the studios of WQEW(AM) and WQXR(FM). The Big Band AM and classical FM are the radio stations of the New York Times, and their construction is a remarkable hybrid of traditional broadcast designs and modern recording studio environments. This construction offers many advantages over customary installation techniques, which will be discussed during the tour. Visitors will have the opportunity to view WQXR's elaborate production and studio facilities. The tour to WQEW and WQXR begins at 11 a.m.

The 1 p.m. tour takes participants to the Sony Music Studios: a full-service multitrack recording and CD mastering facility. The Sony studio features state-of-the-art analog and digital recording equipment and facilities for editing, CD and vinyl mastering and video production. A tour of the primary facilities will be led by Sony's engineering staff.

Finally on Monday, Oct. 9, attendees will visit the birthplace of recorded sound: Thomas Edison's Laboratories in West Orange, N.J. From 1887 to 1931, this was Thomas Edison's research lab and the manufacturing facility for his first commercial phonographs. A rare collection of historical phonographs and recording equipment will be on display here, along with early incandescent lightbulbs and experimental telephone and telegraph devices. A demonstration of historical phonographs highlights this tour.

Space for all tours is limited and tickets for each are available on a first-come, first-served basis.

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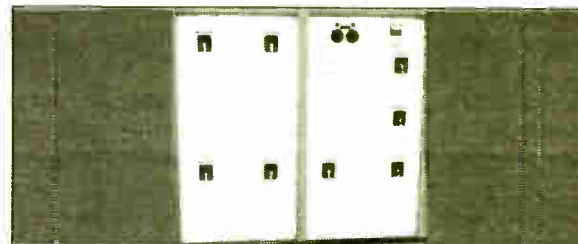
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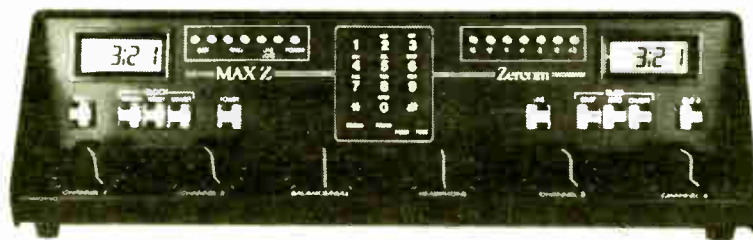
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World Radio History

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READER SERVICE NO. 6



# DAB Needs Cooperation

► continued from page 14

Many other European nations reported on DAB trials but with varying judgments on what will be the key to its success.

Hans Beekhuizen from the Netherlands stressed diversity of program services and others the implementation of the numerous data and ancillary services that DAB supports.

Such services as car navigation, voice mail, paging, text information and purchasing via the radio were described. Pay radio services such as specialized music and live subscription concerts from around the world also were considered to be important potential new areas for radio's development.

The conference, organized by IBC Information Technology Services (an organization not associated with the International Broadcasting Convention known by the same acronym), brought together DAB project directors from as far afield as India, Australia and Canada to describe the details of the services they are testing.

K.M. Paul of All India Radio described the use of both VHF FM band II and L-band satellite to cover vast rural and urban populations. Michael McEwen of Canadian Broadcasting Corp. described DAB as being vital for radio's continued survival.

"If radio is to remain a relevant medium in the 21st century, the change must begin and it must begin now," McEwen said. "Our sense of the consumer mood indicated a burgeoning interest over the next year, as more and more Canadians hear the crystal sound of digital radio and discover its many new potential services."

He was highly critical of the position taken by the United States, where fears that DAB would upset the status quo in radio have prevented the introduction of any services along the lines of the Eureka-147 standard used in other

being said, he concluded that the future of radio is going to be DAB.

Competing direct satellite radio projects made strong presentations each stressing

ahead with the launch of public services before the end of 1995. The manufacturers, though present in force, and with the notable exception of Bosch, largely remained silent.

□ □ □

Jeff Cohen is director of World Radio Network. Contact him in the U.K. at tele-

phone: +44-171-896-9000; FAX: +44-171-896-9007; or via e-mail at [jeffc@wrn.org](mailto:jeffc@wrn.org).

Proceedings of the 1995 International DAB Conference may be purchased from IBC Technical Services, telephone: 44-171-637-4383; fax: 44-171-636-1976.

## US Air Force Big Band Plays AES



**NEW YORK** Imagine four days of cutting-edge audio technology underscored by a nostalgic tribute to the music of 50 years ago.

This may sound incongruous, but the two will complement each other perfectly at the 99th Annual AES Convention when the Glenn Miller Army Air Forces Orchestra performs a 90-minute concert in the Special Events Hall of the Jacob K. Javits Center Saturday night, Oct. 7, at 6 p.m.

The Air Force has recreated the band

in honor of the 50th anniversary of its formation by composer/bandleader Glenn Miller, and features the Air Force Airmen and Strolling Strings in period uniforms. Classic Glenn Miller selections will be included in the program.

The entertainment at the AES Convention will be as diverse as the topics covered in the workshops.

Even before the first session is called together, the Sony IMAX Theater will be the sight of the AES Reception Thursday night, Oct. 5, at 7 p.m. Attendees will

experience a major advancement in 3-D sound with the IMAX Personal Sound Environment (PSE) while viewing the stunning visual effects on the 80- by 100-foot IMAX screen.

Two special events are also planned for Friday, Oct. 6. The opening ceremonies and reception begin at 11:30 a.m. with producer Phil Ramone as keynote speaker. Friday evening will feature an organ concert at St. James Episcopal Church in New York City by Graham Blyth, technical director of Soundcraft Co.

its particular focus.

Noah Samara of WorldSpace spoke of the way his system could transform the lives of four billion people in the developing world who now have no radio or rely on poor reception of distant short-wave stations. On the other hand, Hanspeter Kuhlen of the Archimedes Mediastar project described the provision of radio along with advanced multimedia

**"Success strongly depends on cooperation between broadcasters and manufacturers."**

— David Soothill, SBS Australia

nations. The United States is expected to adopt an in-band system that will not require reallocation of radio frequencies and change the tiered approach to broadcasting.

### Attack on United States

He called the U.S. action "an impediment to the successful implementation of digital radio worldwide." He also said that the lack of any strong interest in DAB by major receiver manufacturers can be blamed on the lack of any DAB market in the United States.

Following on from the U.S. position, much discussion focused on the positions of public versus commercial radio stations, with strong feelings from Quentin Howard of the U.K. independent sector that DAB was designed "by public broadcasters for public broadcasters."

Pointing out that after years of struggle to get the right to have their own transmission facilities, Howard said commercial radio now would have to join with others to be in a DAB multiplex. That

services to the developed world.

Continually, discussion returned to the central issue of when receivers might be available

"We want sets on the market, at a realistic price, sooner rather than later," said Witherow.

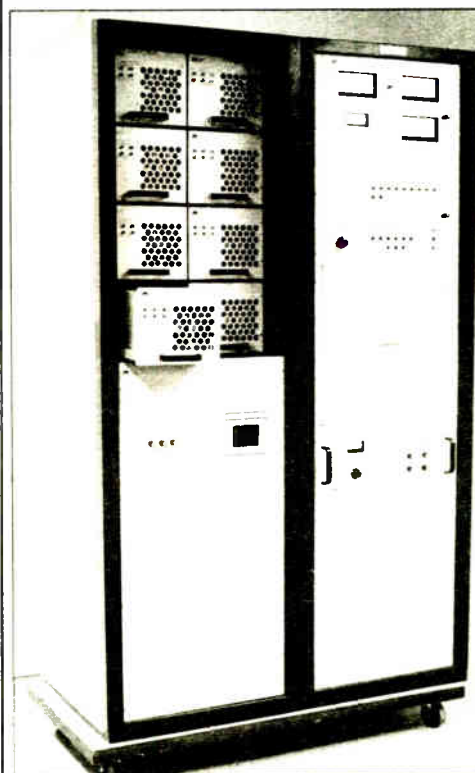
"Manufacturers have presented a rather defensive time schedule, and it's surprising, as they have been in Eureka-147 since the start, that we have this chicken and egg situation," said Christer Grewin of Swedish Radio.

"The success of the system strongly depends on cooperation between broadcasters and manufacturers," said David Soothill of SBS Australia.

"The clear commitment of manufacturers is critical to the successful introduction of DAB," said McEwen. "It's shocking that manufacturers have not now got receivers ready. Each of you go home and lobby your receiver industry."

The conference appeared to strengthen the resolve of many broadcasters, many saying they would now rapidly move

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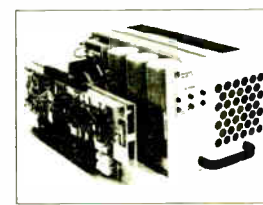
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# AES Exhibitor Directory



*Here is a listing of companies who will be demonstrating and displaying their products at the Jacob Javits Center for the AES Convention October 6 through 9:*

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continued on page 38 ►

## Workers United For AES

by Alan R. Peterson

**NEW YORK** A restructuring of the labor force at the Jacob K. Javits Center in New York City — intended to root out mob corruption — has created a number of positive changes in the center's management and attitude.

These changes are evident in the degree of cooperation the Audio Engineering Society (AES) has experienced in preparing for the 99th AES Convention to be held Oct. 6-9.

AES Co-chairman Ham Brosius commented in a recent press release, "Everybody is bending over backwards; it seems that everybody's looking forward to walking into Javits with a relaxed feeling as opposed to 'steeling' for the inevitable conflicts of the past."

In a July 7 story, the New York Times reported the installation of an innovative system in the Javits Center; administrators replaced the union force with workers hired instead as New York State employees. In eliminating the former work force, a costly and confusing arrangement of work requirements disappeared with it.

Under the previous system, the trade unions were uncooperative: carpenters would not adjust rugs, carpet layers refused to move power cables and a dozen men were needed to unload one truck.

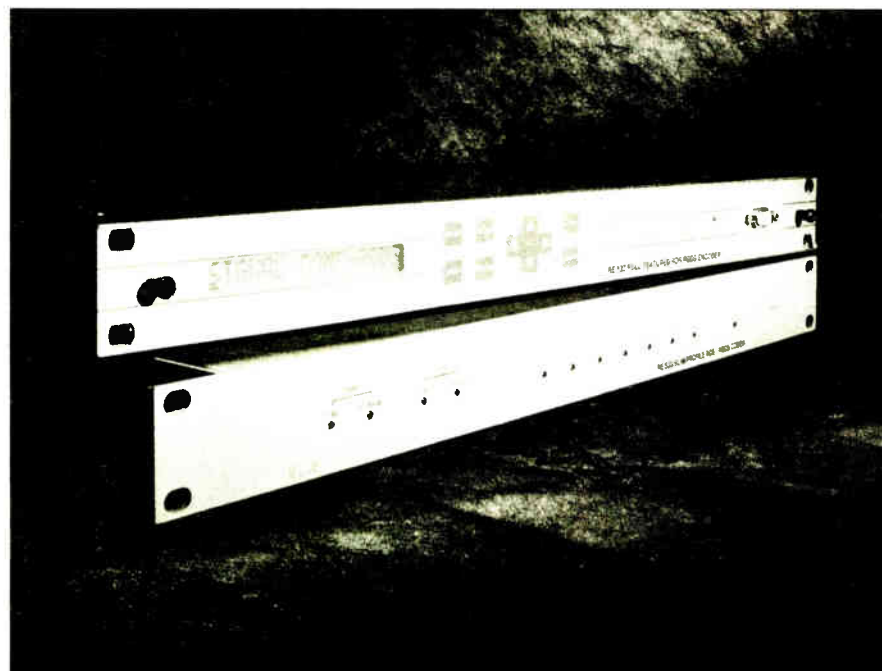
Center officials said the old system drove up costs, especially in overtime, and actually sent conventioners away.

Under the new system, the non-unionized trades are able to intermingle skills. Rug layers can hang drapes on tables and carpenters can move cables and adjust rugs. The new procedures recently weathered a satisfactory "shakedown cruise" during the International Fancy Food and Confection Show at the Javits Center.

According to AES Co-chairman Russ Hamm, "Labor costs have been reduced by 50 percent. It's user-friendly and it seems to be working."

Attendance for the 99th AES Convention is expected to be between 15,000 and 20,000.

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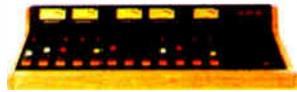
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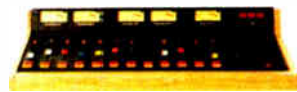
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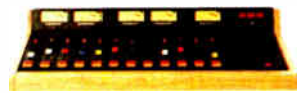
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# Running Radio

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Organizing  
Those Creative  
Promotional Ideas  
page 27.

## MANAGER'S NOTEBOOK

### Use Hindsight to Craft Future Plans

by Sue Jones

**BURKE, Va.** Now that the year is nearing the end of the third quarter, it is the usual time to evaluate what went well this year and what should have been better.

There is always room for improvement as you fine-tune next year's planning. The following are some key areas to evaluate.

#### First considerations

Revenue and budget are always the first considerations. Did you meet your revenue objectives and projected profit margins for each quarter and the year? If it appears that you will meet your annual goal but the quarterly revenue was high for two quarters and lower than projected on the other two quarters, some analysis is needed.

It is important to look at the high-revenue months and quarters as well as the low ones. The idea is to lock in on what works well in your station in your market and what needs change for next year. Check the station promotions for the high and low quarters. Which promotions had the most impact for your station: remote

broadcasts, celebrity appearances, station-sponsored concerts and events, promotional giveaways, or jock appearances?

Did you listen to the listener comments and suggestions when they wrote or called the station with compliments or complaints? If a new jock bombed out in your market, look at all the possible reasons why it may have occurred.

Evaluate the impact of advertising for trade in your area. This may be a tool that your sales staff can implement with some guidelines that could introduce a new client to radio advertising as well as provide premiums for the station. The client's improved revenue and profit will help that client realize the power of radio advertising and the impact on the business.

#### Power of radio

Once that is understood, the client will most likely make advertising a standard budget item for the company and there will be budgeted money for future advertising. Because your station was a business partner in their development phase, these companies will most likely place those budget advertising dollars with your

station as their revenue and profits grow.

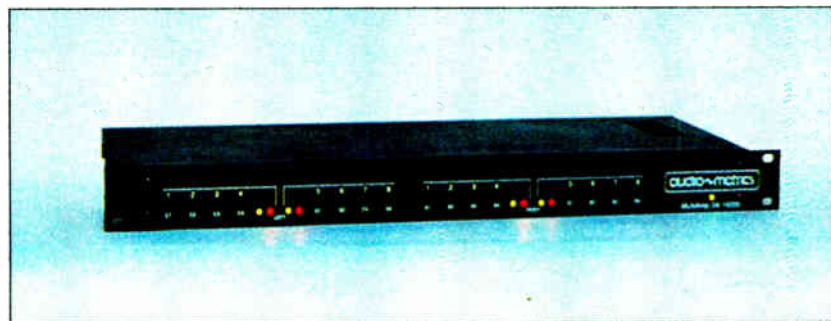
Check major repairs or equipment additions. Evaluate your routine equipment maintenance. Reducing the routine main-

tenance budget may appear to be a good place to make up budget dollars and improve the margins, but you could be setting yourself up for far more costly repairs in the near future.

The leaky pipe in the lunch room may burst or leak enough water to rot out wood flooring or soak carpet that will  
continued on page 27 ►

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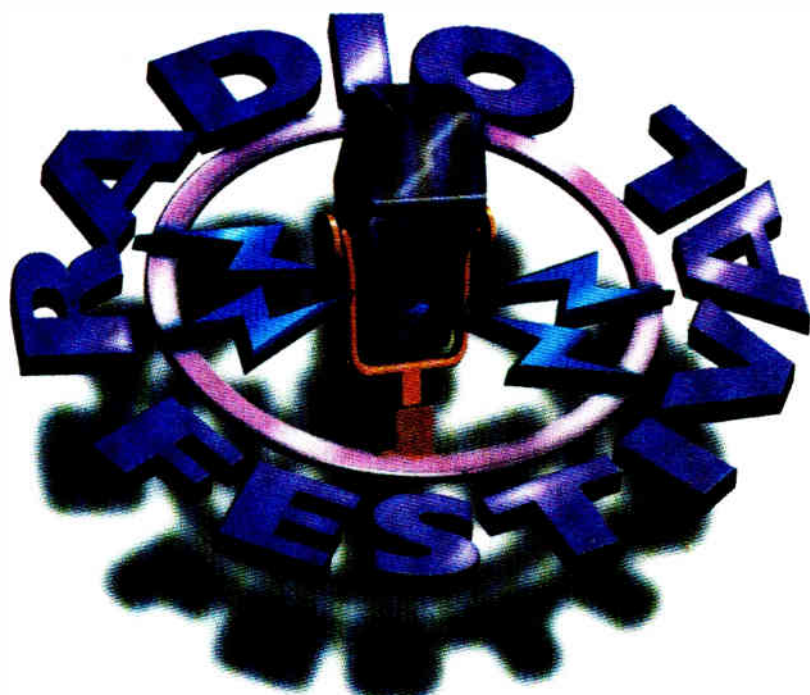
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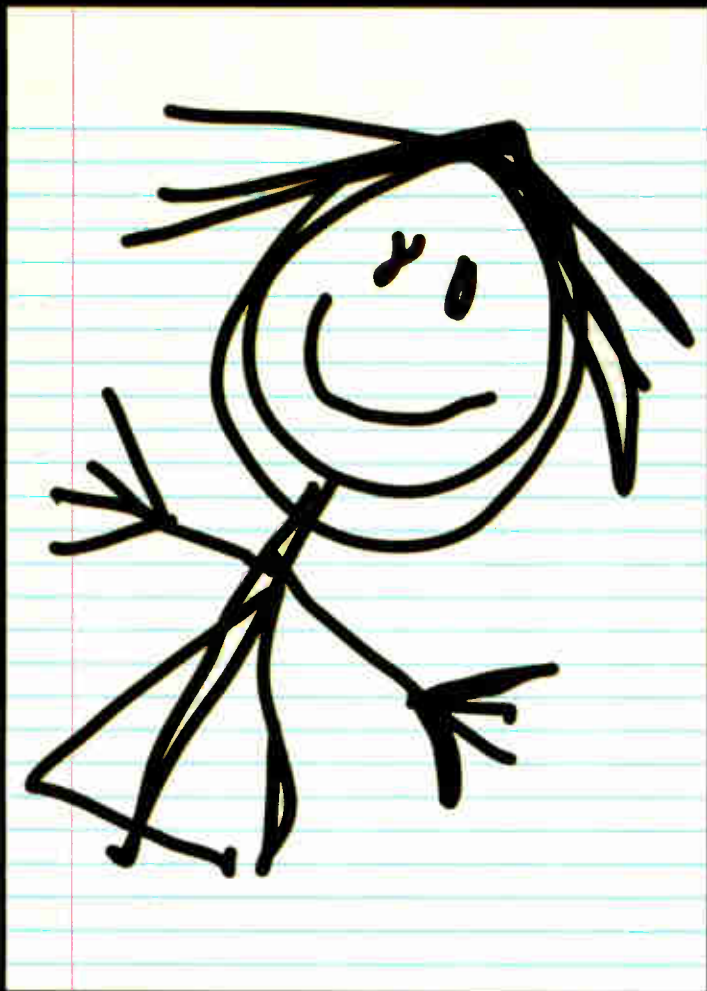
**NEW YORK** In celebration of the 75th anniversary of radio, the Museum of Television & Radio (MT&R) in New York will launch its First Annual Radio Festival this fall.

From October 23 to November 3, the festival will celebrate radio from its earliest days to today, and present a number of seminars, workshops, reunions and live broadcasts from the MT&R's in-house radio studio.

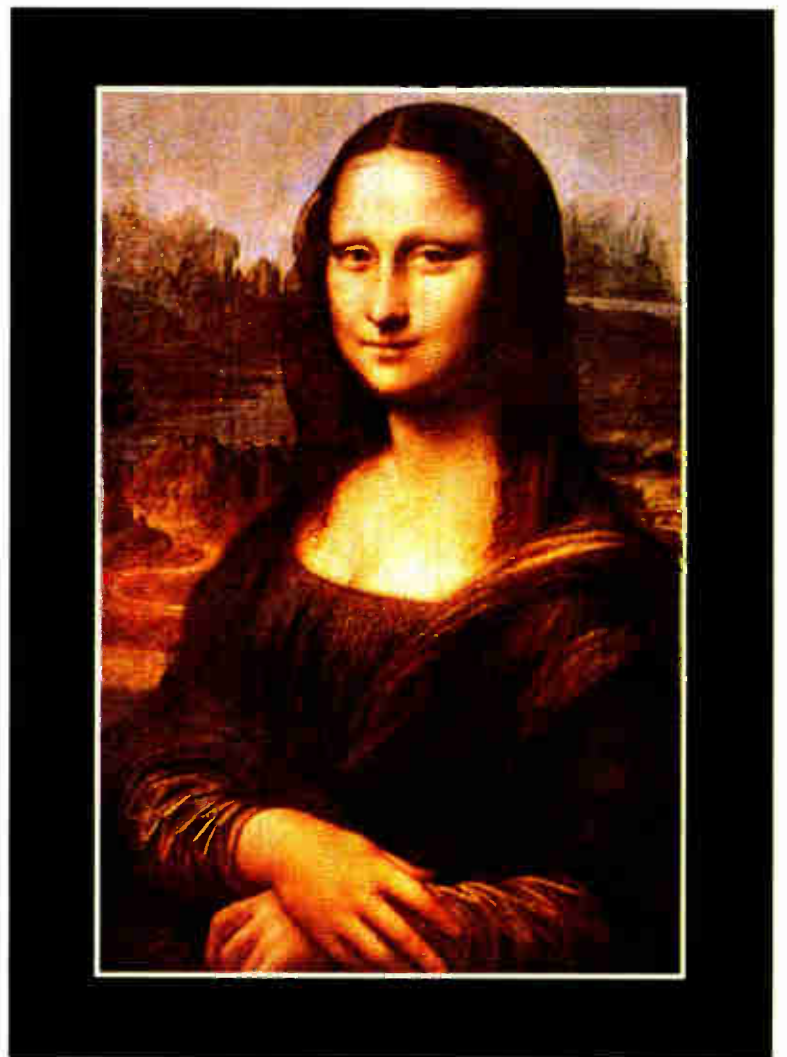
Seminars on Talk Radio will include popular figures such as Rush Limbaugh, Dr. Laura Schlessinger, Barry Farber and Charles Osgood. Other sessions include talks with Casey Kasem, Garrison Keillor and legendary New York deejays.

Live shows originating from the museum's radio studio will be broadcast over KDKA(AM), Pittsburgh, KMOX(AM), St. Louis and WABC(AM), New York.





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## PROMO POWER

# File Away Ideas for Future Promotions

by Mark Lapidus

**WASHINGTON** Over a drink at an NAB convention a few years ago, a general manager I had just met confessed that he didn't know what qualities made for a great promotion director. He was interviewing candidates for an opening in what he considered to be a poorly run department.

His first question was a good one: Do the best Promotion Directors have to be creative people?

It's easy just to say "yes" to a question like that, but the truth is far more complex. I know lots of promotion people who will blow you away with their creativity; on the other hand, they may be totally disorganized and might not even consider other people's concepts.

The not-so-creative-but-highly-successful people, however, often utilize the brainstorming techniques I discussed last

month (RW, Aug. 23).

Many of the best promotions people, creatively oriented or not, learn how to gather information and store it in an organized fashion. Building a promotion archive is a surefire way to be a success.

## Local print media

Never ignore the obvious! Begin building your event archive by exploring the local print media. Start with the daily newspaper and local magazines. Cut and copy (newsprint fades fast) notices of any event that seems interesting. Many newspapers run event calendars or a weekend section that lists the week's events.

When you spot competitors' logos in print ads for events, cut out the advertisement. You may decide to target the event later. They already understand the power of radio and may look for another partner next time around. It is too late to get involved with many activities by the time

you see them this year ... but next year is a different story.

File clipped articles by the month when an event occurs. That way, when you plan next year's calendar, access is simple.

Are you on the mailing list for every major non-profit organization in your community? If not, it is time you sent out a form letter requesting their newsletters.

Are you a member of every frequent listener club offered by other radio stations in your market? Join today — using your home address — and learn what your competitors view as important. You may want to steal one of their activities or ideas for next year.

## Books, books, books

Get copies of Chase's Annual, The Farmer's Almanac and The Yellow Pages. Every promotion department needs books that list important national events and phone numbers. Plan for national pizza

month! Get the phone number for the National Ice Cream Association!

Trade publications (like RW) are jammed with ideas for contests, activities, sales promotions and more. Be certain to copy the articles you like.

If you have a consultant, you should be receiving lists of promotion concepts at least once per month. The key is filing them so you can later retrieve them. Again, take an approach where you file items according to the month where the activity works best.

Computer bulletin board system (BBS) operators have discovered that posting updated information about what's happening in your town means more customers and more time spent on-line. The more time people spend on-line, the more money they make. It is similar to TSL for radio stations.

Every on-line service, from America Online to CompuServe to local BBSs, make a lot of detailed information available for your computer to capture. Print out anything of interest and file it.

Communicate with your staffers. I have said it before and I am sure I will bring it up again. Never underestimate the ability of your staff to contribute ideas. Your receptionist may come up with the best promotion your station will ever do.

## Spot trends

Two or three times a year, send out a one-page form letter requesting each staffer to tell you what they think is hot in your city. One question might be: What major events should our station be involved with next year? Another could be: What the hottest club right now in our town? You may spot trends.

Alert each person to the fact that you would appreciate their letting you know about activities they think are major. It is important to have many sets of eyes and

continued on page 36 ▶

## Hindsight Helps Planning

▶ continued from page 25

need to be replaced, and the total repair bill will be more than correcting the faulty plumbing. Skipping routine maintenance at the transmitter site may cause off-air time or require the purchase of pricey equipment that may have lasted several more years with proper care.

This could be a make-or-break situation for new owners/managers or when you have just switched format and the revenues have not built up to the projected amounts. Look at the ratings per quarter and the impact they may have had on the advertising revenue. Did you pay for the services of a radio consultant and did you receive the increases in the ratings as a result of implementing the recommendations?

## Satisfied?

If you are not satisfied with the ratings improvement in your target demographics, consider using another consulting firm. If you choose another consultant, ask for the phone numbers of other general managers whose stations have increased their ratings by implementing their recommendations.

Most important, check your staff. Salaries and staff costs are probably one of your largest budget items. How is the staff performing against position requirements and meeting goals? Look at the whole staff and not just the sales staff.

Do you have a high staff turnover rate in one or more areas? If half of the staff had to be replaced over a year's period, the recruiting, hiring and orienting of new staff is costly and affects the bottom line. How is the morale? Remember, your staff is your most important asset. If one or all of them are performing below expectations, the solution is to find the underlying cause and correct it. Replacing a person or number of people will only temporarily resolve the problem until the same problem affects the new staff member(s).

The best solution is to make a list of the things that worked well and do more of them. There is no guaranteed method for resolving specific problems. Now you have to evaluate the weak areas and make a list of those things that could have gone better and find workable solutions.

Look at your most costly but greatest potential asset, the staff, and find ways to help motivate them to more productive performance. Money incentives work best and there are several ways to tie bonuses to individual and group performance. Consider some of these possibilities.

Provide quarterly incentives to all department heads or the whole staff for completing tasks within or under budget. This is a good tool for getting the whole staff involved in watching costs. You may consider giving a bonus to all members of a specific department if they reduce their costs by 10 percent per quarter. If they keep the performance up for the entire year, they will have reduced the department's costs by 40 percent.

Work through the numbers. The exchange is well worth it. If you gave

five staff members a \$100 bonus each per quarter (\$500 a quarter, \$2,000 a year) and they saved \$10,000, you are still ahead of the game. Each employee is motivated to find other ways to save money/costs and feels like he or she is making a contribution to the station's well-being and his or her long term employment objectives.

If you do not want to use cash as the incentive, consider using trade, such as dinner for two at one of your client's restaurants. You will have gotten double/triple the benefit from that trade deal in targeting and gaining new advertisers, reducing costs and motivating your staff at the same time. That is managing smarter for optimum performance.

□ □ □

*Sue Jones is a senior manager for Computer Data Systems Inc. in Rockville, Md. She can be reached at 703-323-0491.*

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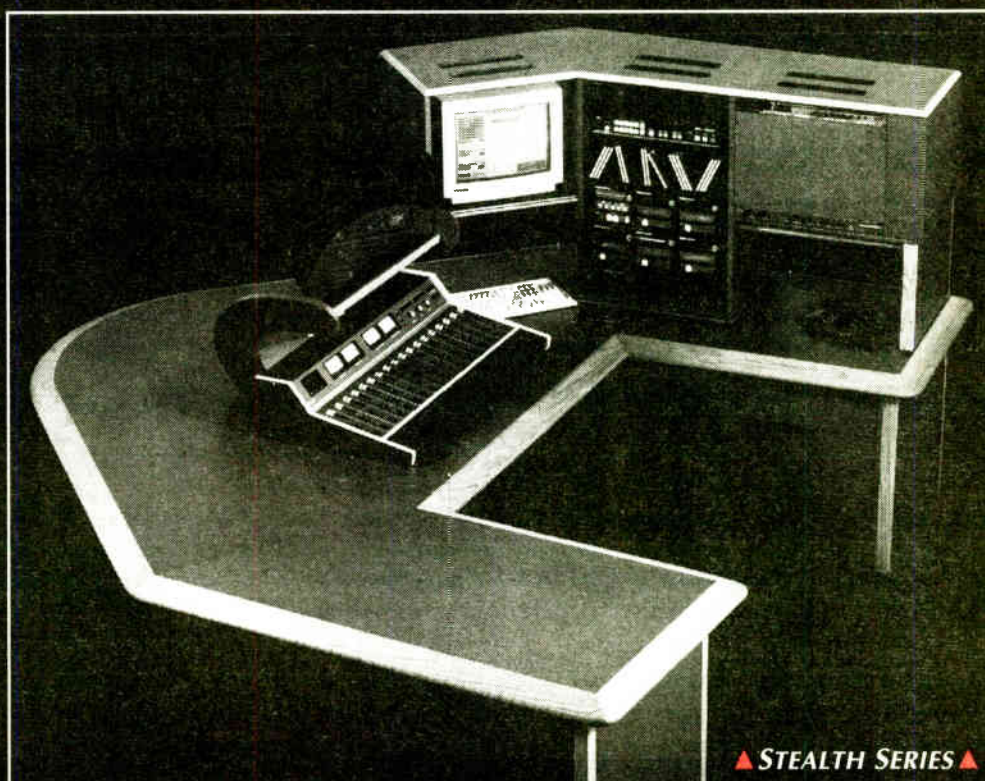
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# Archeology Digs Up New, Old Ideas

by Gordon Govier

**MADISON, Wis.** The cable car from the Dead Sea up to the mountaintop ruin of Masada takes three to four minutes. That was the amount of time I had to figure out how I was going to find someone I had never met before, who had agreed to do an interview with me.

His name was Vendyl Jones. And unlike many of the archaeologists I had inter-

where the Dead Sea Scrolls were found. In fact, he was using details from the Copper Scroll as a kind of treasure map to direct him to what he was sure were hidden artifacts from the Jerusalem Temple destroyed in 70 A.D. Among the treasures, possibly, the Ark of the Covenant.

When I called to confirm our interview, he said he was going to be gone the next day, taking his excavation volunteers to Masada for a field trip. Since Masada was also on our itinerary, I suggested we try to meet there. He agreed.

I had once been an excavation volunteer myself. In 1978, I convinced my news director to give me leave for six weeks in Israel. I found out that archaeology requires a lot of physical labor plus an exhaustive knowledge of ancient history. I decided to stick with radio news.

Four years later I switched news jobs, from Top 40 to an inspirational format station. I soon realized I had an opportunity to combine radio news and archaeology in a unique interview program.

I began a weekly series of 15-minute discussions with Dr. Keith Schoville of the University of Wisconsin Department of Hebrew and Semitic Studies. We borrowed the name from a recent exhibition and called the program *The Book & the Spade*.

Schoville was also the president of the Madison Biblical Archaeology Society. Soon we began inviting guest speakers from the monthly meetings into the studio to talk first-hand about their own work.

Our first guest was Gabriel Barkay,

whose excavations had turned up the oldest scripture passage ever discovered, a 7th century B.C. blessing from Deuteronomy. It was inscribed on a rolled-up silver amulet found in rock

**I found out that archeology requires an exhaustive knowledge of ancient history. I decided to stick with radio news.**

tombs on a ridge overlooking Jerusalem. He returned to the program several times, once discussing his investigation debunking claims that the Garden Tomb was the burial site of Jesus, instead of the Church of the Holy Sepulchre.

Our program does not encourage controversy, but the format gives advocates of various positions a chance to discuss their experiences, theories and conclusions. Consequently, we have aired a wide variety of views on the Dead Sea Scrolls. During the Persian Gulf War, we talked with a number of scholars about damage done to ancient sites in Iraq, and the loss of a whole summer of Middle East archaeology as the war clouds scared off volunteers.

For big breaking news, sources are usually just a phone call away. Earlier this year I interviewed Kent Weeks about his discovery of the tomb of the

sons of Ramses II, right after his news conference at the Explorers Club in New York.

The Executive News Service on CompuServe helps me keep tabs on what the wire services are reporting about archaeology. With e-mail I also receive news lists used by archaeologists. The occasional visit to the Middle East and

the assistance of the Israel Government Tourism Ministry have also been helpful. Audio recorded on-site for the program can sometimes be converted to a soundtrack for slide presentations to churches and civic groups.

On our 1992 visit I brought back eight weeks worth of program material, including the hastily arranged two-part interview with Vendyl Jones. When I got to the top of Masada, I decided to go clockwise, against the flow of the tour groups, and within minutes came upon a man with a Texas twang lecturing a group of young volunteers. It was Jones, and he had plenty to say.

□ □ □

Gordon Govier produces "The Book & the Spade" for WNWC(FM) in Madison, Wis. The show is also heard on WBRI(AM) in Indianapolis and KNWS(AM) in Waterloo, Iowa. His e-mail address is scribe@xc.org.



Author Gordon Govier (l) with Vendyl Jones

viewed for my Book & the Space program, he seemed to relish the swashbuckling image of the profession portrayed in the Indiana Jones movies. In fact, some of the stories circulating about him suggested more of a connection between the real Jones and the Hollywood Jones than just their last names.

We were on a tour for our listeners to visit locations in Israel and Jordan that are discussed on the program. Shortly before we left, I spotted a news item about Jones' alleged discovery of 2,000-year old incense from the ancient Jewish temple in Jerusalem. I called the Dallas-based headquarters of the group mentioned in the article and got a phone number to call in Israel.

Jones was based at a kibbutz near

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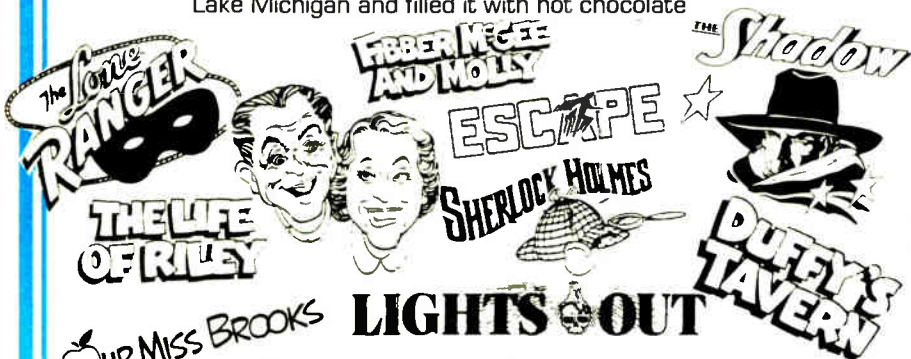
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**LOS ANGELES** Media Marketing Technologies (MTech) introduces RadioPOLL for general market release. RadioPOLL is a unique system that allows radio stations to realize the full potential of listener call-in surveys with greater reliability and speed than ever before. Previously offered only to select stations, RadioPOLL will now be available to subscribers nationwide in a virtually on-demand mode, allowing stations to set up polling as programming needs arise.

RadioPOLL reports audience reaction to late-breaking news, hot issues, political opinion and even the latest movies and songs hours and even days before competing media.

RadioPOLL is easy to set up through Media Marketing Technologies' interactive telephone system, and listener opinions can be accessed within minutes of the poll's introduction. Stations simply call at least two hours in advance, enter their fax number and receive their polling lines. Each station is assigned two toll-free numbers which listeners call to vote. At requested intervals (usually every 15 minutes), tallies are faxed directly to the studio. The final results, sorted by local exchange group, arrive at a pre-designated time before the end of the program.

RadioPOLL is an exclusive product of Media Marketing Technologies, a Ceridian company. For more information, contact Laurie Peters at 310-306-4125; or circle **Reader Service 61**.

## Video and Movie Minutes

**NEW YORK** Sound & Stations Inc., today signed an agreement with Joanna Langfield Productions to exclusively syndicate, domestically and internationally, the successful "Joanna Langfield People Report," "Video Minute" and "Movie Minute." Heard throughout the United States and in five countries on more than 60 radio stations, Langfield, formerly on WABC and the ABC Radio Network, is one of the leading interviewers and movie critics on radio today.

Sound & Stations will begin syndicating the two-minute programs, which are all produced in New York, immediately. Media America will continue to act as advertising sales representative. In addition

to informative and entertaining reports on the latest movies and videos, as well as interviews with today's hottest entertainers. Langfield will be making herself available for on-air promotions, live remotes and specialty programming.

Sound & Stations produces and syndicates radio programming worldwide in cooperation with Radio Concepts International in Amsterdam, Holland. Currently, its programs and those it represents air worldwide on more than 100 commercial radio stations in the United States, Latin America, the Caribbean, Canada and Europe.

For more information, contact Greg Raab at 214-756-6600; or circle **Reader Service 199**.

## Market Smarts

**DALLAS** The USA Radio Network enhanced its investment analysis and market insight with the addition of "Market Wrap" with Joe Battaglia. Now airing on USA Star 2 live at 4:32 p.m., ET, for two minutes Monday-Friday.

Joe Battaglia provides an up to the minute look at the financial and hard money markets. His analysis is based on current events and timely wire service reports. He is a nationally recognized analyst, a nationally syndicated talk show host for the past 10 years and has achieved a series of honors and successes.

This two-minute feature focuses on current political and economic affairs, daily happenings on Wall Street, hot stocks and precious metals.

As a lawyer/financial analyst and talk show host, Joe has a wealth of experience and background which enable him to cover a broad spectrum of events and affairs affecting Americans today.

For information contact USA Radio Network at 800-829-8111; or circle **Reader Service 216**.

## Ten New CDs From FirstCom

**DALLAS** FirstCom Music released 10 new CD volumes into the Sound Designer II Production & Scoring Library. Categories include Holiday/Seasonal, Underscores, Inter-Urban, Specialty, Country, Rock and Promo/Commercial.

Pulling talents from more than 60 superstar composers and over 600 top

musicians, Sound Designer II guarantees depth, variety and quality-and constant updates flow into your library covering everything from the London Philharmonic to chainsaw guitar.

The library is sorted into 10 color-coded, quick reference categories, ranging from Rock and Specialty to Holiday/Seasonal to Dramatic.

Sound Designer II is one of five libraries available through FirstCom's Custom Production Library which allows clients to pick and choose CDs to fit their production and budget needs.

For more information contact Andrea Bergeron at 800-858-8880; or circle **Reader Service 17**.

## Christian Country Grows

**PHOENIX** After extensive studies of potential formats by an independent research firm, KHEP Phoenix has adopted the Christian country format, and is now programming the Morningstar Radio Network's "High Country" format approximately 15 hours daily (including drive times).

Morningstar's syndicated satellite service continues to grow in all parts of the country as J. Richard Lee's Eagle Radio Group also adds the Network's "High

Country" format. Mr. Lee, best known for his long time work as a Christian program agency, broadcasts "High Country" on WCRO Johnstown, WRDD Ebensburg/Altoona and WNCC Barnesboro.

For additional information, please contact Michael Stephen Miller at Morningstar Radio Network at 615-367-2210; or circle **Reader Service 64**.

## New Sound At Great Price

**RICHMOND, Ky.** The Instant Production CD is a license-free recording production studio on disc. It contains 50-plus minutes of music featuring traffic, weather and news music beds; 10-plus segues, 10-plus sweeps, fanfares, New Age music, Hip-hop, rock and even a track titled Omnidrone which is a low D, flanged, perfect for montages that need that certain something.

The \$50 disc has no license restrictions. All rights are waived. Buyer's receive a free subscription of the Frugal Producer newsletter. It contains hints for production, reviews of Sound Thinking products, an even a recipe column.

For information on the Instant Production CD, call Sound Thinking at 606-623-9560; or circle **Reader Service 174**.

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# Not Every Commercial Is Tuned Out

## Part II

by Ty Ford

**BALTIMORE** There is a new reality in radio advertising. The fast-moving '80s are over. Hit by the cooling effect of the economic downturn of the '90s, advertisers are looking for more economical ways to reach their target audiences.

In some cases, this means clients are severing long-term relationships they have had with advertising agencies. In an effort to keep the business, many ad agencies are reducing their costs by sending copy to be produced at the stations.

Radio station sales departments, frustrated by dealing with entry-level ad agency media buyers, are sending their sales staffs direct to the client, circumventing the ad agencies.

### Sorry shape

As these skirmishes play out, what is not being talked about is the sorry shape the art and craft of radio commercial production is in. We are blowing it. Too many of us have become so deaf to the problem of bad commercials that we no longer hear them as a problem.

The signs, however, are there, the most obvious of which is the way radio stations have been down-playing their own commercial inventory. "Commercial-free" hours and weekends send an all-too-obvious message to the listener that the radio station itself acknowledges that commercials are bad.

The truth is that, while some listeners will always vote against commercials, if handled properly, commercials can be integrated with programming. We just

need to pay a lot more attention to the finer points of effective communication.

The problem there is that too many people do not have the knowledge or foresight to do what needs to be done. If you are one of those people, you probably have decided that what I am saying certainly does not apply to you or your station.

### Platinum star

If you really have reinvented your entire continuity and production departments, establishing policies that protect your listeners from burn-out, repetition rates and cliché-ridden (the term itself a cliché) copy, you get a platinum star on your report card. You too may have seen the

## RADIO spots

wisdom of radio before the '80s.

In that era, radio management valued employees who could write, produce and perform. The writing, production and performance of radio commercials were a service radio stations offered or sold to their advertisers.

Although ad agencies existed early on, they were relatively small in number by today's standards. The evolution of ad agencies and commercial production facilities did not happen until independent recording studios entered the market and until clients became convinced that an advertising agency could produce a higher quality spot that was more effective.

At that point, radio began to lose direct

control of the advertiser to the agency.

Strategically, radio stations should be able to profit from the down-pressure put on ad agencies today. However, because of the economical factors I mentioned in the first installment of this series, many stations are not in a position to take back the control.

In general, stations are trying to figure out how to do more with fewer people. Some are succeeding, but in many cases they are blowing out the very people they need to service the client properly.

There is another difference. The hiring requirements for talent and production people have not been demanding enough. So you have people on the air who can read cards, push buttons and stick to the format, but getting much more than a very basic "read" out of them is impossible. So while the potential for radio stations to take back the power is there, many stations simply don't have the people to do the job.

### Tougher choices

Finally, the job of advertising has become much tougher because differentiation among products and services gets more difficult as the number of players increases. At the point at which differentiation becomes too difficult, a price war usually begins. That is where too many advertisers are now. The challenge, then, is in redefining and re-tooling advertising in ways that will be listened to and believed.

Of course this tosses the problem back in the laps of the clients, for they are the ones that have to position their products and services apart from their competition.

Clients who try to sell the same old stuff (with the new spin) will get the listener once, but not twice.

The smart radio station is already doing everything it can to help clients rediscover what makes them different. The first step in that journey is to remove the inbred and misleading copy and bogus offers. As broadcasters continue to clean up the commercial landscape, they help themselves, their clients and their listeners. Remember: Radio does not sell air time, it sells access to its listeners. Without the listeners, you have nothing to sell. The more you know about why listeners tune out, and the more you do to prevent it, the more profitable your station will be.

Next time out I will get into the specifics of Active and Passive Tune-out and how each one eats away at your TSL and your profit.

□□□

*Ty Ford has an attractively priced three-cassette box-set of the almost two-hour long session from NAB '95. He may be reached at 410-889-6201 or Tford1010@aol.com.*

*At NAB '95, Ty Ford was commissioned by NAB to present a paper titled "Better Profit and Ratings from Better Copy and Production." The paper was based on the concept that better management of the most dangerous part of a station's air sound — spot breaks — will result in reduced active and passive tune-out. By reducing tune-out, the station gains quarter hours and cume. With better ratings, the station can charge more for its spots and thereby increase revenues.*

*Part I dealt with the conditions that have placed radio in the predicament in which it now finds itself. Subsequent parts will concentrate on how to identify and fix the problems.*

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# Multilingual Radio in the Canadian North

by James Careless

**YELLOWKNIFE, Northwest Territories** Broadcasting in the Arctic conjures up the stereotype of faint radio signals travelling across vast frozen plains dotted with igloos and polar bears. Like all stereotypes, there is some truth behind this image. The Canadian North—which encompasses the Yukon and Northwest Territories and the far north of Québec—is cold, at least in the winter.

It is vast, covering 3,862,199 square kilometers, or 39 percent of the Canadian land mass. It is also sparsely populated, with less than 100,000 people living in a series of small towns dotted across the wilderness.

## Remote, not backward

However, although radio broadcasting in the Canadian North is remote, it is not technologically backward. Computerized production facilities are in use at many of the larger stations. Nor is it less sophisticated than its southern counterparts.

In fact, given the numerous language groups and distances stations have to cover with low-power repeaters or via satellite, broadcasting is more sophisticated in the North.

So what is radio broadcasting in Canada's North really like?

First and foremost, there are relatively few stations trying to cover a large land mass and many language groups. Even more, there are relatively few stations trying to cover a third of Canadian land mass.

On the public side, CBC North serves the Arctic from regional production studios in Montréal; Whitehorse, Yukon; and Inuvik, Yellowknife, Iqaluit and Rankin Inlet in the Northwest Territories, as well as radio bureaus in Ottawa; Fort Smith, Northwest Territories; and Kuujuaq, Québec.

On the private side, 13 private and non-profit native-owned stations serve listeners. With the exception of the territorial capitals of Whitehorse and Yellowknife, which have two private stations each, all other private-served communities have just one.

Programming in the North often depends on who is doing the broadcasting, their mandate and how much money they have to spare. CBC North, for example, still has more resources than the other broadcasters combined, despite ongoing budget cuts.

CBC North uses these funds to produce more than 220 hours of programming a week in 10 languages, said CBC North Communications Manager Craig Yeo. More than half of the programming is in native tongues. The resulting program lineup mixes English-network feeds from southern centers like CBC Toronto with locally produced indigenous language programming.

Doing the job right is hardly easy, said Yeo. For instance, the Nunavut territory (the eastern half of the Northwest Territories, which will become a separate territory in 1999) is spread across three time zones, yet it is a single federal district.

Yeo noted that during a federal election, the polls close at three different times in Nunavut, a major difficulty for CBC as the law does not allow it to report election results until after all the polls are closed in a district.

Existing somewhere between CBC North and traditional commercial stations are nonprofit native-run operations such

as CHON(FM) Whitehorse and CKLB (FM) Yellowknife. Caught between serving the aboriginal (First Nations) population while also trying to bring in revenue through advertising, these stations feature both English-language announcers playing country music in primetime — interspersed with short native-language vignettes — and longer programs.

## Split personality

For instance, CHON, which operates at 98.1 MHz with 14 repeaters, broadcasts in Gwich'in, South and North Tutchone, Plingit and Kaska in addition to English. In trying to serve both mandates, "we

have developed and are developing a bit of a split personality," said Operations Manager Greg Komaromi. "We have one foot bound in tradition and the other foot firmly in the '90s."

"We try to be very First Nations-oriented and very First Nations-sounding and respond to what we know those listeners like in the morning," Komaromi said. "So between 07:00 and about 14:00 we program a lot of country music, and do a lot of First Nations local news and language spots."

After 14:00, CHON sounds "like any major market station" operating in English, with the exception of certain hours dedicated to solely native program-

ming like the Gwich'in language interview/phone-in show hosted by Ben Charlie on Saturdays.

When Charlie's show is on "the phones go crazy," Komaromi said. "It is about who has been in what community when, and who has been most successful out looking for caribou or fish. It is births and marriages and special events, actual hard news and then country music."

The final players in the region are English-only commercial outlets like CJCD(AM) Yellowknife and CKRW (AM) Whitehorse. Focusing on mainstream formats like rock and adult con-

continued on page 32 ▶

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# Radio in the Frigid North

► continued from page 31

temporary, they deliver a sound that is basically identical to stations in southern Canada, said Dick Peplow station manager of CJCD. In terms of format, "you could be sitting in downtown Saskatoon (Saskatchewan)."

In addition to trying to be all things to all people, northern broadcasters face other challenges as well.

Harsh weather is one of the biggest problems in the North, said Satnam Rai, general man-

ager of CKRW, whose main transmitter is located on Grey Mountain in Whitehorse.

"In wintertime it gets hard to access the transmitter site," Rai said. "Although the roads are maintained, it is just too cold to get up there where it is -40 degrees Celsius. If the heating system goes down or something happens up there, then everything comes to a screeching halt," he said, "and it is no fun to get the engineer and myself up there."

Another problem is one most

southern programmers would consider an advantage: There is very little competition for listeners.

Because there are so few broadcasters, northern programmers are forced to "cover everybody's tastes," Rai said. "So actually developing a music format is very hard."

One big challenge for the broadcasters up North is money, or the lack thereof. This is true both for CBC North and, increasingly, for the publicly-backed native stations.



Radios, Igloos and Polar Bears co-exist in the Arctic.

For years now, tight federal budgets and the national deficit

have resulted in severe cutbacks for the latter group, which is trying to make up the shortfall through advertising.

"There was a 16 percent cut in 1990, another 10 percent in 1992 and then we just got cut another 27 percent over three years," said Greg Komaromi of CHON. "We are looking at a C\$280,000 reduction in our grant funding over the next three years."

Tight finances mean that native stations also face another challenge: finding fluent speakers of aboriginal languages that are also good enough to go on-air.

"We try to get the best people available," said Craig Wallace, morning show host and production manager of CKLB(FM) in Yellowknife.

"Of course the government within the Northwest Territories has simultaneous translation in the Legislative Assembly. A lot of the top-notch people do translating work for the government," Wallace said, noting that the government can afford to pay these native speakers full-time wages, which CKLB cannot.

Interestingly, the English-language commercial stations are not facing a cash crunch, particularly in the Yukon, where economy-boosting gold and diamond explorations are underway. In fact, Dick Peplow of CJCD describes Yellowknife as "one of the few small markets in Canada that is turning a healthy profit."

All in all, the challenges of broadcasting in the North begin with the climate and landscape, but they go much further.

It is a hard market to serve because of the many different language groups concentrated in a small population base. Trying to make a profit from broadcasting here is not easy, unless you run a southern-style operation.

But broadcasters do not appear ready to pack up for warmer climes. If anything, they seem fiercely determined to stay on-air in the Canadian North because it is such a unique and interesting broadcast environment, and because these broadcasters are definitely needed in this land of few people and vast expanses.

□ □ □  
James Careless, an audio producer, covers the industry in Canada for Radio World. Contact him via e-mail at aa938@freenet.carleton.ca.

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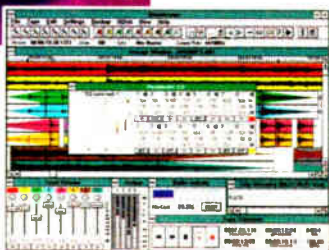
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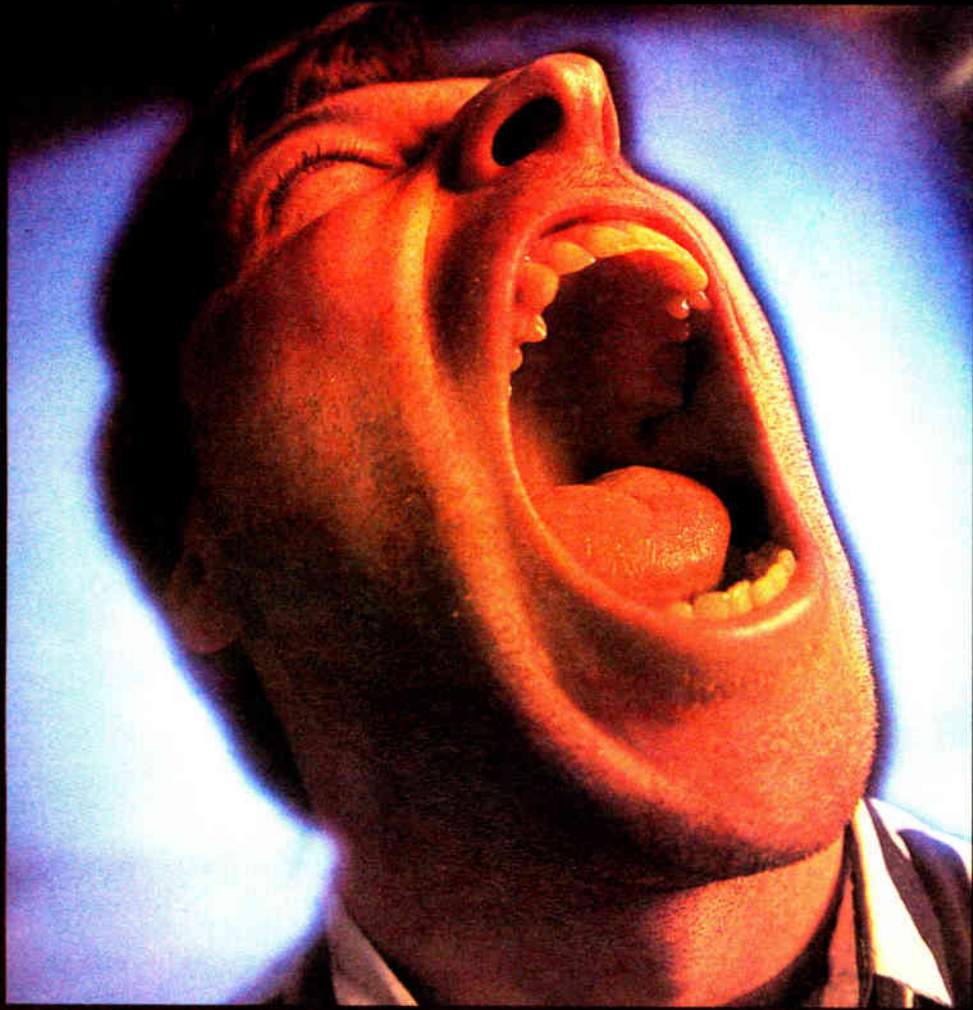


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# On-line Resources for Show Prep

by Alan Haber

**WASHINGTON** Well, here we are, post-NAB Radio Show, and boy are my arms tired! Yup, I took the Interstellar Projection Timewarper back to Haber Space from New Orleans — a veritable hop, skip and a jump from point to point. Unfortunately, the commercial U.S. airlines do not venture into my home in cyberspace, so I had to resort to other worldly means.

And I had to get back here fast, so I could put together a list of some of the cool (mostly music-related) links I have had the occasion to peruse since last we met (gee, has it been a month already?).

## Spicing it up

Well, it has, and even though I am still pulsating with excitement from the Radio Show (or is that from the local Nawlins cuisine?). I am ready to let you know about 10 Web sites you can use to spice up your morning or afternoon drive shows (or mess around in when work gets too much for you!).

I'll get to the mail next month. I promise. And I will resume with the Neat Site of the Month, too. (As always, make sure to contact each site if you are going to use material on the air!)

Now, on with the show!

- **Rockhall.Com.** (<http://www.rockhall.com>). Thanks to the Cleveland Plain Dealer, among other esteemed institutions, this site, presenting information about the Rock and Roll Hall of Fame and Museum, is on-line and kicking you-know-what.

What is here could certainly fill a museum: everything from song excerpts (in Real Audio, .au, and .wav formats) and artist bios, to facts about the Hall of Fame and even information on Cleveland. This is one of the nicest sites I have ever had the pleasure of seeing on the Web, and, in lieu of a Neat Site of the Month this month, this is the Coolest (Non-Radio) Site of the Month!

- **Mr. Showbiz** (<http://showbiz.starwave.com/showbiz/>). If Rockhall.Com had not come along and stolen its thunder, this site would have been Coolest (Non-Radio) Site of the Month. Here you will find everything your listeners want or need to know about showbiz. Movie and music reviews? They are here.

Articles to impart to your listeners? They are here, too. And do not forget the tabloid headlines, either. Very cool, indeed.

- **Top Hits Online** (<http://www.webcom.com/~dtobias/hits/>). What you get here is "a weekly survey of the favorite songs of the on-line community." Your morning show team might work with their listeners to vote for their favorite tunes on-line. The latest chart is available for viewing on-line either graphically or in text form (the chart for the week ending July 29, 1995 had - surprise! - the Rembrandts in first place with "I'll Be There for You," the theme from the hit TV show "Friends.")

From Top Hits Online, you can link to:

- **Hitlist: Music Charts Home Page** (<http://www.cas.american.edu/~todd/hitlist.html>). The Daily Internet Top 20

Hitlist is here, "calculated daily from 60+ current radio and personal singles charts on the World Wide Web, including yours!" as it is proudly proclaimed on the site.

You can link to various radio station charts (maybe even yours!). You will even find international charts, and HitPicks, an on-line chart game your air personalities can play with listeners. And, if you are not already overloaded on chart pages, then why not visit ...

- **.charts, UK Top 40 Singles** (<http://www.dotmusic.com/chcomm.html>). With incisive commentary by James Masterton, who used to provide this kind of service in an e-mail newsletter, this is a great site you can use to compare to your station's chart on-air. And, speaking of great, music-oriented sites ...

- **The Classic Pop World Wide Web Page** (<http://www.io.org/~buff/classic-pop.html>) may not appeal to all stations — particularly those playing, say, alternative or country — but this no-nonsense, fact-filled site offers many riches, including information about such artists as Desi Arnaz (The Victor Sessions) and Nat King Cole.

You will also find links to such sites as the 78 rpm Home page (<http://turnpike.net/metro/gherzens/index.html>) and the Frank Sinatra WWW Page (<http://www.io.org/~buff/sinatra.html>)

- **The WWW TV Themes Home Page** is located at <http://ai.eecs.umich.edu/people/kennyp/sounds.html>, but only temporarily — in fact, by the time you read this, this site will probably have moved. Check on-line at this address for the new link.

Well, suffice it to say, if the theme to your favorite TV show is not here, it probably isn't anywhere. And the site's Webmaster has graciously offered downloads of sound file players for those folks that do not already have them.

Your listeners will get a big kick out of this site, no matter their age or TV show preference!

- **Straight from the U.K.'s Daily Mail**



Newspaper, it is Jonathan Cainer's Daily Horoscopes, in Real Audio (<http://www.realitycom.com/raudio/raud.htm>)! He does tend to go on a bit, but your listeners might be interested in hearing what is in store for them, from across the pond!

- There may not actually be a good cul-

tural reason to have this site on this list, but here goes anyway: the Unofficial Moira Kelly Homepage (<http://www.sirius.com/~eaquino/Moira.html>) is about the same-named actress, and it is a doozy, design- and content-wise. Kelly is in a new movie, too — "The Tie That Binds" — so this may topical and useful, after all (but just don't be surprised if your jocks stare at the pictures!).

- I saved the biggest for last. And, when I say biggest, I mean biggest! It is ... (drumroll) ... the Gigaplex (<http://www.gigaplex.com/wow/>). The site claims that "A billion pleasures await you!" and they may not be far from the truth.

With more than 600 pages of information on-line, covering a variety of popular culture topics, you cannot miss this one for fodder for your on-air personalities.

For example, in the MUSICplex area, you will find a special feature on Rock Legends of the '70s, and a selection of interviews with rock icons. Interviews with Tom Hanks and Ron Howard about the blockbuster film "Apollo 13" are in the FILMplex area. Truly an amazing, useful site.

Well, that is it. I hope these sites do well for your station. Next month, in addition to getting to some of the e-mail piling up here in Haber Space headquarters, I will tackle some of the Net-oriented happenings at the NAB Radio Show.

Until then ...

□□□

Alan Haber can be reached at [zoogang@ix.netcom.com](mailto:zoogang@ix.netcom.com), or try him at 703-329-1380.

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# Good News, Nostalgia Liven's Morning

by Joanne E. Deaton

**FORT BRAGG, Calif.** Elmer Barney and Fred Vodicka, a couple of men in their 50s, have created a morning radio program called "The Good News Guys."

Fred and Barney co-host the program, which focuses exclusively on good news in the Fort Bragg/Mendocino communities and the surrounding area along the Mendocino coast of Northern California.

The program, which is unique in several respects, airs on 98.5 KSAY(FM). Fred and Barney are independent radio producers; they purchase air time from the owner of the station, Wade Axell. KSAY

benefits from the additional revenue and the popularity of the program with local listeners.

## Phenomenal success

"I made a written proposal to the owner," says Barney. "We would obtain our own sponsors and have total control over the content of the program." Axell is an advocate of "live and local radio." In just three months, the "good news" concept has become phenomenally successful.

The program is divided into three 20-minute segments with one sponsor for each segment. Fred and Barney promote their sponsor's product or service in a

comfortable conversational format that has the sponsors singing their praises.

Considering the state of the economy and the severity of the unrelenting winter weather, Barney, with his partner's assistance, was still able to sell the concept of good news and pick up 15 sponsors in less than 30 days.

"I discovered that my enthusiasm for the program and the prospect of hearing good news really appealed to the sponsors and the listening audience," says Barney.

Any resemblance to the Flintstones or Barney the Dinosaur is laughed off by the two men, who look forward to entertaining their audience with a mix of humor,

nostalgia and music from the 1940s, '50s and '60s.

Barney had the radio background and the idea for the program when he first approached his friend, Fred, in July 1994. The two knew each other from their days as fellow members of the local Fort Bragg Kiwanis Club. They found a local AM station owner who was willing to give them a time slot on his station. Paul Clark, the owner of KDAC(AM) and a local realtor with Century 21, was quite intrigued with the idea of good news.

Barney laughs when he recalls the initial foray into the market in September 1994. "We were on three days a week; Monday, Wednesday and Friday at 11:20 in the morning, following Paul Harvey News and Comment. There was one microphone for both of us that we had to swing back and forth, so the quality of the finished product was not quite

continued on page 43 ►

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## Filing Strategy

► continued from page 27

ears. You cannot possibly find everything yourself. Reward those who participate with freebies from the promo closet.

Every promotion department should have a catch-all "possibilities" folder. Put anything in this folder that is difficult to categorize. Trust your gut instincts on this one. These are the items you feel have value, but you're not yet certain how they fit into your future.

Review this folder quarterly, tossing out stuff that now seems useless. I have frequently used this file to store items I cut out of newspapers while visiting some other city. When I'm stuck, one of the first places I visit is my possibilities folder.

One former boss told me he hired someone based on the size of their Rolodex. Put every phone number you actually use in your phone book. Hopefully this list will be composed in an easily manipulated database.

### Filing tricks

A good filing trick is to file numbers by product name rather than contact name. You will find "Moon Bounce" under "M," because a year after you use the product, you probably won't remember the name of the company that rented it to you.

If you spend a lot of time out of the office, you might consider storing all these phone numbers in your datebook rather than in something on your desk. A few times a year go through your phone book and toss out numbers that are out of business or now seem useless.


The final trick is making sure source materials stay in your office. Once your staff learns how much information can be gathered from your books, files and Rolodex, you may have to keep them under lock and key.

And let's face it... if someone else wants to steal this stuff from you, it must have a lot of value!

□ □ □

Mark Lapidus is director of marketing for Liberty Broadcasting. Liberty owns stations in Washington, D.C.-Baltimore, Long Island, and Albany, N.Y., Hartford, Conn., and Providence, R.I.





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Yamaha Corp. of America

Yorkville Sound

Zonal Ltd.

## Ramone To Give Address

by Alan R. Peterson

**NEW YORK** Eight-time Grammy award winner Phil Ramone has been selected as keynote speaker for the 99th AES Convention. He will address the opening session at noon on Friday, Oct. 6, at the Jacob Javits Convention Center.

With the theme "Audio in an



Phil Ramone

Interactive World" setting the mood for the AES convention, Ramone is a particularly appropriate choice for spokesman.

Ramone is recognized as one of the most prolific and creative producers in the industry and is renowned for his work with Frank Sinatra, Paul Simon, Billy Joel and Gloria Estefan. He has consistently applied emerging technologies to achieve high degrees of recording excellence.

In 1994, Ramone was critically acclaimed for his work as producer on Frank Sinatra's "Duets I and II", landmark recordings of Sinatra with 29 other artists employing a ground-breaking fiber optics system (EDNet) to record tracks in real time from different locations.

His other innovations include the first use of Dolby optical surround sound for the 1980 Paul Simon movie "One Trick Pony"; the first use of satellite links between studios; and the first Dolby four-track discrete sound for the 1976 Barbra Streisand movie "A Star Is Born."

Ramone is currently working on "The Brian Setzer Orchestra," with Stray Cats member Brian Setzer accompanied by a full orchestra.

The AES convention is considered the pre-eminent event in the pro audio field and will feature over 100 technical papers and a dozen workshops.

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**Radio World:**

- Alesis Monitor 2
- Rode NT Microphone
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- Both the superior audio of Layer III and compatibility with installed Layer II-only codecs. Zephyr costs about the same as Layer II-only equipment.
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Zephyr's Layer III provides the best broadcast sound quality, and Layer II

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Zephyr includes an ISDN terminal adapter and our ISDN Telephone

mode even allows you to place a standard voice-grade call to a Plain Old Telephone Service (POTS) phone.

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Zephyr owners who want to add Layer II compatibility may send their units to Telos for the necessary hardware and firmware changes. The modifications are free; users need only pay to ship their units to Telos. We'll pick up the return cost.

In late August, registered users will be faxed a notice with complete program details. Not sure whether your units are registered? Fax us or send us e-mail to for registration forms.

All work will be performed by appointment. We'll schedule a convenient date for the work to be done and guarantee

to return your units four working days later. Work will include: changing required motherboard parts; installing EPROMs with new firmware, and giving the unit a thorough factory once-over.

Initial modifications for both Layer III and Layer II operation will add compatibility with most installed Layer II units. In the future, as Telos develops more compatibility packages for Zephyr, firmware exchanges will be offered at no charge and may be performed in the field.

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  - **Dual audio outputs for On Air and Cueing (DL2 has one)**
  - **Do On Air & Production from a single workstation !!!**

Digilink III is a *NEW* multipurpose digital audio workstation for Live On Air, Production, and Automation. Fully compatible with the #1 selling and industry standard Digilink II, the Digilink III has four times the raw processing power of the Digilink II and features a second audio output for cueing an audio piece while playing on air.

The triple play and dual output capability of the Digilink III makes it ideal for very sophisticated Live On Air operation -and- makes it capable of operating an On Air & Production studio from a single workstation. For fast and complex live on air applications, the DL3 can play 3 files at once so that you can lay down a bed, play a phoner, and drop in a sound effect at the same time. Or, you can be playing on air with crossfade while independently recording, playing, and editing a phoner.

A unique capability of Digilink III is its ability to operate two studios from a single workstation. The most common application would be to use one workstation for both on air and production studios. The DL3 is placed in the production studio while a PCAT computer running Arrakis remote control software is placed in the on air studio.

The production studio has complete single play-record-edit capability while the on air studio can independently use dual play for on air. While not a redundant system, it does provides a dual studio workstation solution for under \$11,000.

To make the DL3 even more easy to use for air, a 99 button Gemini control panel can be added to the system for only \$1,195. It places hundreds of carts at the jocks fingertips and the files assigned to each button change to support up to 40 different jocks. The Smart\*Record feature of the controller even allows you to record a phoner at the push of a button. The DL3 will automatically trim the front and end of the phoner, and then you just push the button again to play it to air. The Gemini control panel makes the Digilink III workstation fast and easy to learn and use.



*The 99 button Gem-6CC control panel places hundreds of carts at your fingertips for only \$1,195*



*The 22,000 series console integrates the 99 button Gemini control panel into an easy to use console*

The powerful Digilink III is fully compatible with Arrakis Digilink II and Trak\*Star workstations so that it may be easily added to an existing network.

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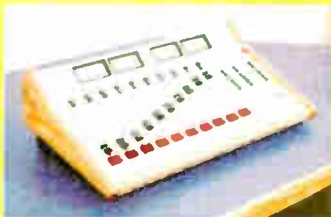
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## Audio Consoles

The stand-out #1 leader in reliable, high performance, digital ready consoles for radio, Arrakis has several console lines to meet your every application. The 1200 series is ideal for compact installations. The modular 12,000 series is available in 8, 18, & 28 channel mainframes. The 22000 Gemini series features optional video monitors and switchers for digital workstation control.

### 1200 Series Consoles



|         |            |         |
|---------|------------|---------|
| 1200-5  | Five ch    | \$1,795 |
| 1200-10 | Ten ch     | \$3,495 |
| 1200-15 | Fifteen ch | \$4,995 |

### 12000 Series Consoles from \$3,995



### 22000 Series Consoles from \$6,995



## Digital Workstations

#1 in digital workstation sales, Arrakis has over 1,600 workstations in use around the world.

As a multipurpose digital audio record-play workstation for radio, it replaces cart machines, reel machines, cassette recorders, & often even consoles. Digilink has proven to be ideal for live on air, production, news, and automation applications. Place a workstation in each studio and then interconnect them with a digital network for transferring audio, text, & schedules between studios. Arrakis is the #1 choice of broadcasters.

### Satellite Automation



### CD Automation



Use for Live On Air, Automation, Production, News & Scheduling



### Digilink & Trak\*Star Workstations

## Studio Furniture

With over 1,000 studios in the field, Arrakis is #1 in studio furniture sales for radio.

Using only the finest materials, balanced laminated panels, and solid oak trim, Arrakis furniture systems are rugged and attractive for years of hard use.

Available in two basic product families with literally thousands of variations, an Arrakis studio furniture package can easily be configured to meet your specific requirement, whether it is simply off the shelf or fully custom.

Call Arrakis to find out how easy it is to design and build your next studio.

### Desk\*Star studio furniture systems



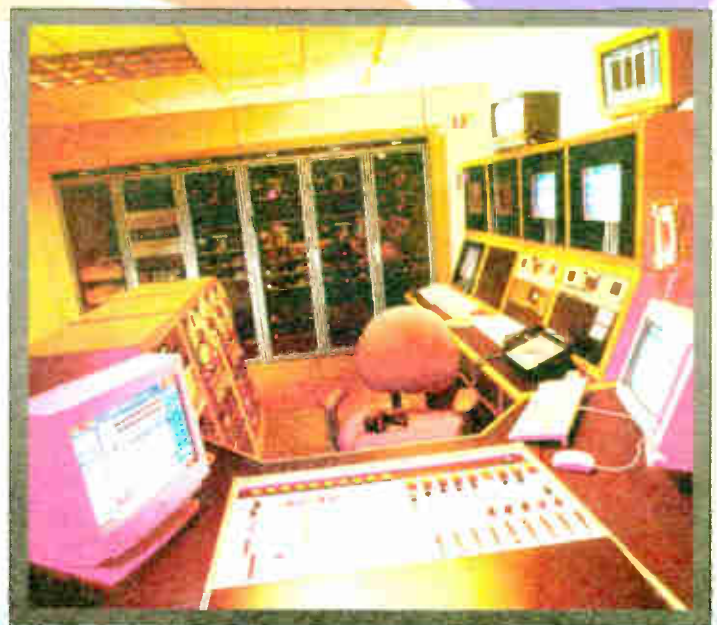
### Modulus studio furniture systems

## Complete systems...

As illustrated in the Sony Worldwide Networks master control studio on the right (one of seven Arrakis studios in the Manhattan, New York complex), Arrakis can provide complete major market studios with Arrakis consoles, digital workstations, video-audio switchers, furniture, and system prewiring.

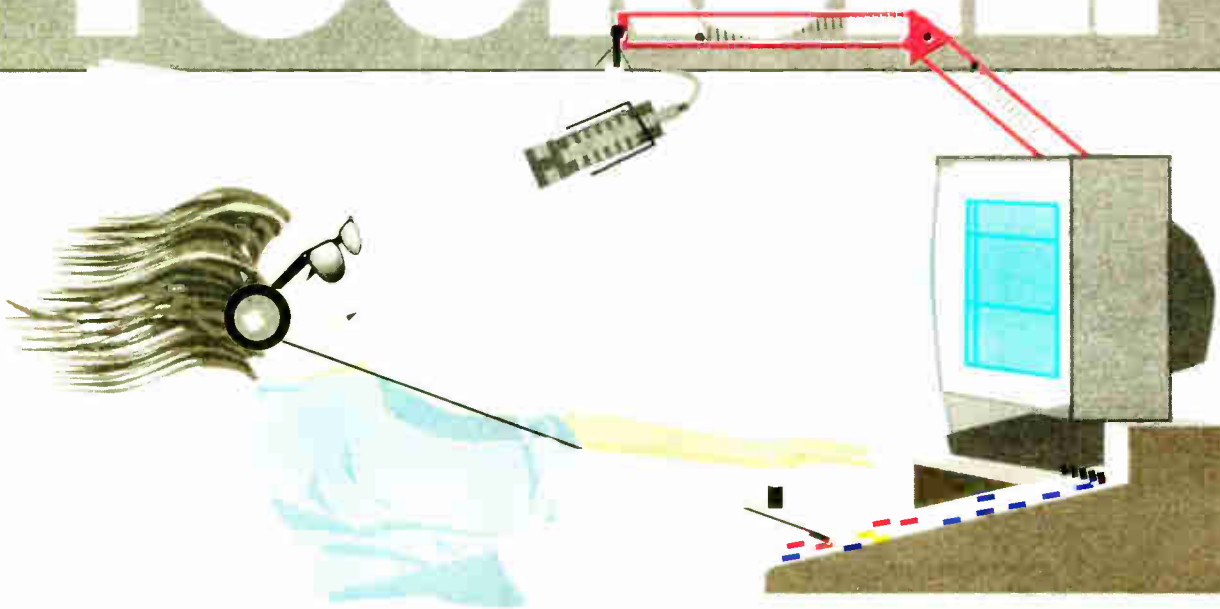
With a choice of several console lines; digital workstations for live air, production, news, and automation; and two major studio furniture product lines, Arrakis can meet broadcasters needs from the compact news studio to the major market network origination center. Complete Arrakis equipped studios can be found around the world from Tokyo, to Moscow, to Japan, to Tahiti. Call Arrakis today for your equipment or studio needs,

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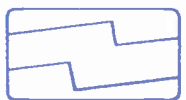


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Computer Concepts puts you in charge of the station of your dreams. You knew that someday

everyone in the station could be in constant communication. You knew that someday the burden of producing your program would be reduced to less than half. And you knew that it was only a matter of time until all your station's audio could be *instantly* previewed and monitored by all with ease. The wait is over.



**Computer Concepts**  
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### Isn't It Time To See What Digital Performance Will Do For Your Station?

Like other digital systems, Computer Concepts clears up cart-clutter and improves sound quality. But that's where the similarity ceases.

*Computer Concepts is also the easiest to use of any digital system anywhere.* Networked for peak efficiency, each area of your station will operate better than ever before.

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# Frugal Engineering Not 'Screwy' at All

*Spend Money Only When You Know You Really Have To and Hang Onto the Rest*

by Larry Albert

**MURRAY, Ky.** Here's a warning, something that is gospel to the true cheapskate: Don't throw out good parts! Remove potentially useful parts before disposing of old equipment. Screws can be a valuable salvage item. Special-style screws are of particular value if you still have equipment that uses them. New equipment comes with a full set of undamaged screws. Time, abuse and neglect will result in lost or damaged screws. Salvaged screws are an affordable solution to this problem. Sorting the screws into Metric and U.S. containers is obvious. Sorting into Panasonic, Sony and JVC is useful, although not as obvious. These are all metric screws. But different manufacturers may use unique screws. A non-standard screw for Brand XYZ is more easily found in the XYZ container than having to sort through the ALL BRANDS container.

Also, remember to be selective in what you save. Do you REALLY need any more octal tube sockets? If you still have items of the same make and model in service, it is easier to keep the whole thing for parts. Remove parts only when needed. When still attached, all items are pre-sorted by make and model.

★ ★ ★

This may come as a shock to those of you who follow this quasi-regular series of

Cheapskate's Tech Tips: I am going to suggest that you spend money. Even more shocking is that you will not be buying the cheapest possible solutions. Spending moderate amounts of money on a recurring basis can improve productivity and reduce stress in your shop (i.e., worn tools can reduce productivity and cause frustration when used). Dull drill bits, worn screwdrivers and dull saw blades are the targets of this column. These are neither endangered nor protected species, so spend and replace them without problems. Dull drill bits reduce productivity and frustrate the user — replace them! Bits only get dull if used. Some sizes are seldom used and will not be dull. Buy a high-quality set of 1/16" to 1/4" bits to replace the old ones. This should cost \$15 to \$20.

For larger sizes, replace any that are regularly used and dull. If you have and use wire gauge bits for drilling tap and clearance holes, replace the bits required for the screw sizes commonly used. Remember, both the tap and the clearance sizes probably need replacement.

Worn, bent or otherwise damaged screwdrivers are more likely to slip out of the screw. This slipping out may cause damage to surrounding areas, in addition to frustrating the user. So do yourself a favor and replace all damaged screwdrivers. Buy at least one good hardened-tip screwdriver in the #2 Phillips style

(\$7 to \$10). Most shops have a collection of old, cheap and worn screwdrivers of this size. One good one is better than 20 bad ones! Throw the old ones out and then they will never give you any more problems.

Saw blades, too, get dull and should be replaced. Carbide-tipped blades for your "Skil" saw cost a bit more than other blades. The carbide blade will cut an occasional nail and still be functional, so spend the extra money (\$10 to \$20). Sharp blades aid in the use of saber saws and hack saws also. Be sure you have some new ones.

If you often use files, how old are they? The common practice of tossing files into

a drawer without anything to prevent cutting edges from hitting other files causes them to become dull. Buy a new file in your most-used size and discover how much better a sharp new file cuts.

The cost of replacing worn tools should be a regular expense, just like the cost of replacing printer ribbons or videotape. If you don't spend the money, is it really saved?

□ □ □

Larry Albert is the television engineer at Murray State University's MSU-TV. Albert believes cheap engineering is an acceptable term and is a self-professed "cheapskate." He can be reached at 502-762-4664.

## Good News Guys On Air

► continued from page 36

to professional standards, even though we enjoyed the opportunity of testing the waters with our concept."

### Local history

One of the features of the "Good News Guys" is local history. When Fred and Barney started talking about the "Green Parrot," an old-time Fort Bragg soda fountain where many of their listeners hung out during their high school days, they opened a Pandora's Box.

Mary Shaeffer, who worked at the Green Parrot when she was in high school, brought Fred and Barney an original menu from the popular gathering place. The fare from the menu revived memories for listeners who could identify with the prices and the nostalgia.

Lena Paolinelli, the former owner of the Green Parrot, is in her 80s and works as a volunteer at the local hospital gift shop. When Fred made a personal call on Lena, she had tears in her eyes as she recalled some of the memories. "Oh, how we loved that place, especially seeing the kids come in after school. It was a special time in our lives that we will never be able to recreate."

When Fred and Barney started talking about old-time baseball players who live on the Mendocino coast, Dee Lemos of the town of Mendocino wrote an article about the program and the baseball team her husband played for in the '40s. A picture of the team and the article on the Good News Guys was printed in the Mendocino Beacon.

By the end of December 1994, changes at the AM station required taking the program off the air for an in-depth evaluation and some new direction. The end

result was the move to FM five days a week, an hour-long program with an open telephone line and much more coverage of the listening area.

The show continues to be popular with local people and with sponsors. A new guest is featured each weekday, either via phone or in person. Former Brooklyn and Los Angeles Dodgers baseball legend, Duke Snider, who lives on the coast, was a telephone guest in May. Other guests have included Tom and Beth Wolsky, independent television producers, both formerly employed by ABC News in New York. Barney's dear friend, artist George Guzzi of Newton, Mass., the creator of the original Star Trek poster, took time out of his busy schedule to call the program in April.

### Fan club

The Good News Guys even have a fan club. It consists of three self-appointed officers: President Lori Cole, Vice President and trivia expert Dodi Browse and Secretary Charlie Boice, the director of the Mendocino Coast Parks and Recreation District.

Expansion to an hour and a half, appearances in parades and private parties and a Good News Guys T-shirt are all in the works for the two men who are ecstatic over the success of the show.

It's a few minutes after eight on a weekday morning in Fort Bragg, Calif. "Sentimental Journey," the theme song, is playing on KSAY, and a couple of guys named Fred and Barney are having the time of their lives on the radio.

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# Build and Power-up New Transmitter Site

**Part II**  
by W.C. Alexander

**DALLAS** In last month's Feed Line I looked at many areas to be considered when laying out a transmitter site. In this column, I will pick up where I left off and look at electrical requirements. It is amazing how many transmitter sites there are with inadequate or poorly designed electrical systems. With electricity as the lifeblood of any such installation, it would seem to me this is one area in which corners should never be cut. Still, it happens all the time.

When planning the electrical system, start by figuring the aggregate electrical load for the entire transmitter plant. This should include all transmitters (main and aux operating at the same time), HVAC, lights, ancillary equipment, antenna de-icers and tower lights. You may think you will never have all this stuff on at the same time, but there may come a day when you do, intentionally or otherwise. Plan to have the power company provide

**You may need some help from your consulting engineer.**

enough service for this aggregate electrical load.

Next, decide whether you want 240 volts or 208 volts, delta or wye. Different engineers have their own ideas about this, but I am firmly in the 208-wye camp. My experience has shown you will have a lot less trouble with transients, lightning damage and the like if your secondary is a wye. I cannot imagine a transmitter made in this day and age that will not tap for 208 volts. HVAC equipment, however, may have to be ordered specifying 208 volt operation.

## Power and grounding

A good ground should be installed at the service entrance to the building. This should be the point closest to the meter or current transformers. A couple of six- or eight-foot copper-clad rods should be adequate. This ground should bond to the distribution panel inside the building, the chassis of all hard-wired equipment and the surge suppressor.

There should also be a short connection of heavy wire between the local tower ground and this electrical service ground. This connection is very important. If omitted, lightning currents will travel through your equipment in search of the utility ground; in place, lightning

currents are shunted around your equipment.

All transmitter installations need some form of surge suppression on the power line. Simple shunt-only types are adequate for most installations, where high-capacity series/shunt units are called for in lightning hot spots.

In some cases it may be desirable to install series/shunt suppressors on the service drop to the building while installing shunt-only devices on the service to each transmitter. Be certain that all surge suppressors

are installed downstream of the disconnect. You will need a way to kill the power to the suppressors in order to service them. Pulling the meter for this purpose is a real pain.

The ground point of the surge suppressors should connect to both the utility ground and local tower ground to provide a low-impedance path to ground for surge currents. Use large-diameter wire (not strap) that is as short and straight as possible for this ground connection.

Individual transmitters should have separate and well-

marked disconnects, fused at the value recommended by the transmitter manufacturer. During maintenance activities, there should be no doubt that the juice to a transmitter is off. I like to see large etched-plastic labels affixed to the front of transmitter disconnects for easy identification.

Finally, have the electrician take a close look at load-balancing before he or she puts the wraps on the electrical part of the project. It is easy to wind up with much more current on one leg than the other

legs. This is hard on transformers and will create higher AM noise in FM transmitters if the imbalance is significant. Stagger single-phase loads so that they alternate between legs. Three-phase breaker panels provide for this, but it is up to the installer to choose which load goes in each slot.

## Transmission lines

The way transmission lines exit the building differs widely between AM and FM stations.

FM stations usually start with  
continued on page 66 ▶

# Move Up from Carts to Touchscreen Digital Audio

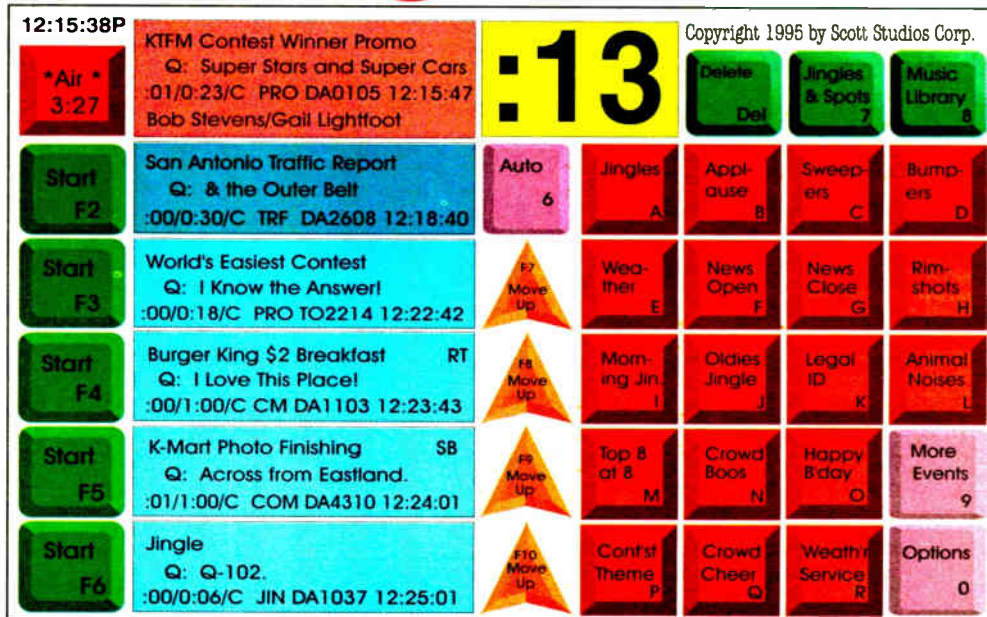
## Play Any Audio at a Touch

**Nothing else** makes radio as fast or easy as having all your spots, sounders and sweepers start with your fingertip—**always on-line and ready** to play from hard disk. And **nothing else** makes your station sound as good or as exciting as touchscreen digital and creative talent with the **new Scott Studio System!**

Here's how it works: Six buttons on the left of the 17" computer touchscreen play what's on your program log. Scheduled spots, promos, PSAs and live copy come in automatically from your Scott System Production Bank and your traffic and copy computers. You see legible labels for everything, showing full names, intro times, lengths, endings, announcer initials, outcues, posts, years, tempos and trivia. Your jocks can rearrange anything easily by touching arrows (at mid-screen), or opening windows with the entire day's log and lists of all your recordings.

On the right, 18 "hot keys" start **unscheduled** jingles, sounders, effects, comedy or promos **on the spur of the moment**. You get 26 sets of 18 user-defined instant "hot keys" for your jocks' different needs.

Large digital timers automatically count down intro times, and flash at 60-, 45-, and 30-seconds before endings. You also get countdowns the last 15 seconds of each event.



The Scott Studio System is your **best** way to make the move to digital audio and eliminate troublesome carts. Each button on the touchscreen plays whatever you want instantly. All scheduled spots, jingles, promos and scripts come in from your traffic and copy computers.



## The World's Fastest Playback!

Touch either of the two buttons at the top right of the main screen to see our "Wall of Carts" with all your audio **on-line!** Touch the sound, spot, jingle, promo, PSA or comedy you want and it plays **instantly**. Or, you can put it anywhere you want in the day's schedule. Audio is displayed any five ways you like.

The Scott System also gives you a "Make Good" button so it's quick and easy to reschedule missed spots or promos.

## Instant Requests from Hard Drive

Our most popular option is a 9 gigabyte disk with digital music. The audio quality of the Scott System hard drive meets or beats the best CDs. We'll pre-dub **1,000 songs** from CDs off **your playlist free!**

Nothing is faster than requests from the Scott System! You get five "Wall of Carts" with music that plays at a touch! Songs are displayed by title, artist, year, length, category, or any ways you like.



## Live Copy On Screen

Live tags, weather, promo copy, music trivia, contest copy and winners' lists automatically pop up on your Scott System's screen.

## The Best Digital Audio

When spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in **all** your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

One question you **don't** have to worry about with the Scott System is "What if it breaks?" The Scott Cart Replacement System comes complete with **every** spot and jingle stored **redundantly** on **two** hard disks with a **split-second** switch to the "hot standby" computer and its own backup audio outputs! You get touchscreen convenience, digital quality, and backup redundancy for no more money than cart machines and commercial carts.



## Sound Better With Digital Editing

Scott Systems' graphic waveform editors work wonders with phone calls in the air studio and creative spots and promos in production.

## Your Best Investment

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# Save Computers with Good Grounding

by Mike Sokol

**HAGERSTOWN, Md.** Consider the lowly grounded power outlet. Mostly ignored, it quietly does its job of protecting us from electrical shocks without much help most of the time.

We only notice it when we get a hum from a ground loop in either audio or video, or feel a "tingle" when we touch a piece of equipment. Then we quickly get out the volt meters and ground defeating adapters without any thought to the real dangers of the situation.

An improperly grounded power outlet can certainly be a potential shock hazard on a single piece of equipment, where

your body can complete the circuit from chassis to ground. But this same fault can cause catastrophic equipment failure in a multiple computer environment. Any time you have two pieces of electronic equipment tied together with a communication cable, you have the potential of a single workstation destroying everything else connected to it.

## Mystery surges

This is not as uncommon as it sounds. Many of the mysterious "surges" we hear about are actually caused by workstations and peripherals being hot-plugged into improperly grounded outlets, or an insulation breakdown in a

peripheral or workstation that is not properly shunted to ground.

Any hi-pot failure in which the insulation breaks down in a power transformer or line-filter capacitor allows line voltage to leak to the chassis. A proper grounding system will either drain this leakage to earth (if it is a small amount of current) or trip the circuit breaker (if it is a hard fault).

Let's say you have a non-linear editing system in your main studio and a second computer tied to it through an Ethernet connection. The main studio was properly grounded (hopefully) during its initial setup, but the second workstation was installed in an adjacent office without any attention to the power outlets.

If a solid ground does not exist on each computer system, then any hi-pot failure in the remote computer will cause 120 V from the line to flow back through the network cable and into the communications port of the non-linear editor with disastrous results. If the main computer is not solidly grounded, then that voltage will also be fed through to your hard disk arrays, monitors and anything else hooked up to the system.

This is not a far-fetched scenario. A few months back, one of my customers had a corroded connection on the ground bus in an integrated power strip feeding four workstations on a Xenix server. When one of the workstations developed a short in its power transformer to the chassis, it induced 120 V AC on all metal parts and port connections.

Normally the outlet ground would sink this current, tripping the circuit breaker in the process. But without a ground, that voltage was sent through the RS-232 wires to the server and back to the other workstations, destroying all four computers in the process, two of them with smoke and fire.

## Damage report

The RS-232 board in the Xenix server was damaged, and one of the printers had its communications port destroyed. It was luck that a good ground was in place at the server, because it also had a twin-ax connection into its IBM AS400 mini-computer, which was consequently at risk. A failure in a single workstation caused thousands of dollars in damage, two weeks of downtime and the potential for entire system destruction. Pretty impressive, isn't it?

Another site had three computers tied to a common plotter through a manual A-B-C switchbox. Each computer was on a separate outlet in a different part of the same room. In the last year there have been a half dozen RS-232 port failures, including several in the central plotter. The cause of the failures: One of the outlets being used for the system had a corroded connection in its ground path. In fact, metal surface conduit was being used for the ground connection, not a separate wire as required in modern electrical codes.

Someone plugged a huge copier into the same outlet as one of the workstations. When it cycled on, there was a brief low-current 120 V potential induced on the

faulty ground. Normally this low current would be drained through the shield on the RS-232 connection, but when someone changed the manual switchbox while the copier was running, this 120 V was dumped back into the communications ports for a brief instant.

The result: More than \$1,000 in service calls in the last year alone, not to mention lost productivity.

## How to hot plug

The safest way to plug together equipment is with all power off and grounds in place, but reality dictates that you will be forced to hook up some piece of gear while everything is going full-tilt.

There is a right way and a wrong way to hot-plug equipment. If your system has grounded power plugs, first make sure your system has been properly grounded and that the outlets and cords are in good shape. If the face of an outlet has been damaged, then it is possible to contact the line connector with the ground plug, a disastrous situation. If someone has cut off the ground lug of a power plug, watch out. You could be lighting some pretty

**A failure in a workstation caused thousands of dollars in damage.**

expensive fireworks if you plug it in.

Second, plug in the grounded power cord of the peripheral with its power switch off. Next, hook up the communications cable. Finally, turn on the peripheral equipment. This order assures that all static and line-leakage voltages will be drained to ground before the communication cable is connected. Unhooking follows a reverse order. Power down the peripheral, unplug the communications cable, then unplug the power cord. Most of the RS-232 and Centronics port failures we repair were caused by the operator plugging in the equipment while not properly grounded.

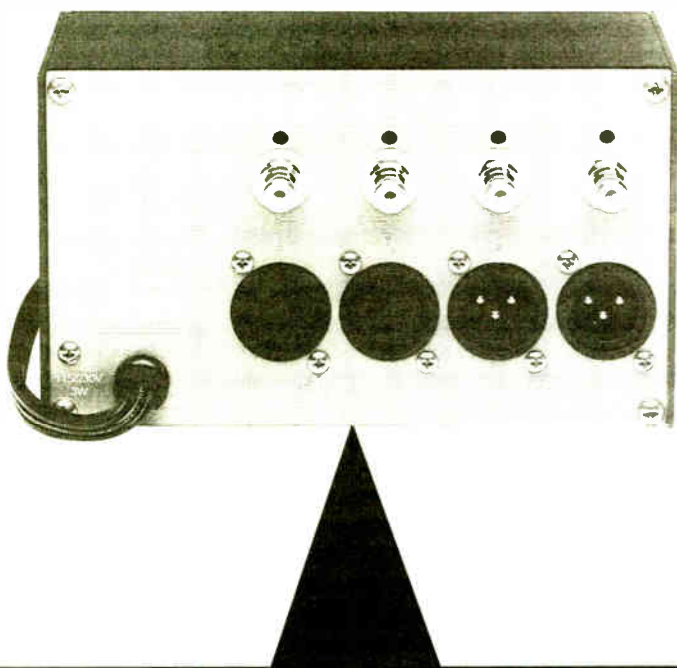
Peripherals without grounded power plugs are more dangerous than properly grounded ones. You are really taking a risk by hooking it up without total system shutdown. If you must, then hook up the communications cable first, then the power plug. This will reduce the possibility of a transformer leak inducing a big "spike" into the ungrounded port.

As audio and video editing systems become more computer oriented, multiple computers with network connections will become more common in the industry. Each additional computer workstation and peripheral is a potential electrical time-bomb.

You just cannot add computers onto a network without considering power for the entire system. Some simple precautions can save you repair bills, lost time and the potential loss of life.

□ □ □

*Mike Sokol is a musician, audio engineer and computer specialist who has written how-to and technical articles for videographers, musicians and recording engineers. He writes a regular column for TV Technology, and Computer Video, RW sister publications. Sokol can be reached at his audio/video production studio, JMS Productions at 301-791-2568.*



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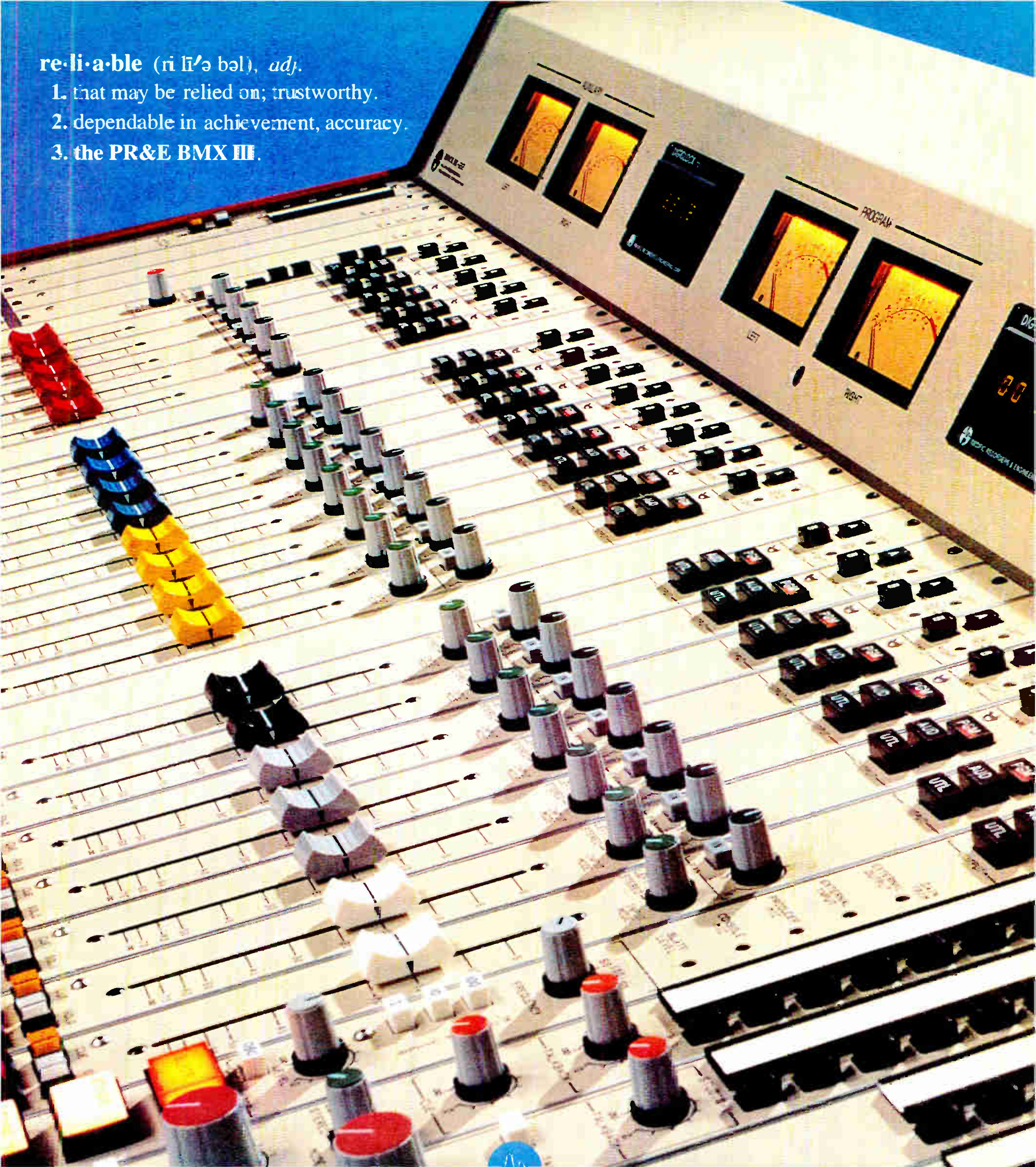
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# Processing Takes Ears and Skills

Part I

by Jim Somich

**CLEVELAND** Audio processing is part art and part science: No two people hear sound in quite the same way.

A program director may have a very clear idea of how she wants a station to sound, but it can be a real challenge to communicate that concept to an engineer.

Sometimes the best you can get out of the PD is "I'll know it when I hear it."

The purpose of this column (and the next one) is not to rehash what you probably already know, but rather to give you some new insights into competitive audio processing and its relationship to format and market.

**Complex answers**

Why bother to use processing? It's a simple question, but the answer is more complex than you might at first think. Ten engineers would give you 10 different answers.

The bottom line is we process competitively to contribute to increased ratings! The key word is contribute. Programming and promotions increase ratings directly; processing does so indirectly — sometimes almost subliminally.

Competitive audio processing can create a signature sound for a station that pays off, but careless processing can ruin your sound and chase listeners away almost overnight.

A thorough understanding of the art and science of audio processing helps you clone the sound of a competitor or create a new sound all your own. Knowledge and experience help you avoid dirty, grungy, fatiguing radio.

Although a wide variety of processing equipment is on the market, most air chains are surprisingly similar. The typical chain consists of multiband compressors, peak limiters and clippers. Many chains include some form of pre-processing or mic-processing.

More exotic systems might include enhancers, such as the Aphex Aural Exciter or BBE. These boxes are used to brighten and add life to our sound. Equalizers are often used to emphasize or de-emphasize parts of the audible spectrum.

**Basic building blocks**

Whether the processing is analog or digital matters less than how it is setup for a particular effect. Your audience only hears the end result and has no interest in how it is achieved.

In many cases, some of the basic processing building blocks are combined in a single

unit — such as an Optimod or Unity — but the blocks inside these boxes are still multiband compressors, limiters and clippers.

Within any given audio processing chain, there are thousands of combinations of control adjustments. That is what differentiates the sound of one station from another — even those stations that use exactly the same equipment.

If you can develop a real ear for processing you will always be in demand. If you can translate what the PD has in mind to an on-air sound, you will be well on your way to mastering the art and science of

competitive audio processing.

Everybody processes, no matter the format. Even a classical station can improve its on-air presentation with careful, intelligent audio processing. In most cases, an AC station will be processed differently from AOR, or heavy metal differently from CHR.

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*Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. He can be reached at 216-546-0967.*



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## STATION SERVICES

# Keep Analog Tape Alive and Kicking

by Tom Vernon

**HARRISBURG, Pa.** Although digital audio workstations have made strong inroads in the broadcast world, there is still a place in many stations for analog recording technology.

This month's Station Sketches looks at analog tape recorder alignment. No matter what type of machines you use, the order for adjustment is pretty much the same: mechanical alignment, playback alignment, and record alignment.

Mechanical adjustments must come first, because trying to use the electronics to compensate for mechanical difficulties will put you on the fast track to disaster. Next, the playback electronics are aligned using a reference tape, and finally, the record electronics are adjusted using the playback system as a reference.

Mechanical adjustments include tape tension, brakes, pinch roller pressure, and head alignment. Purchase a Tentelometer. If you do a lot of machines, it will pay for itself in reduced labor time. Many of the

newer machines specify this device, and it is also useful for running down bad rotating components.

Brake tensions need to be checked regularly per the manufacturer's instructions. You may be able to squeeze a little more life out of worn brake pads by going over them with fine sandpaper. If your studios are not climate controlled, you may have to make seasonal brake adjustments to compensate for summer humidity and winter dryness.

On some models, brakes operate in very

close tolerances. Be sure that the brake pads don't rub against the drums when the machine is in the Play mode, as this can cause wow and flutter problems.

Capstan idler pressure needs to be checked with a spring scale, and should compare favorably with manufacturer's specs. Let the machine run in the Play mode for about 30 minutes before taking measurements. The solenoid has a different resistance when it is cold than after it has warmed up.

Guides with grooves worn in them can introduce scrape flutter, a high-frequency noise usually resulting from mechanical oscillation of the tape. They should be rotated so a new section is in contact with the tape, or replaced. Roller bearings should be cleaned and replaced if necessary. If they are in a housing, be sure to reassemble them in the same order as they came apart. Bearings that squeal during fast forward or rewind are long overdue for retirement.

Pinch rollers need to be replaced when they become damaged, or when the rubber hardens. Usually damage comes first. Take a close look at the capstan shaft. If there is a polished strip at the point of tape contact, it should be sent out to be refurbished, as this can lead to tape slippage. The shaft can be ground down somewhat, and a ceramic sleeve installed, or the shaft can be sandblasted to roughen the surface.

Heads must be inspected, and may need to be replaced if grooves are evident. The normal wear pattern is a flat rectangular square centered over the head gap. Anything else suggests that the head was not properly adjusted the last time it was replaced.

While the machine's EQ may correct for a slight amount of high-frequency loss due to head wear, trying to correct for grossly worn heads this way will result in serious response humps around 5 kHz.

Before beginning head alignment, give the heads and guides a good going over with a demagnetizer. Do make sure that the power is off to the machine before beginning. Give the heads, guides and lifters and pinch roller a good going over with alcohol to remove tape oxide and grunge.

Although the 10 kHz tone on an alignment tape can be used to adjust azimuth, a white noise tape gives a better representation of the phase response of the entire system. It has the added advantage of being easily adjusted by ear. Tape wrap is adjusted by playing back a 10 kHz tone and rotating the head side to side for highest output.

Proper record head height can be verified by recording 150 Hz at standard operating level, and then "developing" the tape using a magnetic developer. Examine the finished product with a magnifying lens and make sure that the tracks are equi-distant from the edges.

Having done this, you can check playback head height by recording a 150 Hz tone at standard operating level, then turning the tape over and making sure it still plays back at standard reference level on both channels.

As you're going through these steps in head alignment, remember Murphy's Law of interactivity: everything interacts with everything else. It may take several repetitions to get it right. Having invested this much time on mechanical adjustments, you may proceed with playback alignment, confident that any remaining problems are with the electronics.

□□□

Tom Vernon's radio home is WXPB in Philadelphia. You can e-mail him at TLVernon@AOL.com, or try the old-fashioned way by dialing 717-367-5595.



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Circle (182) On Reader Service Card World Radio History



# Stormin' Norman and the Gangbusters

by Bob Rusk

**SEASIDE, Ore.** When General H. Norman Schwarzkopf, Jr. was a little boy, Friday night was his favorite time of the week. He would run up to his bedroom and put on his pajamas and then gather around the radio with his sisters to listen to "Gangbusters."

The show's opening was an attention-getter, with the sounds of a policeman's whistle, shattering glass, blaring sirens and machine guns rapidly spraying bullets.

While the action is what attracted most listeners, the Schwarzkopf children tuned in for a different reason:

their father, Colonel H. Norman Schwarzkopf, was the show's narrator.

I was curious to know more about the elder Schwarzkopf's involvement with "Gangbusters," so I contacted the general's office recently. He talked affectionately of his father and recalled how his father's part in solving the infamous Lindbergh kidnapping led to a career in this classic radio show.

"I greatly admired my father," General Schwarzkopf told me. "He was a wonderful man and a great leader. He was also a dedicated public servant. I think it was probably through my father's influence that I gained my dedication to public service that caused me to spend

almost 40 years in the army. Here was my father coming over the radio. That causes little boys to hero worship their fathers even more than usual."

Before he got into radio, the elder Schwarzkopf served as a colonel in the New Jersey State Police and was instrumental in solving the Lindbergh case. It was dubbed "the crime of the century" in 1932, when pioneer aviator Charles Lindbergh's nineteen-month-old son was kidnapped. "When the baby was kidnapped," the general says, "my dad was head of the overall investigation. Because of that, when he left the state police he was asked to play the role of the narrator on 'Gangbusters.'"

The show debuted on the CBS Wednesday schedule in 1936, sponsored by Palmolive Soap. Phillips H. Lord, the show's creator, was the original narrator, interviewing "by proxy" a lawyer who was part of the story.

In 1939, Cue Magazine took over sponsorship and the show was moved to Saturday nights. The following year, Sloan's Liniment became the sponsor and "Gangbusters" moved to NBC-Blue and was put on the weeknight schedule — which General Schwarzkopf vividly recalls.

"I remember that because it was Friday night, the one night of the week that we were allowed to stay up late so we could listen to the program," he says. "I would usually be in my pajamas. My mother would gather around the radio with us; listening to 'Gangbusters' was a real family affair."

As was common with radio shows during that era, transcription recordings of "Gangbusters" were made and there was a large collection of them in the Schwarzkopf home.

"My dad had many of those records when I was a child," says Schwarzkopf. "Every now and then we would pull them out and play them. Unfortunately, like many things, they disappeared over time. I would give anything in the

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world to have them now."

With the outbreak of World War II, the elder Schwarzkopf enlisted in the army, eventually rising to the rank of two-star general, but "Gangbusters" continued to use his name.

"My dad went overseas in 1942, but they continued to use his name as a proxy interviewer," explains Schwarzkopf. "They'd say something like, 'Now by proxy interview, Col. H. Norman Schwarzkopf will interview the sheriff.' They continued to use his name until 1943 or '44. Then they replaced him with Commissioner Lewis J. Valentine of the New York City Police."

The elder Schwarzkopf initially served in the Persian Gulf. That was an indication of things to come for his son, who would become the hero of Operation Desert Storm nearly 50 years later.

"My dad went over to Iran in 1942," says Schwarzkopf. "At the time, the United States was sending a great deal of equipment to Russia. They would bring it in through the Persian Gulf and then send it up through Iran to Russia. But the mountain tribes in Iran would ride out and raid the supplies as they were going through to Russia."

"The United States turned to Iran and said you have to stop this — and Iran said, you have to help us. My dad was sent over to command the 20,000-man unit that was responsible for the internal security of Iran. After the war, I went over and joined him and lived in Iran for a year."

The elder Schwarzkopf was later stationed  
continued on page 66 ►



# Cut the Cord: Install an STL System

by Jack Layton

**MCMURRAY, Pa.** It is no secret that the telephone company would like to get out of the analog equalized program line business. When it comes time to move or install an equalized studio-to-transmitter line, the cost can approach \$2,000!

This is Ma Bell's way of saying, "Mr. Broadcaster, we don't want your analog business anymore. By the way, the monthly recurring charges for existing lines won't get any less expensive either."

As an example, Station XYZ decided to move its studios. The AM audio path was an 8 kHz equalized line. The local phone company wanted \$1,850 to install a new line and \$125 a month for the privilege of using it.

Fortunately, Mr. Broadcaster had a very viable alternative. His reply to Ma Bell was, "Thanks, but no thanks." The total cost of his monaural microwave studio transmitter link (STL) was about \$4,600. A little arithmetic revealed the STL would be paid for, and the studio-to-transmitter path would be free, in about 22 months.

New STL technology opens opportunities that heretofore were impossible. How about an LMA, or even a second station in a market 60 miles away? You can program it from your existing studio. Tie it and the new transmitter site together with a digital stereo STL.

For monaural there are two choices: analog FM or digital. Analog FM is the simplest and least expensive. See Figure 1.

At the studio, a frequency-modulated STL transmitter is placed on channel and fed to a high-gain antenna. A simi-

lar antenna is mounted on the tower at the transmitter site. Low-loss coaxial cable ties antenna and receiver together. Typically, 10 to 15  $\mu$ V of signal at the receiver antenna input is required for 60 dB signal-to-noise at the receiver audio output.

Another way to go is digital. It is somewhat more expensive, but the audio quality is the closest thing to perfect you will find.

An analog-to-digital encoder converts audio into a data stream of binary numbers — ones and zeros. The data is fed to the STL microwave transmitter.

A decoder at the transmitter site converts the digital signal back to analog. Typically, only 5  $\mu$ V of signal is required for 90 dB of signal-to-noise at the decoder audio output terminals.

There is a slight time delay introduced by the digital compression, but not so bad that you cannot monitor the air signal in headphones. Nevertheless, be prepared for complaints from some of those who listen off-air in their headphones.

### Stereo transmission

For stereo there are three choices: The first is a composite system.

The stereo generator is placed in the studio. The composite stereo signal (L+R main carrier information, 19 kHz pilot and L-R information on the 38 kHz subcarrier) is sent via STL to the transmitter site. The composite stereo is taken from the receiver and introduced directly into the FM broadcast transmitter.

The advantage of this system is, the audio processing equipment can be located at the studio, although in cases where unauthorized people "readjust" processing, this could be a disadvantage!

Typically, 100  $\mu$ V or more of signal is required at the receiver antenna terminals for 60 dB of signal-to-noise at the receiver output terminals. Even moderate paths usually require larger

will be as perfect as what was present at the encoder inputs. See Table 6.

With digital, there is no gradual deterioration of audio quality as signal level drops. If RF voltage at the

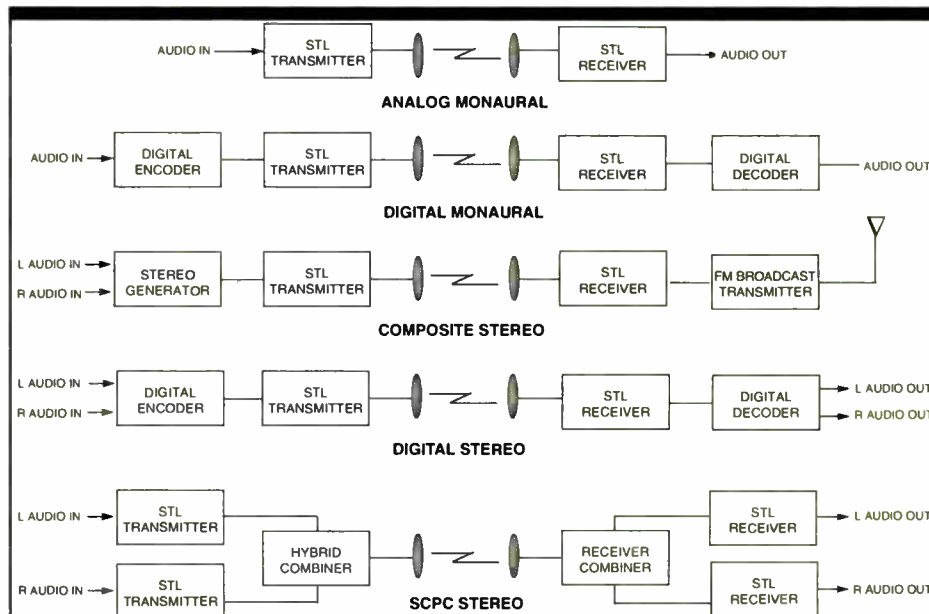


Figure 1. Block diagram of the various monaural and stereo Studio Transmitter Link configurations.

antennas and sometimes larger-size transmission lines.

Digital stereo is the second choice: As with monaural digital, this requires an encoder before the STL transmitter and a decoder following the receiver. Digital encoders and decoders with up to 4 channels are available. For co-located AM/FM transmitter sites or FM/FM sites, digital audio for both facilities can be sent via one STL.

### Digital quality

The real beauty of digital is the audio quality. Only 5  $\mu$ V of signal is required at the receiver antenna terminals for 90 dB of audio quieting on a two-channel system. For a 4-channel digital system, 15  $\mu$ V will yield 90 dB of quieting. As long as there is enough signal for the decoder to do the job, the output audio

receiver antenna terminals falls below threshold, the system will crash. Where long paths are involved, the dollar savings on smaller-size antennas and transmission line will usually offset the cost of the encoders and decoders.

Where three or more audio channels are required, the cost of encoders and decoders will, without a doubt, be less than the extra hardware required to go three-channel analog.

With a single carrier per channel (SCPC) stereo system, two analog FM STL transmitters are placed 125 kHz on either side of the center of the channel. Each carries one channel of audio and both transmitters are fed into a single antenna using a hybrid combiner (which introduces 3 dB of

continued on page 52 ▶

Table 1. The STL system worksheet

### STL WORKSHEET

#### SYSTEM GAINS

|                          |                         |                  |
|--------------------------|-------------------------|------------------|
| Transmitter Output Power | <u>7.0</u> watts        | <u>38.5</u> dBm  |
| Transmitting Antenna     | <u>4 foot grid dish</u> | <u>+18.9</u> dBi |
| Receiving Antenna        | <u>4 foot grid dish</u> | <u>+18.9</u> dBi |
| TOTAL SYSTEM GAINS       |                         | <u>+76.3</u> dB  |

#### SYSTEM LOSSES

|                          |                                 |                  |
|--------------------------|---------------------------------|------------------|
| Transmitter Coaxial Line | <u>425</u> ft. <u>1/2"</u> size | <u>-9.8</u> dB   |
| Receiver Coaxial Line    | <u>250</u> ft. <u>1/2"</u> size | <u>-5.8</u> dB   |
| Coaxial Connectors       | <u>8</u>                        | <u>-2.0</u> dB   |
| Path Length              | <u>20</u> miles                 | <u>-122.2</u> dB |
| Other Loss               | <u>isocoupler</u>               | <u>-0.5</u> dB   |
| TOTAL SYSTEM LOSSES      |                                 | <u>-140.3</u> dB |

#### SYSTEM SPECIFICATIONS

|  |  |                  |
|--|--|------------------|
| Total Loss   |  | <u>-140.3</u> dB |
| Total Gain   |  | <u>+76.3</u> dB  |
| Signal at Receiver Antenna Terminals                 |  | <u>-64.0</u> dBm |
| Signal Required for 60 dB S/N Ratio (2 chan digital) |  | <u>-93.0</u> dBm |
| Fade Margin  |  | <u>29.0</u> dB   |

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# Planning STL System

► continued from page 51

loss). The receivers share a single antenna and a divider also introduces 3 dB of loss.

On short paths, the loss of 6 dB (75 percent of each transmitter's output power in combining and dividing networks) is of little consequence. On long paths, higher gain antennas might be needed to provide adequate signal. The obvious advantage to this type of system is redundancy: if a transmitter or receiver dies, all is not lost. Mono is better than silence.

Subcarriers can be added to all of the analog systems. These may be used to send SCA audio to the transmitter site

or data for remote control. The digital systems provide a data channel from the studio to the transmitter for remote control.

By far, the most popular band for aural broadcast STLs is 950 MHz. In all but the largest of cities, frequencies are readily available. Highly directional antennas, coupled with cross-polarization, often allow the same frequency to be used two or three times in the same area; one station using vertical polarization and the other horizontal. Terrain obstructions between systems is an added benefit when frequencies are in short supply.

Microwave signals require a line-of-

sight path. For reliable service you must be able to see the receive dish from the proposed location of the studio transmit dish; ridges and buildings in the path are a no-no.

## Curves ahead

If the path is long, you must compensate for the curvature of the earth. On occasion, some bending of the transmitted signal due to refraction takes place. This is known as the Fresnel phenomenon. Adequate fresnel zone clearance above any obstacles in the path must be provided.

In the old days, it was necessary to plot the proposed STL path from end to end using typographic 7.5 minute quadrangle maps. Every elevation along the path, shown by contour lines, was plotted on 4/3 linear graph paper that takes the curvature of the earth into account. In calculating a long path, a laborious task indeed.

Today, vendors and STL manufacturers

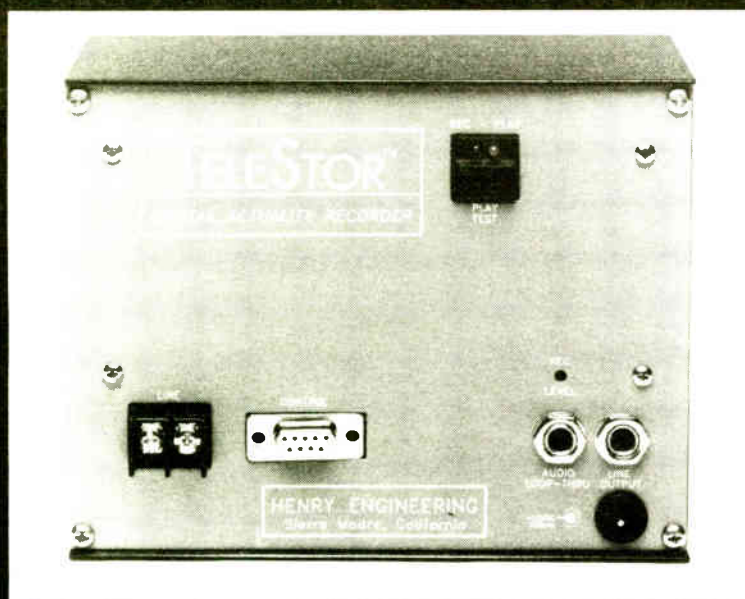
a line-of-sight path, a repeater is the answer. The repeater can be located on the obstruction to take the signal over or around it. See Figure 3 on next page.

A repeater is made up of two antennas: an STL receiver and an STL transmitter. The microwave signal is received at the repeat site on one frequency and then re-transmitted on a different frequency using a second antenna oriented toward the broadcast transmitter site. Monaural analog, one- and two-channel digital and composite systems require only analog repeaters, as described above.

## Coding scheme

Three- and four-channel digital systems require the digital signal to be decoded and then re-encoded at the repeat site. From a practical standpoint, there is no reason why a digital signal could not repeat several times and still deliver transparent, noise-free audio.

When designing a system that uses a



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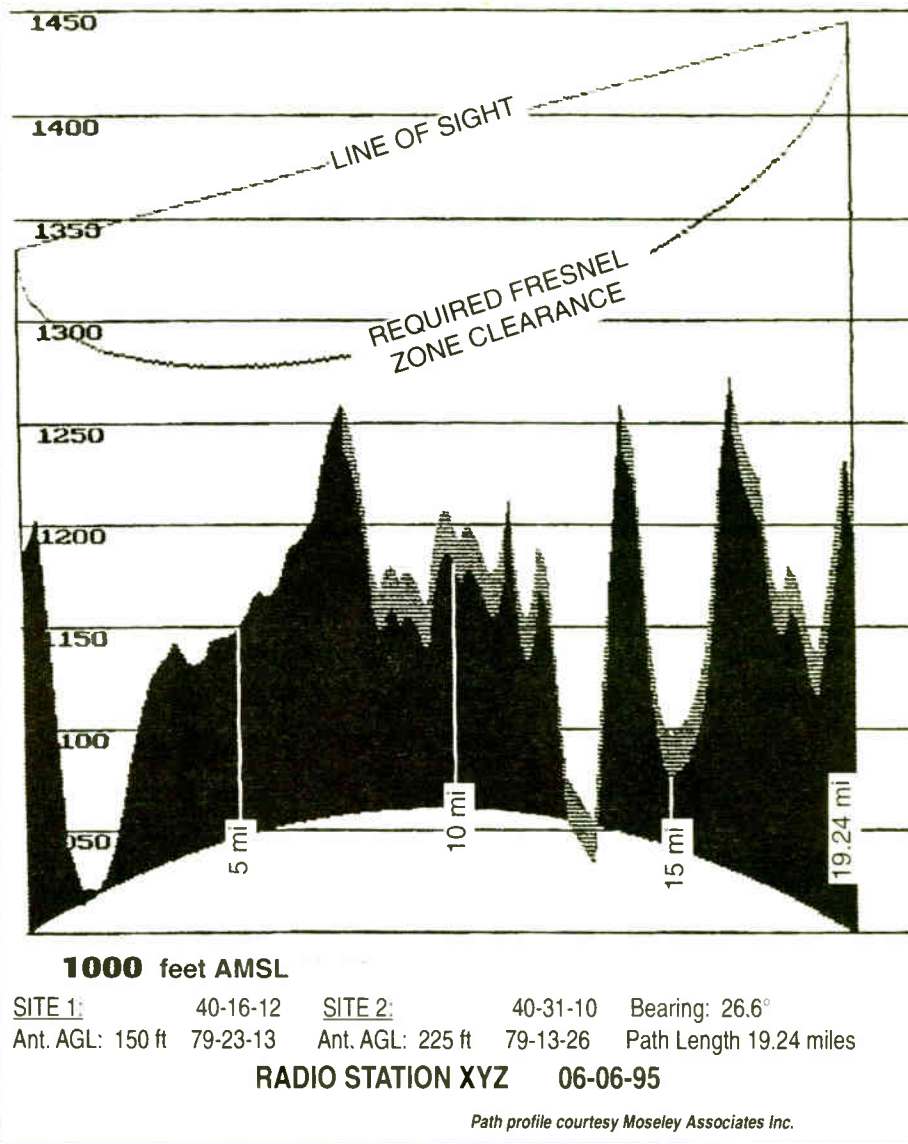
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Figure 2.

Computer printout of a path profile showing the terrain between the proposed studio and transmitter locations of Radio Station XYZ. Note the curvature of the earth, the line of sight path and the Fresnel clearance needed.



can provide you with a computerized path profile in a matter of minutes. All you need are the proposed geographic coordinates of each end of the path and the heights above ground level of the antennas. A computer program, using a three-second data base (a "second" of latitude and longitude is about 100 by 80 feet in North America), will plot the terrain between the two points with this curvature factored in. It also plots azimuth, exact distance and required Fresnel zone clearance (Fig. 2).

If the path is over 40 miles long or there is an obstacle that interferes with

repeater, it must be considered as two separate and distinct systems: Studio-to-repeater and repeater-to-transmitter site.

It is time to discuss the practical requirements for making the STL work — losses, gains, fade margins and more.

Now that you have decided what type of STL system to install, have checked the path to assure a clean shot to the transmitter and have verified ample Fresnel clearance, it is time to get down to the nitty gritty of designing the sys-

continued on next page ►



tem. What size antennas should be used? Can the system get by with half-inch line or will it need something larger? Can the STL dish be mounted on an AM tower? What is the meaning of fade margin?

The design of the STL system centers around gains and losses. On the plus side of the ledger we have transmit and receive antenna gains and STL transmitter output power. On the debit side, there is transmission line and connector loss at both ends of the link.

In addition, there is the path loss; the loss between the transmitting and receiving antenna systems. In SCPC stereo systems — and other systems where two transmitters are duplexed onto one antenna — losses in the transmitter combiner and receiver splitter must enter into the equation. When the

|    |       |
|----|-------|
| 1  | +30.0 |
| 2  | +33.0 |
| 3  | +34.7 |
| 4  | +36.0 |
| 5  | +37.0 |
| 6  | +37.8 |
| 7  | +38.5 |
| 8  | +39.0 |
| 9  | +39.5 |
| 10 | +40.0 |

STL antenna is mounted on an AM tower there will also be loss introduced by the isocoupler.

**Working it out**

For the sake of ease in calculations, all numbers are expressed in decibels (dB), dB gain above an isotropic antenna (dBi) and dB above or below one millivolt (dBm). Gains and losses are then added up and losses are subtracted from gains. The resultant number in dBm is the amount of signal expected to be

delivered to the antenna terminals of the STL receiver.

The figures used here are based on physical conditions presented in the path profile in the first half of this article. The FM studio is at the AM transmitter site; the transmit STL dish is 150 feet up on the AM tower; the path length is 19.24 miles.

The AM tower is situated 225 feet from the building. There are 375 feet of line from the antenna to the building and another 50 feet to the STL transmitter for a total of 425 feet. At the FM transmitter the STL antenna is 225 feet up on the tower. The building is located immediately below the tower.

We need 250 feet of coaxial line at this end; 225 feet on the tower and 25 feet inside the building. Table 1 on page 51 is a completed worksheet for this STL system.

Start with the plus side of the ledger: STL transmitters come in several power outputs. Ours is a 7 W transmitter. Table 2 is a conversion of watts to dBm and our first entry is +38.5 dBm.

Table 3 is a tabulation of the most popular STL antennas and their gain in

dBi (again, decibels referenced to an isotropic radiator). At both ends of our path we propose to use 4 foot grid dishes. From the table we enter +18.9 dB in both blanks.

|               |      |
|---------------|------|
| paraflector   | 20.2 |
| 4' grid dish  | 18.9 |
| 6' grid dish  | 22.0 |
| 8' grid dish  | 25.1 |
| 10' grid dish | 26.8 |

There are some unusual circumstances where an RF power amplifier might follow up the STL transmitter. In other situations it might be necessary to use a preamplifier ahead of the receiver. Both of these devices will add gain to the system. Their gain in dB would be entered in the plus column of our calculations.

**The losses**

Next come the losses: The first figure in the minus column is the coaxial line from the STL transmitter to the antenna. Table 4 lists the loss in dB per 100 feet of four of the most commonly used sizes of foam dielectric coaxial cables. In this case, using a digital system, we can probably use half-inch cable at both ends of the system. This presents 2.3 dB of loss per 100 feet.

At the STL transmitter end we have 425 feet of cable. The loss is 9.8 dB

continued on page 55 ▶

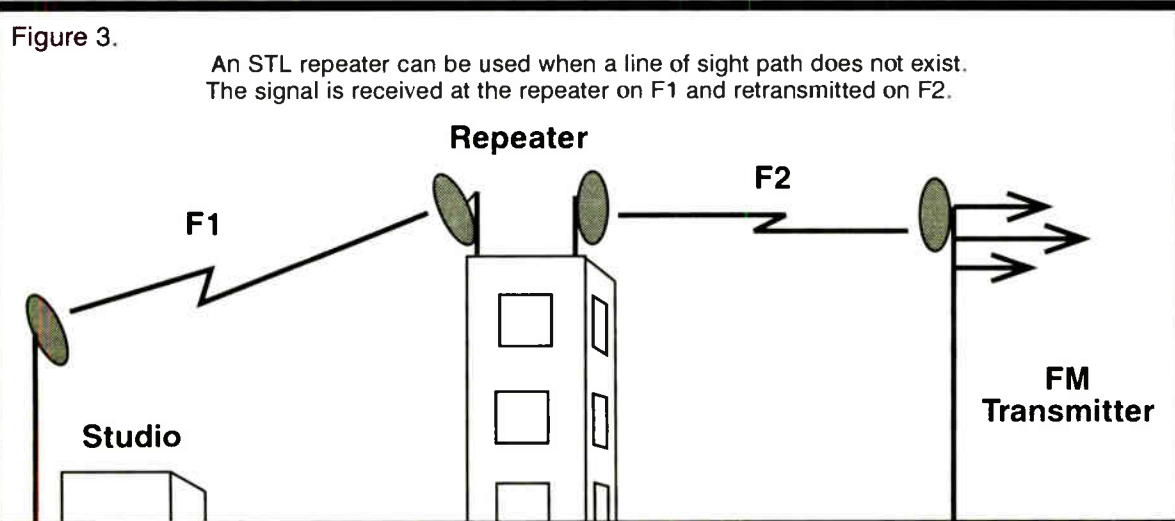


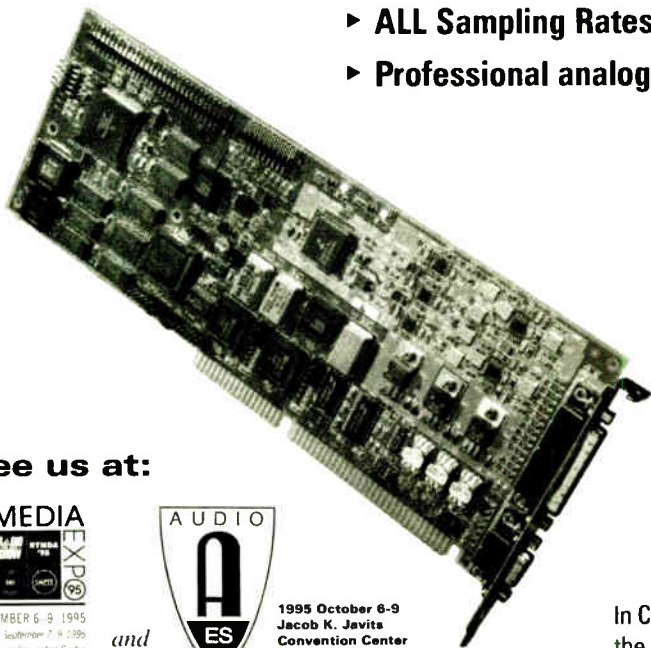
Figure 3. An STL repeater can be used when a line of sight path does not exist. The signal is received at the repeater on F1 and retransmitted on F2.

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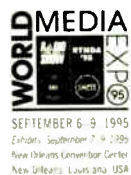
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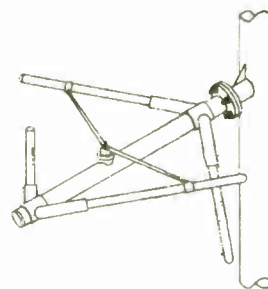
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# Calculating STL Path

► continued from page 53

(4.25 X 2.3 = 9.8). At the STL receiver end the loss is 5.8 dB (2.5 X 2.3 = 5.8).

**Table 4.**  
foam dielectric cable loss in dB per 100' at 950 MHz

| Size   | (Andrew #) | (Cablewave #) | Loss |
|--------|------------|---------------|------|
| 1/2"   | LDF4-50    | FLC 12-50J    | 2.3  |
| 7/8"   | LDF5-50    | FLC 78-50J    | 1.3  |
| 1 1/4" | LDF6-50    | FLC 114-50J   | 1.0  |
| 1 5/8" | LDF7-50    | FLC 158-50J   | 0.8  |

In this installation the STL transmit antenna is mounted on an AM tower. If the tower is a folded unipole or other grounded type of antenna, the STL transmission line needs no isolation. Bond the shield of the STL feed line to the tower at its base. In the case of a series-excited AM tower the coaxial transmission line for the STL will short out the base insulator at AM frequencies. Countermeasures must be taken.

The common solution is to use an isocoupler which efficiently couples the 950 MHz energy across the insulator while providing a high impedance path to energy in the AM broadcast band. The isocoupler presents a small amount of capacitive reactance across the base insulator and typically introduces 0.5 dB of loss.

When changes are made to an AM non-directional radiator — such as the addition of an STL antenna, an FM transmitting antenna or an RPU antenna with its associated isocoupler — the input impedance to it will change. This causes the calculation of the AM output power to be in error. It is required by the commission to make a new set of impedance measurements. In such circumstances, the AM broadcast license must be modified to reflect these changes.

When an STL antenna and isocoupler are remounted on a tower that is part of an AM directional system, a partial proof-of-performance must be done on the system before these additions are implemented. Once the antenna and isocoupler are in place another partial proof must be executed to demonstrate that the array is in proper adjustment. A set of common point impedance measurements should also be part of this effort.

If the STL is an SCPC stereo system with two transmitters being duplexed into the same antenna, RF combiner losses are entered into the loss column; typically, 3 dB. At the receive end the splitter loss of 3 dB is entered.

Coaxial connectors and coaxial jumpers also add losses. Use only high quality N-connectors and low loss RG-214U coax for jumper cables. Never use UHF or BNC type connectors or RG-58 coaxial jumpers. At these frequencies, losses quickly add up.

Add 0.25 dB for each connector in the signal path. If you are using half-inch coaxial cable for transmission line, it can easily be routed directly to the antenna and isocoupler. When using 7/8-inch or larger cable, it is advisable to use a two foot jumper made from flexible coax for connection to the transmitter and receiver.

When larger cable is used, jumpers must also be used at the antenna and the

isocoupler. Expansion and contraction of the line due to changing temperatures can cause damage to the antenna and/or isocoupler. Add 0.5 dB of loss for each two foot jumper.

Once the transmitted signal leaves the antenna it is subject to the inverse distance law: As distance doubles the available signal is spread out over four times the area. Therefore, the signal drops by 6 dB. Over a path of one mile the loss at 950 MHz is 96.2 dB, at two miles 102.2 dB, at four miles 108.2 dB, etc. The formula for calculating path loss at 950 MHz is:

$$96.2 + 20\log D = \text{Loss}_{sp}$$

where:

D = distance in miles, and  
Loss<sub>sp</sub> = path loss in dB

Table 5 is a rounded tabulation of path loss in dB out to 30 miles. Our path is almost 20 miles so we enter -122.2 dB.

**Table 5.**  
path loss in dB at 950 MHz

| miles | loss dB | miles | loss dB |
|-------|---------|-------|---------|
| 1     | -96.2   | 16    | -120.2  |
| 2     | -102.2  | 17    | -120.7  |
| 3     | -105.7  | 18    | -121.3  |
| 4     | -108.2  | 19    | -121.7  |
| 5     | -110.1  | 20    | -122.2  |
| 6     | -111.7  | 21    | -122.6  |
| 7     | -113.1  | 22    | -123.0  |
| 8     | -114.2  | 23    | -123.4  |
| 9     | -115.3  | 24    | -123.8  |
| 10    | -116.2  | 25    | -124.1  |
| 11    | -116.9  | 26    | -124.5  |
| 12    | -117.7  | 27    | -124.8  |
| 13    | -118.4  | 28    | -125.1  |
| 14    | -119.1  | 29    | -125.4  |
| 15    | -119.7  | 30    | -125.7  |

Add up all the gains: 76.3 dBm. Now total the losses: 140.3 dBm. Subtract the losses from the gains and the result is -64.0 dBm. This is the calculated signal that will be present at the receiver antenna terminals.

Table 7 shows the approximate amount of signal required at the receiver antenna terminals for 60 dB of signal to noise in

**Table 6.**  
conversion of microvolts to dBm

| µV | dBm  | µV | dBm |
|----|------|----|-----|
| 2  | -101 | 16 | -83 |
| 3  | -97  | 18 | -82 |
| 4  | -95  | 20 | -81 |
| 5  | -95  | 25 | -79 |
| 6  | -91  | 30 | -77 |
| 7  | -90  | 35 | -76 |
| 8  | -89  | 40 | -75 |
| 9  | -88  | 45 | -74 |
| 10 | -87  | 50 | -73 |
| 11 | -86  | 60 | -71 |
| 12 | -85  | 70 | -70 |
| 14 | -84  | 80 | -69 |

the recovered audio using various types of STLs. The exact specifications are dependent on the design of the receiver and the transmitter deviation with modulation. Always check the manufacturer's actual specifications.

The minimum signal requirement for a two channel digital system is -93 dBm. Our calculations indicate that we can expect -64 dBm of signal at the STL receiver's antenna terminals; 29 dB more than the minimum required for proper operation of the system. The difference between the required signal and the calculated signal is known as the fade margin of the system. Under some atmospheric conditions, microwave signals are subject to refraction or bending. This causes a portion of the energy to arrive out-of-phase with the main beam, causing fading.

**Table 7.**  
approx signal required for 60 dB signal to noise

| Mode               | dBm |
|--------------------|-----|
| analog monaural    | -85 |
| composite stereo   | -67 |
| SCPC stereo        | -85 |
| digital monaural   | -93 |
| *digital stereo    | -93 |
| *4 channel digital | -83 |

\* 90 dB signal to noise

Also, under severe icing conditions, the gain of the STL antennas becomes considerably less than when ice-free. For 99.99 percent reliability, 1 dB of

continued on page 62 ►

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# Build UART Transmitter for Relay Control

by James Murphy

**MORGANTOWN, W.Va.** In the July 26 issue of *RW*, I described an addressable asynchronous receiver decoder/driver, which I abbreviated the RDD. The RDD takes signals from a single-pair line and, after decoding the address, drives a selected output low. This output logic can then be used to trigger a relay or perform

the rest of the chips are simple gates. Only a few pins are used on the UART, so the project is actually quite simple, albeit slightly strange.

Look at the logic activity by setting up some data and sending it along the bus. First, set the thumbwheels for an address and relay function number, then press the Send button. This shuts off Q1, sends the collector high, and forces the output of

minerals TBR1-TBR8 (UART pins 26 through 33) are sent out pin 25, the TRO terminal.

Now imagine you have sent a 04 to address 03. If that is all you wanted to do, you could dispense with all these other chips. But if you recall from the earlier article, this will produce a constant low on the 04 output of the addressed decoder. The only way to remove this active low is to send it another pulse. You might just thumb up a function 00 for the same address and send it out, but that is a lot of trouble as well as being a loose end. This circuit will do that automatically.

**Reset circuit**

Note that Q1 will return low when the switch is released. This negative-going pulse will pass through capacitor C9 to trigger IC-2, which will, in about 0.4 seconds, trigger IC-3. Remember that the 555 is triggered with a negative-going pulse, so the end of the first pulse triggers IC-3.

IC-3's output goes high momentarily and performs two functions: it enables the 6402 again via the NOR gate, and lifts the ground on the function thumbwheel

activate, placing a LO on TBR-1 through TBR-4 of the UART.

This "zero nibble" is transmitted (assuming normal switch functions) and a one-half second pulse appears at the RDD output. If you wish to extend this function to activate a light or buzzer, simply hold the Send key down for the duration.

In order for the system to work as described, do not use the zero output of the 74154 demultiplexer on the RDDs (refer to the schematic in the July 26 *RW*, p. 35). This leaves 15 outputs to work with. And because each location's RDD can perform different functions, the total could be well above 100, depending on how many RDDs you have in service.

**Construction**

Because the highest frequency used is 19 kHz, wiring is not critical. Any method could be used, although an etched PC board is recommended. The thumbwheels may need to be ordered; fortunately, many of the cheaper mail order houses have them.

A 5 V supply is needed to power the units, but with all the logic devices used around the station you probably have a 5 V bus distribution system already in place. If not, perhaps you should consider one before going any further.

So, from a given location, you can address a relay bank in any of 16 rooms or studios, and can activate any of 15 relays or logic pulses in each room. These functions can be replicated wherever you have a transmitter or computer; all you need between them is a single pair cable

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□ □ □

*James Murphy is director of engineering at the West Virginia Radio Corp. Reach him at 304-296-0029.*

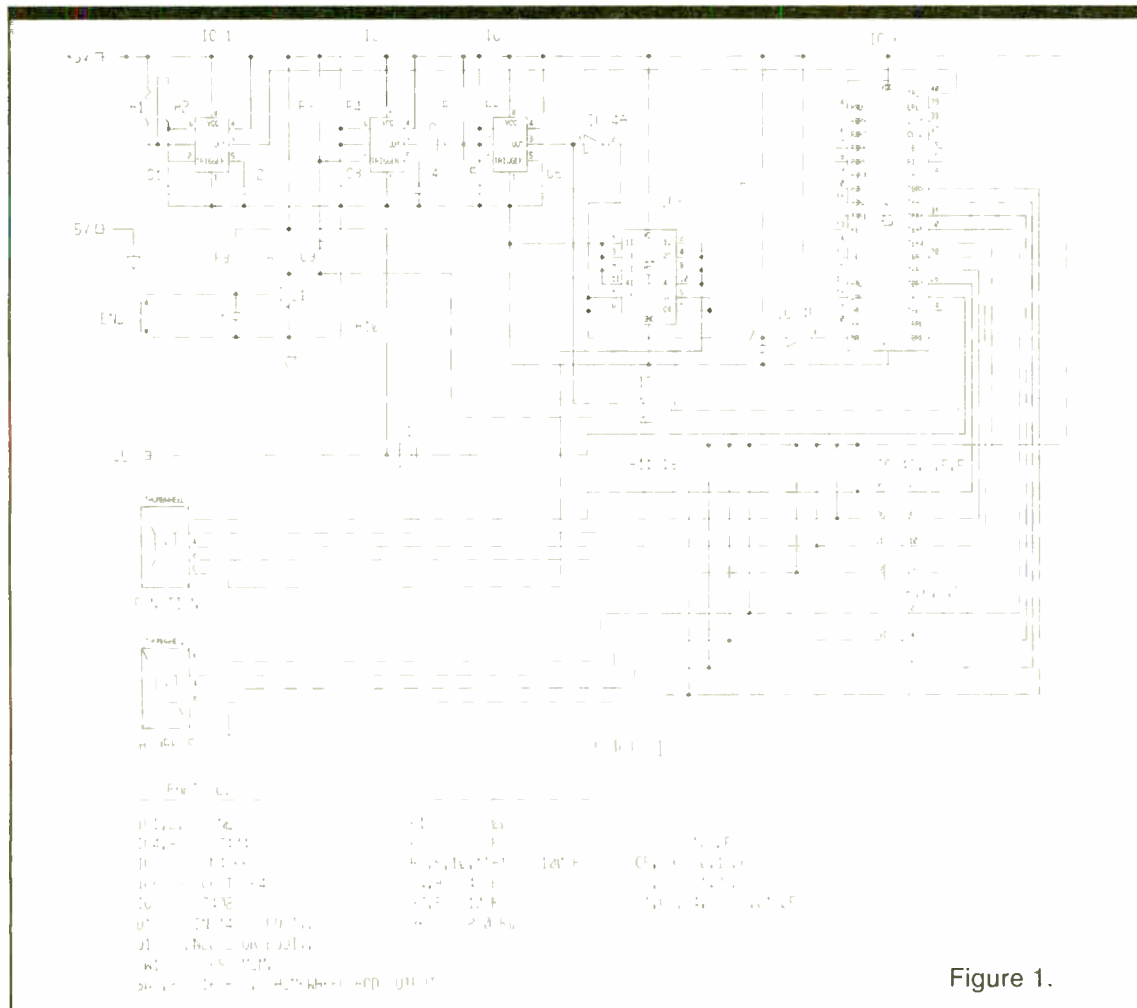


Figure 1.

some function.

One advantage of this system is that it uses only two lines for address and data information, and many receivers and transmitters can be connected to the bus.

If your memory is as short as mine, you might want to dig out the that issue and peruse the article to get familiar with the protocol and the receiving system.

Now sit down, take a deep breath and glance at Figure 1. About all that comes to mind here is that Rube Goldberg would've been proud.

**Wiring gone wild**

Actually, it isn't all that bad, it just looks that way. If you take the tour, you will notice that although the drawing looks complex, there are actually only a few chips used. First, IC-1 is a multivibrator that supplies the clock pulses for the 6402. If you remember, the frequency needs to be 16 times the baud rate, hence our 19,200 Hz gives us 1200 bits per second (bps).

Incidentally, you could use a much slower speed, because the transmitted data is only a single word for each command. Generally speaking, the word is sent before you get your finger off the keyboard or switch.

IC-2 and IC-3 are strapped as one-shot timers. IC-2's duration is about 0.4 seconds, and IC-3 is around 0.02. The 4066 is used for one switching function, and

the 7402 NOR gate low, which enables the 6402. Voila — the data seen on ter-

by closing the 4066 switches. This will allow all pullups (R11 through R18) to

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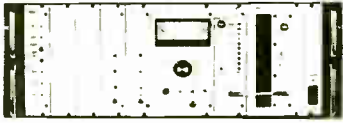


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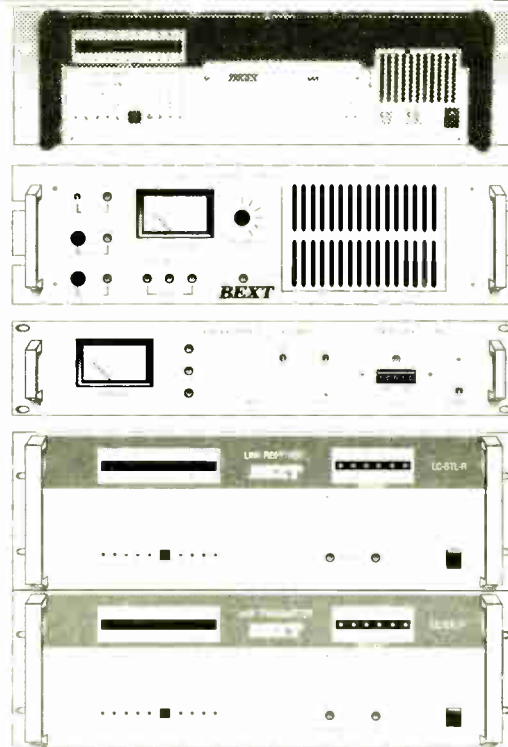
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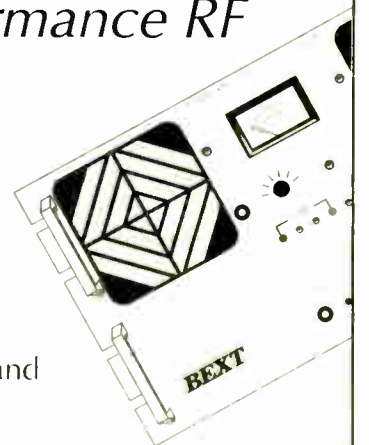
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## KEYBOARD CONNECTION

# Lost in the Woods? Try Retki GPS

by Barry Mishkind

**TUCSON, Ariz.** "You may never get lost again!" That was the promise in mid-1993 when 24 special satellites forming the heart of the GPS (Global Positioning System) first went on-line.

Indeed, one recent TV car ad boasts that within one minute of pushing a button an operator will tell you your exact location. Other ads display a car automatically sensing it has been stolen and calling the police to tell them where it has been taken.

## Future is now

The future is here. The heart of GPS systems is a small antenna and a computer program that receives three or more of the GPS satellite signals and gives your location within 100 feet. Tighter accuracy to one meter is possible using a supplemental service to overcome the intentional errors the U.S. government has introduced into the system.

Recently, I tested one of the more sophisticated systems available to consumers: the Retki GPS Land Navigation system from Liikkuva Systems International (800-99RETKI or <http://www.liikkuva.com/> on the Internet). Retki goes well past the capabilities of the handheld GPS models available over the past several years.

For my tests, I used an Epson series 600C color notebook computer. This notebook features PCMCIA slots which will accept the satellite receiver card. After a minute or so to "re-establish" signal acquisition, the program then marks the map at your current location. The display shows the current latitude and longitude, altitude, direction and speed; even exact time and date information is provided.

The Retki system comes with a map of the United States and a local map of your choice. Depending on the module you are using, you can navigate through a city, or even have the program "draw" streets missing from the map.

## Good resolution

Driving around with a 7.5 minute USGS map, I found the resolution to be well within the advertised "coarse accuracy" of about 100 feet. The readouts were also within a half-mile an hour of my speedometer. The one area that is a bit dicey at the "uncorrected accuracy" level is the altitude.

Especially when stopped, the altitude can wander several hundreds of feet, but is much more accurate while the car is moving.

News, sales or remote van personnel will appreciate the ability to type in an address and have its location immediately shown on the screen. As you drive toward the site, the map shows your progress, and you can zoom in or out as necessary to navigate more easily.

Tests now under way in Washington, D.C., even permit traffic jams to be displayed.

Engineers can use the system to determine the exact distance from a reference point. Unfortunately, this is not available in dynamic display, and azimuth is not yet available at all. One other potential problem is the 400 mA peak drain of the satellite receiver.

This and the constant hard-drive access (to update the map) reduces battery working time substantially.

On the other hand, the software has the ability to store any important locations you wish to add to the map, and additional software is currently in development to give the driver explicit directions to the destination.

A further note about the Epson notebook computer used in this test. The Epson 600 series is now running at around \$2,000, complete with a 486DX2-50 microprocessor, a 10.3-inch dual scan color screen, 260MB hard drive, type III PCMCIA slot, built-in trackball with ergonomic palm rest, and a

special Extra Care Road Service warranty that gets parts and service to you wherever you are.

Options include more memory, modem cards and large hard drives. Plenty of software is pre-loaded, including Claris Works, Sidekick and introductory packages for several on-line services.

## Win95 Update

Windows 95 was rolled out on Aug. 24, by Microsoft. As mentioned in a previous column, Win95 will eventually become the standard for much of the PC world. As you contemplate your upgrade strategy, do not forget the new application software being released to compliment the new 32-

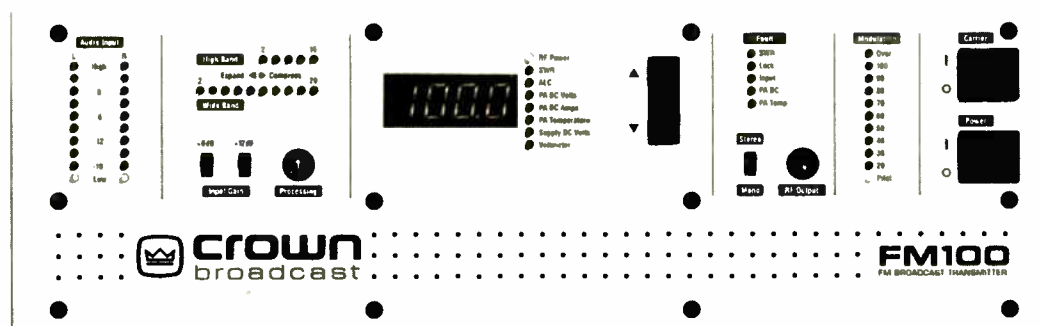
bit Win95 operating system.

Microsoft is releasing many of its key productivity applications in versions designed to take full advantage of Win95. For example, Microsoft Office for Windows 95 provides better integration between the applications, and user enhancements such as right mouse button support for context-sensitive commands, and long file name (LFN) support to do away with the 8.3 filename constraints.

New in Win95 is Schedule+, a fully integrated PIM (personal information manager). Furthermore, performance of Word for Windows and Excel has been enhanced as much as 50 percent, and the ability to edit shared information has improved. Additional support for network and e-mail has been added, and an Answer Wizard feature guides you through new operations, making the

continued on page 62 ▶

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# STL Planning and Construction

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fade margin per path mile must be built into the system. In the case of our 20-mile digital STL, 29 dB is more than adequate.

Now, if this system were used to send a composite stereo signal from the studio to the transmitter, it would be far from adequate. Table 7 indicates that the required signal for 60 dB SNR on a composite system is -67 dBm. The -64 dBm we are delivering to the receiver is only 3 dB above the minimum required. This is not adequate for a 20-mile path.

To make a composite system work with adequate fade margin over this distance, the antenna size at both ends of the path could be increased to eight-foot dishes. This provides another 12.2 dB of gain. In addition, if the size of the transmission line is increased from 1/2- to 7/8-inch at both ends (all 675 feet of it) line losses would improve by 6.8 dB. This would increase the signal at the antenna terminals of the receiver from -64 dBm to -45 dBm. For a composite STL, there is now 22 dB of fade margin on this 20 mile path.

## The fine print

However, using manufacturers list prices and some quick arithmetic, these antenna and transmission line upgrades

just added about \$4,600 to the cost of the system. This does not take into consideration the increased cost of connectors and hangers for larger transmission lines. There is also more wind loading on towers with the larger antennas and lines. The apparent dollars saved in the cost of a digital encoder and decoder start to evaporate very quickly when the entire picture is examined.

The next step is to talk with the local Broadcast Auxiliary Frequency Coordinator. If you do not know how to contact him or her, call the headquarters of the Society of Broadcast Engineers at 317-253-0418 or the FCC's Auxiliary Services Branch at 202-634-6307. This person is your source for information on what frequencies are in use and where.

You should have the following information ready when you make the call: The type of system you intend to use; the geographic coordinates of your proposed STL transmitter site; the type of antenna and its gain; the power proposed to be delivered to the antenna; the height above mean sea level (AMSL) of the proposed antenna; and the azimuth toward which the antenna will be aimed.

This contact with the frequency coordinator is an important step. If you skip over it and choose a frequency on your own, you are treading on thin ice.

Should you create interference, you will be the one made to cease and desist. In addition, question #16 on FCC Form 313 asks if you have coordinated the use of this frequency; to complete the application truthfully, you must work with the frequency coordinator.

## Climbing the tower

When ordering equipment for the STL, make sure you order the proper number of connectors, and of the right gender. It costs money to have tower climbers sit around while you try to round up a 7/8-inch male-N connector. Forget checking the catalog; your local Radio Shack does not carry them!

Where the coax is hung on the tower, a cable hanger is required every three feet. Depending on tower construction, a round member adapter of the proper size or a flat member adapter is required for each hanger. A cable grip is required every 100 feet. Weather proofing is a must for each exposed connector.

A cable grounding kit should tie the shield of the coax to the tower at the point where it leaves the tower. When an isocoupler is used, the coax shield must make good electrical connection to the tower just above the isocoupler and be tied to the ground system on the cold side of the coupler. Ground the case of the isocoupler with two inches or larger strap. Do not depend on the shield of the coax to ground the isocoupler.

Use another grounding kit to tie the shield of the cable to the station ground where it enters the building. Proper grounding keeps lightning damage to a minimum, reduces the possibility of instability in a directional array and prevents RF from appearing in unwanted places.

Keep the STL transmission line as far away from other lines on the tower as is possible, especially lines carrying high power FM or TV signals. Run it up another leg on the tower. Keep the STL dish away from other antennas that might be mounted on the tower, especially high power FM or TV antennas. These precautions will minimize the possibility of unwanted RF appearing at the STL receiver antenna terminals.

First, install the studio end of the link. Have the dish oriented in the direction of the transmitter site. Turn the STL transmitter on. While the installers are still on the tower at the transmitter site, have them orient the receive dish for maximum received signal. Then go back to the studio end and re-orient the transmit dish while someone watches the signal strength meter on the receiver. Strive to get every dB of fade margin available. You have paid good money for it.

Section 74.24 of the Rules allows the short term operation of an aural STL by a broadcast licensee without prior authorization. Such operation is limited to 720 hours (30 days). In other words, once the STL is completed and put into service, Form 313, an application for an STL license, must be filed to cover such operation. The term of the STL license will run concurrent with the broadcast station license.

□ □ □

Jack Layton is the owner of Layton Technical Services in McMurray, PA. He does directional antenna field work and also sells and installs broadcast equipment. Layton can be reached at 412-942-4054.

# Work with Windows '95

► continued from page 61

learning curve a bit easier to negotiate.

Interestingly, these applications no longer scatter \*.ini files all over your hard disk. A new Registry helps keep connections in order, although editing the Registry is not for the faint-hearted.

Instead, an enhanced install/uninstall utility in Win95 makes the appropriate changes for you.

Other software you will want to add to your new Win95 includes a suite of utility programs from Symantec. The popular Norton Utilities has been upgraded to diagnose and repair 32-bit system problems. Similarly, Norton AntiVirus is ready to tackle viruses on the new operating system. Norton Navigator focuses on file management, and adds some interesting support to bridge many 16-bit applications into Win95, such as helping Windows 3.x programs support the long file names of Win95.

## Printing program

Parsons Technology (800-223-6925) is also unveiling many of its products in Win95 flavor. One of the first out the chute is Announcements 4.0 for Windows. A good value, announcements 4.0 comes with plenty of pre-designed templates to personalize and print everything from calendars to greeting cards to letterhead, stationery and business cards.

And Mustang Software (805-873-2500) adds QmodemPro for Windows 95. Fully compliant with the Microsoft's new TAPI communications architecture, QmodemPro for Win95 allows solid high-speed communication and downloading even while doing other work. QmodemPro is Internet-ready as a telnet client, and fully supports drag and drop. Or, use the built-in GIF/BMP/JPEG viewer to view and zoom any graphic file while it is still being downloaded.

## Bookshelf

Many stations have begun to set up home pages on the Internet, either on their own, or through a provider. It may be of some benefit to know how to edit your own Web pages. "Web Publishing with Word for Windows" by Ron Person (Que Books) focuses on users of W4W 6.0a. "Using HTML" by Tom Savola (Que Books) goes further, and includes software for PC, Mac and UNIX. Both come with software and examples of .html documents, and tips.

Finally, if you are really adventurous, perhaps you are interested in setting up your own Internet server. If so, "Building a UNIX Internet Server" by George Eckel is the book for you. A complete reference, this book comes complete with a CD-ROM including Linux flavor of UNIX and other programs to help set everything up. All you need is a computer, modem and a domain name.

□ □ □

Barry Mishkind can be reached at 520-296-3797, or [barry@AzStarNet.com](mailto:barry@AzStarNet.com) via the Internet. His home page is at <http://www.AzStarNet.com/~barry/>.

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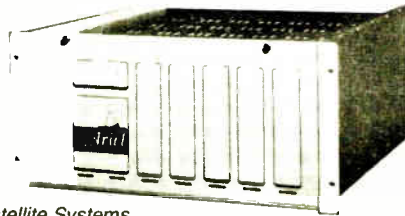
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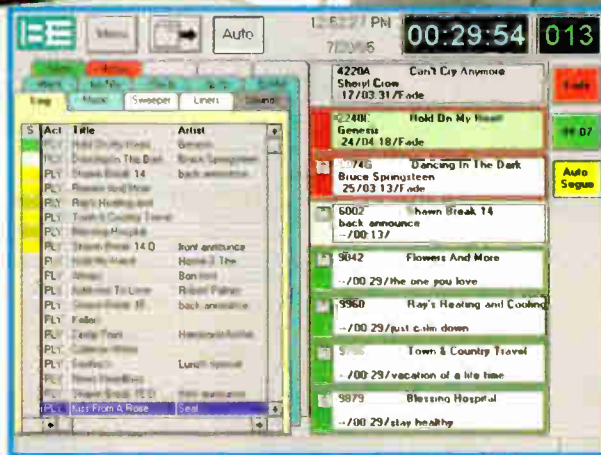
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# The Top Ten List for Your Station

by Jon Banks

**WASHINGTON** I've put together a list of 10 cool ideas for the studio for stations of any size budget:

✓ **Skim the remote:** How many times has a salesperson asked you for a tape of a remote so the client can hear how it sounded on the air ... the day after the remote? Try connecting the air studio skimmer so it can also be triggered when the fader for the remote is turned on and off.

Load a cassette at the start of the show and you will get an automatically edited aircheck of the breaks done from the remote.

✓ **Tape the remote:** While you are at it, make sure the board operator during the remote can also tape the remote feed. During music sweeps, the announcer at the remote can send down interviews, bits taped on cassette, etc.

You can protect yourself against a boring interview that drags on, or edit a bit that ran too long. If a celebrity is only available for a short time, and you do not want to break into a music sweep, you can tape him or her and use it later.

It is a great way to get more control of the on-air product.

✓ **A garbage speaker:** Instead of separate speakers and muting relays for your EBS

monitor, studio intercom, two-way radio, telephone paging system, etc., use a Henry Micro Mixer to sum up to four inputs at preset levels. The box has dual outputs, which can be paralleled to drive a 100 ohm speaker nicely.

A single contact closure will mute all the sources. Set it to a comfortable level, but don't put a volume control on the speaker ... it is important that these sources are able to get the operator's attention.

✓ **Mix-minus, plus:** Announcers like to put the telephone fader into cue and use the telephone hybrid as a speakerphone, even when the call is not going on air. At

those times, the caller should hear the studio microphone only. But when the phone is used on air, the caller needs to hear program (minus the phone feed, of course).

A cute trick is to automatically switch those two feeds to the hybrid ... use the studio microphone feed when the telephone fader on the console is off/in cue, and when the fader is faded up/turned on, switch to the program feed. If you match the levels, it is seamless, automatic, and natural.

✓ **Copy clips:** You have seen doctors use a light box to examine an X-ray. Usually the light box is mounted on the wall, and they slide the X-ray under a little clip at the top of the frame ... the spring clip holds the X-ray in place. You do not need both hands to put it in or release it.

Announcers love those clips for their copy ... get some at a photo supply store.

✓ **Great Interruptive Foldback (IFB):** Nothing makes a remote easier than a really good IFB. An effective IFB can be added to most consoles easily. You will need to wire up a button which interrupts the audition feed to the console's mono output and inserts a mic audio feed instead.

Connect that mono output to an auto answer phone coupler so the remote jock can dial in to get his or her cues. Put all faders except the one carrying the remote

**It is a great way to get more control of the on-air product.**

into audition, and you will have a mix-minus feed to the remote that you can interrupt with cues and commands.

If your console circuitry allows it, I suggest wiring the button so it dims the mix for a talk over, instead of muting it completely.

✓ **Log shelf:** The transmitter log always lives near the remote control, right? Take a small rack shelf, turn it upside down, and mount it below the remote control so it sticks out from the rack. It is a nice shelf for the log clipboard and the EBS booklet, and you can tape a copy of the transmitter power chart to the surface of the shelf for easy reference (put a sheet of plastic on top to protect it).

✓ **Easy labels:** This should work on any word processor, but WordPerfect did a great job for me. Measure the space next to the console buttons that is available for the label.

For an eight-button remote selector, it might be a strip a half-inch wide, and six inches high. Create a table on the word processor one cell wide and eight cells high. For this example, you would have to set the cell dimensions at one-half inch wide by three-quarters high.

Pick a nice bold font and fill in your button labels. Print on a laser printer using a heavy, colored stock ... almost a light cardboard. Cut out the entire strip and lightly glue it next to the buttons. Save the table as a document so you can easily redo it when the labels need to be

continued on page 69 ▶

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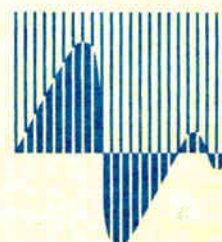
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# New Transmitter Site

► continued from page 45

lines exiting transmitters at the top, then travel horizontally to an egress point high on a wall. Outside, they continue horizontally in an elevated run to the point that they make the vertical transition on the tower.

AM lines sometimes come out of the top of a transmitter, then exit the building through a wall, as in a typical FM station. In other situations they leave the building through the floor, then run underground to the tower area where they connect to the antenna tuning unit (ATU) or (LTU). Many AM stations are laid out so the lines come out the bottom of the phasor into a

basement, turn horizontally, then leave the building underground through a basement wall.

Some requirements are common to all these transmission line egress methods. First, make sure the lines are adequately supported; connections at the transmitter, phasor or antenna switch should not be counted on to provide mechanical support for the line. Doing so can place strain at a critical point. Use whatever support methods are approved by the manufacturer.

Next, make certain the line will not bind at the point where it exits the building. Thermal expansion can lead to chafing and may eventually result in a

leak. Most transmission line manufacturers can supply a specially-made flange designed to accommodate the line where it passes through the wall. It is a good idea to use such a device if it is available, and will also neaten up an ugly hole in the wall.

Finally, plan to seal the hole around the transmission line. Many materials are available for this. Expandable spray-in foam is easy and effective, but unsightly. Duct-seal is not quite as ugly but is harder to apply. Whatever the case, this will become your "critter seal," so do not overlook its importance.

## RF shielding

Transmitter buildings located in close proximity to AM radiators or short towers supporting high-power FM/TV antennas may end up in high RF fields.

Besides possibly violating FCC and state OSHA rules, it may also create all sorts of RFI headaches for you in your audio and control wiring. It may pay to

need some help from your consulting engineer here. Be careful that the numbers you submit are properly calculated, as you may be asked to provide those calculations along with the basis thereof at a later time.

## Drawings

Before your building can go up, you will need some construction drawings. You will probably need an architect for this. In most areas, a building permit will also be required, so good drawings will be needed to apply for this.

Sit down with a competent commercial architect and explain your needs. Bring along your own drawings, complete with specifications and measurements where necessary. If you are adept and trained in such things, you may be able to do your own drawings, get the architect to modify them where needed, then have him/her sign off on them. I do this whenever possible, as it keeps the gap between my

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## Be certain that all surge suppressors installed are downstream of the disconnect.

install copper screen on the walls and ceiling during construction. Wide-spaced copperweld screening will provide a good deal of isolation for relatively low cost.

If installed on the studs beneath the dry-wall, it is invisible. Be sure, however, to leave a piece of ground strap where you can get to it every few feet. A copper screen in the walls will be pretty useless if you cannot bond it to the station ground!

A word to the wise: Local health agencies are getting more and more involved in the permit process for transmitter sites. Do not be surprised if you are required to provide RF power density (RFPD) levels at the adjacent property lines as a condition of your building permit.

Sometimes this comes as a two-stage requirement: to provide predicted RFPD levels prior to construction and actual measured levels afterwards. You may

concept and the finished product as narrow as possible.

Many jurisdictions will require drawings on tower foundations and footings. Have the tower company provide these, along with the figures used in calculating loads. This will allow the engineer in the state where you are building to check the calculations and sign off on the drawings for submission to the building authority.

Time spent carefully planning your transmitter site before construction will pay dividends for years to come. The results will be lower maintenance, cleaner operation, higher efficiency, lower costs and more comfort for you; the engineer that has to live with the site.

□□□

*Cris Alexander is the director of engineering at Crawford Broadcasting in Dallas. He can be reached at 214-445-1713.*

## Recalling 'Gangbusters'

► continued from page 50

in Germany and France, leaving active duty in 1952. He passed away several years later.

Although "Gangbusters" was the only radio show that Schwarzkopf appeared on, he had a great fondness for the broadcasting business.

"He enjoyed it very much," his son recalls. "The program was very entertaining and also pretty darn authentic. It had a definite police thrust to it, and he enjoyed keeping his fingers in police work. At the end of the program, they would announce the latest bulletin of who to be on the lookout for."

As a direct result of the bulletins, several hundred criminals were apprehended during the years "Gangbusters" was on. While "Gangbusters" was understandably the general's favorite radio show, there were many others that he also tuned in regularly.

"There was 'Fibber McGee and Molly,' 'Amos and Andy,' 'The Jack Benny Show' — all of those programs were very much part of your life in those days," he says.

"Then you had 'The F.B.I. in Peace

and War,' 'The Shadow,' 'The Green Hornet' and 'Inner Sanctum.'

"I remember 'Inner Sanctum' especially well," continues Schwarzkopf, "but I never listened to it very much. It started with an opening of a creaky door and that scared me so badly that I'd say, 'I'm going to bed. I'm outta here!'"

The young Schwarzkopf wasn't quite as quick to run away from the hilarious "Fibber McGee" broadcasts. He was always curious to find out what was in Fibber's closet.

"As I recall, he had everything in there," Schwarzkopf says with a chuckle. "They'd open the door and everything would come crashing out. That was the wonderful thing about those shows. They required you to use your imagination. You could conjure up whatever images you wanted to see in your mind. Those shows were marvelous!"

□□□

*Author's Note: Thanks to Mike Mashon at the Broadcast Pioneers Library at the University of Maryland, who supplied research assistance regarding "Gangbusters."*

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# MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

## Automatic Feedback Locating System

Peavey Electronics Corp. offers its new Automatic Feedback Locating System (FLS). This system takes the complex procedure of locating and controlling feedback in PA and monitor systems and simplifies it into an easily manageable task.

When a sudden feedback occurs in a PA or monitor system, it is often difficult to tell exactly which frequency is causing the problem.

The FLS solves this problem. The system consists of an array of LED lights, one LED above each of the graphic EQ's sliders. When a feedback occurs, the FLS instantly detects the feedback, determines the exact frequency band and automatically lights an LED above the appropriate slider.

If a feedback frequency is between two sliders, two LEDs light with variations in intensity if the feedback is slightly closer to one slider or the other. When an intermittent feedback occurs, the FLS still lights the appropriate LED, which stays lit for about five seconds after the feedback has quit.

For information, contact the company in Mississippi at 601-483-5365; fax: 601-486-1278; or circle **Reader Service 49**.

## Parallel Effects Processor

The ENSONIQ DP/2 is a single rack-space digital effects processor that can process one true stereo input or two discrete mono inputs, in serial or parallel routing, with many feedback options possible. The DP/2 uses ENSONIQ's custom 24-bit DSP chips to produce high-quality algorithms and processing options.

The DP/2's 65 algorithms cover the gamut, from reverbs, delays and modulation effects to numerous guitar-style effects to studio applications such as compression, EQ, ducking and expanding.

The DP/2 offers 600 presets: 200 1 unit (a single processor algorithm), 200 2 unit (two-processor combinations) and 200 config presets (groups of dual single processor algorithms ready for studio use).

This processor has TRS balanced quarter-inch connectors and is the only processor in its class to offer both a front-panel input and a headphone jack.

For information, contact the company in Pennsylvania at 800-553-5151; fax: 610-647-8908; or circle **Reader Service 127**.

## Snake Cable

Sound Runner, from Marshall Electronics Audio Systems Division, is a high-quality, low-cost snake cable. Available in analog and digital formats, Sound Runner is a high-definition studio and auditorium cable, ideal for all sound reinforcements.

With two 24-gauge 7 x 32 strands of tin-plated copper conductors, Sound Runner performance standards meet or exceed those of higher-priced lines. Specially



manufactured with a 24-gauge drain wire and color-coded conductors jacketed in red and black, these snakes simplify soldering and punch-down blocking.

continued on page 69 ►

## AM Radio Also Was Early Fax Machine

by Robert H. Coddington

**RICHMOND, Va.** The facsimile "fax" machine — the modern descendant of early wirephoto transmission technology — has become a practical necessity in offices and is even found in many homes today. I don't have one in mine, but I did have a receive-only one in 1941!

It has taken only a half-century for facsimile to invade homes in large numbers. Seasoned citizens may remember this invasion was first attempted in the late '30s and early '40s, when AM broadcasting still reigned.

### Radio "newspaper"

A majority of stations then signed off at midnight or 1 a.m. and — if memory serves — it was WLW(AM) Cincinnati's Crosley Broadcasting that promoted a scheme to expand the service of broadcasting by transmitting news stories in facsimile overnight. This would provide the householder with a timely "newspaper" upon arising in the morning.

In support of this plan, a number of powerhouse stations undertook experimental overnight facsimile transmis-

sions. Of course, this required a facsimile printer in the home.

A New England manufacturer (Alden perhaps) produced a kit designed to produce facsimile images from a radio receiver's audio output. When a mail-order house offered these kits at a close-out price, I, then a teenager, scraped up enough to buy one.

Assembling the kit was a bit like completing an Erector Set project. A bare chassis supported a substantial-driven paper path and the tracing bed. A horizontal arm swept across the paper once per second, synchronized with the signal by a solenoid-triggered clutch. A stylus at the end of the arm traced across the electrically and thermally sensitive paper, which darkened accordingly.

The printer specs called for five watts of audio from the receiver, which used an OZ4 tube to rectify the audio for control and tracing functions. At one sweep per second, the output was slow — around one foot or so of paper per hour.

Certainly it was slow, but running unattended, it had all night to produce the morning "newspaper."

Educational as I found this project to

be, it fell short of expectations. I suppose I should have known the close-out price was a precursor of obsolescence; just before I completed assembling the printer, my local facsimile station of the time, WHO(AM), Des Moines, discontinued facsimile transmissions. I was left with WJR(AM), Detroit, and either Chicago's WMAQ or WGN for signal sources.

### Not one word

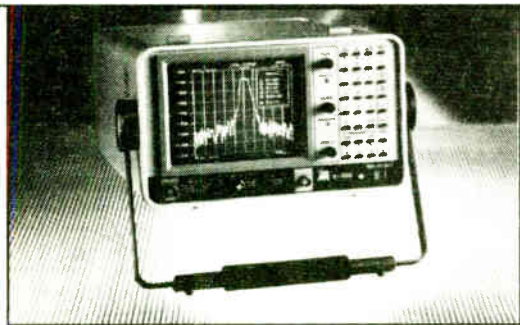
WLW came in like a local during their experimental late-night 500 kW operation as W8X0, but I don't recall them still doing facsimile transmissions. Even though I had 18 or 20 watts of audio, the distant signals probably were not clean enough; I never obtained a single word of readable copy during the few weeks before the other stations also gave up the experiment. So much for early facsimile in the home.

Fortunately, I was able to find another experimenter who made a good trade with me for the printer before I went into military service and World War II.

Now fifty-plus years later, here I am eyeing facsimile hardware all over again.

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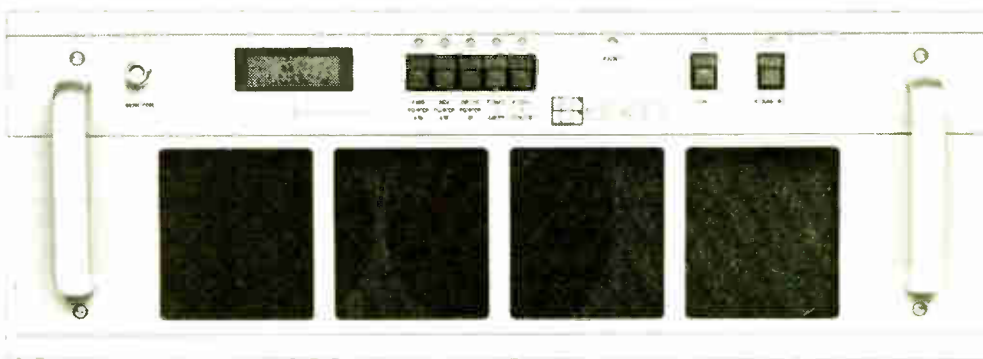
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# MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

► continued from page 67

All Sound Runner snake cables have rugged insulation and solid shielding with tough yet flexible aluminum Mylar. They are jacketed in dark blue PVC and numbered for identification.

Sound Runner 110 ohm digital snake cable meets AES/EBU digital requirements. It can be used for digital mixing consoles, duplication houses and format recording equipment. A low-capacitance design of 14 pF per foot means that it can be used on any manufacturer's equipment.

For information, contact the company in California at 800-800-6608; fax: 310-391-8926; or circle **Reader Service 161**.

## Analog Voice Security for HF Radios

Harris RF Communications offers a new Analog Voice Security (AVS) device that can be embedded in any Harris RF-3200E radio to provide reliable, easy-to-operate voice security.

## Top Ten Tips Plus One

► continued from page 64 changed.

✓ More space: When you designed your studio, you left some extra rack space near the operators for future expansion. If that has not been used up yet, don't just cover it with a blank panel ... use a rack shelf that holds CDs or carts so the announcers have a convenient place for the material they will be using in upcoming breaks.

You can order Mid-Atlantic shelves without dividers; that seems to work best.

✓ Security covers: A studio DA or a console power supply with a front panel on/off switch is an accident waiting to happen. An EBS generator at knee height near the console will get bumped a lot. Accessible monitor amp level controls will only get misadjusted. You don't need that kind of headache.

Buy security panels for any rack-mounted equipment that should not be touched. You cannot protect against deliberate tampering, but at least you won't get called when someone accidentally trips the power switch or shuts off an important volume control.

✓ Bonus Tip (but it's not cheap): Try a Corian countertop in your next studio. It is a hard, synthetic resin that makes gorgeous countertops. It is very durable, and the color is solid all the way through. It is available in a number of solids and patterns, and a quick hand buffing with a special abrasive pad will remove any scratches.

It is not cheap, but after five years, mine still look as good as new. Fountainhead is a similar product by another manufacturer.

□ □ □

Jon Banks is Chief engineer at Washington's WARW(FM). Reach him care of RW.

The new RF-3228E AVS option is a single PWB board that can be inserted into a single option slot in the RF-3200E radio. All operating procedures are carried out through the front-panel keypad with menu-driven prompts. Secure/clear selection is made via a single dedicated pushbutton.

The AVS algorithm developed by Harris requires no digital synchronization for descrambling. As a result, the system provides secure communications over the same operational range as a clear voice.

According to the company, recovered voice quality and voice recognition are



superb, regardless of language or dialect.

The RF-3228E uses a two-dimensional frequency/time-scrambling technique. Scrambling keys are loaded through a rear-panel RS-232 port. Up to 200 keys

## Site Management Program

SiteBase for Windows from SoftWright LLC is a comprehensive communications site management program. A relational database for the Windows interface, SiteBase tracks and updates equipment and other management information, as well as creating dozens of customized reports.

Developed by engineers with expertise in the design and maintenance of communications systems, SiteBase provides a storehouse of geographic information, engineering parameters, equipment, manufacturer and installation specifications and other data that must be at hand for both the site manager and the corporate engineer

responsible for facilities.

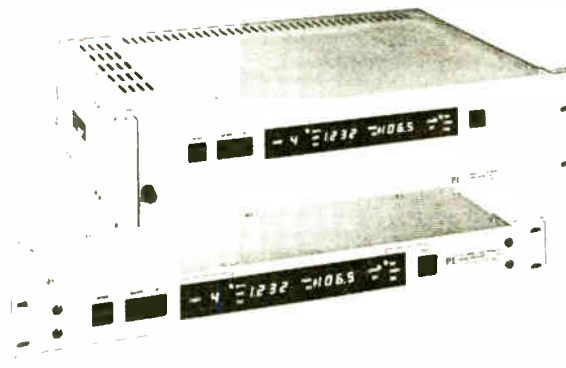
SiteBase features dozens of input screens with data fields to place hundreds of technical parameters and manufacturer specifications, provides data fields for entering geographical and other information, sets up easy-to-use phone directories, and so on.

Using Windows 3.0 or higher, SiteBase for Windows runs on a 286 (or higher) IBM-compatible computer with a VGA, EGA or other Windows-compatible video card, and any Windows-supported mouse and printer. It requires a minimum of 6MB hard disk and 6MB RAM.

For information, contact the company in Colorado at 303-344-5486; fax: 303-344-2811; or circle **Reader Service 36**.

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continued on page 70 ►



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# WORKBENCH

## Second Harmonics Not So Harmonious

by John Bisset

**SPRINGFIELD, Va.** Back in April, I ran a query from WDNX-FM asking for solutions to a second harmonic problem the station was experiencing. The station operates at 89.1 MHz, and was causing interference to viewers of television Channel 7.

Alan Kilgore at WMBV concurred with other Workbench readers, that most second harmonic problems are due to receiver front-end overload. It was not mentioned whether a spectrum analyzer was first used to determine if the radiated signal met Federal Communications Commission (FCC) specifications. That would be step one.

Alan's station operates at 91.9, with 62 kW. Its second harmonic falls on channel 8. The only folks that had problems were using mast-mounted TV preamps or extremely rusty antenna feedlines or connections.

Alan pointed out that if the station actually is radiating a little second harmonic, then there is some problem with the transmitter or a nonlinearity in the harmonic filter, feedline, or antenna.

The problem could be caused by something rusty or otherwise nonlinear in the antenna field or near the receivers. Does the station meet the spurious emissions requirements of 73.1580 and 73.317(d)? Rather than increasing the harmonic emissions and risking a fine, it should be less expensive to solve the problem.

If the station passes the testing as outlined in 73.317(d), and additional harmonic reduction is desired, try adding a second harmonic filter or bandpass filter to further reduce the desired emissions.

More than likely, however, if the area of interference is within or near the blanketing signal (see 73.318), receiver front-end overload is a more likely suspect. That was the problem that Alan experienced. He installed filters in front of the TV antenna boosters,

and repaired rusty twin lead connections — even though 73.318 did not require it. The station had no genuine reports of interference that they were required to remedy.

Jim Dunn of WSSU/WIPA in Springfield, Ill., wrote that although the problem appeared to be second harmonic-induced by the station (occurring in the Channel 7 fringe area), more than likely the viewers were using an amplified TV antenna system. When the signal of WDNX at 89.1 MHz hits the amplifier, the amp is overdriven, goes into clipping, and generates a harmonic on Channel 7.

Jim's experience has shown that the FM traps built into the TV preamps do not help much. He had to install one, or sometimes two, additional traps. The FM trap must be put between the antenna and the TV amplifier. Jim adds that if overload is indeed the problem, the FM traps sold by Radio Shack seem to work as well as more expensive models, provided they are weather-proofed.

Jim truly does speak from experience: he installed over 200 traps in TV antenna systems when his station installed a 50 kW repeater at 89.3 in a Channel 7 viewing area!

Last, but certainly not least, was a reply from Joe Davis at WETA-FM here in Washington. Joe's Hagerstown station at 89.1 causes a similar problem to certain Channel 7 viewers nearby. Joe's investigation paralleled Jim Dunn's: the problem was not a radiation of the second harmonic, but rather the use of booster amps by those Channel 7 fringe viewers.

The booster amp overload can be reduced using a notch filter, tuned to 89.1 MHz, at the input to the booster. Joe added that the reason some built-in booster amp "FM traps" do not work well at 89.1 is that they are on the skirts from Channel 6, located just below 88 MHz.

Joe found a good notch filter manufac-

tured by Microwave Filter Company (800-448-1666). The filter is part number 5KFM (frequency in MHz), and costs \$39. The filter will provide 55 dB of rejection, and is F-connector in and out.

For more information, circle **Reader Service 31**.

We join WDNX in expressing our appreciation to the engineers that contributed these solutions. Alan Kilgore can be reached at WMBV at 334-992-2425. Joe Davis can be reached at WETA-FM, 703-998-2765.

★ ★ ★

I will wrap up this edition of Workbench with a tip for owners of Moseley PCL-606 STL systems. I recently got a call from a client who was off the air. The PA current reading was half the normal amount, there was no output power, but all of the LEDs were green.

After some internal voltage checks, I found that the 7200 mfd 25 V power supply cap had opened up. The power amp voltage was around 4 V! Replacing this capacitor returned

the unit to normal. While the box was open, we noted the other power supply electrolytics and have subsequently replaced them.

It is funny; I remember one of my FCC First Class License test questions was, "Which component has the highest failure rate?" The answer was "C" for capacitor. This being the case, save yourself a lot of troubleshooting time and check the supply voltages first — regardless of the symptoms. You'll be surprised at the bizarre effects bad filter caps in the power supply can cause.

When you replace the electrolytics, do not forget those in the receiver! We have added routine replacement of critical electrolytic caps after five years to our maintenance list because it seems likely that is where most of the failures will be.

□ □ □

*John Bisset is a principal with Multiphase, a contract engineering and special projects company based in Washington, DC. He can be reached at 703-323-7180. Fax submissions for the Workbench column to 703-764-0751. The Workbench Column can be reached on-line at wrwbench@aol.com Printed submissions qualify for SBE Certification credit.*

## MARKETPLACE

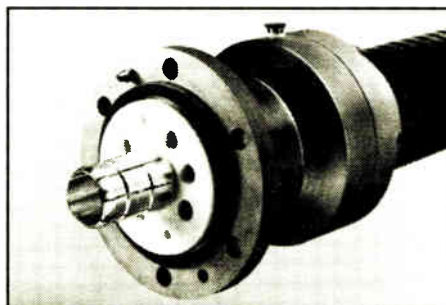
Windows-compatible demo disk. Actual PE Software screen captures outline the software's monitoring capabilities and analyzing power quality or harmonics data collected by remote BMI Model 7100 power monitors. The demo disk also highlights the benefits of this distributed power monitoring system, including its flexibility, convenience and ease of use.

For a free copy, contact the company in California at 408-970-3700; fax: 408-970-3720; or circle **Reader Service 215**.

### Interface Connectors

Andrew Corp. announces an easy-to-install family of 3 1/8-inch and 6 1/8-inch EIA interface connectors for its three-inch, four-inch and five-inch HELIAX air dielectric coaxial cables. These connectors are widely used in AM and FM radio broadcast systems.

These connectors bolt together with Allen screws, eliminating the need to use special tools for attachment and allowing easy installation in tight locations. Despite the simplified design, electrical performance is not degraded: return loss



is typically at least 5 dB better than that of the previous connectors.

Broadcasters can satisfy any connector requirement by stocking a female gas block connector plus a male inner connector. These may be modified to provide any other configuration.

For information, contact the company at 800-255-1479, ext. 42, or circle **Reader Service 85**.

### Mini Hypercardioid Mic

The AKG C647 is a miniature hypercardioid microphone integrated into a sectional gooseneck stand. The high-grade condenser capsule features a smooth and extended frequency response in a slim housing that is barely distinguishable from the gooseneck itself.

High sensitivity and a hypercardioid pattern assure full-bodied, intelligible sound at working distances from one to four feet, depending on ambient conditions. Off-axis sources are attenuated evenly for maximum feedback rejection, and signal-to-noise ratio is excellent. An acoustically tuned interference tube evenly extends bass response, while a switchable roll-off filter effectively controls annoying rumble.

The C647 is well-suited to radio stations with an all-talk format, such as KKLA-FM in Glendale, Calif., which uses several of the microphones in its new studio.

For information, contact Shannon Celia in California at 818-895-3426; fax: 818-830-1220; or circle **Reader Service 112**.

### Special Outlets for PCUs

Pulizzi Engineering now offers Isolated Ground outlets as options on most of the Z-Line Power Controller Units produced.

Isolated Ground receptacles help assure the proper functioning of equipment used in electronics. When communication and other types of electronic equipment are grounded through the conventional building ground, transient signals often cause their circuits to malfunction. This problem is solved by the use of Isolated Ground receptacles that provide a pure grounding path separate from the conventional ground circuit within a building. Isolated grounding can be accomplished with the standard IEC receptacles and the available special NEMA styles.

For information, contact the company in California at 714-540-4229; fax: 714-641-9062; or circle **Reader Service 167**

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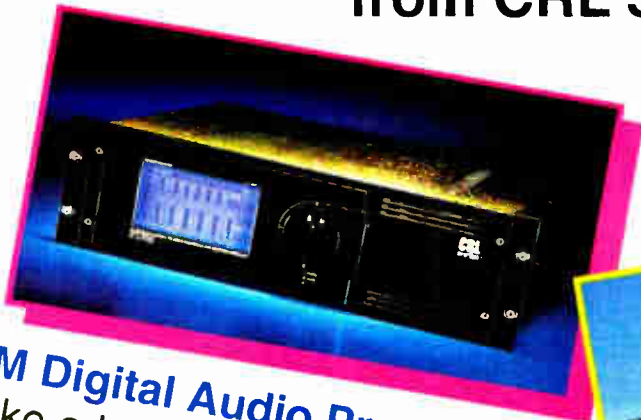
For further information contact:

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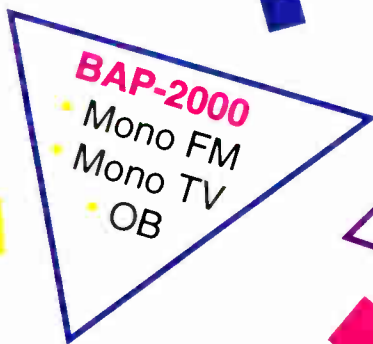
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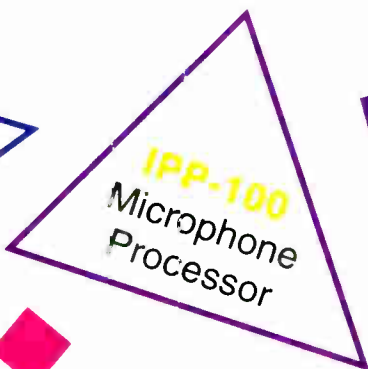
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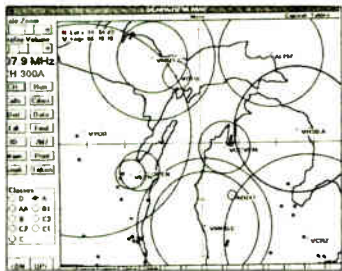


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**RTS-405** stereo TT preamp, 6 mos use, \$140+shpg. B Lord, 206-932-4839.

### Want To Buy

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**Tube Hi-Fi**, speakers, tubes. Altec, Marantz, McIntosh, Western Electric, coax/tri-ax and corner speakers, tubes-VT-4C, 845's, etc. 405-737-3312 FAX: 405-737-3355.

## ANTENNAS/TOWERS/CABLES

### Want To Sell

**ERI 8-bay** roto-tiller FM antenna, in storage, on 104.3, some missing parts, Best Offer. Gary, 919-790-6315.

**Jampro 3-bay** antenna, 100.9 MHz with adomes, \$1800. R Mason, 703-962-1133.

**300' guy** wired towers (2), BO. Jack, 304-765-7373.

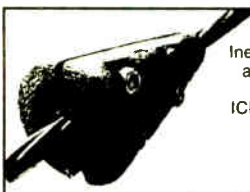
**ERI 7-bay** high power rototiller antenna system, tuned to 97.5 MHz, used only 3 years, retunable, \$8500+shpg. Gary, 919-848-9736.

**ERI 2-bay** FM antenna tuned to 100.1 MHz, used since 1987, BO; 450' 1 5/8" coax in 2 sections, approximately 200' & approximately 250' sections separated by ERI isocoupler, BO; Collins LPC-4 4-bay FM antenna, tuned to 104.9 MHz, operated from 1971 to 1994, has de-icers, BO; approx 280' 1 5/8" coax, BO. T Stafford, 501-933-0403 FAX.

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**Mark Products** parabolic antenna, open grid type, 10' diameter, model P6120 GRN, new, Best Offer; TACO parabolic antenna, expanded mesh type, 12' diameter, model C-1445, Best Offer. R Myers, Sound Masters, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.



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**1 kW** class mod reactor choke. Bill, 914-356-6553.

**200' Heli-ax** transmission line, 1 5/8" or 3". J Powley, 910-342-1843.

**6-bay** on or near 92.1. J Hansen, 612-632-2992.

**6-bay medium** power CP on or tunable to 100.1 MHz. D Michaels, 916-926-1332.

**High pwr** FM antenna on or near 107.1. R Latimer, 409-244-4170.

## AUDIO PRODUCTION

### Want To Sell

**Eventide 910**, exc cond, \$675. J Winters, 717-367-1119.

**Pro Announcer 500** mic processor, as new w/manual, \$600. G Barnett, 619-328-1104.

**Tascam ES-50 & 51** combo sync, 2 slaves, \$2500. D Michaels, 916-926-1332.

**ADC 1/4" patchbays** and cords, NEW, UNDER HALF PRICE, ADC TT patchbays, \$129 up, NEW cords, \$9.95. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

**360 Systems** 16x16 router expansion unit only, \$295. G Watcher, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

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**CRL-4 SG 800A**, SGC 800, SEC 800, SMP 850, good cond, with manuals, \$4000. Jack, KJKY, 1309 S Monroe St, Joplin MO 64801. 417-624-1025.

**dbx-224x** Type II NR, -10 dbm, \$90; (15) space Calzone mic locker, \$90; Symetrix TI-101, phone interface, \$175; Sony ECM-55B lavalier mic, \$150; all as new. Brian, 313-584-9201.

**Good used studio tape** 1/2" \$15, 1" \$30, 2" \$55. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

**Bulk eraser**, \$49; Stewart 4 ch D-box, \$95; Cue command decoder, \$125; NEW Tascam midiizer MTS1000, \$450; Infonics 7" reel copier 1-3 copies, 2@ \$125 ea; Furman elec crossovers, \$95; Peavey M2600 power amp, \$375; Crest FA800 PWR AMP, \$475. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

### Want To Buy

**Cooper Time Cube**, MXR pitch transposer, MXR digital delay, Ensoniq DP-4, Roland SDE-3000 & unusual studio gear preferably 60s to late 70s era. 617-293-5671.

**Ampex tube mixers**, plug-in mic preamp modules for PR10's, Altec or other tube compressors, Mackie mixers. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

## AUTOMATION EQUIPMENT

### Want To Sell

**Harris 9000** (5) ITC 750, Carousels, dual floppy drives, snlg cart deck, more, \$2000. Tom, 715-234-9059.

**SMC Model MSP** automation system, works good, includes 10-channel brain/switcher, SMC racks (3), 452 bi-directional Carousels (2), ARS 1000 reel PBs (3), single cart PBs (2), batt pack OP, Silence Sense, all manuals, 25 Hz/1000 Hz tone gen & some spare parts, you PU in VA, \$3250; 10" country tapes & set-up @ your loca available for reasonable extra chrg. Howard, 615-452-8600.

**SMC Carousels** (2), various memory cards, expansion card, audio & sensor cards, terminal, etc, Best Offer; Extel printer for automation system, Best Offer. C Tracy, WKNE, 603-352-9230.

## CART MACHINES

### Want To Sell

**BE 3000A** stereo R/P with tones, very good condition, \$850; **BE 3000A** mono PB/delay recorder, rack mount, new, \$500; **BE 3000** mono R/PB with tones, good condition, \$650; **BE 3000** (3) mono PB with ones, \$450/ea. D Kelly, 402-372-5423.

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**Audi-Cord DL-PS** (4) stereo PB, excellent condition, \$650/ea; **Delta** stereo R/P, excellent condition, \$1500. E Stevens, 81 Lancaster Ave, Malvern PA 19355. 610-889-9676.

**Denon 951** CD cart machines, and Audiometrics CD cart machines, \$1050; CD cartridges, \$3.50/ea. TM Century, 214-406-6810.

**ITC 99B** mono R/P deck, well maintained, ELSA, many extra parts, \$1000. T Teagardon, WATH, 300 Columbus Rd, Athens OH 45701. 614-593-6651.



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Gates CC11 trideck, PB NAB carts, \$300; Harris CC11 trideck PB NAB carts, \$300; Gates Criterion 80 (2) with recording module, \$150/ea. J Nolin, CKTL, 1646 St-Laurent, Plessisville QC G6L 2Y6. 819-357-0922.

Otari ARS-1000 PB only, good condition, with book, \$250 ea/BO. WMOP, PO Drawer 3930, Ocala FL 34478. 904-732-2010.

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Technics SL-P1200 \$695. M Guthrie, WFNS, 7201 E Hillsborough Ave, Tampa FL 33610. 813-620-9100.

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**Want To Buy**

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**Want To Sell**

Tangent 1202A 12-chnl mixing board, slide pots, reverb, pre- & post-FX, send & return, EQ, excellent condition, \$1000/Best Offer. L Prezant, 718-548-1623.

McMartin B502 stereo console, \$300. Gary, 919-790-6315.

UREI Mod One stereo consoles (2), BO. R Stafford, 501-933-0403 FAX.

Ampro AC10D (2) 10-channel, ea has 4 aux inputs, dual channel mono out, self contained monitor amp, power supply & manual, very good condition, \$950. Dave or Harold, 517-686-9341.

LPB M-5M mono 5-channel console, \$600. 206-337-6695, leave message.

BE BE-4M5DA, new, \$600. G Grassie, 505-734-5565.

Fostex 812 studio mixer, 2 yrs old, 12x8x2, original packing, manual incl, \$850. G Parmelee, Audio Tracks, POB 645, Middlebury VT 05753. 802-247-4208.

Ramsa 820 20x8x16 with meter bridge, \$1795; Quantum 23x16x24 as used by LA Philharmonic, \$3750. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

McCurdy SS7500 stereo console system with furniture, Best Offer. M Guthrie, WFNS, 7201 E Hillsborough Ave, Tampa FL 33610. 813-620-9100.

Harris M90, 19 chnl stereo, incld PGM/AUD inputs and meters, 1-8 chnl remotes, 2 mic mods, good condition, needs power supply, BO; McCurdy SS4370, 8 chnl stereo board incl 3 inputs/chnl, 1-5 chnl remote, 1 mic mod, excellent condition, BO. J LaBaum, 1423 W Norwich, Fresno CA 93705. 209-221-7510.

Ramko DC5AR, 5 chnl mono. J Parsons, Parsons Sound, 2781 Fayson Cr, Deltona FL 32738. 904-532-0192.

Tangent 1202-A stereo mixing console, 12 inputs, echo, send and receive, foldback outputs, solo features, mono outputs, all inputs mic or line equipped, LED VU's, immaculate, \$800. S Lawson, KAK Productions, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

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Aphex 320, as new, used short time, w/manuals, \$1000. Jack, KJKY, 1309 S Monroe St, Joplin MO 64801. 417-624-1025.

Aphex Dominator II 720, exc cond, w/manuals, \$850. Jack, KJKY, 1309 S Monroe St, Joplin MO 64801. 417-624-1025.

CRL PMC 300A peak mod controller, very little use, new, Best Offer. M Ward, 508-875-6109.

DAP-310 Discriminate Audio Processor in working order with manual. \$275. B Hawkins, 950 N Meridan St #1297, Indianapolis IN 46204. 317-684-8411.

Lexicon audio time compressor expander model 1200, new list price \$9500. Excellent condition with instruction manual and 30 day warranty, \$995. Call 301-439-4116.

Orban Optimod 8100, \$2900. Gary, 919-790-6315.

**MICROPHONES**

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Sony ECM377 large dia. cond mic, \$495; RCA 77DX with new ribbon, Crown GLM200 lavalier like new, \$125. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Zercom remote broadcast MAX-ZII; MS-3 mic combiner; Peavey low Z mic with bag, all for \$450. 502-439-1958.

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| 10-19 col inch (per inch) | 55   | 52              | 49 | 44  |
| Distributor Directory     | 100  | 95              | 90 | 85  |
| Professional Card         | 65   | 60              | 55 | 50  |
| Classified Line Ad        |      | \$1.50 per word |    |     |
| Blind Box Ad              |      | \$10 additional |    |     |

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$180, at the 3x rate \$174, at the 6x rate \$162, at the 12x rate \$147, etc.



## MISCELLANEOUS...WTS

12,000 W Topaz true UPS with batteries, \$1750. G Watcher, KFYL, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

Harris/Gates 2 tower phaser, Potomac Inst antenna monitor AM-19 (204), other miscellaneous phasing equipment, Best Offer. Jack, 304-765-7373.

**FM & TV FIELD MEASUREMENT TRAILER**  
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414-242-6000

Radio Labs STP-1 alternators (3), new, \$15/ea; Rusco CD-100 impedance matching svc, new, \$35. G Grassie, 505-734-5565.

Tangent 1202-A stereo mixing console, 12 inputs, echo send & receive, foldback outputs, solo features, mono outputs, all inputs mic or line equipped, LED VUs, immaculate condition, \$800. S Lawson, KAK Production, 928 Hyland Dr, Santa Rosa CA 95404.

IGM Go-cart 24 (4), \$350/each; MCI RTR play decks (4), \$400/each; ITC mono PB carts (4), \$200/each; Delta IV R/P deck, \$2000; Harris 9000 mainframe lightning damage but some cards good, Best Offer; Magnavox 13" b&w monitor, \$99; Wegener demod cards 1610, 1610-01, 1606-21, 1605-12, 1646, 1645, 1683-08, Best Offer; Video 100G b&w monitor, \$49; Conex 25 Hz tone generator, \$99; SMC 250 Carousel, \$300. Dave, 501-646-6700.

## Want To Buy

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NNYN 10003. 212-674-3060.

10 kW gen & transfer switch. J Hansen, 612-632-2992.

Phonograph records from 1950 to 1970, all types of music, 45s, 33s, 78s & transcriptions, top prices paid, will travel. B Berry, 800-321-2920.

## MONITORS

## Want To Sell

McMartin AMR-1 receiver 1230 kHz, \$45. 206-337-6695, leave message.

## RECEIVERS &amp; TRANSCEIVERS

## Want To Sell

Johnson Ultracom 513 UHF 2-way radio base unit, snl chnl, \$50. E Lightman, 412-266-2802.

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S-COM 5K controller with case, rack mt panel, manual, \$175. B Hawkins, 950 N Meridan St #1297, Indianapolis IN 46204. 317-684-8411.

## Want To Buy

Any EBS encoder/decoder in good condition. JP Ambrutis, 207-443-6671.

## RECORDERS

## Want To Sell

Eumig FL-1000U rackmount cassette deck, optical export, Dolby, built-in reverb & mic mixing, very good condition, Best Offer; Revox B77 1/2-track R-R, 7 1/2-15, port, excellent condition, \$600/Best Offer over; Pioneer RT-1050 1/2-track R-R, 7 1/2-15, port, excellent condition, \$500/Best Offer over. L Prezant, 718-548-1623.

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Otari ARS-1000 R-R PBs (4) with tone sensors, good condition, \$300/ ea. Randy, 815-942-2839.  
3M Cantada 700 94C back-

ground music player with 48 hrs unduped music & complete manual, good condition, \$175+shpg. R Zimmer, 520-327-7925.

MCI 110B&C (5) 2 track; MCI 110B (2) 4 track; lots of parts, will sell all or part, Best Offer. M Guthrie, WFNS, 7201 E Hillsborough Ave, Tampa FL 33610. 813-620-9100.

Otari ARS-1000 R-R PBs (4)

with tone sensors, good condition, \$300/ ea. Randy, 815-942-2839.

Ampex ATR-700 2 channel mono, no visible head wear, solenoid switches oxidized, fully operable via remote control connector, BO. C Kocsis, Knobs On, 7315 Oriold Ave, Springfield VA 22150. 703-913-9143.

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high speed cassette duper, excellent condition, \$600; Telex stereo Copyette Series II, \$200; Revox B-77 1/4-trk, \$450. G Grassie, 505-734-5565.

Otari 5050 MKII 12-track recorders (2), 7.5 & 15 ips, good condition with remote controls, \$1400. Gary, 919-848-9736.

Studer A-80 RC 15/30 ips,

1/2" heads with extra 1/4" headstack, remote control, alignment tape incl, rebuilt by Studer, excl cond, \$3500. B Cuson, Tape Tracks Rcdg, 2275 Yargerville Rd, Lasalle MI 48145. 313-241-7998.

Astocom-Marlux 407 RR recorder 7" 1/4-track, works, 3 3/4-7.5, 3 motor, 4 head, \$30. E Lightman, 412-266-2802.

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**Tascam 388** 8-track R-R with console, 7.5 ips/dbx-NR, excellent condition, \$850. G Parmelee, 802-247-4208.

**Ampex AG 440 B**, new heads, \$550; Scully 280, good heads, \$550; Akai X355, \$150; Teac-Realistic X3, \$300; ITC 750, \$150; ITC 770 (2) rec amps, \$130/each; Inovonics 370 (2), good condition, \$250/pair. J Parsons, Parsons Sound, 2781 Fayson Cr, Deltona FL 32738. 904-532-0192.

**Scully 4-track 1/2"** 280B in roll-around console, \$600; ITC 750 PB decks (3), \$500/all. Gary, 919-790-6315.

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**Tascam ATR 60** 8 track with stand, remote, \$2250; Otari 5050-8 new heads, rebuilt, \$1595; Ampex 440B-8, \$1950; Tascam 25-2, \$495; Ampex ATR700, \$495; Scully 16 track 2", \$2950; Tascam 52 top of line, \$650; M79-24 fully rebuilt, \$9,500; Tascam locator for 85-16, \$375; Fostex E22 1/2" timecode deck, \$950; Fostex A80 8 track with 450 mixer, \$995. W Gunn, POB 2902, Palm Springs, CA 92263. 619-320-0728.

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**Moseley MRC 1600** 16-channel, \$1000; TFT 7601 10-channel, \$500. B Spitzer, KKLS/KKMK, 605-343-6161.

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Delta OIB-1 operating impedance bridge, \$800; Potomac Instruments AG51 and AA51, audio signal generator, audio analyzer, \$600. J Whatley, WNUZ, 110 Glenhaven Dr, Alexander City AL 35010. 205-234-2492.

Fluke 5 1/2 digit precision DMM w/IEEE port, \$395; CM-30 Tek Polaroid scope camera for 400 series frame, \$95. G Watcher, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

Potomac Instruments AT-51 audio test and measure set, excellent condition, all accessories, Best Offer. J Seaman, PBS, 1320 Braddock Pl, Alexandria VA 22314. 703-739-5483.

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Including Stereo Encoder, Deviation Limiter, Built in Tone Generator, Antenna Mismatch Protection, and other goodies.

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**REBUILT ELECTRON TUBES**  
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|-----------------|---------------|
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| 3CX15,000H3     | 4CX350A/8321  |
| 3CX10,000H3     | 4CX250R/7580W |
| 3CX10,000A7     | 4CX250BT      |
| 3CX3000F7/8162  | 4CX250BC/8957 |
| 3CX3000A7       | 4CX250B/7203  |
| 3CX2500H3       | 4X150A/7034   |
| 3CX2500F3/8251  | 5CX1500B      |
| 3CX2500A3/8161  | 5CX1500A      |
| 4CX15,000A 8281 | 5CX1500A      |
| 4CX10,000D/8171 | YC130/9019    |
| 4CX5000A/8170   | 8560AS        |
| 4CX3500A        | 811A          |
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| 4CX1500A        | 833C          |
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Have Your Power Tubes Remanufactured by the Original Manufacturer

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power grid tube products  
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**Want To Sell**

Sparta 2-speed (2) TTs with "bag" of spare parts, tired but operational, Best Offer. C Tracy, WKNE, 603-352-9230.

**Advertise!**

Call your advertising representative at  
**1-800-336-3045**  
for details & deadlines

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**EMPLOYMENT**

To place ads in this section, use the ActionGram form. To respond to box numbers write Radio World, PO Box 1214, Falls Church, VA 22041. Attn: \_\_\_\_\_

**HELP WANTED**

**Results-oriented**, good communicator with experience in high power AM/FM, directional and studio maintenance. Digital audio, computer literacy a must. Full-power, top-rated Southwest stations with state of the art equipment. Write to: Radio World, POB 1214, Falls Church VA 22041. Attn: #95-9-20-3RW.

**ENGINEER: WFLS AM-FM/WYSK**

FM has an opening for an experienced engineer with FCC General License and preferably SBE certification. Our state-of-the-art facility requires maintenance of AM and FM transmitters, digital studios and analog equipment. Our company is newspaper-owned with attractive benefits and growth opportunities. Please send resume to:

Human Resources  
**WFLS/WYSK RADIO**  
616 Amelia St  
Fredericksburg, VA 22401  
Equal Opportunity Employer

Group of 6 stations in Hudson Valley, NY want to move up to full time chief from present contract engineer. Knowledge of RF, studio maint, computers, digital audio a must. Good pay & benefits. Fax resume to: Eric Straus, 518-828-9424.

**ENGINEERING ASSISTANT KHKS-FM**

Dallas radio station has immediate opening for an assistant engineer. Must have minimum of 5 years experience in AM/FM transmitters, directional antenna systems, studio design and construction, mechanical and electrical maintenance skills, strong computer skills (including LAN), knowledge of digital audio systems, prior experience with satellite systems and remote broadcasts. FCC General Class license or SBE Certification (or equivalent) required. Associate or Bachelor's degree in Electronics or Electrical Engineering preferred. Send resume to Human Resources, KHKS-FM, 8235 Douglas, Suite 300, Dallas, TX 75225. Equal Opportunity Employer.

**DIRECTOR OF ENGINEERING**

**Orban**, a Harman International company, is a 25 year old San Leandro based company involved with the design, manufacture and marketing of electronic equipment for professional broadcast applications. Orban currently has a director position in its Engineering Department.

The ideal candidate will be responsible for planning, directing and coordinating the research and development of new broadcast, post-production, etc. equipment and systems as well as the improvement of existing equipment and systems from concept through completion.

This position will also be responsible for creating and maintaining a system of and environment for open and timely communication between Engineering and other departments and assisting in the formulation of new product and sustaining a product development, technology goals and plan. BSEE or Computer Science degree minimum, Masters preferred with management education. Previous experience with management in research and development activities in design, engineering and personnel is required. Prefer experience in professional broadcast or post-production equipment or systems which utilize digital signal processing, aware of analog audio design, high speed digital systems, ASIC, CAD/CAM and CASE among others. This individual must have demonstrated ability to successfully interface with staff at all levels.

Orban offers a competitive benefits package. Send resume and salary requirements to: J. Murray, Orban, 1525 Alvarado Street, San Leandro, CA 94577 EOE

**POSITIONS WANTED**

**Chief engineer**, AM &/or FM, former CE Houston, Miami, Boston, Ft Lauderdale, FCC general, ham, non-drinker. M Gottesman, 758 St Michael St #1005, Mobile AL 36602-1326.

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**Freelance Mix show/club DJ** avail for digitally rcded, custom music mixes, 6 yrs club & radio exper, mix show programming, on-air & pro, set your station apart from the rest. Dave, 313-483-5882.

**Good PR skills**, great motivator, very interested in sales, good team player with lots of talent, eager & ready to work, you be the judge. Rick, 405-386-6524.

**Program directors**; have you been interested in a very knowledgeable DJ specializing in vintage Soul music w/a great personality that can enhance your bottom line by doing a 4-hour (morning, afternoon, evening) show? Free one hour audio tape to see if I can do something for your radio station, The Greg Foster R&B Radio Show, audio entertainment at it's very best! 800-770-7878.

**Recently out** of bcdting school, hard worker, willing to travel, on-air, prod, traffic. Joey, (405) 449-3683

**My girlfriend** found out about my love affair w/radio & left me, bring "The Slug Bodean Show" to your station. Russ, 307-362-7211.

**Looking for** a different voice for your commercials, VO's, liners & open & closes, give me a call, the first one is on me, included standard ground delivery, will write &/or produce, when you call ask about our royalty-free buyout, customized jingles, rock bottom prices. Paul, 208-324-2593.

**Major market news/talk** PD/ops mgr, extensive background in promotion, marketing & research, experienced also as network manager & news anchor, looking to join major group or station with focus for the future. Mike, 703-444-0868.

**12 years exp**, seeking programming position in Midwest, AC, country, oldies, small markets OK. John, 515-228-3060.

**Young, energetic** sports guy w/over 6 yrs exper & strong prod skills looking to move up, self-motivated & willing to relocate. Derek, 505-392-5367.

**Janet** 502-895-5888. Versatile, intelligent! Great for start ups or existing stns, wants F/T airshift, first PD gig, tired of false starts and unrated, small markets.

**Major market AT**, experienced in AC/AOR/ALT, seeking FT in MD, D.C., PA or VA market. Have done Morn/APD/PROD. Want longterm gig. Send replies to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box #95-9-20-2RW.

**HELP WANTED**

Los Angeles radio production company has an opening for production engineer. Maintenance experience and pro tools knowledge preferred, motivation essential. Send resume and sample of your work to: Radio World, POB 1214, Falls Church, VA 22041. Attn: Box # 95-9-20-1RW.

**ASSISTANT CHIEF ENGINEER - KRFX/KBPI**

Applicant will be responsible for installation, maintenance, troubleshooting, repair, & modification of a wide variety of broadcast equipment including FM transmitters, production & air studios, remote broadcast equipment, & IBM compatibles. Candidate must be willing to handle after hour emergencies, work a flexible schedule, & accept direction from: Chief Engineer. Please send resume to Laura Kronberg; 1380 Lawrence, #1300, Denver, CO 80204. Jacor Broadcasting of Colorado, Inc. is an equal opportunity employer. **No phone calls.**

**ABOUT OUR EMPLOYMENT SECTION**

**HELP WANTED**

Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$60/column inch. Payment must accompany insert, use your MasterCard or VISA; there will be no invoicing. Blind box numbers will be provided at an extra charge of \$10. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for details.

**POSITIONS WANTED**

Any individual can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 2 issues of Radio World. Contact information will be provided, but if a blind box number is required, there is a \$10 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened.

Mail to: **BROADCAST EQUIPMENT EXCHANGE**  
PO Box 1214, Falls Church, VA 22041 Attn: Simone Mullins



# ACTION-GRAM

## EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company/Station \_\_\_\_\_  
 Address \_\_\_\_\_  
 City/State \_\_\_\_\_  
 Zip Code \_\_\_\_\_  
 Telephone \_\_\_\_\_

I would like to receive or continue receiving **Radio World** FREE each month.  Yes  No

Signature \_\_\_\_\_ Date \_\_\_\_\_

Please check only one entry for each category:

### I. Type of Firm

- D. Combination AM/FM station
- F. Recording Studio
- A. Commercial AM station
- K. Radio Station Services
- B. Commercial FM station
- G. TV station/teleprod facility
- C. Educational FM station
- H. Consultant/ind engineer
- E. Network/group owner
- I. Mfg. distributor or dealer
- J. Other

### II. Job Function

- A. Ownership
- G. Sales
- B. General management
- E. News operations
- C. Engineering
- F. Other (specify)
- D. Programming/production

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

WTS  WTB  Category: \_\_\_\_\_  
 Make: \_\_\_\_\_ Model: \_\_\_\_\_  
 Brief Description: \_\_\_\_\_  
 \_\_\_\_\_  
 Price: \_\_\_\_\_

WTS  WTB  Category: \_\_\_\_\_  
 Make: \_\_\_\_\_ Model: \_\_\_\_\_  
 Brief Description: \_\_\_\_\_  
 \_\_\_\_\_  
 Price: \_\_\_\_\_

WTS  WTB  Category: \_\_\_\_\_  
 Make: \_\_\_\_\_ Model: \_\_\_\_\_  
 Brief Description: \_\_\_\_\_  
 \_\_\_\_\_  
 Price: \_\_\_\_\_

\*Closing for listings is every other Friday for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

## Broadcast Equipment Exchange

PO BOX 1214, Falls Church, VA 22041 • Tel: 800-336-3045 • Fax: 703-998-2966

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Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

## SUBSCRIPTION/READER SERVICE FORM



### FREE Subscription/Renewal Card

I would like to receive or continue receiving **Radio World** FREE each month.  Yes  No

Signature \_\_\_\_\_ Date \_\_\_\_\_

Please print and include all information:

Name \_\_\_\_\_ Title \_\_\_\_\_  
 Company/Station \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_  
 Business Telephone ( ) \_\_\_\_\_

Please check only one entry for each category:

### I. Type of Firm

- D. Combination AM/FM station
- F. Recording Studio
- A. Commercial AM station
- K. Radio Station Services
- B. Commercial FM station
- G. TV station/teleprod facility
- C. Educational FM station
- H. Consultant/ind engineer
- E. Network/group owner
- I. Mfg. distributor or dealer
- J. Other

### II. Job Function

- A. Ownership
- G. Sales
- B. General management
- E. News operations
- C. Engineering
- F. Other (specify)
- D. Programming/production

### Reader Service

September 20, 1995 Use until December 20, 1995  
 Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below.

#### Purchasing Authority

1. Recommend 2. Specify 3. Approve

- 001 023 045 067 089 111 133 155 177 199
- 002 024 046 068 090 112 134 156 178 200
- 003 025 047 069 091 113 135 157 179 201
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- 007 029 051 073 095 117 139 161 183 205
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- 017 039 061 083 105 127 149 171 193 215
- 018 040 062 084 106 128 150 172 194 216
- 019 041 063 085 107 129 151 173 195 217
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- 021 043 065 087 109 131 153 175 197 219
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 in **RADIO WORLD'S**  
**BROADCAST EQUIPMENT EXCHANGE**

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# INTRODUCING THE AUDITRONICS 2500 SERIES THE LAST SMALL CONSOLE YOU'LL EVER HAVE TO BUY



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## A - 6 0 0 0   B R O A D C A S T   C O N S O L E

7305 Performance Drive, Syracuse, NY. 13212  
(tel 315-452-5000 / fax 315-452-0160)

 Wheatstone Corporation