

# Radio World



Studio Sessions

See pp. 25-42

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Radio's Best Read Newspaper

June 14, 1995

## L-Band in Doubt for Eureka Field Tests

by Lucia Cobo

**CLEVELAND** Despite making it all the way through the lab-testing phase of digital audio radio (DAR) systems, Eureka-147 DAB will not get the necessary spectrum it needs for field testing from the National Telecommunications Information Administration (NTIA).

As the laboratory testing of the seven proposed digital audio radio (DAR) systems by the Electronic Industries Association (EIA) and the National Radio Systems Committee (NRSC) neared completion at the NASA Lewis Research Center, the NTIA had not yet granted the EIA and the European Eureka-147 DAB consortium spectrum for field testing its L-band system in San Francisco, and at press time, seemed unlikely to do so.

The other out-of-band proponent,

NASA/VOA, is expected to receive the necessary permits to field test at or near S-band (see sidebar, page 6).

In the United States, L-band (1500 MHz) is shared by government and non-government users. Permission to field test in that band must be secured through the NTIA. The agency indicated it would not likely approve the spectrum use for the test.

Sources at NTIA claimed the agency made its position clear at the World Administrative Radio Conference (WARC '92) in Torremolinos, Spain in 1992, and that the agency's refusal to grant L-band spectrum for field testing was "merely a reaffirmation of our position." At the time, 40 MHz at 1.5 GHz was allocated



for satellite broadcasting of digital audio, but countries were left the option to place the new service in other areas of the spectrum. The United States entered footnotes stating 1.5 GHz was

unacceptable and DAB would be broadcast at 2.3 GHz (2310-2360 MHz, or S-band) on a primary basis terrestrially and via satellite (RW, March 25, 1992).

NTIA sources also said that although an "engineer or technical person" from NTIA may have participated in the early planning stages of the whole testing process, that person "had no policy-making authority."

The EIA, however, said it was still trying to resolve the apparent impasse. "We are still pursuing discussions with NTIA," said Lisa Fasold, EIA spokeswoman. "It has not been officially denied to us."

Field-testing of Eureka at another frequency, such as S-band for which the proponent does have a system, is not an option the Eureka-147 engineers had planned for.

"As far as I know, there has been no definite decision one way or the other," said Clint Pinkham, of the U.S. division of Thomson Consumer Electronics, one of the original partners in the Eureka 147

continued on page 6 ▶

## Vandal Demolishes WCRZ-FM Tower

### Teen-ager Jailed for Cutting Guy Wires

by Bob Rusk

**BURTON, Mich.** The number one rated station in the Flint, Mich., market—WCRZ(FM)—was knocked off the air during the crucial spring ratings period after two guy wires to the station's 370-foot tower were cut, resulting

that we were off the air. Normally when we have that kind of occurrence, with both stations off the air, it's a tower problem," said Patrick.

"We sent an engineer to the tower and he called back and said the tower was down—literally down—lying on the ground. The assistant program director and I grabbed our flashlights and went out there. I'd never seen anything like it. We found two guy wires on the far end that looked like they had been cut. The

received a series of anonymous tips. It was scary," Patrick explained. "We got a call that these people would meet with

continued on page 6 ▶



in the tower collapsing and being destroyed. The tower was just four months old. At press time, WCRZ remained off the air while a new tower was being installed. Sister station WWBN(FM) was also affected, but returned to the air about 12 hours after the vandalism was reported.

The incident occurred in the early morning hours of Mother's Day (May 14), according to WCRZ Operations Manager J. Patrick.

"We got a call at 3:08 a.m. informing us

wires weren't pulled apart. They were clean cuts. We suspected right away that somebody had cut it down. That was where the police took over. They apprehended one suspect the next day and are still searching for a second (suspect)."

Arrested was 17-year-old Burton, Mich., resident Sherman Ronnie Elrod, who has been charged with destroying the tower. He is being held in the Genese County Jail under a \$40,000 bond.

It was Patrick who was able to supply police with the suspect's name. "We

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# NEWSWATCH

## Advisory Committee Issues WRC-95 Report to FCC

**WASHINGTON** The WRC-95 Industry Advisory Committee (IAC) issued its final report to the Federal Communications Commission (FCC).

Established in 1994 by the commission, IAC was to provide advice, technical support and recommendations from industry to assist the commission in its preparations for the 1995 World Radio-communication Conference, convened by the International Telecommunication Union on Oct. 23, in Geneva.

The IAC's final report and comments

filed in response to its Second Notice of Inquiry, will be considered by the commission in developing recommended U.S. proposals for WRC-95. These recommendations, and those of the National Telecommunications and Information Administration will be forwarded to the Department of State for the development of consensus in the final U.S. proposals for WRC-95.

## Del Castillo Re-elected to Designated NAB Board Seat

**WASHINGTON** Ricardo A. del Castillo, vice president of operations,

Tichenor Media System, was elected to serve a second consecutive two-year term on the National Association of Broadcasters's Radio Board of Directors.

Del Castillo began his broadcasting career as general manager of KLAT(AM) in Houston. After eight years, he became a vice president and board member of Tichenor Media System.

## FCC Consolidates Staff

**WASHINGTON** The Federal Communications Commission (FCC) consolidated the staff and functions of its Baltimore Office of the Compliance and Information Bureau into the Laurel, Md., office. The Baltimore office is now closed.

The move is a consequence of the Bureau restructuring its operations so that

both offices performed the same activities. Because the offices were only 17 miles apart and because the commission owned the property in Laurel, it deemed the move a more "efficient use of CIB resources." Transferring the functions and staff to Laurel will decrease lease expenses, reduce space costs by 75 percent as well as reduce administrative costs.

Service to the Baltimore area will "decrease somewhat," according to an FCC release, and it will "enhance service" to Washington.

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When looking for a digital audio system for automation of satellite programming or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

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can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

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# Washington SBE Drives EBS Conversion

by Lucia Cobo

**WASHINGTON** On the heels of the Federal Communications Commission (FCC) reaffirming the July 1, 1995 deadline date for conversion from the Emergency Broadcast System (EBS) to the Emergency Alerting System (EAS), SBE Chapter 37 in Washington recently held an "EBS Update Party."

The second such chapter-level SBE-sponsored effort was a vehicle for Chapter 37 "to give something back," said Thomas R. McGinley, chief engineer WPGC-AM-FM, RW technical advisor and chapter chairman. "This is an opportunity to give the local engineers some profile with the owners and general managers," he said. "To give time and service in the interest of a better EBS benefits everyone—particularly the smaller stations whose units may otherwise go unmodified."

EBS decoder conversion is the only way

Chapter 37 received support from various sources, including the locale used for the event. Bud Aiello, manager of engineering services, National Public Radio, made the audio engineering services unit of NPR in Washington and himself available for the conversion party, which ran from 10 a.m. to 6 p.m. on Saturday, May 20.

The public service project was a "resounding success" according to McGinley, with a total of 35 boxes converted for 25 stations. Chapter 37 invited the Baltimore SBE members to bring in their boxes for conversion, but the timing of the update party coincided with the Preakness Stakes at Pimlico. However, stations came from as far away as Salisbury on the Eastern Shore of Maryland, Warrenton and Fredericksburg, Va., Hagerstown, Md., and a small Baltimore contingent.

There has been some controversy surrounding the idea of chapter-sponsored EBS updates. Some contract

made by Gorman Redlich, McMartin and TFT. The project went smoothly with

Engineers donating their time and expertise included Aiello, McGinley, Bob



Pictured l to r: NPR's Bud Aiello, WPGC-AM-FM's Tom McGinley, Multiphase's Scott Taylor and Ed Bukont, WKYS-FM's Bob Clinton, WJAL-TV's Bob Baker, Lockheed Martin's Dennis Vearrier and Multiphase's Henry Stewart.



NPR's Audio Engineering Services Unit and Henry Stewart

to comply with the new rules that call for all radio and TV licenses to upgrade their EBS decoders to demute within four seconds of sensing the 853/960 Hz tone pair. The modification allows for the new eight-second test tone required in the rules.

There is no equipment currently approved for EAS July 1996 standards.

## NEWSWATCH

▶ continued from previous page

### Arbitron Announces 1995 Radio County Coverage Survey

**NEW YORK** The Arbitron Co. released the 1995 edition of Radio County Coverage, an annual study providing persons 12-plus radio audience estimates for every county in the continental United States, plus metro counties in Alaska and Hawaii.

County coverage reports provide listening information for all counties by state. It includes listening estimates for two dayparts: Monday - Sunday, 6 a.m. - midnight and Monday - Friday, 6 a.m. - 7 p.m. The listening estimates are cume persons 12-plus and cume ratings, average quarter hour shares and average quarter hour ratings, station share of county listening, metro share contribution and county share of station listening.

engineers are displeased with the projects as they earn in the range of \$50-\$200 per unit conversion. But Multiphase Consulting's John Bisset was the driving force behind the EBS Update Party in Washington, and Multiphase Engineers Henry Stewart, Ed Bukont and Scott Taylor spent the entire day at the NPR facility working on the conversion project.

A question was raised about modifying the EBS encoders ahead of the July 1 deadline. The rules specify July 1 as the date to start using the eight-second tone, not before. However, an FCC FOB spokesman suggested that if a market converted all at once, it could convert ahead of the deadline.

The gathering afforded the group an opportunity to socialize and share expertise. Some of the boxes brought in for conversion were rare and unknown models. Boxes that came in included an Avcomm unit no one had seen before, but was easy to modify because it had timing trim pots on the rear panel.

Another unique set of units came in from a former Metro Media station. According to McGinley, the custom boxes built for the Metro Media family of stations bore the name of Thomas J. Dougherty EBS Monitor/Coder. The boxes were well built and deciphering what needed to be done to bring them in compliance "added to the fun," said McGinley.

There was also a steady stream of boxes

food supplies from Bradley Broadcast Sales (coffee, donuts and lunch for all in attendance), and parts from Braddock, Pa.-based LEFF Electronics, as well as TFT Inc. conversion kits.

Baker from WJAL-TV Hagerstown, Md.; Dennis Vearrier, Lockheed Martin; Stewart, Taylor, Bukont; Jim Heim of King Video Associates and Bob Clinton, WKYS-FM.

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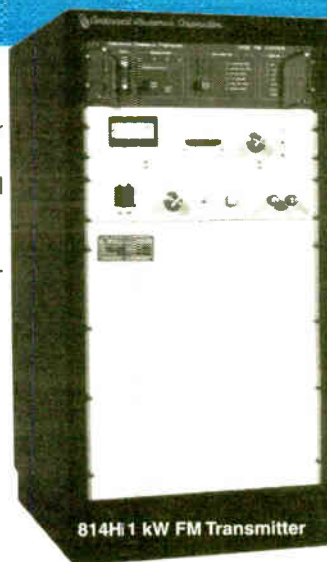
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# Politics Mires Digital Audio Radio Testing

WASHINGTON Boy, do I have news for you. Long-time columnist and frequent Studio Sessions contributor, Alan From the Trenches Peterson joined the staff of RW as technical editor this week. Al takes over for the upwardly mobile John Gatski, who is masterminding the fall launch of Pro Audio Review for RW's parent company, IMAS Publishing.

Al, who has entertained and informed you through the years, will take over as Studio Sessions editor and as an in-house font of knowledge about radio, from the trenches, as it were. Tom McGinley and John Bisset are both keeping their advisory roles with RW (we would never give up their experience, know-how and good humor), and John, of course, will continue to inform you with *Workbench*.

Al will develop his own column for Studio Sessions, gleaned from years of experience in the field of production. He will also contribute to the strategic planning for RW, and pitch in as we continually try to improve the regular Features and Buyer's Guide sections of the newspaper. But he will not be leaving the trenches. Al will continue his involvement with the business; he is a member of the Society of Broadcast Engineers, and will be very active in the Washington-Baltimore radio community.

If you have questions or comments for him, drop him a line in care of RW or e-mail us on CompuServe at 74103.2435.

down and over a neighboring park. It was 2 a.m. and after a very un-informative chat with a very un-helpful Alexandria, Va., police sergeant, I resigned myself to a



night of little or no sleep.

It worked out OK I guess, because it forced me to spend most of the night—no, really—thinking about Eureka-147's predicament (no L-band for field tests) and the egg on EIA's face. As I reported and wrote the front page story, the one thing I couldn't answer, or get anyone to answer was: "Didn't anyone check with NTIA when the tests were being organized?"

I mean, people... Did EIA really think that having an "engineer or technical person" from NTIA present at the planning stage of the tests was tacit permission to grab a chunk of L-band? Or did EIA staff members miss the issue of RW that carried the story of the U.S. government's official position on digital radio (L-band unacceptable, S-band OK, in-band preferred) stated loudly and clearly at WARC '92?

Did EIA assume that because it was EIA, NTIA would give it a bit of L-band for field tests for a system that has no chance of becoming a choice in the United States unless the entire spectrum allocation setup is reworked? Hmmm.

And why aren't Eureka-147 officials crying foul? Did they not expect to get L-band here? Did they believe, or were they

led to believe that once the process was underway, L-band would not be denied to them? Are they hoping to field test elsewhere where they have extensive transmitting "pods" set up and could really shine in the field? Does anyone

backs and then abandons Eureka-147. Then EIA brings Eureka in to test and now cannot get it spectrum. What must

## Tony Brown On the Air At WLIB(AM) New York



Tony Brown received a warm welcome from WLIB(AM) as he debuted as host of the new WLIB radio program, "Tony Brown." The welcoming reception was held at The Four Seasons restaurant and included such New York notables as (l to r): former New York mayor and fellow WLIB air personality David Dinkins; Cheryl Sutton, vice president and treasurer of Inner City Broadcasting, WLIB's parent company, and Pierre Sutton, chairman and CEO of Inner City Broadcasting.

know how many Eureka-147 pods it takes to match one IBOC transmitter's coverage area?

The really awful part is that the wonderful advancement that digital radio technology could represent for this industry is now firmly mired in political muck inside the Washington Beltway. Once the U.S. government's position was made clear, the testing subcommittees should not have accepted an L-band system for testing. Eureka-147 should have been made to test its S-band system or not at all.

What should have been a clear case of head-to-head competition between technologies has been muddled by association and agency politics. First, NAB

the rest of the world think of our efficiencies as a political nation?

The outcome of this story should be quite fascinating. Will EIA continue on with field tests sans Eureka-147? Will anyone care about the tests after this bit of a debacle?

We will continue to mine this story for you and report on the developments as we hear of them.

For now though, ain't politics great?

## FROM DOWN THE HALL

BY ALAN PETERSON



Living in or near the big city has its advantages, but it has its drawbacks, too. I've told you about my brushes with crime in the past... last night I was rudely awakened by swarms of helicopters swooping

unless the entire spectrum allocation setup is reworked? Hmmm.

And why aren't Eureka-147 officials crying foul? Did they not expect to get L-band here? Did they believe, or were they

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# READERS FORUM

If you have comments for Radio World, call us at 800-336-3045 or send a letter to Readers Forum (Radio World, Box 1214, Falls Church, VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

## Ideas for AM

Dear RW,

New ideas for expanded AM band... Now that the AM band has expanded and precious few allotments have been made by the FCC for stations to relocate there, we see progress moving along about as fast as AM stereo. I have at least one radio that will tune in the expanded band, and have heard nothing there, day or night. AM broadcasters do not seem to be rushing to fill the new void.

The article a couple of weeks ago about community radio in Japan sparked some interest. I know that such a system would be impractical in this nation of crowded airwaves; however, it would be great to see (once again) a group of people on the air who do so out of love for radio. If so many existing AMs are reluctant to move to the extended band frequencies, what is the harm of setting aside at least some of this for low-power broadcasting by individuals who simply wish to broadcast to their neighbors?

Such a service could be non-commercial, and permit new (and unique) sources of programming where otherwise none would exist, either because of crowded airspace or the unwillingness of commercial broadcasters to risk certain types of esoteric program material. I would not go as far as turning the expanded band over to pirates, as one of your readers suggested. Anyone wishing to go on the air should be able to pass a test designed to gauge his competency on matters such as radio theory and FCC rules and regulations. It is possible under more crowded airspace conditions to have more than one of this new breed of broadcasters share a frequency.

Power outputs could be limited to levels not exceeding 100 watts, or whatever is necessary to strike a balance between a respectable, if not limited, coverage and avoidance of interference to other

services. Nighttime hours could be allotted by channel to different stations in different areas, affording a typical station the privilege of occasional skywave propagation (just like the clears) for additional DX offerings.

The new service would be in the best interest of the public, offering them more choices. It also would open up the limited airspace to new voices airing original music as well as novel viewpoints, with no commercials except for the occasional swap-shop program. Imagine a completely classical station serving a small community where doing so commercially is not feasible. Network or syndicated programming would be limited to less than 10 percent of the station's broadcast each day, promoting localism.

A final benefit to consider is that such a service can be seen as a gift to future generations who otherwise would not develop the kind of fascination with radio as their descendants who eagerly tuned in on crystal sets, or those like me who spent evenings DX-ing when the local daytimer signed off. What a heritage to preserve!

Edward S. Welch  
Professor, Mass Communication  
Toccoa Falls College  
Toccoa Falls, GA

## True to yourself

Dear RW,

Having been an AM radio broadcaster in a full-service format all of my career, I have been acutely aware of the trend to rid the AM band of music. Those in charge of programming so many great and formerly great stations seem to believe there is absolutely no place for music on our dial.

Of course, I understand the necessary repositioning of our medium toward news, information and talk in order to remain viable and competitive in the industry, but the idea that no one wants to hear music on AM is a little hasty. Granted, talk radio has brought the medium wave band back to life. We have been witness to what many refer to as America's second revolution, and the free flow of ideas is terrific. However, it seems we've gotten to the point where almost anything talk is preferable to a tune. The idea of "if it's talk, it will succeed" is ridiculous.

If a format is well-executed, engaging and promoted, I believe there is still a place for it on the AM dial even if it has some music, and I do not mean jingles and theme music. I am sorry to see what has been my favorite format evolve into liner-card radio on FM. Although I understand the economics of it, with so many opinionated satellite talk shows available, the radio landscape has become a blur of vanilla automatons without individual identity in many cases.

We at KOMO(AM) 1000 have seen the listener erosion and our formerly full-service (with music) format become more talk. My question is, is it necessary to do so to the exclusion of all music? Many listeners enjoy a tune now and then to break the monotony of all the talk and it is not just the older demo because I listen to the listener. During my busy afternoon drive slot we might get a few songs in between 4 and 6 p.m. but it

## Serving Radio Locally

It is time to once again applaud the actions of a local Society of Broadcast Engineers (SBE) chapter.

In May, Washington, D.C.'s Chapter 37, under the leadership of Tom McGinley and the drive of contract engineer John Bisset, voluntarily modified EBS decoders to receive an eight-second emergency warning tone instead of a 22-second warning tone for 25 area stations.

Each station saved anywhere from \$50-200 in fulfilling the FCC July 1 tone conversion deadline that is also part of the new Emergency Alert System (EAS) requirement.

What is more laudatory is that the effort, spearheaded by a contract engineer, meant that chapter members performed this public service in the face of severe criticism and opposition from contract engineers in the business (who disliked seeing revenue slip away).

Chapter 37, like the Houston chapter, which recently undertook the same modification in its community, proved to radio and television management that engineers are clear and bottom-line thinkers and should always be part of the strategic-planning team at the station.

National Public Radio and its manager, engineering services, Bud Aiello, who was instrumental in the Washington, D.C. effort, also deserve recognition for giving something back to an industry that is not always friendly in word or action to noncommercial broadcasting.

Events such as Washington's and Houston's serve to reinforce localism—and localism is what radio is all about. By helping stations stay up to date with the Emergency Broadcast/Emergency Alerting conversion, these two local SBE chapters have helped make the transition to more modern, more efficient emergency warning systems.

Many parts of the country are even now suffering from floods, tornados and assorted forms of bad weather. Radio needs to be there for its listeners with the most effective and up-to-date emergency warning system possible.

Three cheers for the Washington SBE chapter and John Bisset for providing a valuable service to its area broadcasters and for singlehandedly demonstrating that the industry needs its engineers for more than just tweaking a transmitter.

— RW

really does make for a nice break.

I guess what I am trying to say is, we need to keep our own identities, whatever the format and resist the "well, they're doing it so we should too" attitude. We need more feeling instead of format, more humanity and touching of lives that does not come with programming by charts and graphs.

Tom McCarthy  
KOMO Radio  
Seattle, WA

## IBOC listening

Dear RW,

I was one of the many broadcasters who took the DAB bus tour at the show and was impressed by the demonstration. However, I did some off-bus listening to the signal on a portable receiver and heard noticeable multipath-like noise on the regular FM signal. And on both the AM and FM, the signals were being splattered two channels on either side of the broadcast signals.

I asked my consulting engineer's opinion and he thought the FM multipath-like noise was the AM component of the digital modulation. And he thought that the splatter was due to large bandwidth of the digital modulation.

I cannot think of a single FM broadcaster who would add DAB if it caused the current signal to sound noisy, scratchy or inferior. And channel splatter of the magnitude that was present at the show would cause chaos in those markets where there are a lot of stations.

I hoped USA Digital is also aware of these problems and has some plans to address them.

Mark F. McNeil, President  
Guardian Communications Inc.  
Cincinnati, OH

## Excellent and timely

Dear RW,

Alan Haber's article on establishing World Wide Web pages on the Internet was excellent and timely.

An approach that bears more attention, especially for stations with limited budgets, is having an Internet provider set up your page on his own server. This absolutely minimizes one's investment in equipment, requires no special phone lines and is, by far, the quickest way to get a page up and running.

Using this method at WFLN-FM in Philadelphia, our page was up in less than a week from initial approval. We used an existing PC with a modem to retrieve e-mail from an America Online account, and put the AOL address on the WWW page. Very cheap (zero equipment costs in our case) and very friendly.

We think this is the ideal way to test the waters with no real investment. The costs were a few hundred dollars to set up the page (plus a little extra for some graphics that we wanted) and \$20 monthly. Changes to the page are done by the provider for a reasonable charge. If the page "takes off" we always have the option of installing a server on-site and doing everything ourselves.

By the way, how about a monthly list of stations with Web sites? It would be a valuable resource, allowing stations to cruise around, checking out what others are doing for their pages.

To check out WFLN's page (you knew I would get around to this), try: <http://www.netaxs.com/people/isphere/WFLN>.

Jim Perry, VP Engineering  
Marlin Broadcasting  
Philadelphia, PA

**Radio World**

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—PRINTED IN THE USA—

**Next Issue of  
Radio World  
June 28, 1995**

# Vandal Topples Tower, Suspect Jailed

► continued from page 1

somebody from the station, and they could help us. They wouldn't meet with police or the FBI. They gave us an address to go to—an upper apartment in one of the older neighborhoods.

"At first I wouldn't go, because I didn't know what we were dealing with security-wise. But time was ticking. I tried to set up a meeting in a public place, but they never called back. It was getting dusk, so I decided to go down and talk to them. They were just kids. They (said they) knew who did it; the guy was bragging about it."

After being given a name by the three informants, Patrick notified police. The suspect was apprehended about an hour later.

"They pulled him over at a traffic

remains unsolved. It is not known if the two cases are related.

John Risher, vice president and general manager of WCRZ and WWBN, was quoted as saying the stations have not received threats of any kind from disgruntled listeners. He said that the cost of replacing the tower will be about \$150,000. In addition, he

estimated WCRZ could lose ad revenue in the six figures.

Adult contemporary WCRZ (Cars 108) and album-oriented rock WWBN (Banana 101) broadcast from studios in the same building. WWBN relayed its

signal to the toppled tower, then microwaved it to the station's own tower. Banana 101 was broadcasting temporarily from its tower site, operating out of the Cars 108 motor home.

Engineers were able to get WWBN

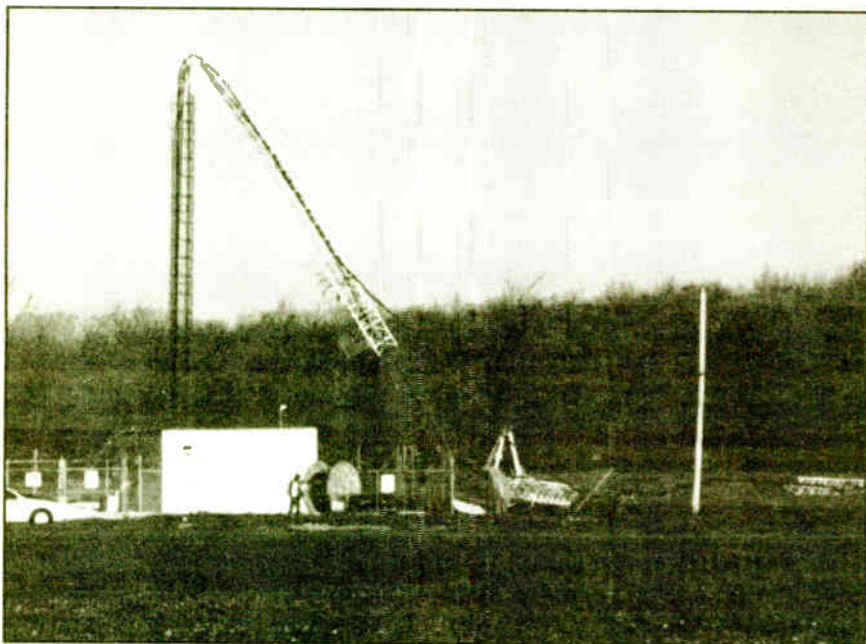
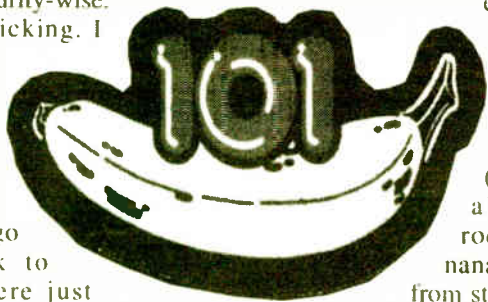


Photo by Clayton D. Hewitt

WCRZ-FM's new tower was destroyed by vandals.

stop," Patrick said. "They found bolt cutters (believed to have been used in the vandalism) at the home of a friend of the suspect."

The FCC and FBI have been called in to investigate the case. Just six months ago a vandal climbed to the top of the WCRZ tower, breaking all the lights on the way up. That case

back on the air by 4:30 p.m. on the day of the vandalism, setting up basic equipment, including two CD players, a cart machine and a microphone, in the WCRZ motor home.

Faircom Flint Inc., which owns both stations, also owns Flint station WFNT(AM). WFNT was not affected by the vandalism. ☹

# L-Band in Doubt for Tests

► continued from page 1

consortium. "As for the tests themselves, we are stuck with L-band or something very close to it. If the frequency is changed, then the lab and field data cannot be correlated."

In addition, he said, "Changing the test frequency significantly would mean a change in hardware. At that point, we would have to evaluate whether it was worth participating in the field testing."

As to whether the field tests could be moved elsewhere (outside of the United States for example) Pinkham said: "The whole idea was a head-to-head comparison of all the proponents. It would be as hereculean a task for EIA to shift these tests elsewhere as it would for Eureka-147 to get new equipment for another frequency."

Eureka-147 could conceivably test at other locations where it has extensive experimental facilities set up in Canada, England, France, Germany, Australia and half a dozen or more locations.

But opposition to the field testing of the L-band system is strong in other sectors. In a letter dated April 26, 1995, to Federal Communications Commission Office of Engineering and Technology Chief Richard Smith, Steven M. O'Kelley, chairman, Aerospace & Flight Test Radio Coordinating Council (AFTRCC) filed the council's opposition to the proposal. The AFTRCC is the spectrum management association of the nation's aerospace manufacturers.

"As a policy matter, it is unwise for the commission to allow tests which are part and parcel of an effort to promote a European technology, the proponents of which seek to undermine United States opposition to reallocation of the L-band."

O'Kelley added: "Such tests could be misconstrued as signalling some sort of change in the United States insistence on preservation of L-band for its critical mission supporting the development of new commercial aircraft and aerospace vehicles."

The National Association of Broadcasters (NAB), which at one point was a partner in the Eureka-147 consortium, offered no comment on the matter. A spokesperson for the association said the NAB had no comment on the issue because the NAB is only involved in the testing of the in-band systems.

The next step in the testing process is a DAB workshop scheduled for Aug. 24-25 in Monterey, Calif. At that time, EIA will release the laboratory test data as well as companion data from the subjec-

tive listening tests held concurrently in Ottawa's Communications Research Centre.

In Monterey, the two subcommittees (EIA's DAR Subcommittee and NRSC's DAB Subcommittee) will meet to initiate the recommendation process. Field testing is scheduled to be completed in October and a final recommendation arrived at by year's end. ☹

## Proponents Plan for Fall Schedule

As laboratory testing wraps up in Cleveland, digital radio proponents were preparing for a busy fall of field testing of their systems.

**USA Digital Radio:** Jeff Andrew at USA Digital Radio said the IBOC proponent would have a "virtual reality" demo of what it had in Las Vegas. Andrew explained it was planning to feature uncut and unedited DAT and video tape recordings from the groups spring NAB convention demonstrations. "There are people who make it to World Media Expo, but not the spring show—but because we do not know about the manpower required for the field tests, we are doing the virtual demo."

**AT&T Bell Laboratories:** Nikil Jayant at AT&T Bell Laboratories said the proponent is looking at a live demo for the fall NAB show. "We are not committed yet to any demo at this point. We are still deciding which demo would be more useful, IBOC (AT&T/Amati) or IBAC (AT&T).

**NASA/VOA:** Don Messer at Voice of America said the proponent is not planning a public demo of its system. "We have done some demos in Pasadena and Toronto and Brazil, over the past two or three years," he said. "In terms of the experiments, ours is the only one field-tested via satellite. We are using the 2.0-2.1 GHz space services allocation. There is no satellite at the moment at 2.3 GHz, so it cannot be tested at that frequency."

**Eureka-147 DAB:** Clint Pinkham at Thompson Consumer Electronics said the group is planning no public demos of its L-band system in the United States. "We had a live demo at the 1991 NAB, and systems up around the world." Eureka-147 DAB's future participation in even the field testing portion of the EIA-sponsored tests is up in the air at the moment, with no spectrum allocation in site (see related story, page 1).



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## INTERNATIONAL UPDATE

# Canadians Skeptical of USA Digital

by James Careless

**OTTAWA** Canadian broadcasters remain unimpressed with the USA Digital Radio system, even after what others consider successful public mobile demonstrations at the 1995 NAB show for the Digital Audio Broadcasting (DAB) proponent.

The European-developed Eureka-147 system, which will be broadcast on L-band, is the choice here and little, if any, chance is given for the competing U.S. in-band, on-channel (IBOC) alternative.

## Not what expected

"I was kind of disappointed with what I heard," said Steve Edwards, vice president of corporate engineering and technology at Rogers Broadcasting, a major player in the Canadian market with 22 AM/FM stations. "I thought it would be better, particularly because they had—I thought—quite good controlled conditions for the AM."

The concerns of Edwards were echoed by Michel Tremblay, executive vice president of the Canadian Association of Broadcasters (CAB) and treasurer of Digital Radio Research Inc., the Canadian consortium spearheading L-band DAB in Canada.

"The test was carried out at the very end of the extended AM band (1660 kHz), without any possibility for skywave and adjacent channel interference," Tremblay said. "So these are almost lab conditions to do a test, not real-life conditions. They also were using a single tower for the demonstration, which is very remote from a real-life situation, where you would use three or four towers to generate an AM signal."

What primarily disturbed both Edwards and Tremblay is, they said, that they heard signal dropouts on both AM and FM. For the AM, they noticed the dropout while the bus, which transported those listening to the demo, was in an underpass.

In a memorandum Edwards wrote to

Tremblay that was circulated among Canadian broadcasters, Edwards stated:

"The FM system failed twice during my bus ride, once leaving the convention center parking lot and again going through an intersection. The bus was travelling slowly in both cases. Similar failures were reported by Kirk Nesbitt (Rogers director of engineering operations) and others on separate bus rides."

Another factor that Edwards questioned in the memo was what USA Digital Radio Project Manager Jeff Andrew referred to as "graceful degradation," namely a gradual reduction in the FM in-band, on-channel (IBOC) signal frequency response as signal quality approaches dropout.

Andrew said the purpose of "graceful degradation," which he stressed is not necessarily a final feature of IBOC technology, is to give listeners "an indication that 'Hey, you're driving to the end of coverage and soon your signal will be disappearing,'" rather than having an annoying on-off IBOC signal.

But Edwards said, "There were times when you were driving along that you could hear the audio bandwidth drop to basically telephone quality. What you end up with, if you want to draw an analogy, is instead of an analog radio blending to mono, in this case it blends to AM."

While Edwards admitted that AM IBOC is "much better than the quality of the mono analog AM signal," he still felt it was "definitely less than CD." Matching the audio quality of CDs is a real issue with the Canadians, because the plan north of the border is to move all AM and FM stations to Eureka-147.

## Hard line against IBOC

Given that the views of Edwards are mirrored in materials released by Digital Radio Research Inc., it seems obvious that—at least officially—the Canadians still are holding their hard line against IBOC.

Edwards summed up this attitude. "On

balance I was not impressed by either of the systems," he said. "They both have some distance to go before they can be considered equivalent to the analog systems, much less good enough to replace them."

"I would rather listen to a decent FM any day than a system that drops regularly at stoplights or slow traffic conditions."

Still, not all Canadians are committed to this position. For instance, Walter Juchneiwicz, owner of Juch-Tech broadcast technical services in Hamilton, Ont., also took the USA Digital Radio bus tour and said he did not experience any dropouts.

As for telling other Canadian broadcasters what he thinks of IBOC after having taken the tour, Juchneiwicz replied, "It is not vapor; it exists."

Describing himself as an advocate for the rights of smaller broadcasters fearful of the costs involved in moving to Eureka-147, Juchneiwicz said, "I think there is room for both systems in this country."

But, he noted, the timing is too late for IBOC in Canada. "Eureka is a done deal for Canada," he said. "I mean, it is here. It has already become a standard. There are too many groups working toward that one common goal."

"IBOC is kind of a fly in the ointment."

## Mixed responses

Andrew gave mixed responses to the Canadian criticisms of IBOC as shown in Las Vegas.

On the question of dropouts, he said, "The routes that I did, I experienced no dropouts, the ones that I actually gave the demo on. But that is not to say there could not have been a dropout. There could have been a power glitch; there could have been anything. I mean, there could have been actually no RF... like on the AM, maybe under a bridge or in a tunnel or something like that, there was no RF."

As for the charge that the AM IBOC demonstration did not fairly test the technology by using 1660 kHz, he noted the frequency was assigned for the procedure.

"We are doing tests at 1390 in Chicago," Andrew said, "and we are doing skywave, and we are doing adjacent co-channel, first-adjacent and second-adjacent interference."

Underlying all of these criticisms, of course, is the fact cited by Juchneiwicz: Canada is committed to Eureka on L-band, with two experimental stations on air in Toronto and Montréal and two more scheduled for Vancouver and Ottawa.

"I think they are trying to pick out things that we are not doing," Andrew said. "As far as getting a fair shake (from the Canadians), I have not seen that so far, and do not expect it in the future."

Still, this may change. Andrew said he would like to stage an IBOC demonstration at the Canadian Association of Broadcasters annual convention in late October.

Notified of this, Tremblay expressed his own interest in the idea, which means that later this year, Canadian private broadcasters would have an opportunity to assess the merits of IBOC.

□ □ □

James Careless, an audio producer, covers the industry in Canada for RW from Ottawa.

# Campaign Launched By NAB

by Whitney Pinion

**WASHINGTON** "Let's break the law, risk our lives and make ourselves really sick!" cheers a teen-ager in a satirical public service announcement produced by the National Association of Broadcasters (NAB).

This spot, in both its radio and television versions, is part of STAR—Stations Target Alcohol Abuse Reduction—a nationwide awareness and education campaign developed by NAB with the support of members of the U.S. Senate, including Strom Thurmond (R-S.C.).

NAB CEO Eddie Fritts calls STAR a "substantial, long-term commitment" to educating the public about alcohol abuse. The campaign is not just public service announcements, he said, but "a charge for community involvement."

The STAR program targets five specific aspects of alcohol abuse: underage drinking, drinking during pregnancy, alcoholism, drunk driving and responsible hosting.

The multifaceted campaign calls for broadcasters not only to incorporate educational material into PSAs, newscasts, public affairs programs, talk shows and entertainment programming, but also to form "education partnerships" with businesses, charities, government, schools and law enforcement groups.

Presently, all 50 state broadcast associations have signed letters of intent to participate in the campaign. STAR kits, which include a CD of nine radio spots and a guide for talking to station staff about alcohol abuse awareness, have already been distributed to radio stations and state associations.

Fritts said that STAR will serve as a framework for local stations, allowing them to expand on work they have already done. NAB encourages the stations to offer their creative input in shaping the programming to fit their individual needs, he added.

"This is a bottom-up, not top-down campaign," Fritts said, emphasizing the active role local stations will play, as opposed to a program that "trickles down" from Washington.

NAB's seven-member Alcohol Education Advisory Board, comprised of experts on topics such as fetal alcohol syndrome, disease prevention and using the media for health promotion campaigns, assisted in the development of STAR and reviewed all scripts and materials for accuracy and appropriateness of messages.

When asked about the budget for this campaign, Fritts would not disclose a dollar figure, responding, "whatever it takes to make it successful."

NAB plans to track the effectiveness of STAR with periodic reviews based on reports from individual stations and state associations.

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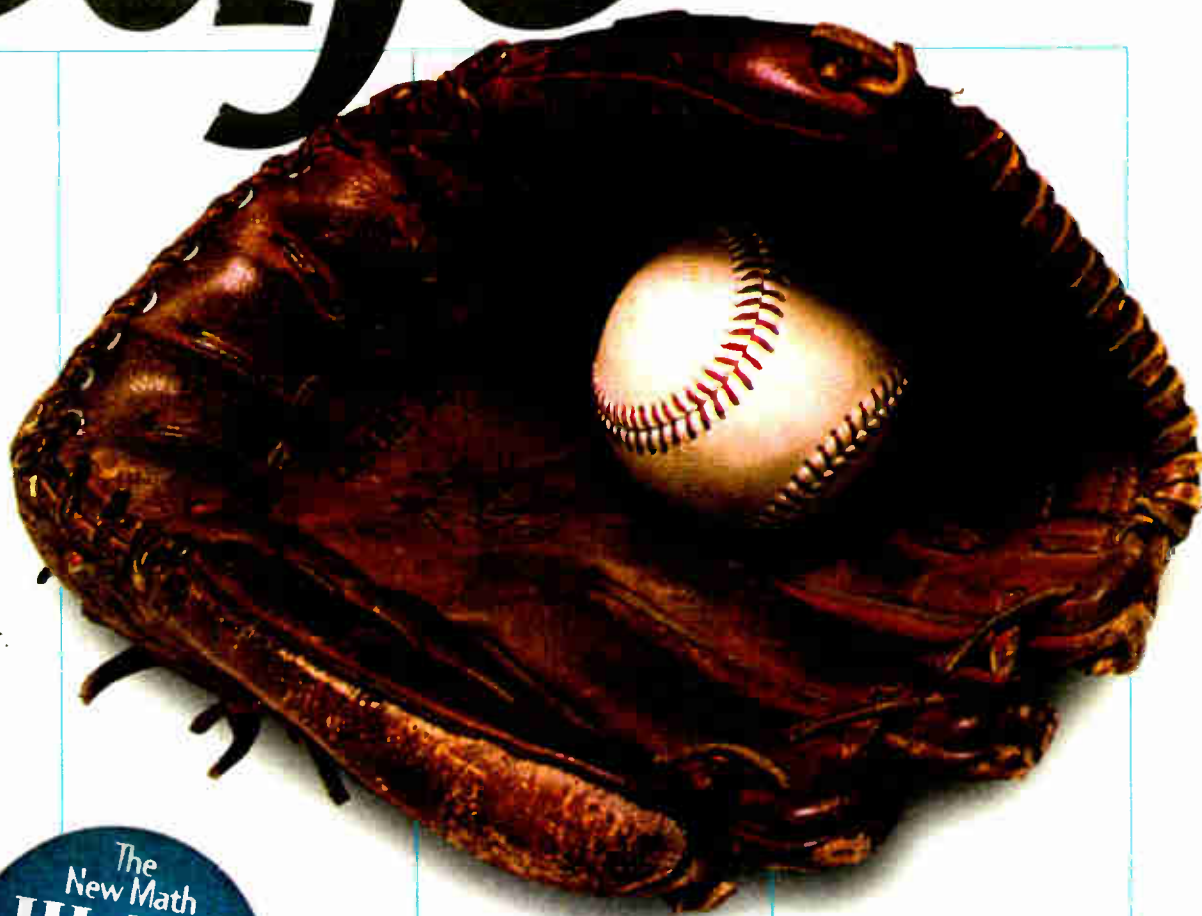


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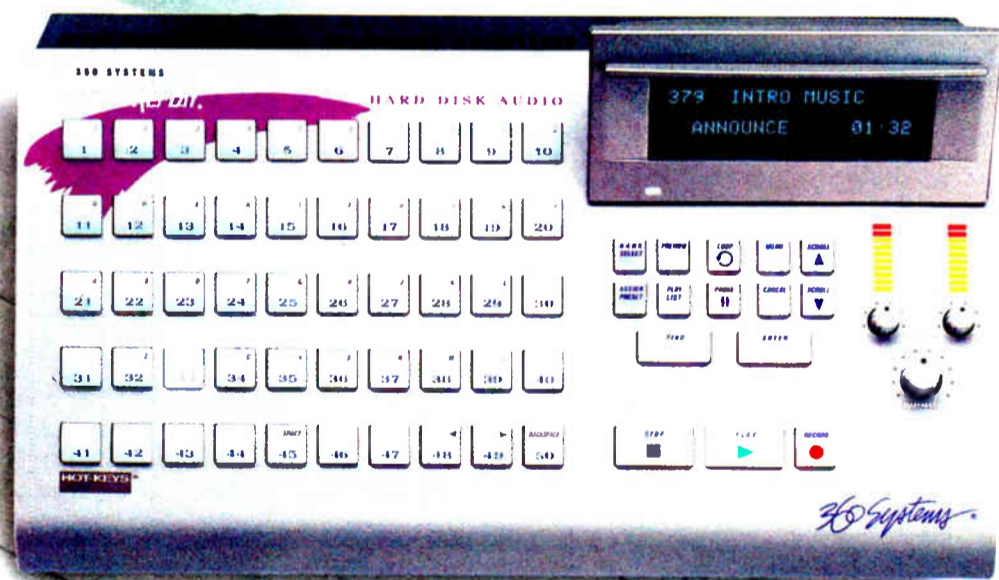


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# ABC Studios, Satellite Join Forces

by Mary C. Gruszka

**NEW YORK** In the recording studio business, interconnectivity is the growing trend. Studios are adding telephone, fiber and satellite infrastructures to handle audio and music transmission.

ABC Radio Networks realized that it already had the studio facilities and transmission services at hand and decided to team up two of its divisions, ABC Sound Services and ABC Satellite Services, to provide full production and distribution services under one roof for both ABC and outside clients.

"The studio world is becoming more sensitive to transmission technology," said Bob Donnelly, vice president, ABC Radio Networks.

## One-stop shopping

ABC Sound Studios, in operation since 1981, and ABC Satellite Services, since about 1984, had previously been somewhat autonomous, according to Donnelly.

"Now we're bringing the two together more efficiently to make our service more marketable in a highly competitive business," Donnelly said. "We're playing on the strengths of both to provide one-stop shopping for ABC and for outside clients. We've got the new studios. We've got the transmission facility. We can get the programming or ads to the radio stations."

With the new alliance, ABC can provide clients recording, mixing and editing facilities, plus transmission and distribution services through its satellite, Integrated Services Digital Network (ISDN), T-1 or fiber networks.

"We can offer start-to-finish packages at a single price," Donnelly said. He stressed that while the main selling point is the availability of both production and distribution services, "we work any way the client likes," so that if a client needs just studio time or transmission services, that is no problem.

The main studios and uplink site are located in New York. ABC also has production centers in Los Angeles and Dallas interconnected to each other and New York via satellite, fiber-optic, T-1 and ISDN lines, according to Donnelly. Using the high-speed ISDN fiber circuits through the services of San Francisco-based DG Systems, spots can be distributed digitally to any number of more than 1,400 radio stations in as little as four hours, or with overnight or two-day delivery.

"This is a great service for ad agencies to get their spots out to the radio stations," said Arthur Burns, Studio Manager. "We make one digital master copy which gets sent to DG, and then digitally sent out to the radio stations. It is a one-shot deal. The client doesn't have to transfer 300 copies and FedEx each of them. This becomes real useful for ABC during sweeps to publicize a story that will run on ABC news or on local Channel 7 news because we can change spots fairly quickly."

## Remote hook-up

Another advantage of having the transmission links is the ability to hook up recording studios in distant locations.

"With the satellite capacity, we can tie in announcers in one city with a studio in another," Donnelly said. "We've inter-

connected between New York and London, for example."

"This eliminates travel expenses," Burns added.

Satellite resources include digital SEDAT audio channels on GE Satcom C-5 and analog audio channels on GE Spacenet-3. In addition to the audio channels, ABC has proprietary fully addressable and programmable broadcast data channels on GE Satcom C-5. ABC's transponders are fully protected and backed up, according to Burns.

The ABC network also includes fiber-optic channels and switched digital services. Service gateways are maintained with IDB Communications, MCI, National Public Radio, Capitol Radio Networks (Microspace) and Atlantic Satellite/Waterfront Communications, according to Burns.

The New York facilities include two studio/control room combinations. Each studio has a roundtable for multiple talent recording sessions, according to Leslie Mona-Mathus, senior technical producer.

The control rooms are each outfitted with an eight-channel Sonic Solutions digital audio workstation with the NoNOISE software package option. "This cleans up audio tape and takes

out the noise," Burns explained. Because it can remove clicks, crackles and broadband noise, it is being used for the restoration of vintage recordings and to fix problem recordings.

According to Burns, this is being used extensively for an ABC program scheduled to air in 1997, a 20th century retrospective.

The two Sonic Solution workstations are networked together to share files between

the two rooms, according to Mona-Mathus. "Each system handles over five hours of stereo time. We record directly to Sonic Solutions for our spot work, and run an analog backup. We can then step

**Control rooms are outfitted with Sonic Solutions digital audio workstations with the NoNOISE software package option.**

right into edit mode. The Sonic Solution lets you do time expansion/compression without changing pitch. We've used this for some spots and for books on tape to fit material on one side of a cassette.

"The software has recently been upgraded to version 2.0," Mona-Mathus added. "This allows us to punch in and out while in edit. Essentially, you can edit live. For one book-to-tape project, the client came away with a pre-edited project."

Other equipment in the studios includes 25-input Pacific Recorders Broadcast audio consoles with 16 bus outputs and four different stereo outputs, Otari two-inch, 16-track analog audio recorders, Sony R-DATs, D-

projects that include books on tape, infomercials, commercials and live broadcasts.

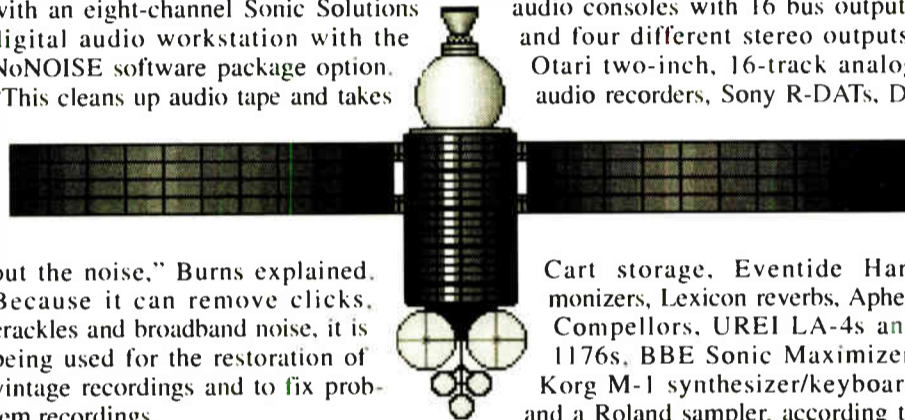
"We have about 55 to 60 clients outside ABC," Donnelly noted. "We're working with radio-oriented clients mostly," Burns commented. "The percentage of inside and outside work varies depending upon the time of year. During sweeps

periods, projects are about 50/50. During non-sweeps months, we do about 30 to 40 percent ABC work and the rest is outside client work. We're also getting a lot of international type of business."

Burns noted the advantages that the ABC facilities can offer a client. "Our biggest advantage is that any technical problems are handled instantly," Burns said. "Our satellite dishes are on our roof. We don't rent our satellites from anyone. Because of that, our rates are less expensive in general. We have somebody here to make sure that it all works. A client can be very secure when they come here."

"We have 24-hour service," Burns continued. "We have a full-time staff around the clock, 24-hour guard service and messengers around the clock. We have huge flexibility. We have a roster of engineers that clients can use, or they can bring in their own engineers. We work with our clients in creating package deals. ABC has a reputation for quality audio work."

"There's a false perception that we give priority to network jobs," Burns added. "The reality is that we provide ABC with services on the same scheduled basis as any other client. Our approach to scheduling and booking is the same as any independent audio house. However, other audio facilities don't offer clients the support services of a major broadcast network. That's what sets us apart." ☺



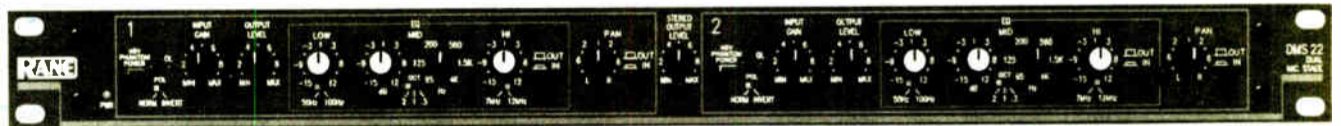
out the noise," Burns explained. Because it can remove clicks, crackles and broadband noise, it is being used for the restoration of vintage recordings and to fix problem recordings.

Cart storage, Eventide Harmonizers, Lexicon reverbs, Aphex Compellers, UREI LA-4s and 1176s, BBE Sonic Maximizer, Korg M-1 synthesizer/keyboard and a Roland sampler, according to Mona-Mathus.

Since their inception, ABC Sound and ABC Satellite Services have served clients outside ABC. They include radio program syndicators, producers, advertisers, ad agencies and radio networks with

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## GUEST COMMENTARY

# Closer Look at Tower Regulation

by R. Morgan Burrow, Jr.

**ROCKVILLE, Md.** I am writing to further illuminate rule 47CFR22.371, the Federal Communications Commission (FCC) regulation requiring tower proponents (especially Public Mobile) to protect the radiation pattern(s) of nearby standard broadcast stations.

Licensees and engineers at AM stations should familiarize themselves with this rule. Station management should discuss any notification letter received concerning nearby tower construction with their technical people and/or the station's consulting engineer. This is not a matter on which the AM station's management should just "pass the buck"; it could become very expensive to the station later.

If there are questions about rule 47CFR22.371, Sid Briggs is the contact person at the FCC at 202-418-1328.

## In essence...

Essentially, one who proposes to erect a communications tower within 0.62 km (0.5 mile) of a nondirectional station or 3.0 km (1.9 mile) of a directional standard broadcast (AM) station must notify each affected AM station and give the licensee ample time to obtain special temporary authority "STA" (if needed) and/or make other arrangements. The tower proponent must arrange to make

pre-construction and post-construction measurements in accordance with 47CFR73.154 of the commission's rules. The measurements must demonstrate that the radiation pattern(s) of the affected AM station have not been adversely affected. Furthermore, the tower proponent is responsible for the installation and maintenance of detuning apparatus where its use is required. If adverse effects to the radiation pattern of the AM station result from construction of the nearby communications tower, the tower proponent

**The AM licensee has the right to insist the tower proponent retain the station's consulting engineer to handle detuning matters and make partial proof measurements.**

is responsible for correcting the situation at his expense.

The partial proof of performance required by section 73.154 is a serious matter to any AM station. AM broadcasters fought hard for the 1989 FCC policy statement and the subsequent addition of Section 22.371 to the rules. The 1989 policy statement cites cases where com-

munication towers were erected with disregard for the nearby AM station, with the AM station incurring substantial expenses for correcting problems associated with the nearby communication tower.

## Necessary aggravation

Tower proponents very likely regard protection of nearby AM broadcast neighbors as an aggravation and/or an unnecessary expense. Tower proponents will very likely go where they can get the

partial proofs dealt with as inexpensively as possible; these common carrier proponents are probably unaware of the costs involved in retuning a directional array, in particular if problems arise. It has come to my attention that the work product on some of the partial proofs concerning nearby communication towers is substandard.

A station licensee has and should exercise all available rights entitled to under Section 22.371, the earlier policy statement, and other applicable regulations:

1. Know the reputation and work quality of anyone proposing to perform a partial proof on and/or detune a tower near the AM station. Remember, the risk of trouble increases the closer the proponent's tower is to the AM antenna or array. The risk of re-radiation increases with stations operating toward the high end of the AM dial.

The AM licensee has the right to insist the tower proponent retain the station's consulting engineer to handle detuning matters and/or make the partial proof measurements. In cases where recent work (last five years) has been done on an AM station's directional array, the station's consulting engineer is probably familiar with the location of the proof test points as well as the AM antenna system; this can actually be an advantage to both the station and tower proponent in the way of lower costs. Most of the cellular companies will cooperate in this way.

## Protection from shoddiness

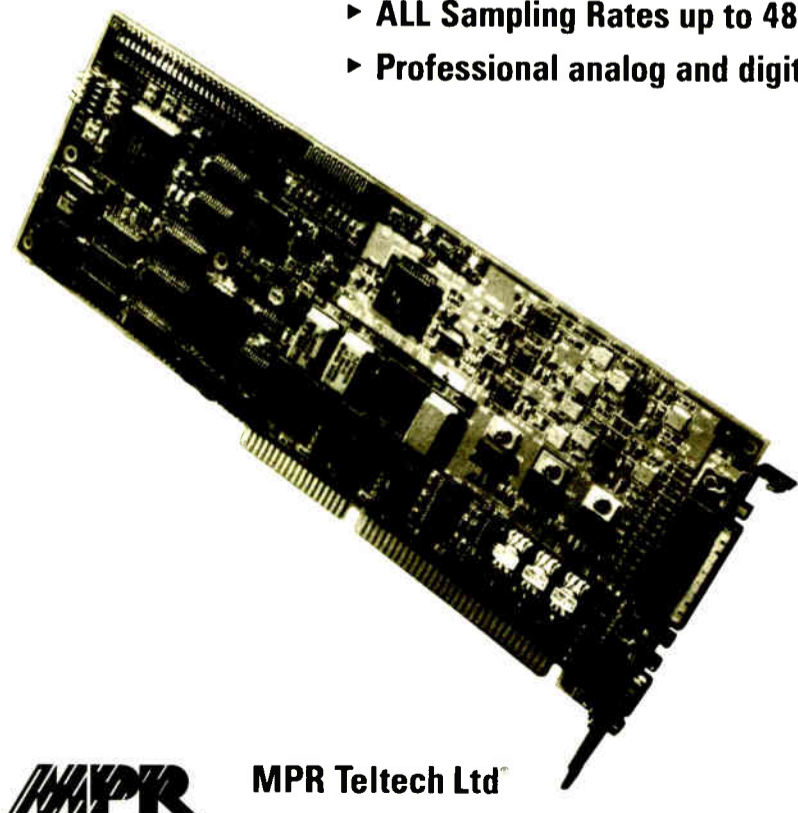
2. Protect the AM station from hurried or substandard proof work. In the event the tower proponent's employees or subcontractors underestimated the work required by Section 73.154, it is not the fault of the AM station. Make certain the measurements are taken properly. Four short tips:

a. Insist on knowing how many people

continued on page 14 ►

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**GUEST COMMENTARY**

# EAS Offers Radio Versatility and Security

by Fred Baumgartner

**DENVER** In installment one, I tried to impart the message that EAS (Emergency Alerting System) is a powerful tool and making full use of it requires climbing a learning curve.

Hopefully, as broadcasters we can see that the benefits of climbing that curve are great. In this installment, I will cover a few of the concepts involved in establishing the EAS Web in your community. To save time and boredom, let me concentrate on the differences between EAS and EBS (Emergency Broadcast System).

To summarize the first part of this article, the strength of EAS derives primarily from the Web network architecture driven by intelligent signaling "header" codes. Simply stated, the interconnections in the EAS Web resemble a spider web. When the EAS Web is plucked, depending on the message, a few, many or all of the strings vibrate with the alert. This could not be more different from the EBS daisy chain. The primary hardware difference is the existence of two or more inputs.

**Background channels**

EBS used broadcast signals to carry the message from one broadcast station to another. Everything that happened in EBS happened in front of the public. EAS can use these foreground paths, however, when properly assembled, the EAS Web is composed mostly of background channels. Ideally, foreground channels are less than 20 percent of the local EAS Web. Why? Because foreground channels are targeted to the public in a specific area and under control of the broadcaster; background channels are far less likely to be filtered as severely and thus can carry low priority messages and messages destined for other locations.

Foreground channels are highly reliable, and during high priority alerts, such as national or tornado warnings, serve to strengthen the EAS Web.

In every part of the country, there is a phenomenal number of channels that can be used as background paths for EAS. Every police and fire department maintains communications systems, most states have microwave paths, some areas even have an RPU frequency set aside for emergency use. In the current regulatory atmosphere, even National Weather Radio stations may begin to relay emergency traffic beyond that which is weather related. Background channels provide the paths from emergency agencies into the EAS Web.

Ideally, every emergency agency that has been granted access to the Web will have two paths, via background channels, with which to reach into the rest of the Web. Ideally, every broadcaster will utilize background channels to bring messages to news and on-air operators.

**Road blocks**

Whenever the EBS tones are broadcast, much of our audiences leave. With EAS, tests are rarer, and with proper preparation on the local level, they should occur on all stations and all channels at exactly the same time. They should also be considerably briefer. Real alerts should also be escape events. This is only true if enough background channels are used

properly to keep the propagation delay to a minimum.

Because each station can choose to record and play back an EAS message at a later time and because each EAS node must have approximately eight seconds to decode (and thus delay) each message, there is a finite amount of time needed

**EAS's Web resembles a spider web. When the EAS Web is plucked, depending on the message, a few, many or all of the strings vibrate with the alert.**

for the message to pass through the Web. With proper Web design and local test policies, the propagation delay can be much shorter in total than the old EBS required for the first message alone.

With EAS, it is possible to eliminate the tune-out that EBS caused. Again, an entire article would be needed to describe the Web details and policies that need to be in place in your community to take advantage of this feature.

**Targeting**

EBS fired a shotgun every time it was used. EAS, on the other hand, can target a specific community or communities. The obvious advantage is that you can filter out messages that do not impact your coverage area.

A more complex topic is reverse targeting. How does an alert for a rural community get back to the wide area broadcasters that serve that community? Reverse targeting is like a rock dropped into a bucket of water. The message must first flow out from the affected area, before it can be reflected back. Because an emergency in one area is

news to the surrounding areas, most large stations will want to tie into the EAS web as deeply as they can, if for no other reason than news coverage. Reverse targeting is another article in itself.

The EAS Web has no inherent boundary limitations. This is very different from EBS, which carried the EBS message from

to be clear, your station EAS decoder can decode the messages and pass them on to the news department without danger of rebroadcasting them directly.

At some point, the EAS Web can reach a point of "critical mass" where alert messages are bounced around the WEB for any one to decode. All of this can be accomplished simply because the EAS nodes can reconfigure existing communications systems to handle emergency traffic.

**Security**

The power of the Web is awesome. Because a message can be entered at many locations and be carried by the Web from coast to coast, it is important to restrict the "keys" of the system to the emergency personnel that need them.

Encoders should be restricted to the few codes needed for their proper use. Most emergency agencies have a very defined area of authority, and a very defined set of emergencies they can declare. Encoders can be given very restrictive keys.


Likewise, background channels themselves are not inherently secure. With the addition of encryption, where the activating agency and each of the nodes that monitor it have encryption devices, the chances of an improper alert are almost nil.

For reference, EAS can be much more

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a central point to the edges of the coverage area of the stations involved. The EAS Web can permit messages to travel thousands of miles if interconnections are made between communities and states.

Each node determines if the message is of value to its listeners (which can be other nodes downstream) before passing the message on. If some nodes, on background channels, are set to filter out very few messages, messages will travel a very long distance. What news director would not want access to every emergency message sent in the state, region, country or continent for that matter? Just



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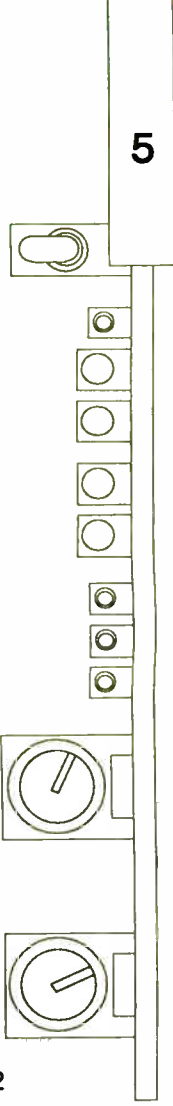
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5



# Look Closely at Rules

► continued from page 12

are going to make measurements on the station and whether they will be accompanied by drivers. This is important to determine whether or not each member of the measurement team will be measuring a realistic number of the station's proof bearings daily.

b. Before any measurements are made, take your meter and proof maps and measure a bearing or two in order to obtain representative preconstruction measurement values and time intervals. Repeat these measurements at the same locations after the tower has been built and check for agreement. Compare to the proof data. Get your station manager to allocate

the time required to do this.

c. Obtain copies of measurement log sheets showing the measured value, date, time and location of measurements made on each proof bearing.

I received a report that in some cases in heavily populated, heavy traffic density Northeastern areas that a single individual without a driver has measured in excess of five two- to 10-mile radials, approximately 15 points per radial, in a day. The implication of sloppy work may be realistic, especially during the winter months when days are short and available measurement time (approximately six hours) is even shorter.

Typically, the time required to complete

a partial proof is location-dependent, but a safe estimate of two to three radials per day maximum per measurement vehicle in normal city traffic is reasonable, especially during the shorter months in a typical northeastern city. Test points measured two minutes or less apart should be questioned, especially when one considers the time required to park the car, get out, calibrate the meter, read and log the measurements, get back in the car, drive safely to the next location, and repeat the process, especially in heavy stop-and-go city traffic. There are documented cases of proof measurements being contrived in hotel rooms and other places.

d. Accompany and observe: The AM station's engineer should schedule some time to accompany those making measurements to observe the work product. The station engineer should take along the station's meter and make some representative measurements. Reputable firms will grant this request.

## Proof points

3. Insist that the proof points used in the station's FCC proofs be used whenever possible. Even though with the passage of time some of the proof points may no longer exist, the probability is high that at least some of them exist. Note that Section 73.154 requires use of proof points when possible.

4. Cooperation: The FCC notice requires it. The AM station should cooperate with the tower proponent and permit accurate measurements to be made on the nighttime pattern (if applicable) during day hours. The AM station has the right to reasonably restrict nighttime pattern measurement time intervals during day hours to carry commercial coverage-sensitive programming.

I have received reports that some before/after construction measurements were made on nighttime directional patterns at night; in my opinion, this is not a satisfactory substitute for skywave-free measurements made during day hours.

5. Adjustments to station equipment: Allow verification of antenna resistance and/or common point impedance using recently calibrated equipment prior to commencement of the preconstruction measurements. These values are necessary for direct power measurement and are generally beneficial to the station. Allow insertion of a calibrated ammeter (preferably non-thermocouple) for comparison purposes. Generally, a test jack is available for these measurements in AM station equipment of modern design.

## Risky conditions

In the case of very old equipment in poor condition (or poorly constructed equipment) where questionable parts and/or disassembly is required to access the measurement location, I generally pass on making any measurement or adjustment to avoid risk of damaging the equipment and note conditions accordingly.

Any substantial shift of antenna impedance or directional operating parameters post-construction to preconstruction may indicate a problem requiring further attention. The station engineer should insist the matter be resolved in a satisfactory manner.

Other than trimming the common point impedance to licensed value, other adjustments to the equipment should be left to the station's consulting engineer who probably is personally familiar with or has tuning notes on file. The objective

of the partial proof is to show agreement before and after tower construction without the need to retune the AM station's equipment, not necessarily whether the station operating parameters are centered on licensed values or the equipment is adjusted for maximum efficiency.

6. Review data: The average ratio of preconstruction and post-construction measurements should come out to approximately 1.0 for each measured radial (average of no change at each test point on the radial). Deviations greater than 10 percent should be carefully accounted for since these can indicate a problem. Deep directional pattern nulls with scatterproof measurements generally show significant but not unreasonable deviation.

## Financial obligations

7. Contract: Write into the response to the notification letter that the tower proponent is financially responsible for correcting adverse effects to the AM station's radiation pattern(s) due to construction of the nearby communication tower. This is important since many of the form notification letters omit this.

Write any other special conditions beneficial to the AM station into the response to the notification letter concerning construction of a nearby tower. You may want to consult your local or FCC attorney for legally binding language.

8. Problems: The AM station should immediately involve its consulting engineer in resolving any problems involving the new nearby tower. Most responsible common carrier companies will honor this request because they would rather see the matter resolved without involving the commission. The AM station should be wary of accepting data from computer studies (especially NEC and derivative programs) in lieu of direct measurement-based data. Simply because a computer generated some numbers does not imply they represent the real-world situation.

The AM station has the right to notify the tower proponent to have the detuning apparatus checked for proper adjustment at reasonable intervals, either by the AM station's engineer or the subcontractor for the tower proponent. For a directional AM station, detuning equipment at any nearby towers should be checked before any adjustment of the array is attempted.

In the rare instance where problems occur and/or cooperation cannot be obtained, collect the notification letter and any other correspondence and consult the station's FCC attorney. Before writing Sid Briggs or any other FCC official, be certain the station is in order. In an egregious case, the FCC may pay both the station and the new tower site a visit.

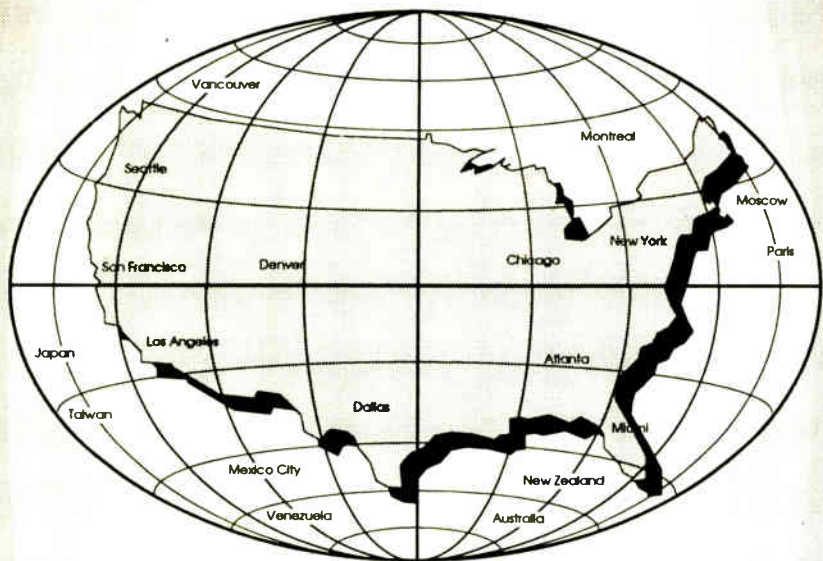
The encroachment of towers near AM broadcast sites is virtually certain, considering the sectorization (splitting) of cellular sites to handle heavy cell loads and the development of PCS and other new communication systems. The FCC has now afforded the AM broadcaster protection: it is up to an affected AM station to take necessary steps to protect its interests and minimize the likelihood of an expensive retune of its transmission system later.

□ □ □

Morgan Burrow is associate engineer at Mullaney Engineering Inc in Gaithersburg, Md. He can be reached at 301-921-0115.

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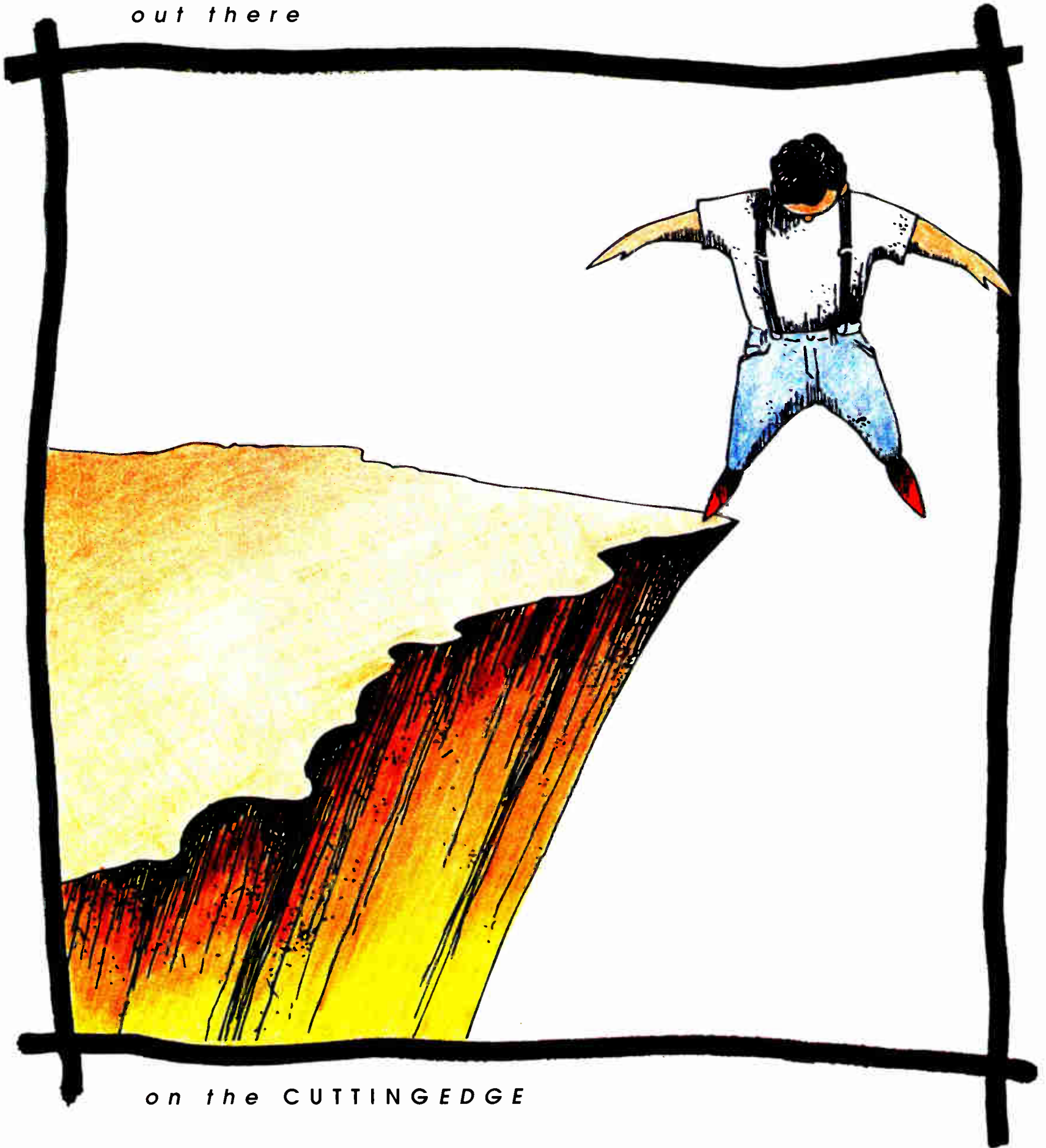
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World Radio History

# Radio Rallies to Cover Bombing

by Harry Heath

**OKLAHOMA CITY** Uncounted stories could be told of Oklahoma radio's courageous and persistent high-risk coverage of the tragic Murrah Federal Building bombing here April 19.

Suddenly at 9:02 that Wednesday morning, one of the biggest spot news stories in broadcasting history broke, and within minutes this city was the focal point of world attention.

How well radio responded is told by the hundreds of broadcasting outlets around the world that carried the feeds made available by men and women who

manned on-the-scene outposts to provide around-the-clock coverage.

The story at 5th Street and Robinson Avenue was wrapped up—except for the unfolding action in the federal judicial process—by the controlled dynamite implosion May 23 that brought down what remained of the tattered house of horror.

## Daunting challenge

Carl Smith, executive director of the Oklahoma Association of Broadcasters (OAB), summed up the daunting challenge to local broadcasters.

"All did an excellent job," he said.

"Even our music-intensive stations dropped their formats and stayed with the story for two or three days."

Tim West, general manager of Oklahoma News Network (ONN), said "the bulk of the coverage emanated from Clear Channel Communication's facilities."

West said KTOK's Carrie Hulsey was only a block away when the shattering blast erupted. She provided eyewitness accounts of the confusion surrounding the building.

As soon as the word reached the station, KTOK news director Jerry Bohnen went live. He remained at the microphone

without interruption for nine hours.

Clear Channel stations KEBC-FM and KJYO-FM took KTOK coverage live, abandoning regular programming.

"Within 20 minutes," West said, "the FBI evacuated the 50 Penn Place building where our stations and network as well as the local FBI headquarters are located. Everyone was ordered to leave as a precaution against another bombing, but Bohnen remained on the air. Little did the FBI know that another reporter would remain behind. Ken Jones hid in a closet to avoid detection."

The "all clear" was given at 6 a.m. the following day.

ONN news director Matt Skinner set up an anchor point via Marti as close to the shattered federal building as possible. From there, Skinner and Bohnen served as anchors for continuous coverage, with KTOK and ONN reporters searching out stories and interviews.

## Incredible story

"After an hour or so," West said, "KTOK and ONN returned to home base to start piecing this incredible story together. ONN operations staffers Mark Christian and David Haggard fed ABC, BBC, Australia and many, many other networks around the world."

From that point on, KTOK and ONN provided continuous coverage for several days. A regular beat was established at the building site and "our reporters provided several national scoops," West said. "In addition, talk-show host Carol Arnold provided a venue for local citizens to air their grief and disbelief. Radio became a necessary tool during this tragedy."

West said there are far more stories to tell, but "in my mind the true story is that our radio reporters actually risked their lives" to bring the story to shocked listeners.

"I am very proud to be in radio, and even more proud to be a member of Clear Channel Radio of Oklahoma," West said.

Oklahoma City's oldest radio station, WKY(AM), carried around-the-clock coverage from April 19 through April 23, with 17 staffers regularly involved and the entire staff of 30 lending a hand at times. No commercials were carried during that time, but no advertising revenue was lost. All clients accepted make-goods, WKY's Dennis DeMichele said.

WKY was one of the most active sources for other media outlets. The station fed reports to NBC, NPR, BBC, Canadian Broadcasting, New Zealand Radio, Australian Radio plus numerous stations throughout the United States.

Special WKY programs included a live-talk open forum discussing the tragedy and how to cope with it plus on-air counseling from medical and psychotherapy experts. In addition, the station reported the latest information from the Red Cross, Salvation Army, Feed The Children and other disaster relief organizations.

Numerous relief agencies were given on-air time to solicit specific items needed during the rescue effort. WKY organized a fund drive to aid bombing victims and their families.

## No commercials aired

Another long-time station, KOMA (AM), and its sister station, KRXX-FM, covered the bombing all day for three days. Three full-time newspeople handled

continued on page 19 ►

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World Radio History



# KGOE Proves Programming's 'The Thing'

## California FM Succeeds with Rebroadcasts of San Francisco AM Programming and Local Strengths

by Bob Rusk

**EUREKA, Calif.** You want to put a new FM on in a market that already has more than a dozen stations. But with only 120,000 people in the listening area, finding a format to attract a good share of the audience is a major challenge.

That was the situation Tom Crane found himself in when he was granted the license for 105.5 MHz here. Crane solved his dilemma with the notion of rebroadcasting the number one station in San Francisco.

And that is what KGOE has been doing, since signing on the air in September 1993. The station bypasses most local programming, and is an affiliate of Capital Cities/ABC-owned powerhouse KGO (810 AM).

KGOE, which has no ownership or management connection with KGO, rebroadcasts the station 24 hours a day. KGO, a 50,000 watt news/talk station, has long dominated the San Francisco Arbitrons. At night KGO has a large share of the listening audience up and down the West Coast.

Almost all of the shows on KGO are hosted by local talk moderators, with much of the focus on issues of interest to people throughout Northern California.

"If you live here, you're linked to the San Francisco Bay area," Crane says of Eureka, located 300 miles northwest of San Francisco. "You go to the Bay area to shop, you go to the Bay area for entertainment. You may have moved here from the Bay area. There's a huge influx of people here who grew up and were educated in the Bay area.

"People here are interested in hearing about what goes on in San Francisco and all over Northern California. And that is what KGO delivers."

KGOE relies upon the San Francisco station for most of its news coverage, but does offer two five-minute local newscasts every weekday through an arrangement with the ABC, Television affiliate in Eureka.

"We find that our audience isn't interested in a lot of local news," says Crane. "We try to give them enough, and then let KGO cover regional and national news. Once a week we do a one-hour program called the North Coast Forum, which gives the community an opportunity to talk about local issues."

KGOE manager Judy Clark stresses that "the audience listens to KGOE because it's not a local station, it's KGO. When we were first deciding what time to run the local news, I put it on and covered up the sports on KGO. I had ten calls within 25 minutes from people complaining."

Mickey Luckoff, president and general manager of KGO, says he thought "it was an interesting suggestion" when Crane first approached him with the idea

of simulcasting. "This is contrary to LMAs. We pursued it after we checked out what the nuances would be. We really did it to find out how marketable it would be."

Luckoff adds that "when we originally started out, we were looking to do this in multiple markets away from our metro



area. Yet it took a lot of clearances to make this thing go into Eureka, because you have a network (ABC), syndicated programming, AP and AFTRA (the union for radio artists).

"Whether we could do this again remains to be seen," he continues. "With Eureka we were very fortunate. All the syndicators as well as AFTRA went along with us. Eureka is a small enough market, so none of them felt they were losing anything."



Pictured l to r: Tom Crane, KGOE-FM station owner and Judy Clark, station manager

Crane, whose Southwestern Broadcasting Corporation also owns stations in Texas and New Mexico, says "listeners have tuned in to the notion that they can receive KGO on 105 FM. Even at night (the only time KGO can be heard in Eureka), the Arbitron study shows that it's almost 100 percent conversion."

The station scored very well in its first rating's book, according to Clark. "We were number two with men 18-34 and 18-49," she states. Numbers from the second book come out in September.

Crane says that even though his

station has the benefit of piggy backing on KGO's top-rated programming, KGOE is not able to charge premium ad rates.

"KGO is the number one station in San Francisco and has many years of ratings to support that. We have only the beginnings of ratings," he explains. "We have just begun to establish our presence. But when you think about it, to be on the air for just a few months and to be as high as number two in a market with 15 stations is truly a great feat."

In April, ARM (Actual Radio Measurement) conducted an in-car listenership survey of the Eureka market and KGOE scored 19.4—the largest audience share, which was 3.1 points ahead of the number two-ranked station in the market.

Although most talk stations are on the AM band, Crane thinks the format fits well on the FM side. "We had the FM license," he says. "I think there's a strong value in FM talk. I think the FM signal serves the KGO format well, in terms of sound and audio quality. Because we broadcast in mono, we reduce the multipath and have the advantage of a pristine signal."

Crane predicts there will be more affiliations between stations that do not have an ownership/management connection.

tape KGO every day and ship the tapes to him so he could listen to KGO while he was driving his tractor. As soon as we got on the air he wrote us a letter and said, 'I no longer have to have my brother tape KGO. I can listen full time. Your station is the greatest thing in the world!'"

## EAS Offers Security

► continued from page 13

secure than EBS ever was. In EBS, everybody had the key, and an inventive hacker would have little trouble imitating or recording and playing back the tones to trigger an alert. In EAS, a recorded message has no meaning if played back after the original alert time. Creating a false EAS message is far more of a technical challenge than creating a false EBS message. Still, when installing your EAS Web network, some care must be given to prevent unauthorized persons from accessing the EAS encoders or their communications paths.

### Station issues

My hope is that I have introduced you to the major opportunities and issues involved in setting up the EAS Web in your community. I have said nothing about the national infrastructure required by the commission, simply because it is fundamentally the same as EBS and well defined in the Report and Order.

The local issues are, however, local. EAS gives all communities and broadcasters the hardware and common language (header protocol) to establish very powerful, fast and meaningful emergency communications Web networks. Taking advantage of what the Web can offer requires that broadcasters become aware of the issues and abilities of the EAS Web, and work together and with their community to make a secure, life-saving and useful information system.

I also did not cover equipment selection. With EBS or the typewriter, there were few options, it is what it is. In EAS there are options as to the software, the number of inputs the hardware supports, digital message outputs and translators, automatic logging and more. Each of these issues deserves some time in and of itself.

I cannot say it strongly enough: while EAS is not complicated or difficult to understand and implement, it is not simply a black box to bolt into the rack and forget. EAS requires little operator training, installation time, or expense, and it can be a very valuable asset to broadcasters in terms of information gathering, community involvement and operating cost reduction.

□□□

*Fred Baumgartner is engineering manager at KDVR-TV Denver. He first published "EAS: Colorado's answer to EBS," in the Aug. 22, 1990 issue of RW. Baumgartner designed and built the first prototype EAS units for the Colorado Broadcaster's Association in 1989 and consulted with TFT in the design of its EAS/EIS decoders.*

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World Radio History

# Radio Rallies to Cover Bombing

► continued from page 16

hourly feeds from and to the CBS Radio Network.

No commercials were carried during the day of the bombing. Ad revenues lost to pre-emptions and coverage totalled \$15,000.

KMGL-FM covered the story 24 hours a day for two days, then carried reports every 15 minutes with updates on the victims. The audio signal from KFOR-TV augmented KMGL-FM's coverage.

Spokesman Rob Adair said the needs of the Red Cross and Feed The Children were covered hourly, and on-air support was given to fund-raising and food and supply efforts, hot lines, counseling services and call-in shows.

The station estimated a minimum of \$10,000 to \$20,000 in ad revenues lost due to pre-emptions and coverage.

## Fund-raising Efforts Add Up

What began as the three stations' local fund-raising campaign for the Governor's Victim Relief Fund soon became a national effort. National talk-show host Don Imus, carried on KQLL(AM), personally donated \$1,000 then challenged his listeners to call the station's 800 number.

At that point the drive begun by KQLL, KOOL and Y92.1 had reached just over \$16,000. That amount doubled in just three hours after Imus's call for help. As "Imus in the Morning" began airing two hours later on the West Coast, calls again came pouring in. The next morning, Imus increased his donation to \$2,500.

General Manager Bill Paddock said at last count the fund had reached \$50,000.

For three days, KTNT-FM aired extended newscasts every 30 minutes with updates as circumstances warranted. Six full-time employees handled the coverage, program director Steve English said.

KTNT stayed with its "smooth jazz" programming and honored all advertising contracts, but it did not neglect its public service commitment, announcing locations of drop-off points for victim relief and collecting donations at promotional activities.

KISS-FM went to continuous coverage 14 minutes after the blast, continuing through 11:30 p.m. Then came updates three times an hour through 6 a.m. when continuous coverage resumed until 10 p.m. Thursday. That pattern was followed until continuous coverage ended at 5 p.m. Saturday. Three-an-hour updates continued from Saturday through Tuesday afternoon at 3 o'clock.

The station's coverage included all news conferences from the Oklahoma City Civic Center and Sunday's memorial service at the Fairgrounds Arena.

Chris Baker, operations manager and program director for KATT-FM and KYIS(FM), said the station used its network to provide remotes to its two sister-stations.

Two staff members monitored scanners, radio and other sources for additional details until Sunday, when one person was reassigned to other duties. A mobile

studio at the blast site included a technician, an engineer and one reporter for each station. It was operational for a full week after the bomb went off.

On long programs without station breaks, such as FBI news conferences and the memorial service, spots were bumped. Make-goods were arranged where possible.

## Full cooperation

Full cooperation was given to law-enforcement agencies concerning street closings, calls for volunteers with special skills and other assistance information, Baker said. Countless requests from city fire and police rescue departments and American Red Cross, Feed The Children and the Salvation Army were honored.

Sixty-four miles northeast on the Turner Turnpike, the state's other major metropolitan area was quick to zero in on the capitol city's tragedy.

Perhaps the most extensive coverage by Tulsa stations was that of KRMG(AM). News director John Durkee reported that his station began live continuous coverage within 10 minutes of the explosion, using its entire news staff of 15, including sports, meteorological and traffic reporters. There were no commercial interruptions that day until 7 p.m.

After continuous coverage ended, KRMG provided "status reports" at least every 30 minutes around the clock until Sunday, April 22. During this period, that station's news staff was at the bomb site augmented by ABC, Mutual, NBC and Oklahoma News Network feeds.

When Timothy McVeigh's arrest became public, the station resumed continuous coverage for two hours. It maintained reporters in Oklahoma City daily through Friday, April 28.

KRMG provided daily live coverage of FBI and FEMA news conferences, the Sunday memorial service featuring President and Mrs. Clinton, Gov. and Mrs. Frank Keating and evangelist Billy Graham, the president's radio address on the bombing and the GOP response and thank you by Keating.

As the story unfolded, all of KRMG's regularly scheduled public affairs programs dealt with the bombing.

Durkee said no final figure has been arrived at in calculating lost revenues through pre-emptions, but the figure for April 19 alone topped \$10,000. At that point, overtime costs, provisions for staff, equipment costs and time charges were estimated to range between \$3,000 to \$4,000.

Following the example of the First Family, Durkee said, KRMG gave away 3,500 dogwood seedlings to listeners. Talk-show hosts dedicated their programs to the bombing, giving Oklahomans a much-needed outlet for their emotions.

KVOO, Tulsa's oldest AM radio station, and its sister FM stations KICK and KVOO-FM, used seven newspeople to stay on top of the tragedy.

Lisa Monkres, speaking for J. Michael DeMarco, vice president and general manager, said seven KVOO reporters went into continuous coverage about 13 minutes after the blast until 7:05 p.m. At that point, the station aired five- to 10-minute status reports on the hour and half hour around the clock through Sunday. These were shortened to about two minutes from Sunday until April 28.

KVOO's 32-foot mobile studio traveled to Oklahoma City the day of the bombing and remained throughout the weekend. From time to time it was a command center shared with ABC Network News, KOTV Tulsa, and KWTW and KOCO, Oklahoma City.

## Broadcast collaboration

In addition to its own on-site coverage, KVOO aired reports from ABC and audio feeds from the three above-mentioned TV stations.

The station chalked up 160 hours of overtime at approximately \$2,400. An early rough estimate of lost revenue runs between \$10,000 and \$15,000.

KQLL-AM-FM and KCMA-FM coverage began less than a half hour after the explosion with break-in news as details became available for the next 48 hours. Then coverage was limited to the regular weekday morning newscasts until McVeigh's arrest led to more break-in coverage.

News coverage involved three persons, but fund-raising efforts included 20 staff members, according to Julie Meylink, marketing and promotions director. About 100 hours of overtime was put in, but costs will be minimal because station personnel volunteered their time. No commercial time was pre-empted.

## Provisions and support

KQLL took 150 sandwiches and a large supply of cookies to the American Red Cross on day one to feed blood donors

and ARC staff members.

KMYZ-AM-FM and KTHK-FM provided updates regularly intermixed with their music formats. The stations' fund-raiser for the Red Cross had reached more than \$10,000 in checks and pledges as this story was written.

For sister stations KRAV-FM and KGTO-AM, owned and operated by the Kravis Co., updates every 15 minutes began shortly after the bombing and continued throughout the day.

"Our morning show on Thursday and Friday was devoted to discussion about the bombing and what the public could do to help," said Linda Cruze, news director.

On April 29 and 30 the stations aired a special edition of "Tulsa Weekend," a weekly public affairs program. Dr. Rick Jones, staff member at a local psychiatric clinic, discussed anxiety and depression as an aftermath of the bombing.

Public service announcements for the Red Cross, Salvation Army and law-enforcement hotlines as well as times for church services dedicated to the bombing victims were broadcast hourly the week of the tragedy.

KBEZ-FM and KHTT-FM broke in with special reports the first 48 hours following the disaster. Special features included listener call-ins and on-air guests from the Mental Health Association of Tulsa. The latest official information about victims was broadcast as received, a spokesperson for the stations said.

Both KBEZ and KHTT assisted in various relief and fund-raising efforts, and listeners were given information about blood donations and collection sites. ☺

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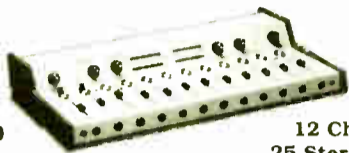
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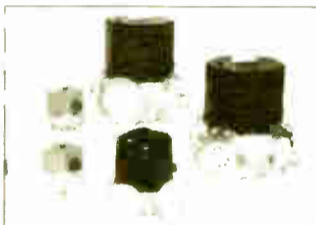


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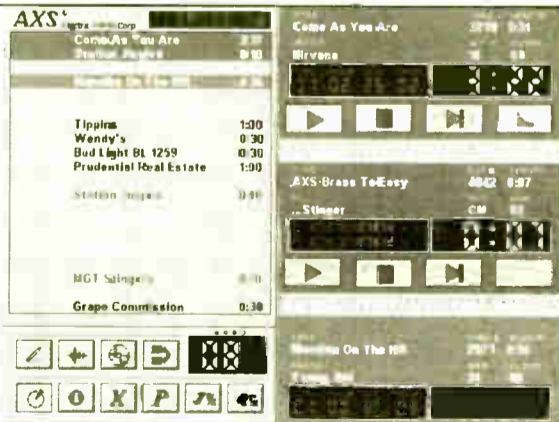
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# KOSU Provided Marathon Coverage

by Harry Heath

**STILLWATER, Okla.** Until April 19, KOSU-FM General Manager Craig Beeby's cellular phone was only a convenience. That day it became a necessity. Without it, he said, there would have been no satisfactory way for his station to cover the most devastating act of domestic terrorism in the nation's history.

Before April 19, Rogers and Hammerstein's chesty song "Oklahoma!" brought to mind a landscape of waving wheat.

Today broadcasters can merely mention the words "Oklahoma City" and listeners instantaneously recall the details of that day of terror. The landscape changes to a shattered and trembling Murrah Federal Building and its 167 dead, including 19 children.

## Live in infamy

The blast that created Oklahoma's "day that will live in infamy" came at 9:02 a.m. as business was well under way in the multipurpose federal building that housed, among other agencies, a day-care center.

Beeby became aware of the bombing 18 minutes later. To get an immediate fix on the bombing scene itself, he quickly tuned to television channels 4, 5 and 9 in Oklahoma City. They were on the scene and transmitting.

That monitoring convinced Beeby that KOSU-FM, the state's first public radio station, at Oklahoma State University, had to provide on-the-scene coverage. He was staggered by the magnitude of the damage.

Step one was to attempt telephone contact with Oklahoma City. That was impossible. Some telephone lines into the city were not functioning and others were jammed with emergency calls.

Southwestern Bell Telephone had evacuated its building following the blast and now an overload of calls was pressing for service. The computerized system went into automatic mode. Few if any Bell workers could get into the building.

For several blocks surrounding the explosion site reporters moved into what looked like a war zone. There was a craving for information but hard facts were hard to come by in the ensuing chaos.

## Coverage plans

By 9:30, when he determined that cellular telephones were operational, Beeby and KOSU news director Kelly Burley quickly put together coverage plans. Then, with reporter Jennifer Johnson, Beeby left to provide live broadcasts.

Beeby's cellular phone was crucial. En route to Oklahoma City, some 65 miles away, Beeby called Burley and told him to contact KWTW seeking permission to carry the station's audio signal. His cell phone kept him in touch with station personnel in Stillwater while he pushed the speed limit. Beeby and Johnson were at the disaster scene by 10:30.

Meanwhile, Burley was breaking into regular programming with updates from the KOSU studio while Chief Engineer Dan Schroeder was working on the technical systems for the KWTW audio feed.

By 10:20, continuous live coverage began via KWTW audio.

Ten minutes later, Johnson and Beeby were on the scene with live cellular phone reports. Burley acted as anchor, Beeby said, "interviewing us live and coordinating live coverage from Channel 9 audio with our own reports."

Beeby and Johnson filed reports "from all 360 degrees around the blast site" throughout the day.

## Crucial role

The role of radio was crucial throughout the day, Beeby commented.

"We could assume that many at home were tuned to TV, but people at work throughout the state were getting most of their information from radio. So were those on business trips in the state and vacationers traveling through." Without radio, Beeby said, a significant segment of the audience would have been left without any idea of the extent of the catastrophe and the exceptional mobilization of rescue teams.

"Our cellular phone was worth a million dollars that day."

It takes both training and skill to speak extemporaneously over an extended period such as this remote required. Beeby said. Fortunately, he had done his share of ad libbing in 21 years in front of a mic.

Both Channel 9's large news staff and its commitment to local service were important to the overall KOSU coverage, Beeby pointed out.

The KOSU strategy was to provide updates within the ongoing KWTW audio feed.

On day two, Beeby filed reports all day for the Canadian Broadcasting Corp. and he and Johnson were filing to other media throughout the United States. During this time, Burley slept only four hours in two days.

## Concealed weapon

The scene shifted to Perry, 60 miles north of Oklahoma City, on day three. Timothy James McVeigh had been arrested by a highway patrolman who noticed his Mercury Marquis did not have a license plate and that McVeigh, when pulled over, had a bulge in his jacket. He was carrying a concealed weapon.

By now Beeby and Johnson were a smooth-working team. KOSU was the first to break the news that McVeigh was under arrest and the first to report he had asked for legal help.

"While one of us was giving the report the other was gathering information," Beeby said. They alternated between interviewing sources and putting new information on the air.

The station's small news staff was hard pressed. Natalie Bell, who had been with KOSU for seven months after 10 years in broadcasting, including stringer assignments for National Public Radio, had moved to Detroit only a week before the bombing. Fortunately Beeby, a radio veteran with a master's degree in mass communication, could step into the breach. He praised the performance of Johnson who, with only a year and a half of experience, performed well under stress.

Burley, with six years in KOSU news, was on the air most. He coordinated the flow of KWTW audio with information gathered by phone and teleprinter and interviews with Beeby and Johnson at the scene of the action. Schroeder worked around the clock with Burley to assure no breakdowns

in the engineering aspects of the coverage.

Newspersons covering the tragedy cooperated with one another putting aside competitive situations. In Perry, TV reporters were taking notes from Beeby and Johnson as they aired new information. "Then they would use our facts in their next feed," Beeby said.

On day three, the KOSU team was once again in Perry, filing live reports from the Noble County Courthouse prior to



McVeigh's transfer by helicopter to a federal facility in El Reno, near Oklahoma City. Burley continued as anchor.

KOSU's live coverage began at 1:35 p.m. and continued through 6:30 p.m. Again KWTW audio and live reports from Johnson and Beeby by cellular telephone made up the bulk of the coverage.

At the nationwide memorial service Sunday, Johnson fed live reports by cell phone to KOSU. The service, in which President and Mrs. Clinton, Gov. and Mrs. Frank Keating and evangelist Billy Graham participated, drew an overflow crowd to the State Fairgrounds Arena in Oklahoma City.

Following the memorial service, KOSU's programming began resuming its classical and semi-classical music format.

Beeby said he was "extremely impressed" by the Oklahoma City disaster plan, based upon preparations for tornado damage.

"It was like a Civil War army unit. Men would advance in rows of four to a target point in the building. Then they would wait until they felt it was safe to go farther."

At one point the morning of the first day, police and fire officials thought a second bomb had been located, this one within the shattered building.

Police shouted for everyone to run from the area.

## Radio on the run

"At that point, I was describing the panic for KOSU's audience as I ran down the street with the crowd, speaking into my cellular phone as I ran. You can imagine how dramatic the sound of a frightened crowd fleeing from the disaster area would be. Fortunately, that bomb report proved to be false," Beeby commented.

With telephone service crippled, radio played a key role in calling for relief supplies for rescue workers.

"For example," Beeby said, "rescue workers needed knee pads as they pawed their way through the rubble looking for trapped victims. It was this and similar broadcast appeals that quickly brought much-needed emergency supplies and volunteer workers to the scene."

There was an outpouring of appreciation to broadcasters for their on-the-scene work.

"When I went to a popular campus pizza parlor as our coverage slacked off, people treated me like a celebrity," Beeby said with a chuckle. "There was so much heartfelt appreciation from everyone."

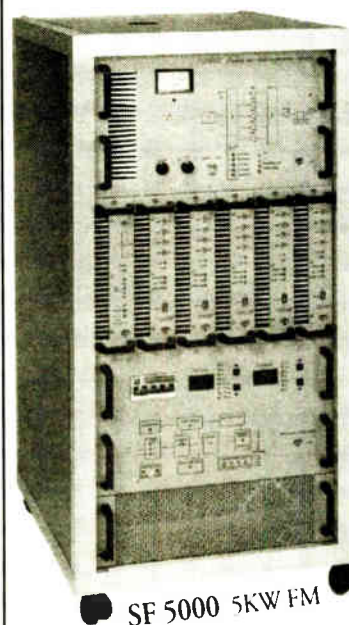
KOSU, which in the past year received \$190,000 in listener contributions, said its coverage of the disaster brought an outpouring of phone messages and letters of appreciation.

One of many letter-writers told Beeby: "I didn't participate in your recent successful fund drive, but I know you also have planned some kind of bombing benefit, so I'm enclosing a check for you to use in any way you see fit: it shows my appreciation for your coverage."

□ □ □

Harry Heath is professor emeritus of Oklahoma State University.

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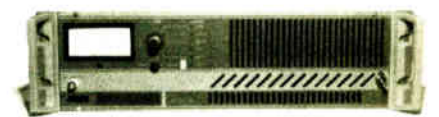


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# Versatile Relays Perform Switching Tasks

by Jim Murphy

**MORGANTOWN, W. Va.** As I have mentioned before, the modern radio station probably switches as much as—if not more than—it mixes. This applies not only to control room functions, but also the various switching and routing requirements at transmitter and remote

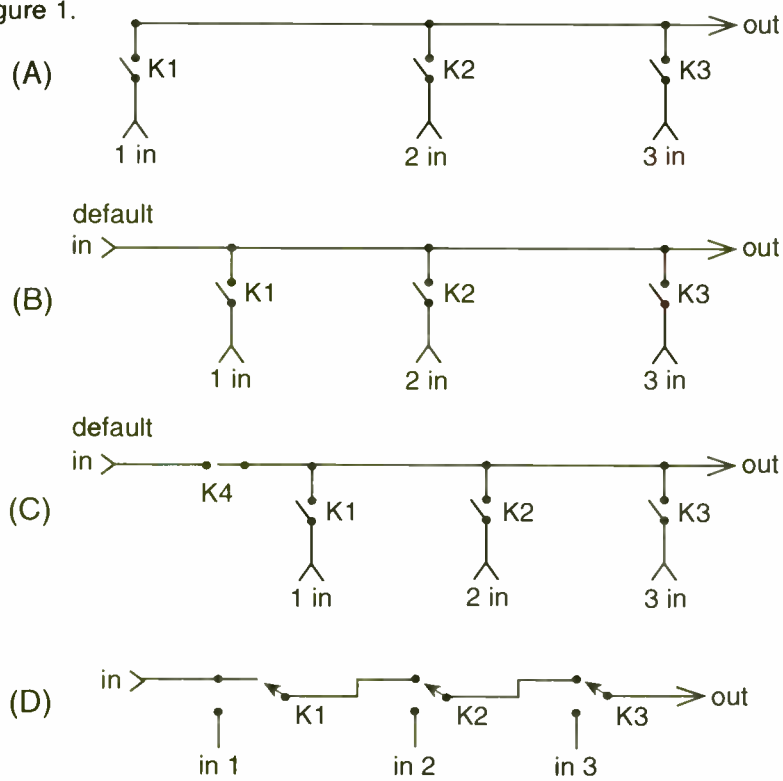
matrix systems. But if you look around the station, behind the racks and under the consoles, you will find dozens of relay boxes or aluminum brackets housing the circuits that perform special switching tasks, not the least of which is the routing of audio. These audio requirements come along frequently, so you might find yourself in a dilemma as to

switches will introduce distortion and/or clipping. In the end, it is hard to surpass the performance, reliability and ruggedness of the simple relay.

Audio routing using relays is common,

selected source would be heard at the output. The addition of a fourth relay, shown as master relay K4 in Figure 1(c), will remove the default audio when any input relay is energized.

Figure 1.



sites. From power change to remote satellite crystal switching, from audio line selectors to satellite polarity switching, these systems are a vital part of today's broadcast station.

Some of our switching requirements are complex, time-based, or computer-driven, usually requiring professional-grade equipment with fancy names like sequencers, intelligent switchers or

whether to use solid state switching, or go with the old-fashioned relay.

While there are many solid state analog switches on the market, it is hard to beat the versatile relay. Even though it has a higher unit price, the cost usually evens out because relays do not require elaborate differential and well-regulated power supplies. Moreover, if the chip parameters are not controlled properly, analog

and can be accomplished several ways. Some basic flow diagrams are shown in Figure 1. In 1(a), the inputs are switched into a common output line. The circuit is simple, and requires only single-throw relays. The only drawback here is that one of the relays most likely would be used as a common source, and would be

If the proper relays are available, the circuit in 1(d) handles both jobs, i.e., interrupting the default path when selecting a source. Note, however, that the upstream relay controls the default audio flow, and would require the necessary wiring scheme to provide control to other source locations. These relays, too, for

Figure 2.

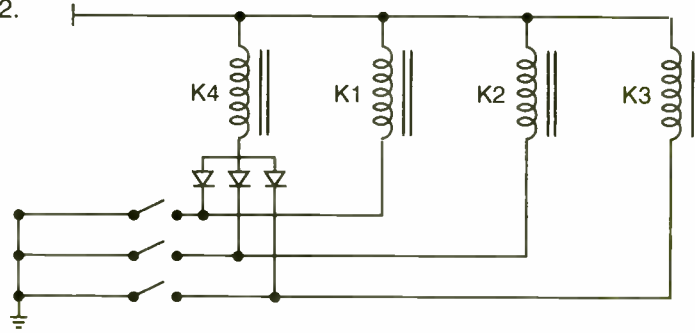
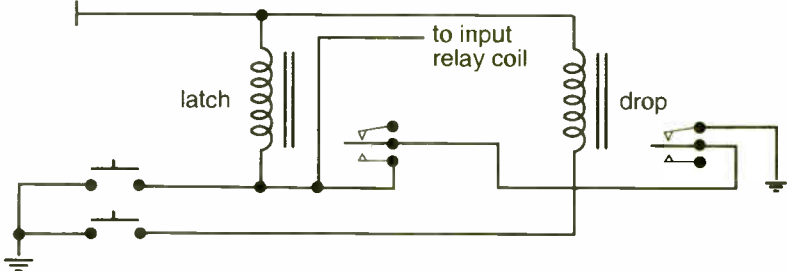


Figure 3a.



energized most of the time. Furthermore, it would need to be released before another source was selected.

One solution to this, as shown in 1(b), is to establish a separate default input. The circuit as shown has a problem inasmuch as all inputs are placed in parallel with the default, so a mix of both default and

stereo, would need to have 4 form C contact arrangements.

Figure 2 illustrates the wiring scheme for the circuit in 1(c), which solves the aforementioned problem. When any input relay line is pulled low, the master relay energizes, breaking the default audio path. The diodes isolate the input relays by passing the low to the master relay but preventing the low from energizing another input relay coil.

The scheme shown in Figure 2 uses a maintained-type switch, sometimes listed as push-on, push-off. For this type of operation, you need only to pull the bottom end of the desired coil to ground, hold it there, then release it. This method, however, is limited, because it is not compatible with most switching protocols.

A better method, utilizing latching circuits, is shown in Figure 3. Alas, we need two more relays, though they require only one set of contacts each. We energize the latch relay with a momentary closure, the relay holds itself through the NC contacts of the drop relay until another momentary switch closure activates it. Other advantages of this method are that economical SPST momentary switches can be used, and the latch and drop can be performed easily from multiple locations. A less desired method in 3(b) uses a normally closed switch in place of the drop relay. For multiple location operation, it must be looped through each remote switch before returning to the source. Not a good concept, for if the line becomes open, none of the relays will operate.

The addition of transistor drivers, as continued on page 45 ▶

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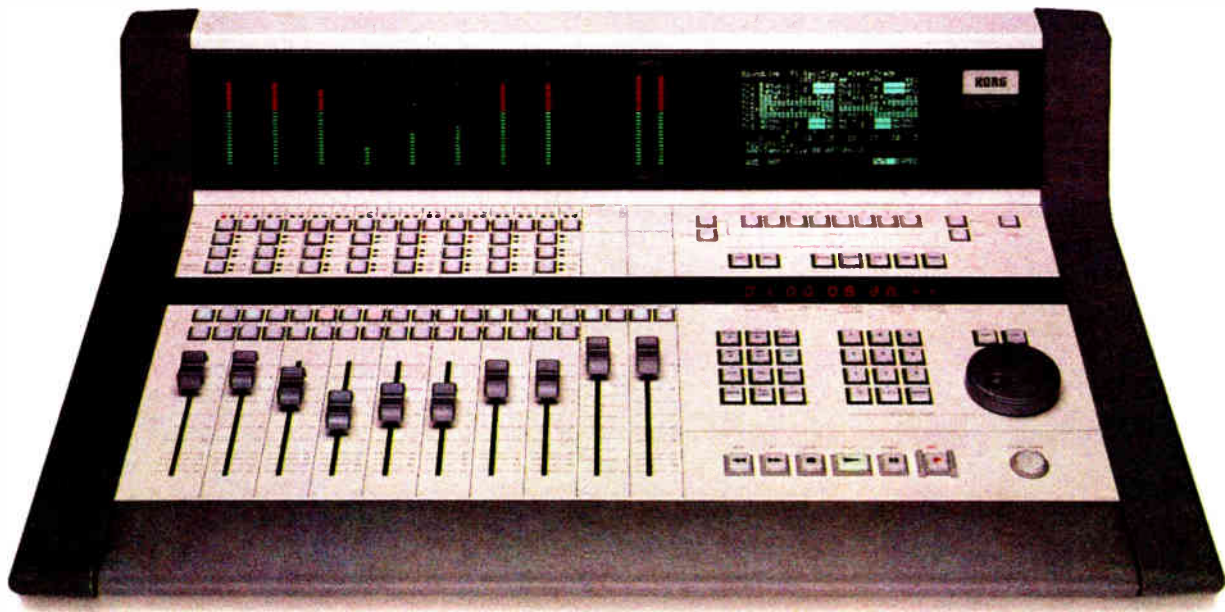


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# Studio Sessions

TL Audio's  
Fine Tube EQ,  
See p. 30

Equipment and Applications for Radio Production and Recording

## PRODUCT EVALUATION

### DM-800 Brings DAWs Down to Size

*Editor's note: The following product review is a special two-part series on Roland's DM-800 digital audio workstation—a product that has attracted a lot of attention because of low cost, portability and simplicity. Part I will focus on product description and features, and Part II will reveal how the unit performs under real-world conditions.*

#### Part I of II

by Ty Ford

**BALTIMORE** Remember when computers went from things that fit into a room to things that sat on your desk? Remember how amazed we were that so much technology could fit into such a small space? It is happening again, and Roland is doing it with its DM-800 digital audio workstation.

List price for the DM-800 with two internal 500MB hard drives is \$7,495 and \$6,295 without hard drives. With its 26-inch by 11-inch by 4-inch dimensions weighing in at about 16 pounds (with internal drives), the DM-800 is... well... cute. I have seen skateboards that are bigger and heavier than the DM-800. The two most obvious implications of the DM-800 are that as long as there is AC power available, you can take your work home with you, or toss a mic and battery-powered preamp into your gear bag and head out to any remote location to record clients, ambience, music or sound effects.

#### Uses

Say you were at a radio station and you had a client that wanted his or her voice and some voice drops from happy customers as part of their next spot. You sell the client a remote broadcast package and show up with the DM-800. While the airstaff and promotions director do the remote, you record the client and a few customers and maybe even your own announcer track. Because the DM-800 can be had with two internal 500MB (about 180 mono track minutes) hard drives, you have plenty of room for three or four stereo music beds and some sound effects. At present, the storage limit is 12 track hours at 48 kHz.

By the end of the remote broadcast, you have mixed the spot and played it back for the client over headphones for approval. Of course, you will want to remember to bring some release forms for the customers to sign, but the sizzle this can add to the event, plus the efficiency of getting all the work recorded and approved by the client at the same time, takes the event to a whole new level.

That long-form documentary series you are working on that requires a list of actualities and natural sound also gets a lot more interesting, especially when you

use a stereo mic for natural sound and a cardioid element for V/O and interviews.

Forget about networking workstations in your multiroom facility. If you have a three-room facility with a sound stage, V/O booth and video post-production



Roland's portable DM-800

suite, you can simply unplug the DM-800 and move it to the room applicable for the next part of the job. If you had a really busy three-room facility, you would want four DM-800s. That way you could back up one while the other three were being used.

All of these benefits, and all those you may think of along the way, become possible after you become intimate with the DM-800. The 171-page manual covers most of the topics and is of some help, but it only gets a grade of C. While

Roland has shown improvement (the sections on SMPTE synchronization, SCSI and troubleshooting are actually quite good), whoever wrote those sections should rewrite pages 26 to 100. A more complete index would also help as well.

Don't get me wrong, for the money, the DM-800 is as impressive a display of technology as the Yamaha ProMix 01. Neither one is "plug-and-play," but after you reach the first plateau of the learning curve (when you only need to look at the manual once a day), you can do really good work.

The slim back panel of the DM-800 has surprisingly few connections. The four balanced 1/4-inch TRS analog input jacks double as effects returns and Aux ins. The four balanced 1/4-TRS analog output jacks double as effect sends and Left/Right Mix outputs. There is a stereo headphone jack with adequate power, a foot switch jack that can be used to

punch in and out of record or for entering a tempo map in Tap Tempo mode.

There are two S/PDIF RCA-style digital outputs and one input. The DM-800 will record at 32, 44.1, or 48 kHz through either analog or digital ports. Each

**You sell the client a remote broadcast package and show up with the DM-800.**

100MB of disk space yields 16 track minutes at 48 kHz, 18 track minutes at 44.1 kHz or 25 track minutes at 32 kHz.

Because the sample rate of the project determines the final output sample rate, the manual suggests that you think ahead when choosing the sample rate for each project. A project intended for CD, therefore, should be recorded at 44.1 kHz. If DBS is the final destination, go with 32 kHz.

#### Synchronize to SMPTE

Two RCA jacks are used for LTC (Longitudinal Time Code) SMPTE In and SMPTE Out/Through. There is no connection for Word Clock. The DM-800 can lock to MTC (MIDI Time Code) while transmitting MIDI clocks with song pointer position, or synchronize to

continued on page 28 ►

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## PRODUCT EVALUATION

# Yamaha Packs REV100 with Performance

by Alan Peterson

**HARRISBURG, Pa.** Yamaha has put its digital reverb experience and sound into a clever new box called the REV100: a low-priced reverb aimed at project studios and smaller production rooms and definitely designed to compete with well-known makers of inexpensive reverbs.

In recent years, Yamaha's emphasis has been on the SPX line of multi-effect boxes while Alesis and ART had the lock on inexpensive digital reverbs. Yamaha now shows it can put out a slick-sounding, easy-to-use processor for around the same price (\$299)

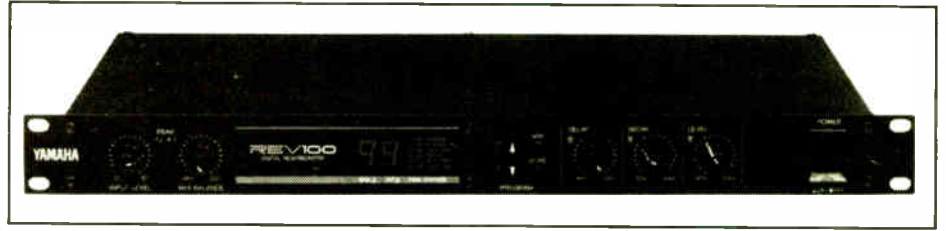
as the aforementioned companies.

The REV100 is one rack unit high with a two-digit LED readout, four buttons to recall and edit programs and MIDI functions, and five dials for levels and tailoring sounds. Ins and Outs are true stereo and -10 dB line level. AD/DA is 16-bit, 44.1 kHz, and 20 Hz-20 kHz frequency response. The all-metal case has exceptional RF rejection. There are peak-level LEDs only, and the unit is powered by a 12 V wall-wart.

## Features

Popping the bottom panel reveals a Hitachi CPU and two Toshiba DSP chips;

off-the-shelf parts with no proprietary Yamaha chips to be found, and simple PC pots, instead of more expensive (and



Reverb versatility from yamaha

positive-feeling) rotary encoders, and a socketed ROM with the REV100 programming. I like to wish "upgrade" when

I see a socket, but it is not likely on an inexpensive box. The board looks designed for other applications as well, with two marked but undrilled regions for heavy-duty chips. Yamaha gets points for a socketed (not soldered) lithium battery for memory protection.

Program editing is simple. The front

panel is screen-printed with memory locations for various effects (i.e., stereo reverb, delay, et al). Use the up/down buttons to move to your chosen location. In fact, pick the direction to go and press the button. Now hold in the other button and watch the scroll speed double, moving you to the program much faster.

The dials allow you to do something revolutionary: tailor the sound by ear. The classic SPX-90 allowed you to adjust reverb time, delay and EQ only by "nudging" up-down buttons, one parameter at a time. You never heard the whole sound until you were through. With the REV100, dial in pre-delay, reverb length, effect balance and wet-dry mix by ear during "check-check-check," and get it right without even looking at the front panel.

Above each of the edit pots is a single LED. When on, the value dialed in matches the default value in factory ROM. This gives a nice starting point to

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**Thumbs Down**

- ✓ wall-wart power supply
- ✓ no display other than two digit LED
- ✓ unbalanced, 10 dB ins/outs

For more information, contact Yamaha at 714-522-9011; or circle **Reader Service 71**.



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work with, although it is very easy to overshoot and waste time twiddling the dial when trying to hit the mark. I would rather the REV100 do what its grandpa, the SPX-90, does: press the RECALL button again to return to default values, regardless of pot settings.

There are no front-panel controls for EQ, but some basic high- and low- pass filtering is available through MIDI. More on that later.

### In use

There are some very nice stock sounds— instantly usable—including the "vocal rev" series, "bathroom," "wood booth" and others. Some have very fitting names: "old tunnel" (for that Great Train Robbery effect), "church 1 and 2," and "stone room," a wonderful, ringy King Arthur-ish sound. How about that dopey echo that is built into cheap karaoke machines? Try Delay program No. 54, "karaoke."

I am a fan of what I generically call "Andy Williams reverb"—a long pre-delay to a hard dark-sounding plate from out of nowhere, blossoming and quickly damping. The REV100 allows me to construct such a reverb by ear quickly and accurately.

While not a multi-effects processor, the REV100 combines delay and reverb in higher programs, allowing you to coax

continued on next page ►

SHORT TAKE

# Beyerdynamic's New Portable Mic Preamp

by Ty Ford

**BALTIMORE** While beyerdynamic has a solid reputation for microphones and headphones, it does not come to most people's minds when mic preamps are mentioned. The MV 100 may change this. It is a solid, portable (12 ounces with a pair of 9V batteries) stereo mic preamp with phantom power for \$699 list.

Inside the impact plastic case (3.25 inches by 5.75 inches by 1.5 inches high), the MV 100 uses the ubiquitous SSM 2017 chip for the main gain stage. Frequency response is rated at 18 hz-22 kHz, with signal-to-noise ratio rated at -128 dB referenced to 60 dB gain. Distortion is better than 0.03 percent at +10 dB output.

Intended uses include portable DAT machines, such as the popular Sony TCD-D7, that have no mic preamps (or are equipped with marginal ones). You can now do quality location recording projects with phantom-powered condenser mics.

According to beyerdynamic, the battery life of a pair of 9V alkalines is approximately six hours with phantom power and ten hours without.

Connectors are latching balanced XLRs IN, RCA cinch jacks and stereo mini-jack OUT, plus a power supply input jack for 24V DC. You can plug a set of headphones into the stereo mini-jack, but unless the phones are really sensitive, you probably won't get enough gain to hear what is going on at an acceptable level.

Features are spartan but useful. There

are three switchable gain levels (20 dB, 40 dB and 60 dB), a 120 Hz low-cut filter, and a multipurpose off/on switch that allows the MV 100 to be used with or without phantom power. There are LED indicators for "on" and "low power" and each channel has its own clip LED.

You will probably break a nail the first time you try to get the battery compartments out until you learn the knack (push in, slide, release). Although the battery slide trays are keyed so that they can only be inserted one way, battery replacement is not completely idiot-proof. Even though the trays are labeled and the end of the trays are notched, the batteries can be incorrectly placed in the trays.

This might present a problem if you are trying to change batteries in the dark, so



remember to put in new cells before the next Grateful Dead concert. If you are using condenser mics and the Dead decides to jam for more than six hours, plan your power supply change during the rest stop.

The MV 100 case is designed with a pair of metal posts that come in handy for attaching a carrying strap. The only thing I'd like to see added is a "mono" switch that would allow the inputs of either channel to be sent to both outputs. Other than that, the MV 100 is a well-built "problem solver" that's a nice addition to beyerdynamic's quality line.

Thanks to Bradley Broadcast of Rockville, Md., for quick delivery of a Sony TCD-D7 portable DAT recorder for use with this review. For more information, contact beyerdynamic at 516-293-3200; or circle Reader Service 122.

# Low-Buck Reverb

► continued from previous page

out some chorusing and flanging. The controllability is nowhere near the higher-priced boxes, but tweak and ye shall find. For example, Program No. 84, "big flange" sounds especially gooey.

REV100 programs can be selected and modified via a single MIDI IN jack on the rear panel. While most stations do not do MIDI, many parameters not available through front panel controls are accessible: reverb high damp, low-pass or high-pass filtering, flange resonance and cutoff frequency.

Paradoxically, if you want to explore this avenue, the manual does not give you the REV100 system-exclusive format. Instead, it tells you to contact a Yamaha Sales Center for the code. Considering the MIDI information provided in the manual, it seems strange to omit this.

### The price of economics

As the REV100 is an inexpensive processor, corners had to be cut. Big bucks were saved by leaving out an LCD display showing program names, parameters and cute "hello" pictures. The double-digit LED display is the entire user interface. If you edit a program, it is up to you to remember where it is and what it does.

It would be nice if the dials were "soft," and could control features now only addressable by MIDI, but that is complicating the box's original intent: cheap, fast, clean 16-bit reverb.

Then there is the wall-wart clogging up another outlet. Wall-warts eliminate internal power supply designs and keep costs way down, but nobody likes them.

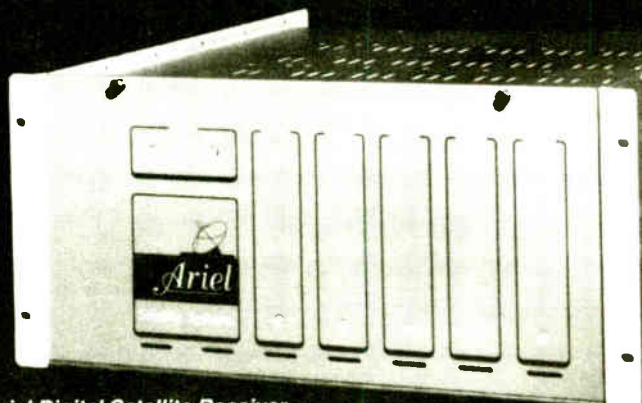
Finally, there is the REV100's in/out levels. All pro audio publications are calling for standardized +4 dB balanced ins/outs. Yamaha's classic SPX-90 was unbalanced, but gave the option of changing levels with slide switches. The REV100 connects to -10 semi-pro consoles just fine, but for optimum performance from +4 balanced production consoles, its low output just does not cut it. An additional op-amp along with TRS jacks and level switches designed in would cost little and give users the option to go +4 or -10, balanced or unbalanced.

Despite these negatives, the REV100 is a good, basic inexpensive reverb with a lot of flexibility and clean Yamaha sound. It is serious competition in the cheap reverb arena. I recommend the REV100. The price and the name make it worth buying.

□□□

Al Peterson is production director at WNNK-FM Harrisburg, Pa., and a regular contributor to RW.

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STUDIO SESSIONS

maximum of 50 projects. If you do use internal hard drives, adding more drives to Group 1 allows you to seamlessly increase the recording time. Adding drives as Groups 2 and 3 allows you to add more projects. You can also disconnect these drives and reterminate the stack without affecting the drives in Group 1.

There are other significant differences between the Roland DM-80 and the DM-800. The DM-800 has a feature called Wave Window Scaling that gives a rough display of a graphical waveform from 128 ms up to 6.4 seconds of any one track. The DM-800 comes with MMC (MIDI Machine Control), time compression, a time code/sync resolver and RMDB (Roland Multichannel Digital

Bus), which is Roland's eight-channel digital audio bus that also communicates serial communication protocols. The add-on box needed for this is the DIO800 (\$1,095) which is supposed to hit the market this month.

The DM-800 has fewer direct outputs than its predecessor, but there is a work-around that provides for up to 12-channel mixing. The controls on the face of the DM-800 are very similar to those found on the DM-80 editor and mixer. On the mixer side, there are eight faders, pan pots, status lights and selector buttons, a pair of Aux return faders and one master fader. In addition, there is an analog input trim control for each of the four analog ins, two-band EQ adjustment, providing

independent and overlapping frequency selection plus cut or boost and headphone level output control.

On the editor side, there are cursor keys for navigating the windows, eight auto locator keys, previous/next-phrase locator buttons, function buttons, transport controls, seven dedicated buttons to access the seven main operational modes and a set of alphanumeric buttons for data entry. A number of the buttons have multiple functions. For your convenience, there is a jack on the back panel of the DM-800 that accepts an XT- or AT-compatible keyboard that duplicates the functions of many of the front-panel controls.

The DM-800 may be backed up via

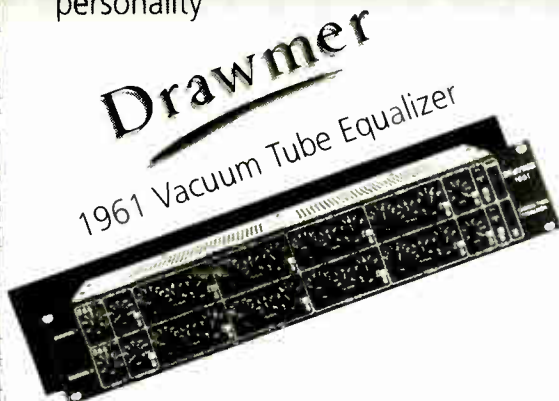
SCSI DAT or 8mm tape through SCSI port A. or to regular audio DAT. Roland recommends you use the SCSI backups rather than the audio DAT backup because of the higher reliability of the former. For back up, the 1.2GB takes two hours to backup on 4mm DAT and four hours on 8mm Exabyte. The manual also suggests that you can use removable media: magneto-optical or phase-optical disks or Syquest platters to copy your entire project as another way to backup your project.

*In the next Studio Sessions, Ty Ford will put the DM-800 to the user test. For more information, contact Roland at 213-685-5141; or circle Reader Service 29.*

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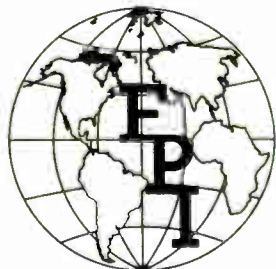
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**1-800-336-3045**

# Solid EQ from Tube-Based TLA

by John Diamantis

**WASHINGTON** A relatively new company from the United Kingdom, TL Audio, is making inroads into the mainstream studio and broadcast equipment arenas, and offers an interesting line of vacuum tube based products. While not pure tube designs, they seem to have reached a sensible balance, with solid state input stages, and tube voltage gain stages, that will not require unreasonable tube selection procedures to get good sound out of the units.

Some of the items offered include a valve (it is a U.K. company after all) compressor, an eight-in, two-out valve

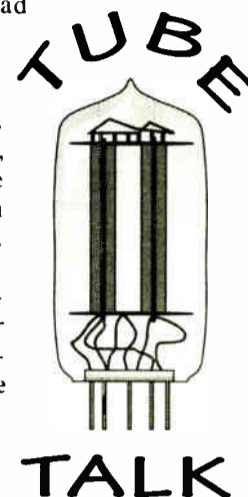
and outs). It is able to operate at nominal +4 dBu, or -10 dBu levels, and offers 48 V phantom power for your condenser mics. Physically, the unit is two rack-units tall, and requires ventilation above of at least one rack space.

From the moment I plugged in the TL Audio EQ and started playing with it, I appreciated the ease with which I could set up an EQ, change settings, and go back to my original point. I did not feel the need to want to "slip between" the switch selectable frequencies, and, with a minimum of knob twiddling, could get the sound just right. I appreciated the shelving controls more than the bandpass controls, and found the high frequency

(-85 dB noise, +4 dBu), flat response (+0, -1 dB 20 Hz-20 kHz), distortion free (0.04 percent THD at +4 dBu; 0.03 percent IMD at +4 dBu) signal. Some very low level 60 Hz component was located in the unit, and appeared to be power supply related. Input overload occurred at almost +30 dBu in, while it drove a 600 ohm load to +24 dBu.

In summary, I liked the TL Audio EQ. It was easy to use, well built, and affordable. The controls are well chosen in function, and are well laid out. Highly recommended.

TL Audio products are distributed by Sascom Marketing. For more information, call 905-420-3946; or circle Reader Service 89.



very long life, and if you have ever had the opportunity to listen to a well designed power amp with 300Bs in the outputs, you would understand what all the fuss is about. While the Chinese tube manufacturers came up with their own version in the last few years, according to aficionados, and some curve tracer comparisons I have seen,

they do not compare to the genuine article. An upgraded and uprated version, from a European manufacturer named Vaic, has initially shown itself to be a strong contender. Domestically, Cetron, affiliated with Richardson Electronics, has offered a median priced, high quality version of the tube for the last several years.

The point of all this, is to dramatize the incredible expansion of tubes and tube equipment into the mainstream equipment arena less than five years from the end of the century. I can hear the TV spots now... soon, you will be able to build your own 20 watt per channel, class A, directly heated triode amplifier... with tubes made today... that won't cost you your tomorrow... and the company that will bring it to you"... AT&T.

Mainstream equipment manufacturers are getting into the vacuum tube as well. Offerings from Aphex, Peavey, and others, have done much to show the vacuum tubes' advantages in certain applications, as well as help bring the price down to a more affordable level.

John Diamantis is engineering manager for WGMS-FM, WTEM(AM) and WBIG-FM in Washington, D.C.



TL Audio mixes solid state with "valves."

mixer, amps, mic preamps. The unit I evaluated is the Valve EQ.

## EQ features

The TL Audio Valve EQ (\$1,395) is a stereo, four-band equalizer, utilizing a low-noise solid state input stage for balanced line or mic input, two dual-triode 12AX7As for voltage amplification in the EQ section, and an electronically balanced solid state output stage. Inputs and output are accessed via XLR connectors on the back, while an unbalanced instrument connection can be made via a 1/4-inch socket on the front panel.

The four bands of EQ are comprised of a Low and High frequency shelving control, with four switch selectable frequencies and continuous control of gain, +/-12 dB. The middle two bands are bandpass filters, each with four switch selectable frequencies, and continuous control of gain, +/-12 dB, with a filter Q of 0.5 (fairly wide).

The unit can be used as a four-band stereo EQ, or as a mono eight-band EQ, switch selectable from the front panel (and assuming proper connection of ins

shelving control to be one of the best I have used. It was very easy to dial in a little brightness, or a lot of brilliance, and again, get the sound I wanted, in a minimum of time.

All of the filter sections overlap somewhat, allowing for nice, mild correction, preventing the kind of peaking and notching other EQs will let you do (and get in to trouble doing). This kind of processing was great for sweetening up produced promos, and adding some brightness and articulation to recorded voice.

## Very clean sound

The overall sound of the unit was quite clean, sounding neither like a vintage piece of gear (warm and mushy), or a modern piece of lesser solid state gear (lean and screechy). Noise was low, overall, and the TL Audio never added any undo coloration to the mix.

Overall build quality also was very good, with a quality circuit board, sealed pots, and good parts evident.

On the test bench, the TL Audio EQ performed excellently, providing a quiet

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For more information, contact New Frontier Electronics at 215-862-9344; or circle Reader Service 125.

### Otari DTR-8 DAT Recorder

Otari's latest DAT recorder uses a two-head mechanism and conforms to the DAT conference standard for compatibility with other pro and consumer DAT decks. Features include +4 dBu active balanced analog I/O with XL connectors, and both AES/EBU and coaxial digital I/O. Search mode uses TOC information for up to 300 times normal speed search. No SCMS.

For more information, contact Otari at 415-341-5900; or circle Reader Service 172.

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DN-951FA CD CART PLAYER



DN-961FA DRAWER LOADING CD PLAYER

## PRODUCT EVALUATION

# Fostex D-25: A 'Useful' Studio Tool

by Rich Rarey

**WASHINGTON** Handy in the video world, broadcast world and post-production houses, the Fostex D-25 digital master recorder is a useful audio tool. With a list price of \$7,995, the D-25 costs less than its comparable Sony 7000 series competitor.

What is immediately useful on the D-25 is the abundance of front panel controls—controls on the Sonys that are tucked away behind menus. Need to mess with the incoming time code? Press a button. RAM scrub? Same, just press a button. After dialing through the Sony Mega Menu system to change operating parameters, the D-25 will seem like it has an exposed DAT control center.

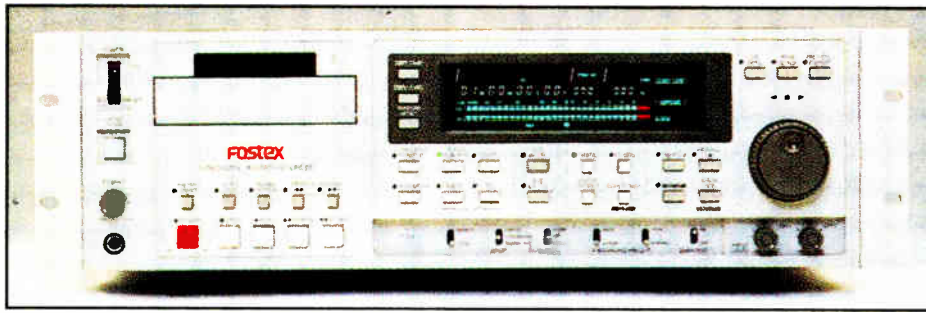
Sonically the D-25 performs well. In my experience, DATs sound like, well, DATs. To my ears, most professional machines record and playback with similar sound quality. As Fostex has positioned the D-25 to "work like a Sony," the 37-pin and GPI remote connectors follow the Sony standard. Analog input levels to the XLR connectors are switch-selectable (+4 dBu, +4 dBm/600 Ohm, and -10 dBv), and the analog outputs include a monitor jack for each channel.

**Uses**

As I worked with the D-25, three broad applications came to mind: as a DAT master

recorder for digital workstations, as a broadcast DAT using its Chase feature for accurately time-shifting programming, and as a general studio recorder. The D-25 is controllable from its RS-422 serial port, and VCR emulation is menu-selectable from six choices: Native, PCM-7050, BVE 1, BVE2, CMXs, and LYNX.

The operating manual suggests that just linking the D-25 to a Fostex D-30 will create a modest DAT audio editing system. Alas, it appears the RS-422 port is the only control point for some standard



Fostex D-25 studio DAT

features I would have liked to see on the front panel: Direct search to a particular numbered program ID, and +/- 12.5 percent varispeed. Some less-common features controlled at the serial port are independent left and right channel recording, and Skip and End ID editing. Direct ID search would have been extremely helpful when I used the D-25 in production.

In this application, I was using the D-25 as a playback machine, taking advantage of its instant start feature to cue up selected cuts on a theme music DAT. To travel to another cut, I had to repeatedly press the S-ID search button, and count the button presses to arrive at the desired Program number. The lack of direct search from the front panel may hamper your on-air use of the D-25. Once the selected cut was loaded, the D-25 works just like its Sony competitor; use the RAM scrub button to engage the jog dial,

and you can adjust the start of audio material.

Pressing the Mark/Set button will load the timecode into memory for later re-cueing. Press Play, and the D-25 quietly begins playing—it is always striking how mechanically quiet Fostex DAT machines are. Unlike other DATs with the RAM instant start feature, the D-25 has an ample ten seconds of audio in its RAM buffer, five seconds ahead and five seconds behind the point where the RAM Scrub button is pressed. This amount of RAM is a welcome feature if you've ever had to mark DAT tapes on the fly.

**A few irks**

There are, however, some features that might make a D-25 user wary. I found that I could easily ruin a recording by flipping the sampling frequency switch. The D-25 remains in record, but at a different sampling rate. Upon playback, the D-25 will not automatically track this change, and you must set the sampling frequency switch appropriately. By comparison, the Sony 7000 series is rigid in the control of sampling frequency (rigid to a fault perhaps; if a Sony detects just a snippet of recorded material at the top of a used DAT, it will prevent the user from changing the sampling frequency). Once in Record, a user may want to disable the Remote/Local switch to Remote. Personally, I would like to see Fostex strengthen Record protection, perhaps so far as to prevent any button except Play and Stop from interrupting recording.

While recording, the usual care in selecting sync sources is needed; the D-25 accepts Video sync (composite, frame pulse, or field pulse), WORD sync, and INTERNAL sync. I found that making a recording with Video sync selected, but no sync input, will yield a quiet burst of noise every five to ten seconds.

The D-25 is equipped with two buttons that control audio monitoring: Confidence Monitor and Audio Monitor. During Assemble recording, the playback audio can only be heard if the Confidence Mode has been engaged. The Audio Monitor button then toggles between input audio and recorded audio. For our subjective test purposes, we

always engaged the confidence mode; after all, it gives one confidence that a DAT recording is actually taking place. It is inferred from the manual that this two-button approach is helpful when using the D-25 as part of an editing system.

**The chase mode**

For a Chase mode test, I supplied the D-25 with house time code, loaded in an offset and pressed Chase. In 47 seconds, the D-25 had wound halfway across the tape and locked solidly to the prerecorded time code. The Chase mode is menu-selectable to lock only once, re-chase if it becomes unlocked from the reference time code, or "F-Sync." The F-Sync is "suggested when the sample clock of audio signals and time code clock are not in agreement and disengagement of locking results after running for an extended period of time."

A nice feature is the Catch Offset button. This automatically calculates the difference between the reference time code and the prerecorded time code (this is a multibutton task on a Sony). I appreciated the Force Jam button too: frequently a DAT's internal time code generator and the reference time code are hours apart (and it is usually a laborious task to synchronize them). With one button press, the reference time code is jammed into the internal generator.

In tape handling tests, the D-25 fast winds and rewinds a 120-minute tape about 20 seconds slower than a Sony 7010. The D-25 has two winding speeds, the faster speed is engaged by pressing the respective transport key a second time. In our use of the D-25, we preferred the high speed, and found the double button-press irksome.

Although the D-25 display is adequate

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### Product Capsule: Fostex D-25 Studio DAT Recorder



**Thumbs Up**

- ✓ useful features
- ✓ lower price than competitors
- ✓ VCR emulation
- ✓ chase mode



**Thumbs Down**

- ✓ less-than-expensive feel to controls
- ✓ hard-to-read alphanumeric menu
- ✓ lacks lockout control during record mode

For more information, contact Fostex at 310-921-1112; or circle **Reader Service 93**.

for numerals, users may have difficulty with the glyphs that represent mnemonics. Fostex must have realized this too, because the setup menu designations are numbered. It is much easier to refer to the manual for the various parameters contained within the setup menu, and program the parameters by referring to its number, rather than by its mnemonic.

**Summary**

Although some features and functions are not to my liking, the D-25 is a very versatile pro audio DAT player/recorder. Bolstered by my evaluation experience with the lower-dollar D-10 last year and now the D-25, Fostex DAT machines are quite capable at competitive or even better prices. Those familiar with any of the Sony 7000 series DAT recorders will have little trouble using the D-25, and even appreciate its unique features, while remaining mindful of its few idiosyncrasies.

□ □ □

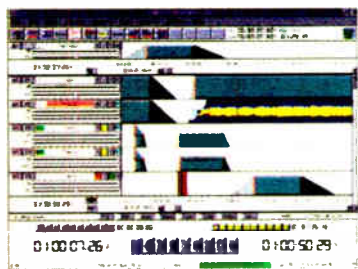
Rich Rarey is technical director of National Public Radio's "All Things Considered" and is a frequent contributor to RW.



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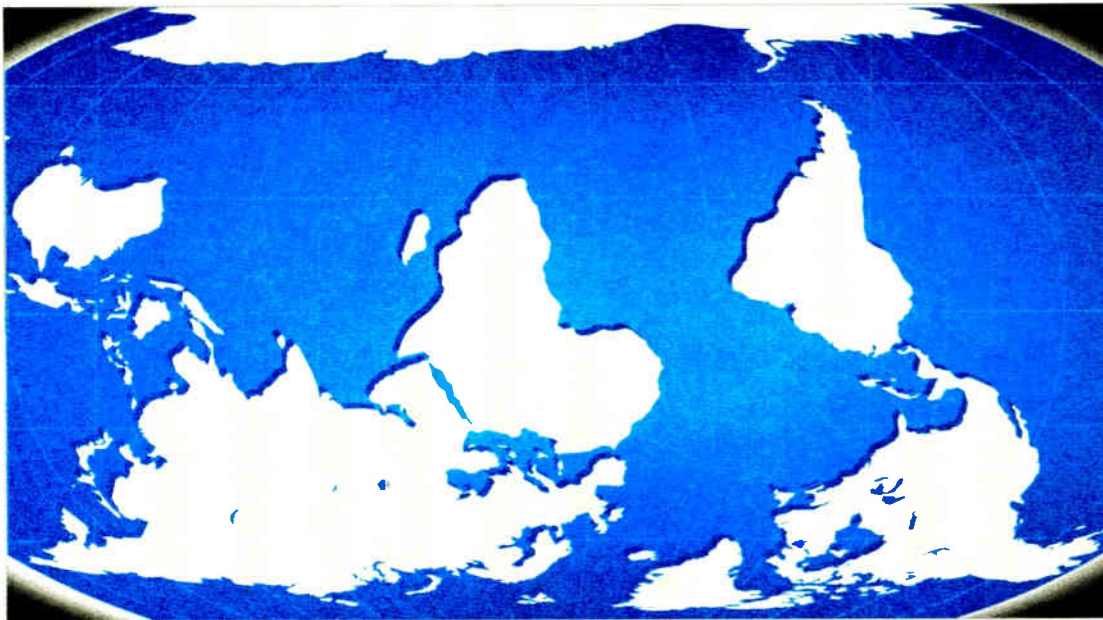
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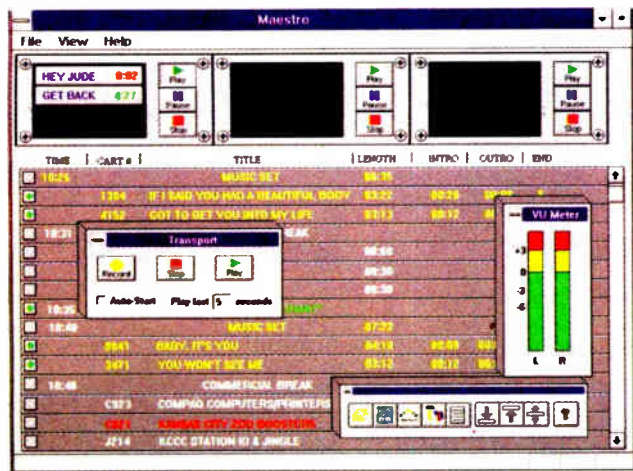
DCS from Computer Concepts has long been the leader in automating commercials and spot insertion for stations of all sizes. But the big news this year is an unprecedented array of new products for every facet of on-air operations, and every kind of radio facility. All are field-proven and backed with the kind of customer service that has been instrumental in the success of Computer Concepts.

As your needs change, so can your DCS-based system. For example, DCS systems can be configured to store music, commercials, jingles and other audio cuts either centrally on an audio server or distributed on individual DCS workstations. A new option, Audio Central+ distributed audio, offers both capabilities plus complete fail-safe redundancy.

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## DIGITAL DOMAIN

# Various Methods for Archiving DAW Data

by Mel Lambert

**LOS ANGELES** The advent of desktop editing systems—be they Mac- or PC-based platforms—represents a mixed blessing. While it opens up significant creative advantages over analog, tape-based systems, off-loading and archiving the copious megabytes/gigabytes of data they produce can quickly have us reaching for the Tylenol. Data-DAT and Exabyte represent one possible solution, but suitable recorders can prove relatively expensive. In the case of DAT, we can

only off-load two channels at a time, and with Exabyte we can only achieve, maybe, 4-6 times play speed throughput.

One possible alternative is to use one of the several brands of modular digital multitrack (MDM) machines, which also offer additional benefits. As most RW readers already know, two formats of low-cost eight-track recorders are now being offered that utilize either S-VHS or Hi-8mm helical-scan videocassettes. Alesis and Fostex currently market recorders based on the ADAT S-VHS format, while Tascam and Sony support a non-compatible proprietary

format based on a Hi-8 VCR transport. Multiple decks can be synchronized together using MIDI TimeCode or conventional SMPTE-EBU timecode to provide additional record/replay capacity.

## Using MDMs

And, lest we overlook the possibility, one or more eight-track MDMs can be used in a production studio in place of analog transports; in situations where we will not be doing large amounts of editing, the ability to lay up, overdub and transfer tracks between machines offers a

possible alternative to hard disk-based systems.

But, for workstation owners looking to ease the indigestion caused by overloaded hard drives, an ADAT or Hi-8 digital multitrack offers a large amount of storage capacity on cheap media. (You should not use bargain-basement tape brands for either format. The ADAT runs at three times the normal SP speed for S-VHS transports, while Tascam/Sony decks run around 10 percent faster than your home-movie camcorder. There is no need, however, to spend big bucks on such tapes either.)

Alesis/Fostex ADAT decks offer 40 minutes of recording time from T-120 tapes (54 from T-160s), while Tascam/Sony machines offer 108 minutes from P6/E6-120 tapes (82 from P5/E5-90s). With the correct interface, it is hence possible to simultaneously off-load up to eight channels of 16-bit audio from a workstation. And, of course, you will be able to replay the tapes at a later

**One possible alternative is to use one of the several brands of modular digital multitrack (MDM) machines which also offer additional benefits.**



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date to locate the required materials without having to reload the data into your workstation. (And if the tracks represent, for example, alternate stereo mixes of some new station IDs or jingles, or maybe some out-takes, the audio elements can be dubbed directly to the final replay medium.)

One potential drawback of using MDMs, however, is that to save costs, both formats feature multichannel I/Os, rather than individual AES/EBU- or S/P DIF-format connectors. The good news is that an increasing number of workstations now feature compatible multichannel interfaces that connect directly to Alesis/Fostex or Tascam/Sony decks. In the case of ADAT-based transports, Alesis has developed the proprietary (and patented) ODI format, which multiplexes eight 24-bit digital audio data channels with sync and user bits into 256-bit blocks carried across a fiber optic link. For Hi-8 decks, Tascam has developed a non-compatible TDIF-1 digital I/O format, which bears a remarkable similarity to the familiar AES/EBU data sequence, with 16 audio and 16 auxiliary/user bits per 256-bit block; data is carried via unbalanced connections using conventional 25-pin D-sub sockets. All of the normal sampling rates are supported by both interface formats.

In addition to accessories available continued on page 41 ►

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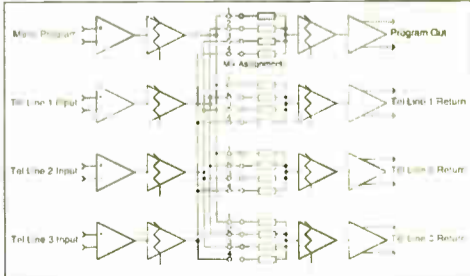
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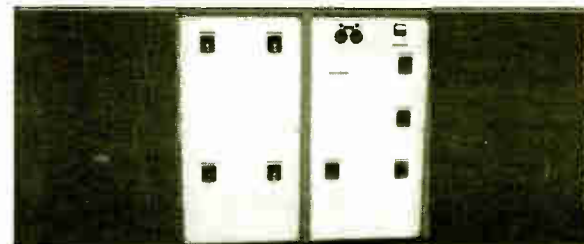
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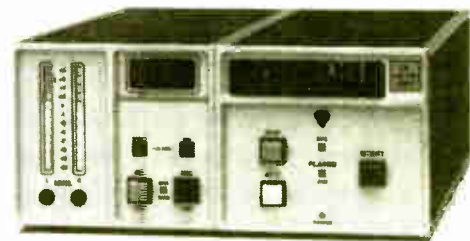
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FIELD REPORT

# Denon MiniDisc Cart Goes to College

by David E. Reese

**CLEVELAND** WUJC is the campus radio station at John Carroll University in the Cleveland radio market, and cart machines had been the playback source of choice for PSAs, promos and an occasional music selection since the station went on-air. In April 1994, the time seemed right for WUJC to enter the digital domain further than a CD player or two.

While several options were considered, we ultimately chose the MiniDisc, and now, shortly after NAB 1995, we are convinced that we made a good decision. Our initial purchase was one Denon MD Cart Recorder (DN-990R) for our production studio and two MD Cart Players (DN-980F) for our on-air studio. We

number if it is showing the next track that will be played. Other display window information includes disc and track titles, operating or error messages, status indications, recording levels and remaining or elapsed time. The time is given in minutes, seconds and frames."

The majority of disc information can be accessed by pressing the Disp/Caps/Num button. Longer messages, such as song titles for example, will scroll right to left across the 13-digit character display window. Putting disc or track titles on the MiniDisc is an easy process. Press the Mode/Cue button to go into the edit mode, then turn and press the Select knob to choose a title function. The rotary Select knob is used to select characters, and you quickly become very adept at

disc, in which case it will re-cue to this "next" track upon playing out.

If you want to preview the last few seconds of a track (i.e. listen for the out-cue), you can press an End Mon/Clear button while the disc is in standby mode to hear the last 10 seconds of the track. After playing, it will re-cue to the start of the track.

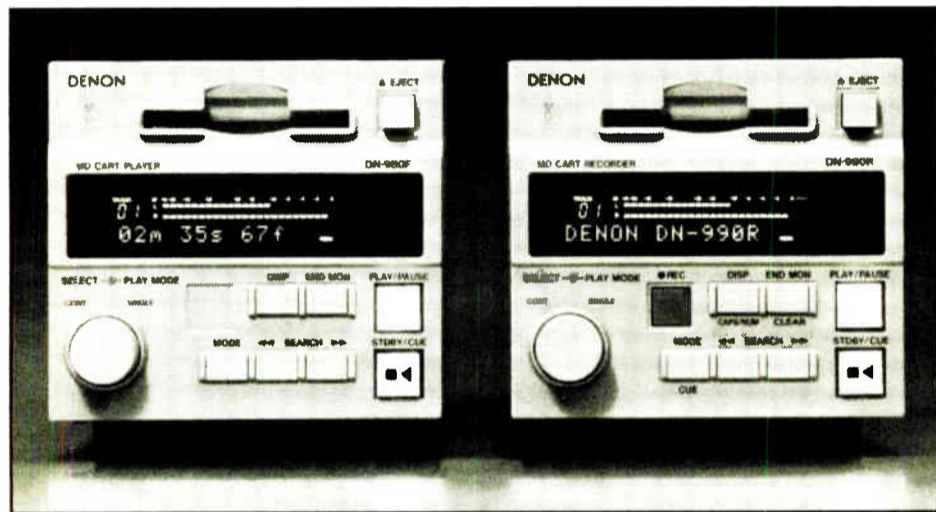
Recording on the MiniDisc is accomplished by first pressing the red button (on the DN-990R only). This activates the 24-segment peak response level meter on the display window and causes the Play/Pause button to blink yellow. To begin recording, press the Play/Pause button which will then illuminate green

to indicate recording. While you can use the Play/Pause button to pause during recording, typically you will press the Stdby/Cue button at the end of the recording. The MD will take about three seconds to write information to the table of contents (UTOC) before it cues to the start of the track you just recorded.

**Lots of tracks**

You can record up to 255 tracks on a MiniDisc, but you will probably not get above 50 or so for most broadcast applications. A single track must be at least two seconds in length, which again, should not be a problem in most broadcast situations, except perhaps for an occasional "drop-in" or "shout" that is extremely short.

The DN-990R also offers six basic editing functions. In day-to-day broadcast use, continued on page 42 ▶



MD player/recorder duo

have since added a third player and intend to add a second recorder during the summer.

**Features**

The Denon MD units are table-top designed and conveniently fit three units wide on a standard rack shelf, much like the cart machines they are designed to replace. The MiniDisc format provides digital features that many broadcasters have become familiar with: 74 minutes of recording time with a 44.1 kHz sampling rate, 16-bit quantization and ATRAC audio compression using a magneto-optical re-recordable system. The ATRAC compression algorithm is 5:1 ratio—allowing the generous up-to-74-minutes of record/re-record time on a disc smaller than a computer floppy.

The random access nature of the MD is one of its greatest assets—select a track and in a "second" it is cued up and ready to play. All of this with none of the old cart problems such as wow and flutter, drop-outs and tape shedding, stretching or wrinkling. There are almost 30 operating functions of the MD that can be set by the user, but we found the factory settings most appropriate for broadcast situations.

The user-friendly front panel features a MiniDisc loading slot with eject button, florescent tube display window, typical operating controls and a few buttons for specific MD features. The MiniDisc itself is loaded into the cartridge slot with an easy finger "push" and unloaded with a "press" of the eject button. During recording or playback, an Eject Lock feature prevents accidental removal of the disc.

The display window shows track numbers in either two (01, 02, etc.) or three (101, 102, etc.) digits and flashes the track

moving through the alphabet.

Specific characters are selected by pressing the Select knob. Titles can contain up to 255 characters, within a maximum limit for the entire disc. Pressing the Disp/Caps/Num button switches between caps, lowercase, numbers and symbols. When you've completed a title, just press the REC button to write the information to the disc.

The Select knob is also used to choose the track number you want to play; clockwise rotation increases track numbers one-at-a-time, while counter-clockwise decreases. You can press the Select knob in and turn it to jump through tracks 10-at-a-time, but for most broadcast situations, this is not necessary. A concentric ring around the Select knob allows for "single" or "continuous" play mode. Once the Select knob is used to choose the track you desire to play, the MiniDisc is automatically cued to that track in just a few seconds.

**Text characters**

During cueing, the Stdby/Cue button flashes yellow and then stays lit once it is cued. Pressing the Play/Pause button begins playback and this button will light green to indicate the MD is playing.

There are several ways you can terminate playback of a MiniDisc. Pressing the Play/Pause button stops (pauses) playback at the point where you press the button; press the button again to restart from the stopped position. Press the Stdby/Cue button to stop playback and re-cue the MD to the beginning of the track that is playing. If you let the MD "play out" without pressing any buttons, it will re-cue to the beginning of the track unless you have used the Select knob during playback to select another track on the

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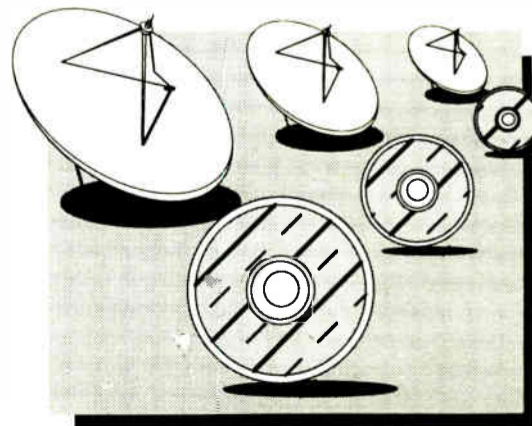
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Circle (68) On Reader Service Card

# The Trials and Tribulations of ISDN

by Rich Rarey

**WASHINGTON** The following is an account of what happens when a new technology and the necessary infrastructure to make it work have not yet quite meshed together.

My story comes from an experience with a recent remote broadcast of "All Things Considered" (ATC) at Chapel Hill, N.C. Late last year, the ATC staff planned to take the program on the road. Chapel Hill was selected for a number of story reasons, and plans were finalized to spend a week in the area recording interviews and gathering sound, and then return two weeks later to broadcast from WUNC(FM), the local NPR member station. It was late March when an ATC host, producer and I arrived to begin the week of recording.

## The setup

Between interviews, we stopped by WUNC for a site survey, and discussed with Chief Engineer David Wright how we could best get high-quality audio back to Washington. David was excited by the prospect of installing an ISDN line, newly available in the area (WUNC has two Switched 56 (SW56) circuits already).

After examining what transmission equipment NPR had readily available, I

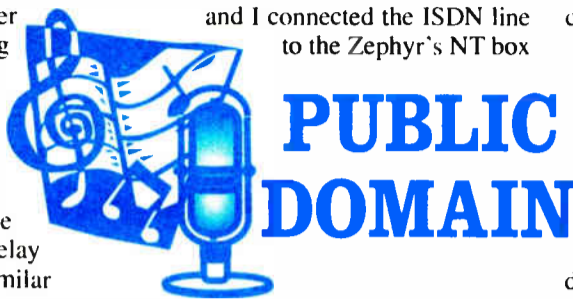
decided that the Telos Zephyr was the most convenient, as it has a built-in modem, and only requires an external NT box—which the Zephyr powers—to get up and going. Because NPR has a Zephyr in Master Control, we planned to connect to it and use the Zephyr's Layer III protocol. We anticipated bonding the two 64-kbps bearer channels together, and sending mono audio to NPR.

The studio in Washington would send back a mix-minus, and the program host at Chapel Hill would have to anticipate the digital processing delay to hit cues precisely. The delay is similar in length to analog playback at slow tape speeds. As the week before the broadcast rolled around, the Zephyr was in use at another NPR remote at the U.S. Capitol, and was only available that Friday. It was shipped to WUNC with the other equipment for the broadcasts that began the following Tuesday.

Although others may be uncomfortable with such a tight time frame to work out any problems in a new ISDN service, I had supreme confidence that it would work without a hitch. The plan was to simply connect the equipment together, plug in the ISDN line and we'd be on-the-air.

Ah, technology. Were it only that simple.

On the Monday of broadcast week, host Robert Siegel, producers Margaret Low-Smith and Jon Baer, and I arrived in Chapel Hill. After a full day of wrap-up interviews and recording, we arrived at WUNC in the late afternoon. David and I connected the ISDN line to the Zephyr's NT box



and dialed the Zephyr back at NPR. DISCONNECT read the display.

## The headache

We dialed again, same result. The connection held for milliseconds and then dropped. David contacted Bell South to begin troubleshooting. We weren't worried: technology would save us. The next morning, broadcast day, found David and me in the WUNC telco closet, still trying to connect the ISDN to anyone, anywhere. The broadcast anxiety began to mount. David and I started discussing alternative transmission paths, and he obtained a CCS CDQ-1000 as a backup. Using the CDQ-1000's MUSICAM protocol would provide a reasonably clean path to Washington using switched 56, we thought.

We continued troubleshooting with Bell South, working with Network Service Manager Vanessa Harrison and several specialists, who electronically watched the progress of each call we placed. The symptoms stumped us: we could call and connect to a local Switched 56 number. We could even call one ISDN bearer channel from the other, but we could not maintain a connection outside the Centrex system. The morning and afternoon was spent in the telco closet talking to trouble shooters at AT&T and Bell South. No one had any answers.

At 4 p.m., NPR Master Control called our Switched 56 line, and we started to get uneasy when ATC host Linda Wirtheimer's first words over the circuit from Washington were "Robert, you sound terrible." However, host Robert Siegel's voice sounded fine leaving the console.

A hurried conference between Master Control and Chapel Hill revealed that the SW56 line had "watery" sounding digital artifacts. Thus, it sounded horrible. We had heard such artifacts one other time from another SW56 site in California. Because we did not know the cause, we went to Plan B.

It was not a pretty sounding broadcast that day—we reconnected using the G.722 protocol and the artifacts disappeared, along with some bandwidth.

On Wednesday morning, David Wright obtained a CCS CDQ-2000. With it, we bonded the two SW56 lines together, to get a sampling rate of 112 kbps. Back in the telco closet, we received a call from Don Colter, Telos customer service engineer, who was at the Telos booth at the Las Vegas NAB show.

In a five-way conference call the NPR technical staff on-site, Colter and Bell South went over the fine points of the ISDN connection. Everything had been ordered and installed as prescribed. The

Zephyr has only two protocol settings: AT&T Point-to-Point, and National ISDN-1. Bell South's protocol was Northern Telecom DMS100 "Functional" (similar to the National ISDN-1). Bell South DMS Specialist Joel Troutman was sure that the Zephyr was not distinguishing between ISDN-1 and the Northern Telecom DMS100. He pointed out that a service technician on-site was able to connect using a TPI550 test set.

Telos' Don Colter was just as sure that the problem lay somewhere in the switching system. Don asked us to connect a computer with a communications program (such as ProComm Plus) to the Zephyr's serial port and enable the Zephyr's built-in ISDN analyzer (a truly great feature). In this debugging mode, all the data transactions in the ISDN data channel are sent to the computer and captured as a file. We initiated a Zephyr call, captured the data, printed it out and sent it by fax to Don in Las Vegas.

## In the data

After a short consultation with the Telos engineers at the NAB show, Colter reported that a data message called "notify" was being emitted by the Bell South switch, and the Zephyr, not recognizing this message, was handling it as a fatal error, and thus disconnecting.

Colter put firmware upgrades en route via Federal Express. In the interim, our Wednesday's "All Things Considered" sounded great using the CDQ-2000 and SW56. But the Zephyr problem was not yet solved. Thursday saw the arrival of the firmware upgrade from Telos. David Wright and I installed the chips, and it still did not work.

In our now-daily conference call with Bell South, Don suggested that Bell South change the protocol to National ISDN-1. DMS Specialist Joel Troutman simply asked Network Service Manager Vanessa Harrison if it was "okay." She said "let's do it," and within seconds the Bell South switch and our Zephyr were reconfigured. We called NPR and finally connected. After four days of thrashing with technology, we finally overcame the problem.

In later discussions with Telos President Steve Church, I learned that the notify message, unique to Northern Telecom's DMS equipment, is "designed to provide supplementary information to the subscribing user." Essentially it is text that's supposed to be displayed on a phone set's liquid crystal display. In our case the words outside call was being sent in the NOTIFY message. Steve said Telos has never encountered this particular problem before, and Zephyr U4 firmware versions 2.40 (and later) now ignore all unrecognized messages. Steve also said that telephone companies are working with the National ISDN users group to implement "a special ordering code that causes the telco people to enter the right stuff into their terminals."

What have I learned from this experience? That there are great people at Telos and Bell South who stand behind their high quality products and services, and I learned that technology has a fragile shell. It just is not the robust end-all I thought it was—at least not yet.

your ob'd. eng'r,  
Rich Rarey

□□□

Rich Rarey is technical director of NPR's "All Things Considered."

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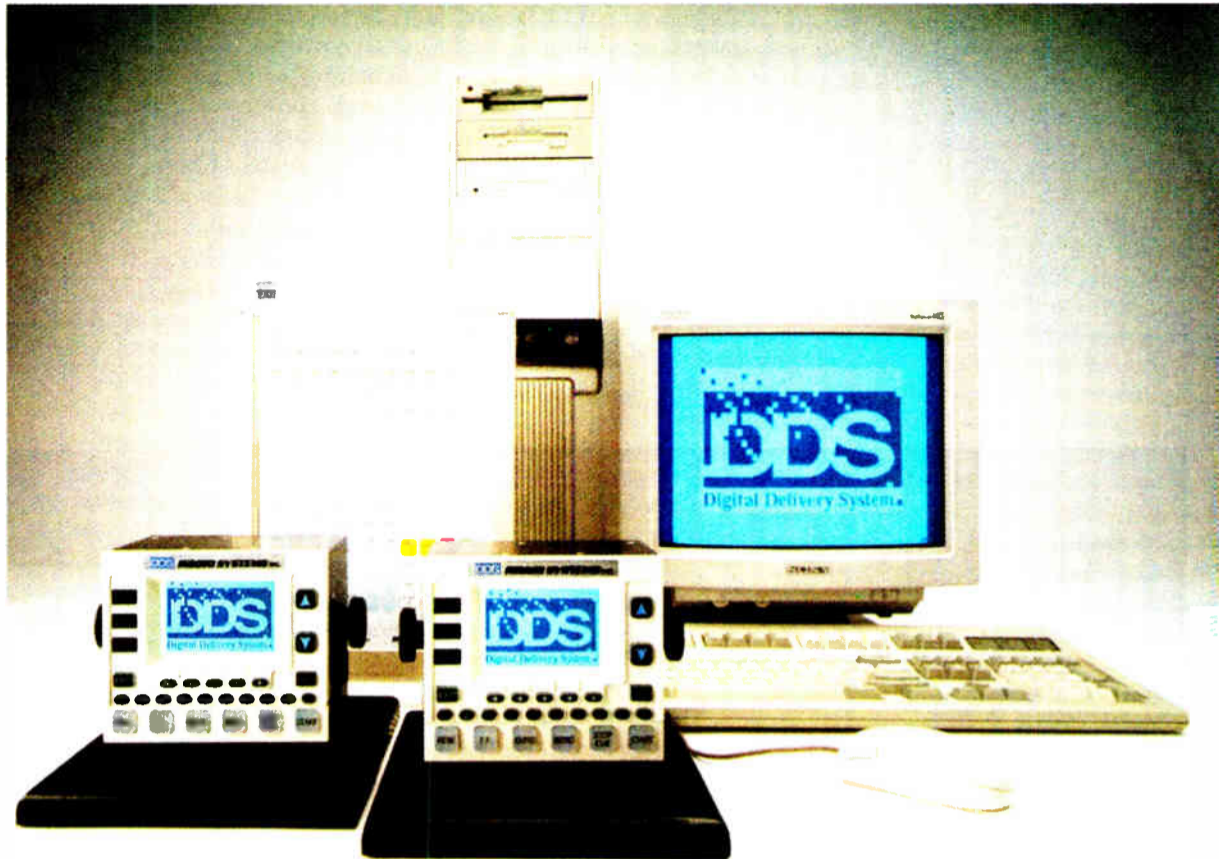
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## SIGNAL-TO-NOISE

# Sennheiser Embarks on New Promotion

## Jurgen Wahl to Tackle New Marketing/Educational Program

by Frank Beacham

**NEW YORK** As you get older you find that the best teachers are usually not the ones found in school. They often appear out of nowhere—when you least expect it—helping you deal with an immediate situation at hand. Jurgen Wahl is that kind of teacher.

For 11 years, Jurgen has been disguised as a Neumann microphone salesman. During that tenure, he made me drool many a time over exotic mics that I could scarcely afford. Never mind that he did not make the sale. Jurgen patiently explained what I could do with such a microphone and usually had me wondering whether I should sell the car and all my other worldly possessions to own such a precious instrument.

A few years back, in Los

**They need the likes of Jurgen Wahl to show them creative possibilities with the great audio tools now available.**

Angeles, Jurgen loaned me a Neumann "Fritz" dummy head binaural microphone for a live radio drama that featured flying ghosts. It was a lot of fun watching the actors play to their wooden-faced "audience," but most importantly, Jurgen gave me a lifelong lesson in how to record binaural audio. This is stuff you'll never find in those dry audio textbooks.

### A smart move

Now, through the superior judgement of someone at Sennheiser and Neumann, Jurgen is moving from the position of Neumann's national sales manager to a new job that will bring his teaching skills to a much wider audience. He will develop and produce educational and marketing programs about Sennheiser and Neumann products on videotape, CD-ROMs and other audio/visual platforms.

Jurgen is now busy at work on his first assignment, which is to create an interactive ad on behalf of his employers for the newly announced CD-ROM pro audio magazine, Control.

If there's ever a field that needs to better educate its customers,

it is professional audio. The microphone (along with the camcorder) replaces the writing pen for a new multimedia-savvy generation who grew up with Walkmans glued to their ears. They need the likes of Jurgen Wahl to show them creative possibilities with the great audio

tools now available.

Good luck in your new job, Jurgen. And thanks for the memories.

### Morse Code out

Sad news for those of us old enough to remember Heathkits and electronic components big enough to solder with human hands: The U.S. Coast Guard has turned off its Morse code equipment for good. Seems

that satellites and automatic navigation beacons have made dots and dashes obsolete.

There is a lot of sadness about the loss of this venerable communications language. "It's the human touch,"

Coast Guard radioman Tony Turner recently told the New



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York Times. "It's coming from a continued on next page ►

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person's hand, through the air, into another man's ear—there is no language barrier.

"This just happens to be a very emotional circuit for a lot of people," he continued. "It has a lot of things others don't. It has got personality."

Yes it does, but let's not wallow too much in nostalgia. There is also some personality on the Internet.

For you audio-addicted 'Net surfers, check out the World Wide Web site of InterStudio Limited in London (<http://www.interstudio.co.uk/isl/>). The site has a great list of used pro

audio, video and film equipment for sale. And, as an extra added bonus, they also have listings of collectible classic guitars and Beatles memorabilia.

#### Telco audio

I found an interesting new gadget for anyone who must record or send audio over standard telephone lines. The TAC+ from Sound America, Savannah, Ga., is a pocket-sized phone coupler designed to deliver analog audio from cassette players, remote broadcast equipment and other sources into the telco network.

The TAC+ hooks between a phone's headset and base. It has a mic level output for tape recording, an input jack for feeding a cassette recorder, mixer, etc., and an attenuated output that connects with just about anything. A versatile six-step 60 dB attenuator works on both inputs and outputs.

Other features include capability to mix voice with an external feed, a cough button, selectable 8-32 or 600-ohm transformer input, and the capability to work with just about any type of phone system.

Though there have been many

phone couplers available through the years, the TAC+ is one of the most useful and elegant designs we've ever seen. It crams many useful features into a tiny, well-designed box that virtually disappears into a radio reporter's field pack, and, at \$99.95, it is a real bargain. (Sound America is at 5669 Highway 17 South, Savannah, GA 31405. Phone: 800-688-8208.)

□□□

*Frank Beacham is a writer, director and producer. His address is 163 Amsterdam Ave. #361, New York, NY 10023. E-Mail: [beacham@radiomail.net](mailto:beacham@radiomail.net).*

## Digital from DAWs

► continued from page 34

from the relevant manufacturers and third-party vendors for converting AES/EBU or consumer-grade digital I/Os into ODI and TDIF-1 formats, there is one new unit that I would suggest warrants particular attention. Spectral Inc., in addition to developing the remarkable Spectral Music and Audio-Prisma workstations, has designed what comes pretty close to representing a "universal gearbox" for inter-converting between ODI and TDIF-1 formats, in addition to the firm's proprietary SMDA1 (Spectral Multichannel Digital Audio Interface) I/O used in its products, and Yamaha Y2.

#### New from Otari

And Otari's new UFC-Universal Digital Audio Format Converter handles up to 24 channels of ODI, TDIF-1, ProDigital PD, SDIF-2 and (optionally) AES/EBU-format I/Os.

Finally, ADAT and Hi-8 digital multitracks can also be used to make 20- and even 24-bit recordings, utilizing one or more enhanced resolution analog-to-digital converters. The PrismSound MR-2024T Interface Adapter connects directly to a Tascam DA-88 MDM, and provides a user-selected choice of 16-, 20- or 24-bit recording. In essence, the unit multiplexes the digitized audio input signals into a total of 128 bits of data, representing either six 20-bit channels or four 24-bit channels (plus packing bits), which are then recorded across the DA-88's eight 16-bit audio tracks. Rear-panel XLRs accommodate four stereo AES/EBU-format I/Os, while 25-pin D-sub connectors connect to the DA-88; error LEDs monitor track mode, error rates and output monitoring.

For more information, contact Otari Corp. 415-341-5900; fax: 415-341-7200 378 Vintage Park Dr. Foster City, CA 94404. Spectral Inc. 206-487-2931; fax: 206-487-3431 18800 142nd Ave. NE Woodinville, WA 98072. Sprocket Digital: 818-566-7700; fax: 818-566-4477 211 North Victory Blvd. Burbank, CA 91502.

□□□

*Mel Lambert has been intimately involved with the production and broadcast industries on both sides of the Atlantic for almost 20 years. Now principal of Media & Marketing, a Los Angeles-based consulting service for the professional audio industry, he can be reached at 818-753-9510.*

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# Denon MD Goes to College

▶ continued from page 37

you will find a couple of these extremely helpful. If you are putting a batch of PSAs or commercials on a single disc, you will want to edit off a track or two on a regular basis. "Track Erase" is one such editing function. Press the Mode/Cue button to enter the edit mode and use the Select knob to choose the edit function you want. Make sure you have already selected the track you want to erase before beginning this process because once you choose the edit function "Track Erase?" and press the

Select knob to select it, you will get a "Track OK?" message. If this is the track you want to erase, pressing the Rec button will complete the edit. Erasing a track automatically rennumbers any tracks affected by the erasure.

For example, if you erase Track 6 from a MiniDisc with 10 tracks on it, Tracks 7-10 will become Tracks 6-9 when the edit is made. Another convenient editing function is the Move function which allows you to rearrange the order of the tracks on the MiniDisc. The other editing functions include

erase all tracks, divide or combine tracks and title tracks.

### Rear panel

It is nice to see a manufacturer provide standard broadcast connectors rather than proprietary plugs like some cart machines used to require. Denon uses balanced XLR analog input and output connectors with individual left and right channel level controls. There is also a digital XLR-type input and output, a nine-pin D-sub serial remote (RS232C) and a 25-pin D-sub remote connector.

This remote connector provides the ability to "remote" both recording and playback operations. The serial remote connector provides for interfacing with a personal computer. Denon's new MD Remote software offers a graphical interface readily available for any station that has computers operating under Windows tied into their production or on-air studio facilities.

Additional rear panel features are a power switch, an AC inlet for the power cord, a fuse holder and a headphone jack.

We never expected our conversion from carts to MDs to be 100 percent smooth-sailing, and we were correct. There were some "bugs." We found Denon, as an

equipment manufacturer, easy to work with and helpful in every instance in correcting problems. Of the three units we initially purchased, one player was dead "in the box." Denon immediately replaced this unit and we were up and running with our full complement of machines. The next failure was a display window. The unit operated fine, but we could not tell what track was cued, timing information, etc. Denon sent us a new display that required a five-minute change-out with the old one and we were back in business.

The biggest problem that crept up in our units was an inability to cue up the MiniDisc. Both players eventually developed this. This apparently was caused by an internal problem that Denon discovered with the players. After Denon modified our units, they both worked great. The player that we purchased later (which we assume is a "second generation" machine) has had no problems whatsoever.

# 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.

Circle (103) On Reader Service Card

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**Scott Studios Corp.**  
13375 Stemmons Freeway, Suite 300  
Dallas, Texas 75234 USA  
800 726-8877  
**(800) SCOTT-77**

### Day-to-day use

As a noncommercial station, our MD players are primarily used to play PSAs and station promos. From time to time, we will also play music that has been dubbed from CD to MD. It was our hope that the MD would provide superior sound quality, ease of operation and cause a minimal amount of disruption as we switched from carts to MiniDisc. In each instance, we have not been disappointed with the outcome. The "near CD" quality of the MD provides a "sharp" and "clear" sound far superior to what we had with analog carts.

The MD player (and recorder) is extremely easy to use. Our units were installed overnight so that operators had carts to use one day and MDs the next.

If you want to enter the digital domain, we suggest you take a close look at the MiniDisc for a low-cost, high-quality alternative to cart machines. So far, the MD format has offered WUJC all the advantages of carts (convenience, quick cue) and has none of the disadvantages (maintenance, tape reliability, wow and flutter, marginal sound when compared to digital). As far as audible compression artifacts—both on studio play back and on air, we have not noticed any nor have we received any complaints from listeners. Just clean digital sound.

□ □ □

David E. Reese is an assistant professor in the Department of Communications at John Carroll University and director of WUJC, John Carroll University Radio. For more information on MiniDisc technology, contact Denon at 201-575-7810; or circle Reader Service 54.

# Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No. (s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

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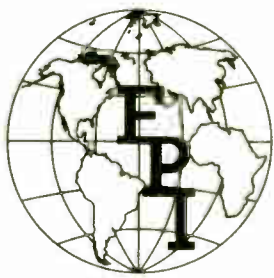
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# Radio World

Vol. 19, No 12 Radio's Best Read Newspaper June 14, 1995

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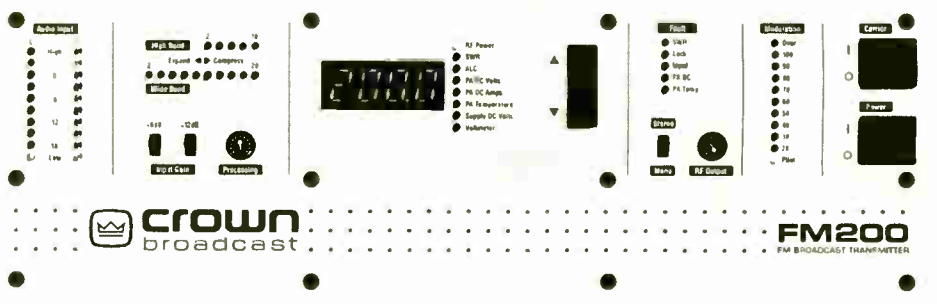
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READER SERVICE NO. 60

# WORKBENCH

## Poor Man's Hybrid; Kit to Link PCs

by John Bisset

**SPRINGFIELD, Va.** Next time you peek into your Telos IA2 interface or switch console, check to make sure that the 7400 series CMOS chips have the 74LS- designation. The 74LS- chips have better ESD immunity. They are available from ECG, JimPak, Digikey or your favorite parts supplier.

★ ★ ★

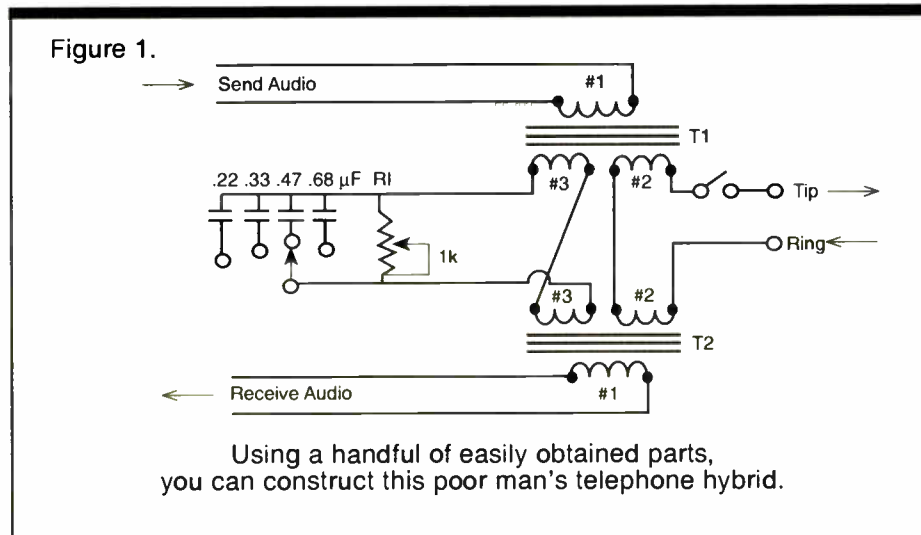
If your capital budget won't permit a new hybrid this year, you might want to consider Walt Lowery's "Poor Man's Hybrid." Although this hybrid is a bare-bones approach, it will meet the needs of feeding spec-spots down the phone, recording stock market reports or a news actuality.

The basic hybrid consists of a handful of parts, shown in Figure 1. The send audio feeds through windings #1 and #2 of T-1 to the phone line. The phone company asks that you keep the send level down to -10 dB. The receive audio (the caller's voice) travels from the phone line through winding #2 to winding #1 of transformer T-2. The caller's voice will arrive somewhere between -15 dB and -25 dB. If you want to get fancy, add an

op-amp with 20 dB of gain to provide line level out.

Because the phone line is a two-wire circuit, both send and receive audio appear on winding #1 of T-2. To cancel out the send audio from the receive audio, winding #3 of both transformers

R-1 and the capacitors C-1, C-2, C-3 and C-4 replicate the RC characteristics of the phone line and allow tuning or nulling of the hybrid. The Audisar 600-3 transformer, from Bob Munger (206-454-2040) works well, as will any telephone repeat coil. The Audisar is



are connected out of phase. In theory, the send audio present in winding #3 of T-1 cancels the send audio present in winding #1 of T-2. The variable resistor

available from Harris-Allied (800-622-0022). Walt adds that if you add a 300 to 3200 Hz bandpass filter and some opamps to provide line level input and output, you have a replication of a commercially available hybrid. No, it's not the former Symetrix or Radio Systems!

★ ★ ★

While we're on the subject of telephones, let me tell you about a new ordering handbook that is available free from Telos Systems. It's titled "The ISDN Basic Rate Interface, Zephyr and You." The booklet streamlines ISDN line ordering, and includes an order form that can be duplicated and faxed to your

phone company. Inside are telephone company phone numbers, definitions of ISDN terms and a description of various system protocols. Don Coulter will be happy to fax you a copy. Send your request via fax to 216-241-4103, or by voice at 216-241-7225, or circle **Reader Service 133**.

★ ★ ★

If you are in charge of maintaining your station's computers, you can now maximize the use of office printers using ParaLink Pro. This package links PCs together through phone wire to create a mini-network of computers that

**Although this hybrid offers a bare-bones approach, it will meet your needs.**

share one or more common printers. The ParaLink Pro Start Kit includes two small transmitters that plug into the computer's parallel port. Twenty-five-foot cables are supplied that plug into standard RJ-11 jacks on the transmitters. The system can handle a total of 32 PCs and eight printers. The transmission length is 1500 feet total. Extra computers and printers can be added using ParaLink Pro's Expansion and Receiver Kits. The starter kit lists for \$249.00, and the expansion kits run \$69.95 each. For more information, circle **Reader Service 73**.

□ □ □

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. Printed submissions qualify for SBE Certification credit.

## 64 Years Ago

Reprinted from Radio World June 20, 1931.

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.

### U. S. is Far in Lead with 14 of Total 35 Short-Wave Stations

The United States leads the world in short-wave broadcasting, fourteen of an international total of thirty-five stations being located in this country, according to a survey made by the foreign department of the Pilot Radio & Tube Corporation.

Of twenty-nine other countries with short-wave facilities, none has more than two stations. Great Britain has only one, as have Germany, Austria, Holland, Rumania, Russia, Czechoslovakia and Norway.

France opened her first station only last month, while Italy has two very successful transmitters in Rome. Honduras, Costa Rica, Colombia and Brazil each has small but efficient stations. Canada has two transmitters. Mexico a single powerful outfit in Mexico City. Australia, New Zealand and Siam have two apiece, the Dutch East Indies, the Philippine Islands and Japan one each. There are two small stations in India and a very large one in French Indo-China.

The most widely known stations, according to the survey, are W2XAF-W2XAD in Schenectady, N. Y.; W8XX in Pittsburgh, Pa., and PCJ in Eindhoven, Holland. The Dutch station is regarded as having the largest international audience, as it is continually broadcasting special programs timed for the most convenient reception in different countries of the world. Announcements from PCJ are made regularly in six languages—Dutch, German, French, English, Spanish and Portuguese—and all by the same man! Many announcers are poly-lingual.

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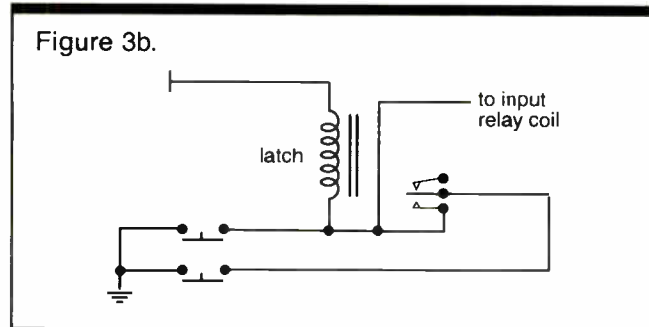


# Relays as Switchers

► continued from page 22

shown in 3(c), reduces the drive requirements and allows the relays to be controlled by standard logic devices. A momentary high will acti-

5/1.2 x 10<sup>-3</sup>, or 4166 ohms. Use the nearest higher standard value, in this case, 4.7 kohms. If the relay action is inconsistent or is slow to activate, lower the resistance slightly. Just do not exceed the sink capabilities of the TTL source.



vate the relay circuit. If you build this, make sure the transistor can handle the coil current as well as the relay supply voltage. As a design procedure, calculate the required base current by the formula:

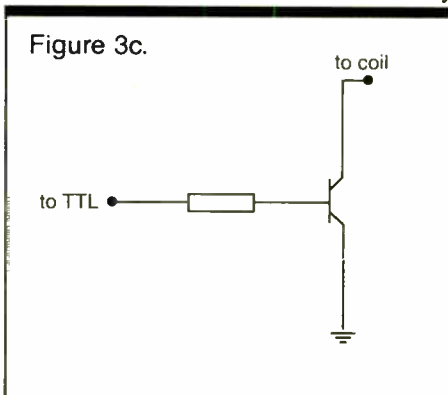
$$I_b = \frac{2 \times V_{cc}}{\text{Beta} \times R_L}$$

Example: A standard 24 V relay has a coil resistance of 500 ohms, therefore the current required is 48 milliamperes. Our transistor has a beta of 80, so we plug in the numbers:

$$I_b = \frac{2 \times 24}{80 \times 500} = 1.2 \text{ mA}$$

If we are driving from a TTL source of 5 V, we need a series base resistance of

of the switch lines is accidentally grounded while troubleshooting, the most dramatic result will be a relay

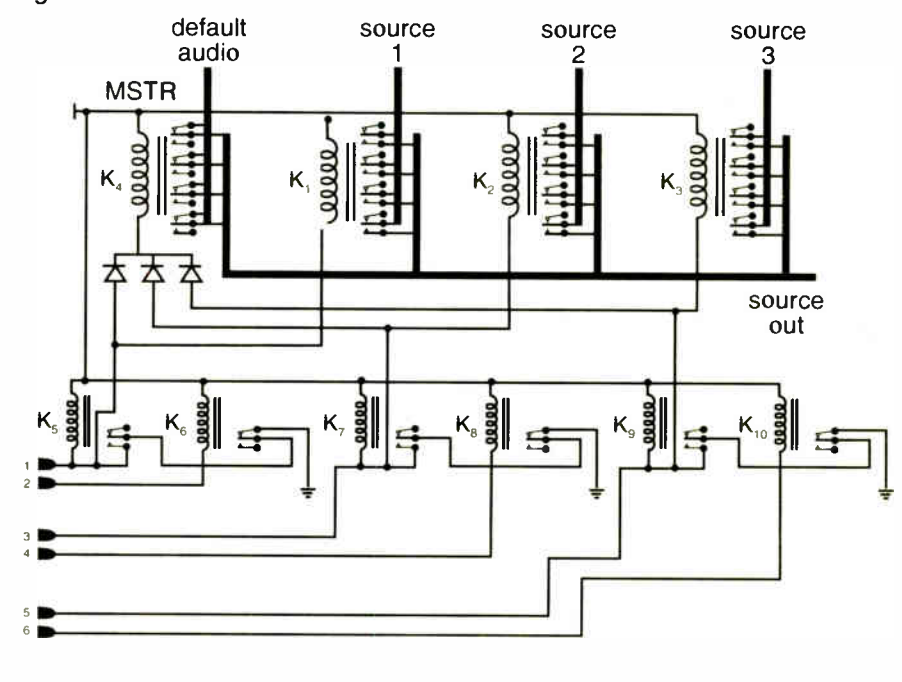


closure. If we were switching on the high end, one could easily short out the

Figure 4 shows the wiring scheme using 4PDT relays audio, and simple SPDT types for the latching function.

Incidentally, I always switch the low end of the relay in these circuits. The main reason for this is that if one

Figure 4.



power supply.

Because these circuits require only momentary pulses, they lend themselves easily to common switches, other relays, open collector outputs and remote control contacts. And by adding the transistor drivers, almost any logic output will work nicely, allowing you to easily interface to all types of contemporary equipment.

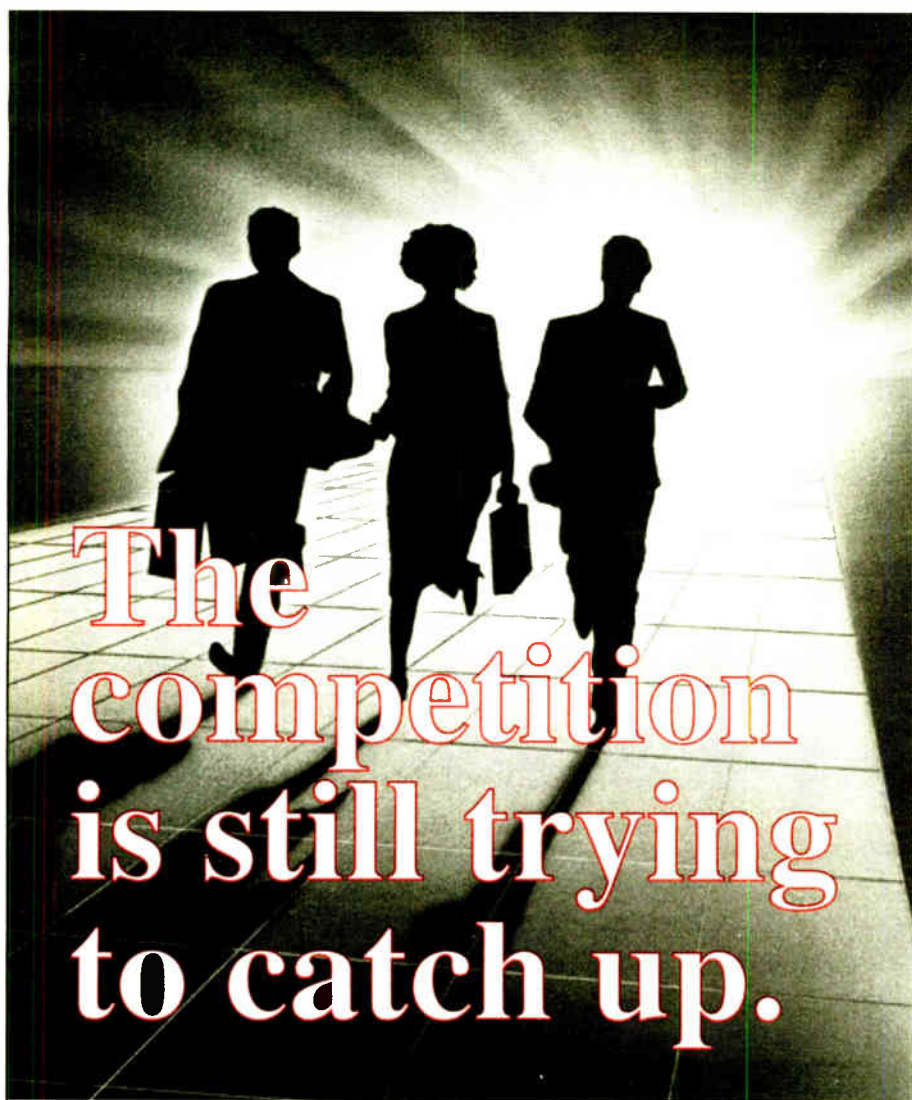
Hopefully, one of these adjustments will help you with your audio switching requirements and allow you to pick the parts from that old surplus equipment

lying around, or, of course, your junkbox.

□ □ □

James Murphy is director of engineering at the West Virginia Radio Corp. Reach him at 304-296-0029.

*Editors note: The May 31 issue of RW incorrectly attributed this article to Jim Somich. Also, the last two paragraphs were inadvertently omitted.*



The competition is still trying to catch up.

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# Bring Your Computer Up to Speed

by Richard Mertz

**FAIRFAX, Va.** As I write this column, many of you are still weeding through all the literature you picked up at the NAB spring convention in Las Vegas. My first trip to this granddaddy of all conventions in the late '70s provided me the opportunity to view all the new equipment: transmitters, antenna systems, audio consoles, tape recorders and cart machines.

Cart machines were state of the art gear, then. But, in case you haven't noticed, it is now the '90s. Cart machines and tape recorders are taking a back seat to digital recording devices.

## Many to choose from

These digital recording devices come in many shapes, sizes and configurations. Tape has been replaced by floppy disks and hard drives. Some systems, like Roland's DM-80 digital production workstation, rely on dedicated hardware and software while others, like the Dalet production/automation system, are PC-based. Some, like the Dalet system, run over computer networks.

The PC horsepower required to operate the PC-based systems varies. For example, Dalet recommends a 486 DX (32-bit) system with 8MB of RAM.

Implementation of any digital audio system for whatever need will always hinge on the up-front cost of the hardware and software. Stations looking for alternatives to purchasing brand new computers might consider upgrading one already on hand.

A few months ago, I wrote a series of articles describing the upgrading of existing XT or AT computers to a 386 processor-based machine. The articles were predicated on the drastically reduced cost of 386 motherboards being sold at that time.

continued on page 48 ▶



## KEYBOARD CONNECTION

# Buying New Computers: Capability vs. Cost

by Barry Mishkind

**TUCSON, Ariz.** True or false: Buying a computer is easy. After all, a computer is a computer is a computer, isn't it?

All too often a staffer needing a computer for a project is shown to the back room where an old disused computer sits. "Here you are," he or she is told, "just clean it up and put it in your office."

Or, a client offers to provide the station with a computer in lieu of cash. Not infrequently the manager comes back with a unit that is the '90s equivalent of a Trabant: overpriced and underpowered.

## Educated consumers

As radio and TV stations use more and more computers for everything from management and sales support to program and transmitter control, the capabilities and reliability of the equipment become more important than the cost.

It does seem prices for computers and accessories drop virtually every week. But cutting through the sales hype and getting the proper combination of options to meet your needs can become an exercise in frustration and failure as it becomes clear that all computers are not created equal.

So, what tips can help make buying a computer a successful experience?

The first area to consider is where the computer is purchased. Local warehouse pricing may seem attractive. However, some brands carried in the warehouses acknowledge as high as a 20 percent rate of defective units. Once you get the computer out of the box, you may have to take it directly out for service, wasting valuable time before you can use it.

Mail order companies use high volume and low margins as a draw, and several national companies have instituted policies for 24-hour service lines, and will even air-express replacement parts to you.

On the other hand, a local company often will take care of any problems immediately. In the end, their slightly higher price may be, in fact, cheap insurance.

Nevertheless, wherever you purchase, pay attention to what you are getting. Remember, the specifications are not written to make it easy for you.

## Monitor specs

For example, the color monitor is a fairly costly component in the building of a computer, often as or more expensive than any other part. So, there is a lot of pressure to cut corners here.

The first ploy is the "monitor extra" in the small print. That way, the maker can "compete" with the cheaper monitors. And there are many of them. If you are planning to spend more than three minutes a day in front of your computer, don't settle for a monitor with higher than 0.28 or 0.31 dot pitch.

Not only are there still 0.52 pitch monitors out there (dot pitch is the

distance between the tiny cluster of dots on the screen—the larger the number the coarser the image), but have you measured a screen lately?

While the industry standard would seem to be a 14-inch VGA monitor, in practice what you get is more like a quarter-pound hamburger "before cooking." The screen might be just 13 or so inches diagonally from the edges of the case. Viewable area might be even less.

The actual size may be of great importance to someone who uses the monitor all day, or to the air talent, who should not have to squint to see the monitor.

Similarly, consider whether the monitor is interlaced or not. Most consider non-interlaced monitors to be better with less flicker and less fatigue for the user.

## Storage

Another area that seems to be regularly overstated by salesmen is the capacity of the hard drive. As applications seem to take more and more hard drive space, and digital audio storage claiming even more, there is a tendency for some companies to specify a size twice that of the physical hard drive. The fine print mumbles "with disk compression" and assumes you'll get twice the manufactured capacity. Watch out.

If you plan to add a modem to the computer, make sure you get the speed you need. A 96/24 modem usually means 9600 baud for the fax section, but only a slower 2400 baud for data. The cost for a faster modem is modest. Don't get stuck with 2400 baud these days.

There is also occasionally a bit of inflation on the motherboard specs as well. For example, a 486DX80 with sufficient "on-board cache" can be faster than some Pentium chips. Do not pay for more computing power than you need. In fact, sometimes the cheapest way to upgrade is to add more cache RAM to your existing motherboard. An example: Jumping a 64k cache up to 256k can make a substantial difference in operation, and for well under \$100 can keep a 486-33 quite useable in many applications.

There's one other area in which many users forget to take the time to ensure a good purchase. This is the feel of some of the peripherals, like the keyboard and mouse, or the look of the monitor.

Whether you plan to buy locally or by mail order, it is a wise idea to try out the keyboard, and see how the mouse feels and operates before buying. Check out the monitor to see how crisp it is, how vivid the colors, how bright the display.

The difference in cost between a mediocre computer and an excellent one really is not that much. And cutting on components usually saves only a few dollars: saving \$10 on a keyboard, or \$5 on a mouse, can be false economy.

□ □ □

Barry Mishkind can be reached at 520-296-3797, or "barry@coyote.datalog.com" via the Internet.

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# Give Computer a Boost

► continued from page 46

When I wrote the original articles, 386 motherboards were selling for about \$100. Just recently, at a local computer show, these boards were selling for \$65! No fooling!

## Upgrade options

Like the 386s, the cost of the 486 motherboards is also falling. These 486 motherboards are sold both with and without the processor. Some motherboard prices I have seen are as little as \$95 without the processor. Depending on the manufacturer and speed, 486 processors cost between \$150 to \$290. There have been many combination offers (motherboard and processor) available. You can now find a 486 80 MHz processor and

motherboard for \$240 or less. I have stayed away from upgrading my computer to a 486 for several reasons, least of all the cost. Initially, these motherboards

used the larger 70-pin memory SIMMs (Single Inline Memory Modules). My 386 motherboard uses the older style 40-pin SIMMs, and I wanted to use memory I already had.

The newer 486 motherboards have been designed to accommodate both styles of

memory. This feature, which only recently began appearing, makes the transition to the faster motherboard somewhat less expensive.

I have a 386 33 MHz computer with 8MB of RAM memory and a 256 kilobyte cache. Look around your station; there are many of these computers out

sufficient for this upgrade.

When shopping for computer equipment, I've found one of the best places to shop is the traveling computer show. Recently I came across a vendor who was selling 486 motherboards with 80 MHz AMD processors. While you cannot stick the little "Intel Inside" label on the front of the case, the performance is the same. Spend some time reading the manuals that come with the motherboards.

## Boards and regulators

You want to find motherboards with the 3 V regulators. The vendors say this feature provides additional stability. It really depends on the voltage required by the processor. The motherboards with the regulators, most times, will accommodate both the 5 V and 3 V processors.

The motherboard should also be able to handle a variety of processor chips. Make sure you can use DX2, DX4 (for higher speed processors) and even Pentium processors. The motherboard I purchased sported five ISA slots and three VESA slots. This made it easy to use all of my interface cards. This motherboard also had special "Green" features. "Green" means that the motherboard BIOS permits the shutting down of particular peripherals to conserve on electricity. After a certain period of inactivity, the hard drive motor, monitor and so on would shut down until a mouse is moved or a key is tapped. (It gets very quiet when the hard drive motor stops!)

## Easy upgrade

Some words about BIOS (the computer's Basic In Out System). There are three major providers of BIOS: Phoenix, Award and AMI (American Megatrends). All three function properly. However, I prefer the AMI BIOS because of the ease with which you set the options. The 486 motherboard I bought has the AMI BIOS. This BIOS is the new point-and-set BIOS that allows you to use your mouse to set the various options. (Kind of like Windows—well, maybe not.)

The upgrade is easy. Remove the old interface cards and the old motherboard. Install the new motherboard and the old interface cards. Plug in the power supply and you're ready to set the BIOS. It was literally that easy for me.

I did replace the IDE-floppy-I/O board with a VESA (32-bit) card. This speeds up access time to the hard drive and allows you to take advantage of Windows 32-bit data transfer. The card cost \$27.

To sum up, 4MB of memory from my old motherboard (free), the new motherboard, \$240 (and Pentium-ready when the prices get real) and a \$27 IDE card upgrades a three-year old 386 33 MHz computer to a 486 80 MHz computer that is fast.

Type DIR at the DOS prompt and all you get is a blur of file names rushing by. Using WINCheck IT (see my last article), the benchmark speed test equals that of the 60 MHz Pentium! To bring the memory up to 8MB would cost an additional \$136. Not too shabby!

Thanks again to all those who have written with questions and comments about the computer upgrade articles. I appreciate your response.

□ □ □

Richard Mertz is a principal at the consulting firm of Suffa & Cavell, Fairfax, Va. He can be reached at 703-591-0110; through CompuServe at 730.3026, or on the Internet at rmertz@dgs.dgsys.com.

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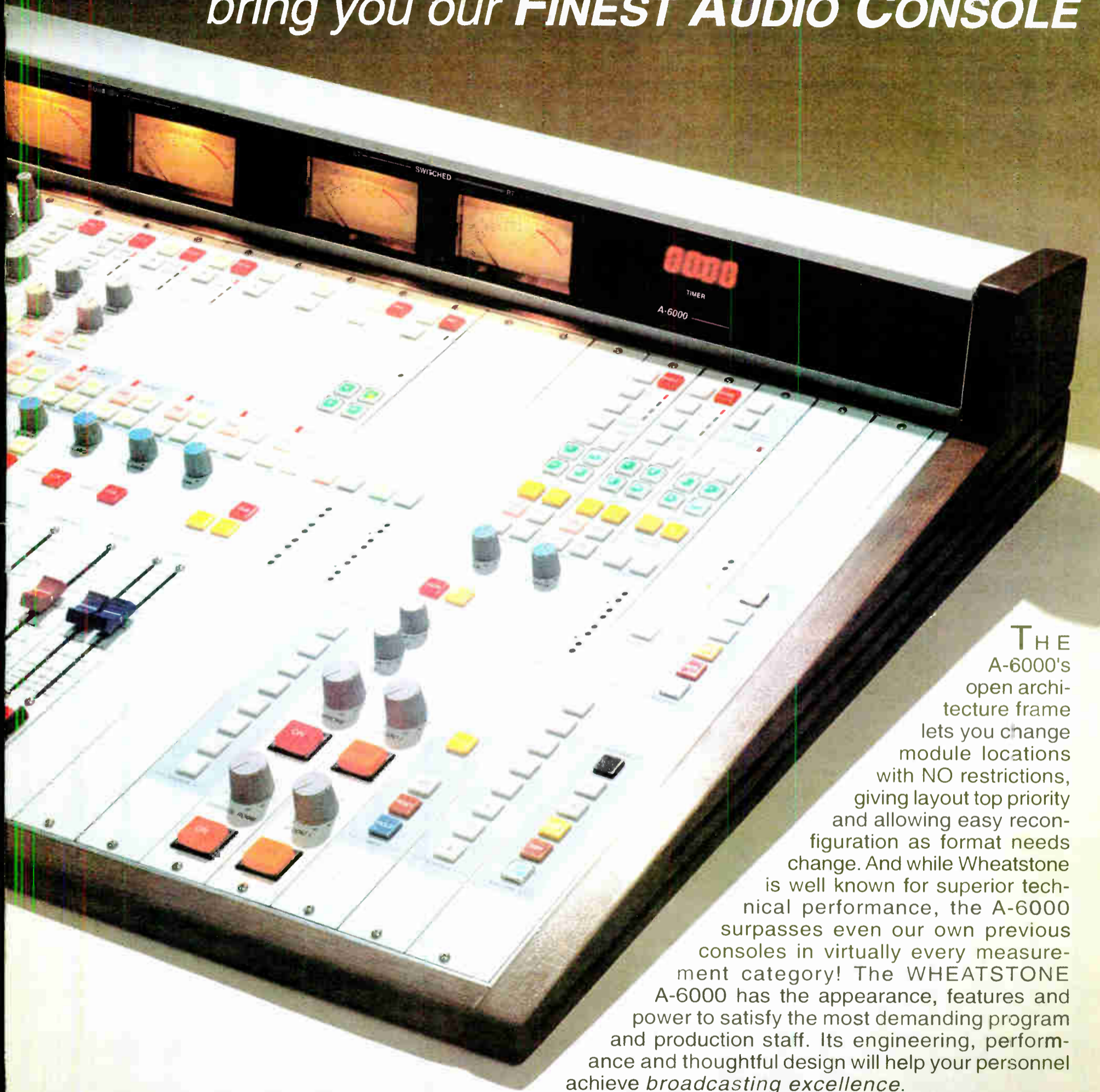
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# Program Pioneered Radio Techniques

*Editor's note: Looking back at "Amos 'n' Andy," one can clearly see the changes wrought by the Civil Rights movement of the 1950s and 1960s and the affirmative action battles that are still being fought in the 1990s. It is unlikely that a radio program in which two white men pretend to be black would be considered humorous or socially acceptable these days.*

*But the mores of the first half of this century were quite different, and "Amos 'n' Andy" enjoyed a large white listenership. Many in the black community, on the other hand, disliked and actively*

characters on the "Sam 'n' Henry" program, but they wrote all the dialogue and played the parts in an ethnic dialogue that was so convincing many thought blacks were actually playing the parts.

## Distinct era

The "Amos 'n' Andy" radio series had three distinct periods. Initially, the series ran in 1928 on the Chicago Daily News station, WMAQ(AM) where Correll and Gosden moved after two successful years and 586 episodes on WGN(AM).

At WMAQ, the duo faced a problem. They wanted to continue doing the same kind of program they had done on WGN. But WGN owned the rights to the "Sam 'n' Henry" program. Undaunted, the two set out to develop a program that would build on the experience they had gained in the old program.

After considerable study, they settled on the names of Amos Jones and Andrew Brown as the key characters. The "Amos 'n' Andy" show debuted on March 19, 1928. Like their earlier program, this one was also a comedy whose humor was based on black characters and the situations they faced in Depression-era America.

The program's premise was simple. Two black men move from Atlanta to Chicago to make their fortune. They found the Fresh-Air Taxicab Company of America, "incorporated" on one asset—a broken down car with no top or windshield. Each episode revolved around their attempts to stay solvent, Andy's philandering, the activities of the lodge of the Mystic Knights of the Sea and a host of characters that eventually exceeded 500.

A typical episode included nine or more characters. During this first period, Correll and Gosden wrote all the scripts and played all of the characters. This required skill in character development, an understanding of microphone techniques and great care in developing the script.

Part of the character differentiation was through the pitch of the voice. Correll, who played Andy, used a low pitched voice to portray his character as boastful and domineering. Gosden played Amos with a thin, excitable high pitched voice. But in addition, Correll added depth to his character by working the microphone only an inch away from his lips. Gosden on the other hand played his character from nearly two feet away from the microphone.

When they played the other characters on the show, they would alter the pitch of their voices, the distance from the microphone and the dialect in which they spoke. To enable them to make the necessary position changes required, the scripts had to be carefully constructed.

During these early years, they did not

rehearse the program. In listening to recordings of this period, one is impressed with how skillfully Correll and Gosden slip from one character to another, matching pitch of voice, dialect and distance from the microphone flawlessly and effortlessly.

## Word play

At the same time, these episodes are fairly dull by contemporary standards. Much of the comedy is based on word play. "The weather was abdominal." "She was enstrangled from her husband." "'You tell him that 'n' you're gonna antagah the man, make him mad.' 'Aunt Tagah? I've had a lot of aunts, but never one named Aunt Tagah!'"

Because Correll and Gosden played all the parts during this period, no female voice was ever heard, even though the plots often involved women. The women are discussed but never heard. If they communicate, it is over the telephone or by letter.

Correll and Gosden were meticulous in their attempts to develop credible characters. They spent a considerable amount of time in the black community. Each time they developed a new character, they carefully honed a personality and dialect that would be distinct and faithful to people they knew.

Amos was gullible—but a hard worker whose ideas often got Andy out of his many scrapes. Andy was full of hot air and lazy, but he always protected Amos from anyone else who might dare to take advantage of him.

## Chainless chain

At WMAQ, Correll and Gosden pioneered in another way. They wanted to expand the program to other stations. To do this, they developed what they called the "chainless chain." Until the late 1970s, radio networks fed their programming to affiliated stations on dedicated telephone lines. A network web of sta-

tions was called a "chain," because it was tied together by the interconnecting telephone lines.

But many stations, WMAQ included at this time, did not belong to a network. Correll and Gosden decided to record the program on phonograph records and distribute the program to affiliated stations by that means. This put added pressure on them because scripts had to be written at least six weeks in advance to allow for the recording, pressing and distribution of the transcriptions to the affiliated stations.

Eventually 45 stations carried "Amos 'n' Andy" in this manner. In addition, the Chicago Daily News introduced an "Amos 'n' Andy" comic strip which was written but not drawn by Correll and Gosden.

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Amos 'n' Andy

protested Charles Correll and Freeman Gosden's portrayals of "Amos 'n' Andy."

The appropriateness of "Amos 'n' Andy" was debated while the show was on air, and is still being debated today. In the context of radio history, however, this racial debate is tangential to what "Amos 'n' Andy" did. The show used words to paint pictures in the mind of the audience—even if the pictures misrepresented the realities of black life—and did so with techniques and ideas that shaped the evolution of radio and in some cases, are still being used today.

by Read G. Burgan

**LAKE LINDEN, Mich.** Radio history was made on Jan. 12, 1926. Two white men, Charles Correll and Freeman Gosden, stepped before a WGN microphone in Chicago and slipped into character as two black men.

The series was called "Sam 'n' Henry." What makes this program important to radio history? And who were Charles Correll and Freeman Gosden?

## Radio infancy

In 1926, radio was in its infancy. While many sensed its potential, few knew what to do with it. "Sam 'n' Henry" pioneered a whole new genre—character comedy. The serial was based on the day-to-day situations that evolved in the lives of two black men. It proved radio could sustain an audience using a story that was continued from one show to the next.

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# Radio's Early Pioneers

► continued from page 51

In 1929, NBC offered Correll and Gosden \$100,000 a year to bring the program to its radio network. The first 15-minute episode of "Amos 'n' Andy" aired Aug. 19, 1929, on NBC under the sponsorship of the Pepsodent Company. The program was heard Monday through Friday at 7 p.m. until 1943. When "Amos 'n' Andy" moved to NBC, the Fresh-Air Taxicab Company moved to Harlem and Correll and Gosden moved to Hollywood.

How popular was "Amos 'n' Andy"? Many movie theaters postponed the start of their evening movies until 7:30 p.m. Others advertised that the evening episodes of "Amos 'n' Andy" would be

piped into the theater. Without these concessions, their patronage dropped dramatically. In some cities, you could walk down the street on a warm summer night and never miss a word of the popular comedy, because everyone in the neighborhood was listening and the dialogue wafted to the streets below from the open windows.

### Nothing lasts forever

But nothing lasts forever. By 1943, the program's ratings had slipped to 60th place. The program was in trouble and Correll and Gosden knew it. In February 1943, the final 15-minute episode of "Amos 'n' Andy" aired. Multitudes of listeners were shocked when the program

disappeared from the airwaves for nearly eight months and never returned in its daily 15-minute format. Gosden was 43 and Correll 52.

After nearly 20 years of the same format could they change? The second period for the "Amos 'n' Andy" program began on Oct. 8, 1943, and continued until 1954. In this new phase, the basic story and characters remained the same. But instead of a daily 15-minute series, the program aired once a week for half an hour. No longer did Correll and Gosden do all of the parts. Oh, they still did up to 90 percent of them, but now they had a whole cast of actors.

Women were actually heard on the program. Staid announcer Bill Hay was replaced by exuberant Harlow Wilcox. Sam Pierce became one of the show's producers. Professional writers Bob Connolly and Bill Moser did the writing.

The program included a live orchestra and sound effects personnel.

Perhaps the most important change was the status of Amos. As the half-hour program developed, the Kingfish became the regular foil of Andy, and Amos all but disappeared. The program might well have been called "Andy 'n' Kingfish." Amos was just too subtle for this 1940s version and had to make way for someone with more substance. These were dramatic changes but they did the trick.

Once again the program returned to the top-10 radio programs and remained there for several years.

### Last era

But radio itself was changing in the 1950s, and in 1954 the "Amos 'n' Andy" program entered its third and final era. It returned to a daily Monday through

continued on page 54 ►

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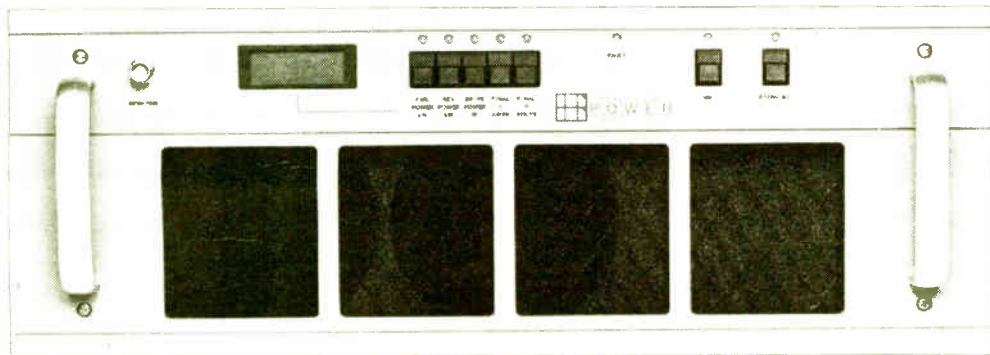
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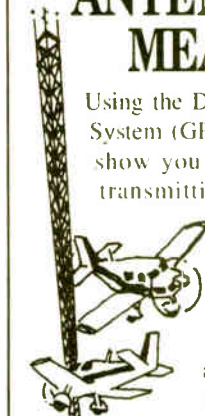
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COLE'S LAW

# Avoid Keeping the FCC in the Dark

by Harry Cole

**WASHINGTON** Today I tell the tale of the poor AM licensee in Mississippi that had to turn off its station in September 1991, because of a variety of problems—some of which are probably familiar to most readers: the lousy state of the station's equipment when the station was acquired, problems negotiating continued use of its transmitter site, etc. You know the drill.

Anyway, the station goes off the air, and the licensee jumps through the proper Federal Communications Commission (FCC) hoops. It advises the commission that the station is silent, and it requests authority to remain silent pending correction of its troubles. The commission grants that authority for a limited period, the licensee comes in and asks for an extension, the commission grants the extension, etc. You know the drill.

### Silent treatment

All goes according to the script until July 1993. The station has been off the air for almost two years at that point, and the authority to stay silent expires. But the licensee doesn't try to re-extend that authority. So, on Dec. 29, 1993, the commission issues a show cause order giving the licensee one last opportunity to come forward and explain why its license shouldn't be revoked.

What does the licensee do? Well, the one thing it doesn't do is file a proper appearance in response to the show cause order. And, not surprisingly, the administrative law judge promptly terminates the proceeding, finding against the licensee.

Finally, at the end of February 1994, the licensee seeks reconsideration of the judge's ruling. It claims that it has taken a variety of steps aimed at getting the station back on the air, and it provides a proposed timetable for doing so. It also offers a variety of explanations for its inability, over some two and one-half years, to get the station up and running again.

Now bear in mind that the licensee has had, up to this point, multiple opportunities (not the least of which was the show cause proceeding) to explain to the FCC what's what with its station. And it appears that the licensee has consistently declined those opportunities. Still, in April 1994, the Mass Media Bureau asked the licensee for information and documentation establishing its ability to resume operation—in other words, yet another chance to make its case.

### Separate responses

The licensee provides two separate responses, in April and May. And in June, it notifies the commission that, lo and behold, after almost three years of suspended animation, the station is back on the air. (Whoops, it went back off the air briefly in June because of equipment problems, but then returned to the air in July 1994.)

And now the bottom line. In April 1995, the Mass Media Bureau finally concluded that everything with the station is fine, that no further action will be taken, and that the station's license is no longer in jeopardy.

This saga provides a number of lessons for all of us.

First, it underscores the importance of the fact that a broadcast license does not automatically evaporate just because the station is off the air. Rather, the FCC has to jump through a number of stringent procedural hoops (most notably, a show cause and revocation proceeding) before the commission can formally pull the plug. (The primary exception to this would be if the station were off the air at the time its renewal application were due—in that case, the station would have to file a renewal, and the commission could, theoretically, simply deny the renewal because the station was not operating and was

unable to demonstrate that it would be able to return to operation.)

Thus, if you find yourself forced off the air, don't despair.

### Keep 'em informed

Second, this tale demonstrates the importance of keeping the FCC apprised of the status of your situation, even if you're off the air. The rule is that, if you're going to be off air for more than 30 days, you have to request and obtain authority to stay silent. That authority is generally pretty easy to get the first time. Usually such authority is granted for six-month periods, and it is pretty easy to get

renewed (also for six-month hits) as long as you can demonstrate that you are continuing to make serious efforts to get back in operation.

What you should not do is what our folks in Mississippi did, that is, stop asking for extensions. When all the FCC knows is that the station is off the air and the licensee has stopped asking for permission to stay off the air, the FCC reasonably concludes that the licensee has called it quits. After waiting a decent interval—in the Mississippi case, approximately five months (from the July 1993 expiration of the authority to remain silent to the December 1993 show cause order)—the FCC will move toward pulling the plug.

A third lesson here is that, if you do happen to get a show cause order, for continued on page 54 ▶

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# Early Radio Techniques

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Friday format, as a 15-minute show called the "Amos 'n' Andy Music Hall" on CBS, where it had moved in 1948. Many of the fans were disappointed with this format, in which they played current popular records, engaged in short dialogue and interviewed guest entertainers.

But if some fans were disappointed, this program is noteworthy because it pioneered some new techniques. Correll and Freeman had reached the point where they wanted to have more time for personal pursuits. Sam Pierce, who produced this series for them, recalled the events fondly.

"They asked me if there was any way we could do a show without laughter and

still have it play. I said I didn't think so. We pretaped five shows with the cast and played the first one on the air at CBS.

"We received a call from the head of CBS, Bill Paley, who said 'That's a terrible show!' It really wasn't a terrible show. He just missed the audience. So I said, 'I'll tell you what I'll do. If I can put laughter in the show that you will buy, will you go for it?' And he said, 'No! I don't believe in any of that trick stuff.' Now this was before there had been any laughter added to any shows. I said, 'Let's just see what we can do. Maybe we can get an audience and we'll see how the show plays.'

"I took the next show and got a marvelous editor, Jack Laddie, who deserves

all the credit for that show as far as putting laughs in. We spent the whole night adding laugh tracks that we took from old Jack Benny shows. We developed a whole new technique of rolling laughter in an editing room with three tape machines. We played that on the air the next night and Mr. Paley called and

brains of the whole thing, and that was Freeman Gosden. He used to scare me to death. When I first went to work for Freeman Gosden, I was one of the most upset guys you'll ever know. We finally had it out one time and from then on Freeman and I became close friends and good friends.

**We developed a whole new technique of rolling laughter in an editing room with three tape machines.**

—Sam Pierce

Producer, Amos 'n' Andy

said, 'Well you got an audience and the show is now right!' From then on, the "Amos 'n' Andy" Music Hall never had an audience."

## Tickets please!

That sometimes created a problem for Pierce. "A client would call and say, 'Listen, we've got some people coming out who want to see a show. Can you get us tickets?' I'd have to say, 'I'm sorry. The tickets are all gone for this whole week. We can't get any.'"

Listening now to those broadcasts, it is easy to detect the canned laughter. But for better or worse, it ushered in a whole new approach to broadcast comedy. But Pierce and his crew took the art of tape recording even further in an attempt to minimize the time necessary for Correll and Gosden to do the program.

"Freeman and Charlie would work one day a week on five shows. They would come in the studio, read the lines with the cast and tape it. When it came to the guest part, I would read the guest to Freeman and Charlie, and they would react as Amos and Andy to the guest. Then I would take portable equipment and an engineer and go to wherever the guest was—at a studio shooting a picture, at his home, wherever they were. We had guests like Jimmy Stewart and Jack Benny, so we were not fooling around. They were top people.

"Then I would play Amos and Andy to them, and they would read back against my Amos and Andy. Then I would go back and take my voice out of the original tape track and put the boys' voices in against the star. We developed a system where it took about one full day's work to do one 15 minute show, just to get that inner cut and the laughs in."

## False start on TV

The "Amos 'n' Andy Music Hall" survived until 1960. In the interim, an attempt was made to move the program to television. Because Correll and Gosden were white men playing black roles, the very stars of the program had to be replaced. By this time, some of the radio actors on the program were blacks and they were integrated into the new series.

The program was not a success. The entire southern loop of the television network refused to carry it. In addition, the rising self-consciousness of black America caused many to resent the stereotypes represented by "Amos 'n' Andy." While the program was run in syndication for several years, it was not popular and subject to much criticism.

What were Correll and Gosden like when out of character? Sam Pierce describes them this way: "You had one very, very stern serious man who was the

"Freeman was serious, Charlie was a heavier, lighthearted sort of guy who knew he had it made—he had all the great parts. Charlie wasn't as concerned with life and government or anything else. Freeman was a serious man in terms of everything. He took his place in the world seriously. He was a great friend of President Eisenhower's and worked very hard on the campaign to get Ike elected."

In retrospect, "Amos 'n' Andy" was a period piece. Its creators pioneered many techniques now taken for granted. Broadcasting owes a great debt to the role they played in maturing radio into a true entertainment medium.

*Author's Note: The quotations from Sam Pierce are from a one-hour recorded interview made by the author at the Voice of America studios on March 24, 1975.*

*Read Burgan is a free-lance writer and a former public radio station manager who can be reached at 906-296-0652.*

# Keep FCC In the Know

► continued from page 53

crying out loud, take it seriously. A show cause proceeding is, in effect, a capital punishment trial, with the operative presumption being that you, the defendant, are not entitled to keep your license. This is your one chance to try to rebut that presumption. If you get a show cause order, you should consult with communications counsel ASAP and be sure to meet any and all deadlines.

And the fourth lesson here is that, notwithstanding the first three lessons, it ain't over 'til it's over. If you really do want to keep your license, it may make sense to continue your efforts to resume operation notwithstanding ongoing setbacks at the FCC. Of course, to take that approach, you should be sure to have a good story to tell (with documentation) to demonstrate that you really have been a diligent broadcaster who was the victim of forces and circumstances beyond your control.

The bottom line is that, on occasion, a little guy (i.e., somebody who doesn't happen to be Rupert Murdoch) can prevail in cases like this. But still it seems that it would be a lot easier, a lot smarter, and a lot less risky, to avoid the problems in the first place. To do that, we advise, as always, that you confer with communications counsel.

□ □ □

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

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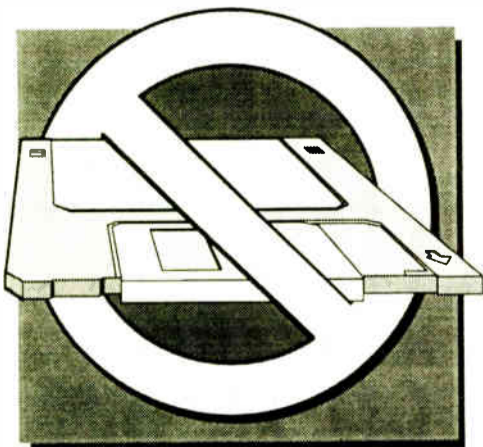
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USER REPORT

## KKAT Signal Fuller, Richer with EQ3

by Jim Mickelson  
Program Director, KKAT(FM)  
and Chuck Condon  
Chief Engineer  
Apollo Radio of Salt Lake City

**SALT LAKE CITY** KKAT is a hot country FM station in a very competitive market. We are always searching for something to give our signal the edge over the competition. In the past, we have

tried various forms of equalization and other signal processing to make our signal richer, fuller and bigger. But we consistently found that more EQ seemed to make the high end of our signal harder and gave the low end too much thump.

When we had the opportunity to try out Night Technology's EQ3, we were a bit skeptical at first. It is, after all, an equalizer. But we were pleasantly surprised to find that this equalizer provides what NTI

claims: high-definition audio.

Our test was simple. We put the EQ3 in the analog signal chain right after our on-air console and before our Optimod 8200. Because the frequency bands on this EQ are broad (around two octaves), they interact with each other, a fact that has to be taken into account when making adjustments.

The new manual NTI provides gives thorough guidelines and "getting started" information, but just a few minutes of

experimenting with the controls gives you the experience you need to make proper adjustments. The adjustments we made let us open up the high end for an airy sound, and we were able to tighten and enhance the low end without adding too much thump. We were so pleased with what the EQ3 did for our signal that we decided to keep it.

The specs on the EQ3 are respectable, with a noise floor below .031 mV at 1 kHz, and a signal-to-noise ratio of more than 90 dB. But the main thing is that NTI seems to have figured out how to add EQ without adding phase shift or phase distortion. Compared to other EQs we have tried, the EQ3 has no audible phase distortion, even with fairly heavy EQ.

The result is something you have to experience to understand. Instead of just boosting the highs with the air band, you really open up the high end. The same is true for low-end performance. And the 2.5 kHz control can put sizzle on the talent without making announcers hard to listen to.

The EQ3 comes in a two rack-unit package with all controls on the front and all connections in the rear. The inputs and outputs are accessible via XLR connectors (pin 2 hot), with additional phone jack outputs as well. Inputs are actively balanced, and the outputs are unbalanced. The international voltage adjustment plug has a built-in fuse for AC protection.

The front panel has six bands of adjustment for each of the two channels, plus an in/out button for each channel. A yellow LED illuminates when the EQ is in the circuit for each channel. Each frequency band is adjusted with a pair of concentric knobs. These knobs are connected switches, not potentiometers, so the adjustments are precise and repeatable. The outer knob click-steps in 3 dB steps, and the inner knob



Night Technology's EQ3

moves in 0.25 dB steps. So the whole range of each filter is adjustable in 0.25 dB steps. Filter center frequencies are sub-bass (10 Hz), 40 Hz, 160 Hz, 650 Hz, 2.5 kHz and "air band." The "air band" is a shelving filter with the elbow at about 2.5 kHz.

The EQ3's noise floor is so low that it is compatible with digital signal chains. It takes 7 V or more to clip the signal, so you can insert the EQ3 virtually anywhere in the analog signal chain.

If necessary, we can use the EQ3 as a gain block. One of the things we like about it is that once the response curve has been set to its final adjustment, you can raise or lower gain by moving all of the frequency control knobs on the front panel one or two clicks up or down. I've tried it in 3 dB steps, but it can be done in 0.25 dB steps as well.

The EQ3 is definitely what we needed. It gives us a full, rich sound without listener fatigue. It is a giant achievement in an unassuming little box.

□ □ □

For information, contact Bill Raventos in Utah at 801-375-9288; fax: 801-375-9286; or circle Reader Service 126.

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USER REPORT

# Unity 2000 Wins in On-air Showdown

by John Alan  
Chief Engineer  
KTRH(AM)-KLOL(FM)

**HOUSTON** To understand what makes Cutting Edge's Unity 2000i today's audio processor of choice, you need to know something about my background. Indulge me in a short trip down memory lane. As a teenager, a section of the basement in our family home was my repair shop where I collected every old radio and television I could get my hands on. I would fiddle and fuddle and often get zapped in my quest to resurrect old electronic gear. By trial and error I learned how to make those fascinating gizmos work.

### History of tweaking

We had an old Philco tube-type hi-fi mono, combination phonograph and AM radio that I commandeered for my bedroom. FM was still largely unknown. I would lie in bed at night and scan the AM dial, listening to as many far-off stations as I could pick out of the clutter. I wondered how the sound got from the station to my Cleveite headphones and why some stations sounded better and louder than others. I even bought a VU meter from Lafayette Electronics and hooked it up so I could see the audio I was hearing.

Later I bought a Knight Kit AM transmitter, used its basic design but made it bigger to get more power output. I helped several pirate broadcasters in the Grand Rapids area, and they all had to sound loud and clear.

I have probably done as much tweaking and modifying of different types of audio processors as any of my in-the-trench peers. God also blessed me with a good set of ears and the knowledge to interpret what I hear on the radio and how it relates to the audio processing.

Enter the Unity. About three years ago there was a rash of new offerings of audio transmission processors from established sources and a couple of newcomers. True to form at that time, I was using several different boxes from various manufacturers, all of which had been modified in some way to do what I wanted them to do. I felt our audio was as good as anyone else's in the market.

With such an array of knobs, however, I found myself chasing my tail at times. If I were to die in a fiery car crash, the station would be scrambling if something in the audio chain gave out. With all the new fancy do-it-all boxes coming out, it was time to find one that could replace the majority of our collection.

KLOL is 100 kW at 1,970 feet and our sister station, KTRH, a 50 kW DA-2. We set up a system to test competitors against one another and our current system, the only true test of what a processor can do. We arranged to have a number of processors, including the Unity 2000, for an on-air showdown.

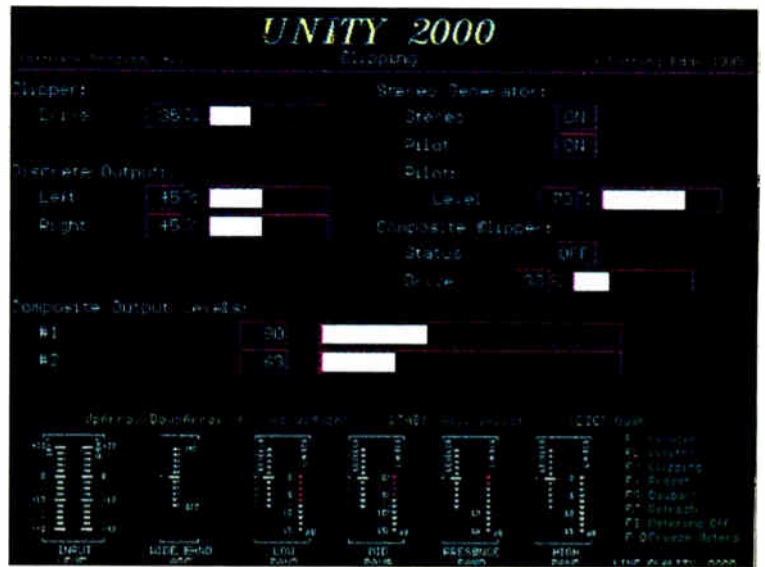
Since we were happy with the sound of our station, our objective was to find the device that could best mimic our proprietary collection, which we felt offered the best in the elusive loudness-versus-dis-

ortion tradeoff. We set up a series of empirical listening tests.

One at a time, we eliminated the system we felt was the weakest. When it was over, two systems were left—our collection and the Unity 2000.

### A blow against digital

Time to strike a blow against the digital madness sweeping electronics land like a deadly airborne virus. In our blind listening continued on page 58 ▶



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## Digital Audio Workstation Myths

### Exploding the Price Myth

**Myth:** "I have to spend \$10,000 to get a professional digital audio workstation."

**Fact:** The CardD System's FastEddie™ software gives you the fastest and easiest cut-and-paste editing you will find at any price. The waveform display gives you sample-accurate editing. The CardD System's Card Plus™ audio board has truly outstanding sound quality. You can pay a lot more and get a system that won't do your radio production work as well as The CardD System.

### Exploding the Multitrack Myth

**Myth:** "I need a multitrack digital audio workstation to do voice-overs."

**Fact:** FastEddie's split-screen editor and MIX tool let you overlay sounds. You can lay a voice over a music bed, and then lay sound effects on top of the voice-over. There is no limit to the number of sounds so you can layer in FastEddie. So, even though The CardD System is called a "2-track" system, it does the production work that used to require a multitrack tape machine.

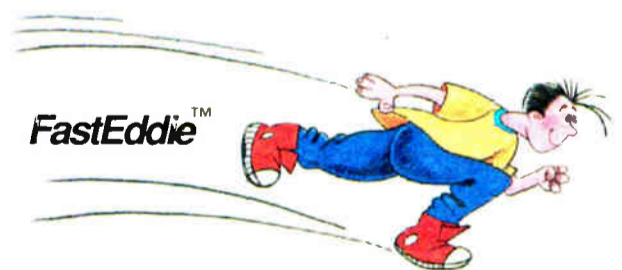
### Exploding the Complexity Myth

**Myth:** "Digital Editing is complicated to learn and use."

**Fact:** Most CardD System users were editing on tape before purchasing The CardD System. The CardD System is easy to install on your IBM-compatible computer, and the FastEddie editing program is very intuitive and easy to learn. FastEddie comes with a Quick Start guide and a tutorial, including sample sound files. Hundreds of CardD Systems are in radio stations doing daily production work.



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# Unity 2000 Wins Broadcast Showdown

► continued from page 57

tests with a host of trained and untrained ears, two comments emerged about every digital processor tested. First, the high frequency range sounded fragile, brittle and at times artificial.

Second, the audio passing through the digital processors sounded two-dimensional. The Unity is different. All control circuitry is digital. But the audio signal is never converted from the analog domain. This means predictable, repeatable precise digital control of a natural, unadulterated audio path.

Cutting Edge's Frank Foti is working on a totally digital processor. But he has told me that he won't release it until it sounds



as good as the analog path in the Unity. Digital certainly has its place, and the day will come when we are digital end to

end, but so far the best digital processor is no match for the best analog device.

The best digital processor today is

emulating what the Unity's audio path does naturally. In the emulation, audio goes through an A/D converter, then the audio is sampled at a rate that is often much too low and then converted back to the analog world. The comment I hear most about the Unity is its open, three-dimensional sound, plus it can get very loud. Sound is analog from the source to the analog receptors in your ears. Analog sound is natural; digital manipulation is artificial.

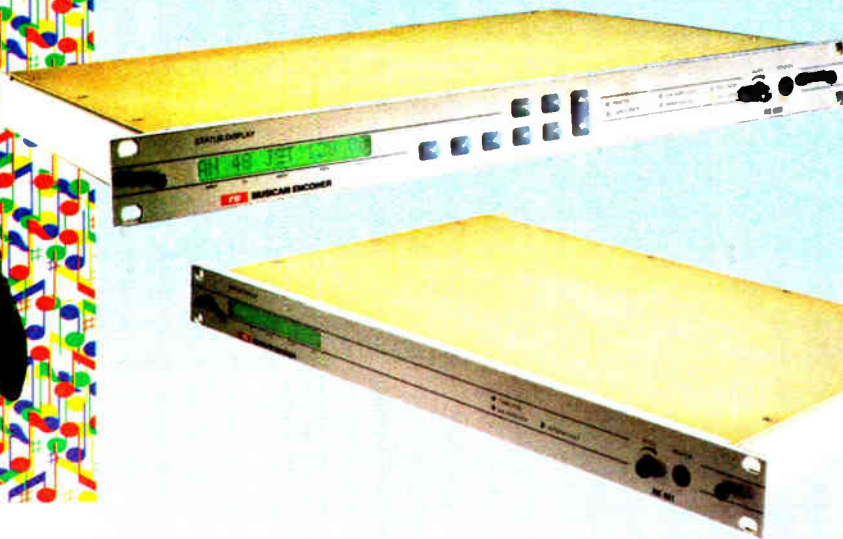
## Some tinkering

The Unity does require some tinkering to get it the way you want it. My advice is if you're basically happy with the sound you have but are looking for more, get a Unity and set it up in an A/B configuration with your present system. Then match the sound of the Unity to your system. After that, you can dial in the improvements you seek, like more loudness, better highs, a stronger bottom or just a more natural, open sound while maintaining the positive aspects of your current setup.

If you're using the Unity from scratch, simply pick the preprogrammed setup that most closely matches the sound you



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World Radio History

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want, then tweak from there. If the Unity is at the transmitter, no problem. Remote software is included free with every Unity. You can adjust it from your office, home or even through your laptop connected to a cellphone.

Several levels of security are available. And customer service is available. You can call and talk to Frank himself. If he doesn't have the answer, you'll need to come up with a new question.

## AM version

Recently, Cutting Edge has made available the Unity-AM, which is the AM version of the FM 2000i. The AM processor incorporates all the features of the FM box but is tailored for AM broadcast. The Unity-AM has full NRSC pre-emphasis and filtering. Recently, my sister station in Houston, KTRH, installed a new DX-50 and bought a Unity-AM to max the signal out. Compared to the multiband processor they were using, the Unity-AM is louder and cleaner with fewer processing artifacts. Like the FM2000i, Unity-AM has the same open yet loud sound.

Let me tell you what I have told everyone who has asked me about the Unity. The Unity represents the best compromise between loudness and artifacts. If I could find a better processor, FM or AM, I would buy it. So far, that hasn't happened.

□ □ □

For information, contact Danielle Kreinbrink in Ohio at 216-241-3343; fax: 216-241-4103; or circle Reader Service 162.

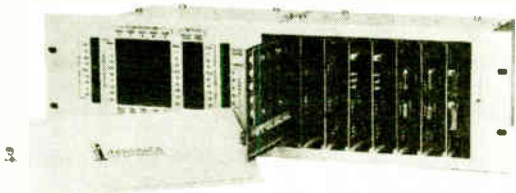
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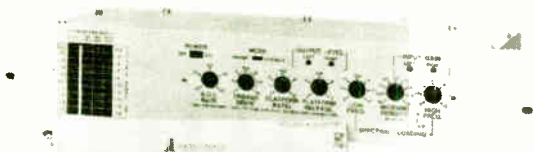
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## 250 Programmable 5-band Stereo Processor

Gated AGC, 5-band Compression and EQ, split-spectrum Limiting—all with colorless PWM gain control. Manually pre-program 4 processing presets, or place entirely under computer/modem control via RS-232 bus.



## 255 "Spectral Loading" FM Processor

Triband-PWM Stereo Processor for contemporary music formats. Gated AGC, 3-band Compression and Limiting; unique "Spectral Loading" feature for a very aggressive sound.

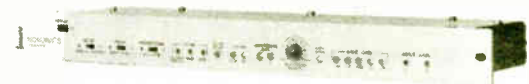


## 260 Multifunction FM/TV Processor

Stereo AGC - Compressor - Limiter ideal for TV-aural and budget FM's. Split-spectrum dynamic control.

## 715 "DAVID" FM Processor / Stereo-Gen.

AGC - Compressor - Limiter, plus clean Digital Synthesis of the multiplex baseband signal. Internal RBDS/SCA combining; amazing performance at low cost!



## 705 & 706 Digital Synthesis Stereo Generators

Choice of a no-frills, basic Stereo-Gen., or a full-featured unit with metering and remote control. Both have patented overshoot compensation and a clean sound.



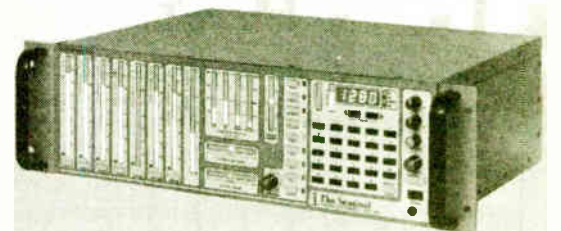
## 530 Off-Air FM Modulation Monitor

Tunable Mod-Monitor gives accurate measurement of total mod., pilot injection, stereo separation, etc. The peak flasher, metering and alarms may be removed.



## 550 The "Sentinel" Monitor Receiver

All-mode radio tunes AMAX-spec C-QUAM® Stereo, FM/FMX® Stereo and all analog and digital RBDS/SCA subcarriers. Comprehensive audio diagnostics permit off-air evaluation, comparison and analysis.



**Coming soon:** An easy-to-use RBDS Encoder, and a Monitor/Decoder for use with any FM Mod-Monitor.

# Inovonics, Inc.

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## USER REPORT

# Prism Gives WZKB Powerhouse Sound

by Mac Jones  
Owner  
and Jim Smith  
Chief Engineer  
WZKB(FM)

**WALLACE, N.C.** Being in the largest town in a 30-mile radius, as well as part of a business hub, we tend to get a lot of traffic and have a relatively large listening audience. Even though our residents number only about 3,200, our market size is 120,000.

Recently, we decided that it was time to pump up our mix of oldies, AC and Southeast beach music, and to fill out our signal in fringe areas. Driving out of Wallace, we noticed that our signal started to pop, hum and crack (picket fence, as we call it) between 33 and 35 miles out. And by the time we reached Comfort, N.C., about 35 miles away, we lost the station.

To fill out our signal in these fringe areas, to decrease multipath distortion and to increase our presence on the band, we decided to invest in some audio processing gear.

We called Cindy Edwards with the Audio Broadcast Group and told her what we wanted to do. She responded with a pair of Prisms from Gentner.

In early April we installed the Prisms. The installation could not have been simpler. We hooked them up, ran a couple of wires to them and they went to work. The



Mac Jones credits the Prism for adding miles to his station's signal.

instruction manual says that setup takes two minutes, and that's not an exaggeration. The step-by-step instructions were complete and straightforward, with various types of settings we could try for the sound we wanted to achieve.

We had another pair of processors available, so we hooked them up also and

conducted an unscientific comparison. They made a minor difference in the sound. But the difference with the Prism was like night and day. It was so noticeable, we stood in the control room saying, "I don't believe this." And that was its performance right out of the box, before any adjustments.

What's especially handy about the Prism are its controls. By making meter readings, you can return to previously set adjustments if you do not like adjustments you have just made. With a lot of other systems, that is not possible.

Now our sound is much fuller: it's got richer bass and better mid-ranges. The highs are absolutely fabulous. Our 3300 W FM station now has a 100 kW killer sound.

Our first test run of the processors involved driving around in the van, listening to an Elvis Presley song. It sounded like Mr. Presley was sitting on the dash.

We now have presence on the band that we did not have before. It is phenomenal. If you ride around in our listening area and scan among the three 100 kW power-

house stations that cover our market, we are right there with them.

This system has enabled us to be louder without generating a harsh, grating sound. If you listen to one of our competitors for a few minutes, the sound grinds on your nerves. They run composite clipping, which no doubt makes them louder, but the sound is hard to bear. We are as loud as they are in this market without running composite clipping.

The Prism is definitely a good investment, and there is no doubt that it will pay for itself. It has added a couple extra miles all the way around our signal, so now the signal is solid all the way out to the 35-mile mark. And it brought 10,000 to 15,000 more listeners to WZKB.

If another station owner or engineer asked us about checking out the Prism, we would say not to try it unless you intend to buy it. If they're going from no processing to the Prism, like us, then it is well worth the money.

We knew what we wanted and needed in a processor and the Prism fit the bill. It is a perfect thing.

□ □ □

For information, contact Rich Finlinson in Utah at 800-945-7730; fax: 801-977-0087; or circle Reader Service 81.

## SPECIAL REPORT

## New Optimod Options

**SAN LEANDRO, Calif.** Orban offers both PC remote control software and a new encoder for its 8200 digital processor.

Orban's 8200PC software provides stations using an 8200 processor with full control of its Optimod-FM processing from any location. 8200PC displays all of the 8200's meters and processing controls on a computer screen via modem connections or direct connections. With 8200PC, station staff can listen and make changes to the sound from the studio, home or anywhere else conducive to making critical listening decisions.

8200PC is intended for applications where one or more Optimods require remote control. Stations with Optimods located at transmitter sites can make real-time changes via computer, while leaving Optimod-FM 8200 at the transmitter. 8200PC's backup feature enables multiple Optimods to share either individual processing presets or an entire catalog of settings (processing, automation, I/O, calibration and remote interface).

This software is designed to be easy-to-use for anyone with a basic knowledge of Microsoft Windows and Optimod-FM 8200. It includes controls to modify presets and to do most anything else that can be done from the 8200's front panel controls. 8200PC also maintains the passcode security of the 8200, offering the user only those features that his or her passcode is authorized for.

The 8208 is a remote, standalone stereo encoder that accepts digital-domain STL signals from the 8200. It

is intended for applications where a single Optimod unit supplies the same program to two or more transmission sites. In no-loss (no data compression) digital distribution systems, the 8200/8208 combination provides control of overmodulation without overshoot, artifacts or loss of loudness.

The 8208 accepts either analog or AES/EBU digital inputs, with all encoding accomplished in the digital domain. The digital input automatically synchronizes to any sampling rate from 32 kHz to 48 kHz, and automatic switching of pre-emphasis and/or de-emphasis follows status bits in the AES/EBU signal.

A front-panel switch selects analog or digital inputs. However, if digital input is selected and no valid digital input is present, the 8208 automatically reverts to analog inputs until a valid digital signal is restored.

Other 8208 features include front-panel LED metering for composite output level, pilot level, left and right input levels and output levels; rear-panel DIP switches to select pre-emphasis type and usage; and optoisolated remote control of input selection, de-emphasis on/off and type, mode selection, and mono signal to left or right channel only.

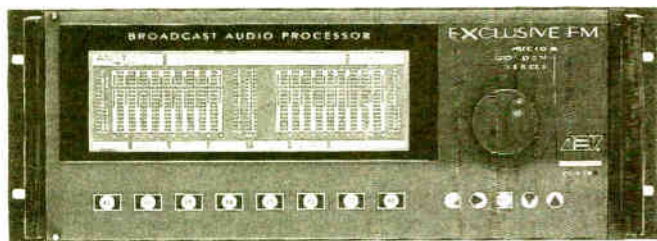
Key specifications include a signal-to-noise ratio better than 90 dB, separation greater than 70 dB, total system distortion less than 0.005 percent THD and crosstalk less than -85 dB.

□ □ □

For more information, contact the company in California at 510-351-3500; fax: 510-351-0500; or circle Reader Service 171.

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## SPECIAL REPORT

# David-II Pumps Sound without Fatigue

## David Upgrade Strikes a Compromise Between 'Aural Brutality' and Long-Term Listenability

**SANTA CRUZ, Calif.** A few years ago, Inovonics introduced a simple, inexpensive FM stereo processor/generator to meet the needs of budget-minded broadcasters. The product was nicknamed David (as in David and Goliath), though the intention was never to suggest head-on competition with the much more complex FM air-chain products in common use. Despite its modest intentions, David has enjoyed

widespread acceptance.

Recently, Inovonics introduced the David-II. This new unit features a redesigned processing section that aims both to satisfy broadcasters who insist on taking radio processing to the thresh-

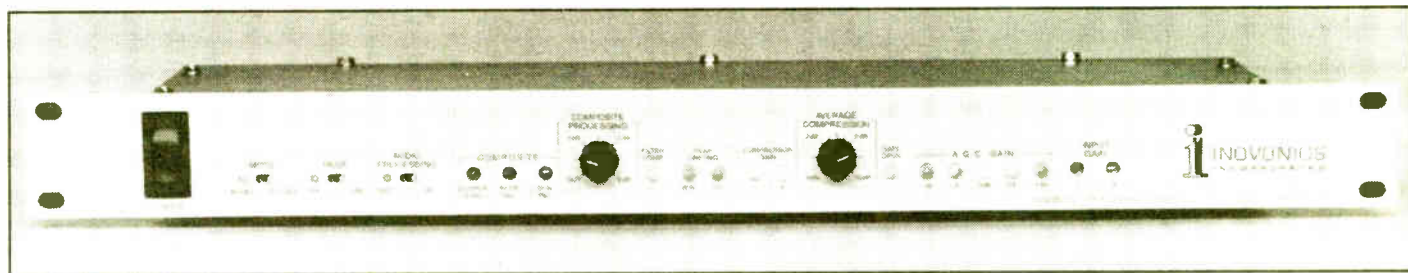
old of aural brutality, and to deliver a signal with long-term listenability. Processing in the David makes use of feedforward pulse width modulation (PWM), a technique initiated into broadcast audio processing system by Inovonics more than a dozen years ago. Feedforward PWM, though by no means a digital processing system, is still an

on/off, "one and zeroes" method that eliminates FETs, VCAs or other implementations of the classic analog gain cell that can be critical in design and often require trimming to reduce distortion and control feedthrough. Moreover, feedforward processing yields a gentle transition into compression and limiting, rather than the abrupt compression or limiting threshold com-

emphasis curve.

Other features include proprietary low-pass filter overshoot compensation and internal RDS combining. The David-II is also equipped with an adjustable composite processor, which is placed ahead of the 19 kHz stereo pilot injection point to eliminate any possibility of clipping the pilot.

The design objective of the David-II is to answer the need for an easy-to-install, easy-to-use FM processor/generator for a wide variety of broadcasting situations. Of course, no product of this class can pretend to furnish the sound-shaping



David-II uses feedforward PWM, a technique Inovonics introduced to the industry.

mon to more traditional feedback gain control circuits. Feedforward PWM permits considerably more dynamic range control before processing artifacts become audible.

David-II processing furnishes slow, gain-riding AGC, as well as split-band compression and limiting that conforms to either the 50- or 75-microsecond pre-

versatility afforded by a complex multi-band processor. Nevertheless, when cost and simplicity are key, the category of products represented by the David-II deserve careful consideration.

□□□

For information, contact Jim Wood in California at 408-458-0552; fax: 408-458-0554; or circle Reader Service 78.



## LMA/DUOPOLY CONTOUR MAPS

The **DATAWORLD** LMA/DUOPOLY Market Survey Contour maps present a precise electronic verification of overlapping and intersecting contours.

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## SPECIAL REPORT

# Air Chain Adds Listeners to KALW

**SAN FRANCISCO** When Aphex Systems began hearing reports of added fringe coverage by users of its Digicoder stereo generator, the company held off promoting this important benefit for more than two years. Only after FM stations around the world corroborated the reduction in multipath and the additional fringe coverage did Aphex begin to go public with these benefits.

The story of how WDRE(FM) in Long Island, N.Y., added coverage of a million more people in New York City and Long Island, as well as a six-figure increase in ad sales directly attributable to new coverage, has been publicized in recent months.

KALW(FM) in San Francisco provides another dramatic case history, along with a unique way of proving that "something's really happening out there." Last year, KALW installed the Aphex Air Chain, consisting of the Model 720 Dominator II peak limiter, the Model 320 Compellor leveller/compressor, and the Model 400 Digicoder stereo generator. KALW is a public station, supported by listener contributions. KALW Chief Engineer Dave Evans compared the number of listener subscriptions from well-established fringe areas before and after installing the Aphex Air Chain:

CITY	DISTANCE	% INCREASE
Palo Alto	30 miles	9.5%
Orinda	18 miles	9.3%
San Ramon	28 miles	14.2%
Cupertino	43 miles	8.0%
Los Altos	34 miles	4.3%
Mtn. View	36 miles	12.5%
Redwood City	24 miles	9.7%
Sunnyvale	37 miles	37.5%

Evans notes that this is an average of 13.1 percent increase of subscribers in these selected fringe city zip codes.

KALW General Manager Jerry Jacob confirms the results. "I was aware of a very high number of subscribers on the improvement in our signal. We had made no transmitter, antenna or power changes. We did not even change the tower lights,

"We have done nothing else technically to affect either the sound or signal of the station. As a matter of fact, I live in an FM null and now can hear the station even on low-quality radios without external antennas."

How does the Aphex Air Chain sound? Jacob, with a background as acoustics consultant and recording studio owner, says, "I've never heard as obvious an on-air difference as



The Air Chain, with the Digicoder, makes a substantial on-air difference.

with the Digicoder. A/B comparison with other stations makes the Aphex difference really noticeable, especially when we use KALW as a reference level. I am not confusing distortion and excessive compression with loudness. You can listen to KALW and KKSF (another San Francisco Aphex-equipped station) for longer time spans at higher real levels than to the competition without ear fatigue or irritation. That translates to higher average quarter hour and cumes."

□□□

For further information, contact Brad Lunde in California at 818-767-2929; fax: 818-767-2641; or circle Reader Service 98.

# THE StereoMaxx 3-PACK: MARKET WINNING SOUND.

SOUND BETTER AND LOUDER WITH A REAL IDENTITY  
WITHOUT SPENDING BIG MONEY FOR BIG NAME PROCESSORS.



## The StereoMaxx: Spatial Image Enlargement.

When everyone in town is processed to the hilt, what can you do to win the sound battle? The answer is StereoMaxx. It makes your station sounds bigger, not just louder, by enhancing and enlarging your station's stereo image, making it wider and deeper beyond the boundaries of the speakers. No matter what type of radio your listeners tune, StereoMaxx will make your station sparkle with energy and excitement. While your competition will sound flat, dull and lifeless by comparison. And when you use it with our Composite Processor and the FM ModMinder, you get to be the most identifiable station in your market. Guaranteed.

## The Composite Processor: 6 dB More Loudness. U.S. Patent 4,441,199.

Add up to 6dB more loudness, without ringing or overshoot, giving you the maximum modulation the law allows. Installed at your transmitter site, working with the StereoMaxx or any other existing processor, the CP-803 will make your air chain the loudest in town. This patented clever processor deals with the composite signal out of the stereo generator, avoiding many conventional audio problems associated with other (even some famous) processors.

## Don't Pay Big Money For Big Name Processors.

Big name processors come in two basic versions: The economy model that does very little and the expensive models that do too much. Either way, your station may be stuck with the same sound as your competition. Big money for big name processors does not necessarily mean market winning sound.

## The FM ModMinder: Absolute Max Modulation.

Digital technology and the FCC approved measurement method utilized in the FM ModMinder enable your station to operate at absolute maximum legal modulation. If your competition is not FM ModMinder equipped, your station will have them beat. Guaranteed. Easy dial-up access software included so you can perform a host of test functions by remote control from your office based PC (or from anywhere else in the world), giving you peace of mind every day.

## Here's The 3-Pack Deal: Buy The StereoMaxx & ModMinder. Get a Free Composite Processor.

We give you a free CP-803 Composite Processor when you buy the StereoMaxx and the FM ModMinder together (you save \$1,495). Or, if you don't need all three, your MSI dealer will surely give you a great deal on any one or two of them. And if you're running duopoly, here's an opportunity to get the MSI processors you need on a great deal for all your stations. Act now, because this is a limited time offer.

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## SPECIAL REPORT

# New DP-100 Is True Digital Processor

**TEMPE, Ariz.** CRL Systems has added the DP-100 to its line of FM audio processors. The DP-100 is a true digital processing system. It includes a digital stereo generator, gated AGC, five-band compressor and three-band limiter. Also included is CRL's stereo sound enhancement feature and an improved digital version of the company's patented dynafex noise reduction system.

The DP-100 does not emulate an analog processor. Using 32-bit floating point processors, the DP-100 reaches a high degree of processing flexibility and power. Software configurations and expansion capabilities for split-site



and RDS/subcarrier generation are included.

The processor boasts an 18-bit, or optional 20-bit, A/D converter with a dynamic range of 107 dB A-weighted (20-bit, 110 dB dynamic range) and eight-times oversampling D/A converters with 108 dB signal-to-noise ratio. The DP-100 comes standard with asynchro-

**A touchscreen is the focus of the DP-100's front panel.**

nous sample rate AES/EBU input and output, and XLR-wired connector and optical interface. Analog and AES/EBU

sources are mixable and routable digitally with the DP-100. All input/output ports can be individually assigned and routed for added flexibility. The DP-100 also offers manual or automatic tracking of analog input controls for calibration.

The DP-100 includes remote control inputs and outputs and serial ports. Using your computer with DP-100's PC software gives the user complete remote control of his or her processing. Enhanced menu screens make the unit's Windows-based PC software easy to use and understand.

Complete 100 percent digital architecture makes expansion simple. Two additional I/O slots are provided and three DSP multiprocessor cards can be added. Also, future upgrades will be easy from any PC with CRL's Windows-based software.

The focus of the front panel of this processor is a large touchscreen LCD display with an array of graphical menus. The user simply touches the screen for the desired fine-tuning function.

The DP-100 offers complete configurable security protection. Eight different passwords can be customized to the user's skill level or ability. Each password can be designed to be view only, or any combination of view and write privileges. These passwords can also define which menu operation the user can access. The processor offers either a fast basic menu or a comprehensive advanced menu option.

□ □ □

For more information, contact Valerie Hummer in Arizona at 800-535-7648; fax: 602-438-8227; or circle Reader Service 20.

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**KLARK TEKNIK**

**Version 2.0 Software in DN3600A Provides More Intuitive Control, Faster Memory Access**

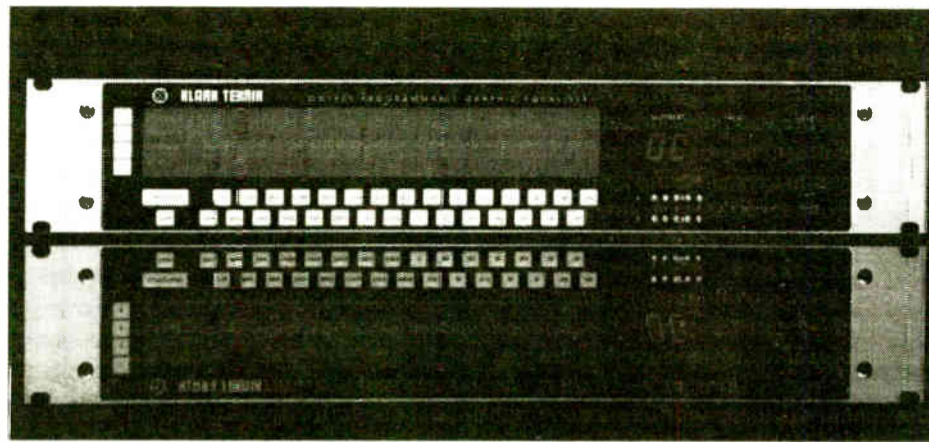
**BUCHANAN, Mich.** Klark Teknik has introduced the DN3600A programmable, digitally-controlled graphic equalizer with Version 2.0 software.

The DN3600A, introduced last year as the DN3600, now features a brighter screen display that is easier to view under a variety of lighting conditions. Owners of the original DN3600 equalizers can have their units upgraded to the "A" version for a reasonable charge. The new software is being issued as a free upgrade for owners of existing DN3600 equalizers.

Version 2.0 software is a complete rethink of the operation of the DN3600, with improved and expanded facilities, easier and more intuitive control, faster memory access and a greater degree of legible information presented to the user.

The most obvious change relative to previous software versions is the additional information displayed at the top of the screen, including numerical frequency and level display of the selected fader, name of last recalled memory, Q mode and channel selected.

The equalizer faders, as well as the low-/high-pass filters, now can be adjusted in the curve display; the display



changes in real time. Also, the display mode now can be inverted so that the graphic image is either blue on white or white on blue.

Additionally, when the DN3600A is interfaced to a Klark Teknik DN60 real-time analyzer, auto EQ to a user curve is now possible. Instead of replaying the fader positions with the curve dictated by the DN60, auto EQ now adds the DN60 data to the fader positions.

The user can recall a preferred curve from memory and do an auto EQ function to combine it with the calculated room correction.

For information contact U.S. distributor Mark IV Pro Audio Group in Michigan at 616-695-4750; fax: 616-695-0470; or circle Reader Service 129.

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Monitors, Headphones & PA Equipment
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STL, Telco, Remote & ISDN
- November 1—  
FM Transmission & RDS

**FOCUSRITE**

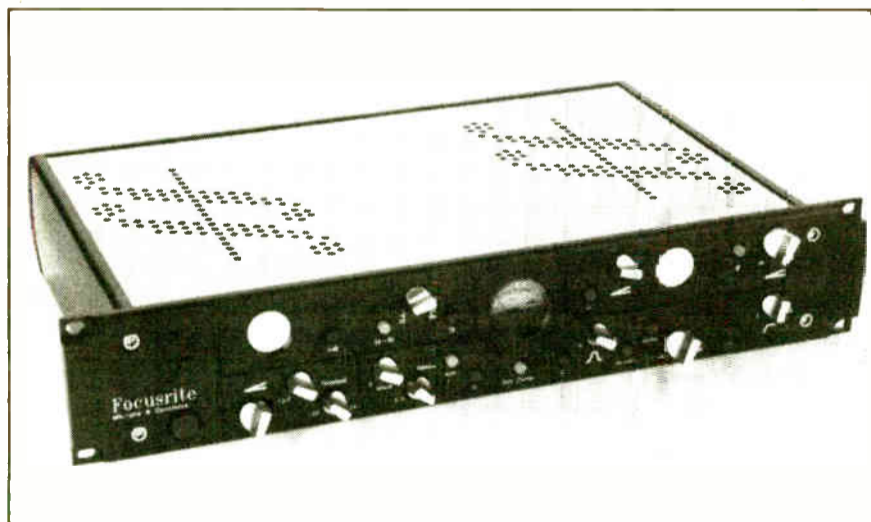
**Red 7 Combination Microphone Preamp and Dynamics Processor Used for Voiceovers, Recording Studio and Concert Sound**

**BOURNE END, England** The new Focusrite Red 7 is a combined microphone preamp and dynamics processor for use with voices or instruments, from microphone to storage or transmission.

The Red 7 is the result of years of development and refining and uses a high-performance Lundahl trans-

former at the input to provide correct matching for microphones over a wide range of impedance. includes the mic pre, a VU-type meter that shows level after the chosen input, or that may be switched to indicate gain reduction being applied by the compressor. To the right of the VU meter is the line input stage and the output fader.

The lower half of the panel contains the controls for the compressor on the



former at the input to provide correct matching for microphones over a wide range of impedance.

The dynamics section is based on the proprietary Focusrite discrete VCA, which is externally controlled by off-line VCAs providing compression and de-esser/exciter functions. This approach provides two dynamics functions with completely independent control with only one VCA in the signal path, resulting in low noise and very low distortion.

The upper half of the control panel

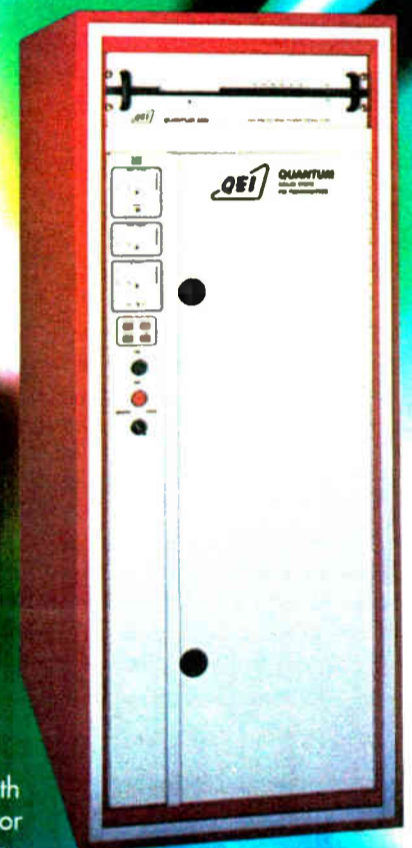
left-hand side and the de-esser and excitation functions on the right. Lastly, there is a high-pass filter to remove any unwanted rumble and low-frequency noise.

Red 7 can be used in various applications, including voiceovers, workstation overdubs, and recording studio and concert sound.

For information on Focusrite, contact Group One, U.S. distributor, in New York state at 516-249-1399; fax: 516-753-1020, or circle Reader Service 157.

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## LEXICON

### Lexicon 300L Features LARC Remote Controller, Extensive Analog And Digital Interfacing

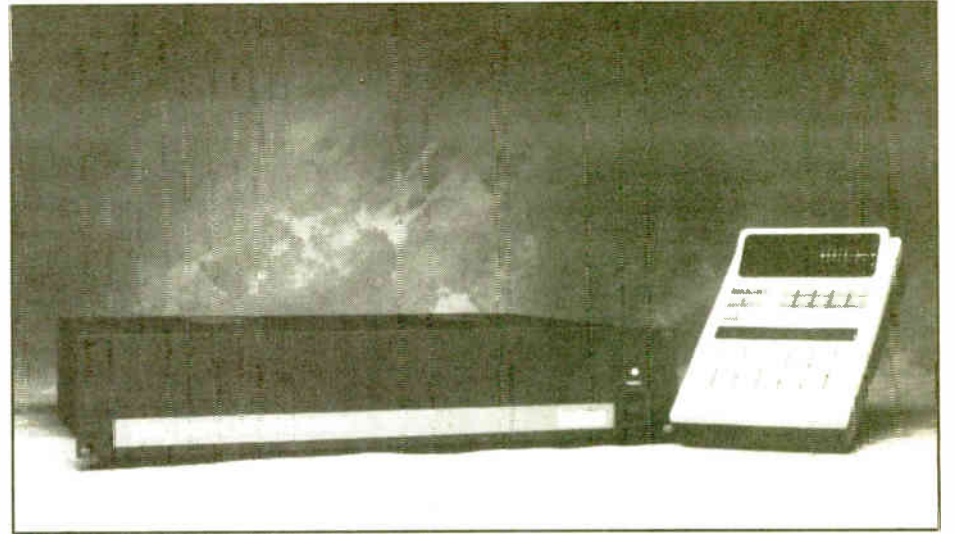
**WALTHAM, Mass.** The new Lexicon Model 300L is a compact, versatile and powerful reverb/effects unit particularly suited to radio production work. A true stereo device, the unit offers a number of features, and the well-known Lexicon sound, at an affordable price.

Based on the Model 300, the 300L offers the additional functionality of Lexicon's familiar LARC remote controller, allowing effects to be selected and adjusted from the mixing console.

Offering extensive analog and digital interfacing—particularly valuable as stations gradually convert to digital audio—

the 300L features a multimachine architecture similar to that of the Model 480L in a compact, rack-mountable package. Both single- and split-machine setups are available on the Model 300L, the former running two Lexicon DSP engines in a unified stereo configuration, while split setups offer dual mono and cascade configurations.

Single-machine algorithms available include reverb, ambience, stereo pitch shift and stereo adjust/delay, while the split configurations offer chamber, dual delay/flange, compression and mono shift. The Model 300L offers a range of



timecode- and MIDI-based facilities, including a 50-cue event list and the

ability to automate parameter changes and glides, making the 300L particularly useful for post production applications. The 300L also features Lexicon's Dynamic MIDI for greater control within a MIDI setup.

The Model 300L's ROM-based software can be upgraded in minutes by inserting new chips.

For information, contact Will Eggleston in Massachusetts at 617-736-0300; fax: 617-891-0340; or circle Reader Service 204.

*Looking for the ultimate affordable digital STL solution?*



# Look No Further!

## Moseley

▼  
Moseley Associates Inc.  
111 Castilian Drive  
Santa Barbara, CA 93117  
Voice (805) 968-9621  
Fax (805) 685-9638

**W**HEN Moseley introduced the DSP 6000 in 1992 it was immediately acclaimed by the broadcast industry as THE digital STL solution. Here's why. The DSP 6000 virtually eliminates the problems associated with conventional analog transmission such as noise due to signal fades, birdies from intermod interference, and lack of spectrum for multiple audio feeds to LMA and Duopoly transmitter sites. Almost three years later, the DSP 6000 is the de-facto industry standard for sonic clarity and reliability with sales approaching 2,000 installations worldwide. But you probably already knew all of that stuff, right?

What you may not have known, is that the DSP 6000 also works in conjunction with your existing Moseley analog composite STLs! If you've invested in a Moseley PCL 505/C, 600, 606, 606/C or 6000, a few simple modifications convert your entire system to digital! And it won't cost a pot of gold (just under \$6,000). **Call us for modification instructions, or better yet, ship us your STL and for a mere hundred bucks, we'll make the modifications and do the setup for you.**

Isn't it time you stopped chasing rainbows and started enjoying the sonic clarity of digital? "Digitally clear. Clearly digital. Just the way we planned it." ▼

## MICROCON SYSTEMS

### MicroCon Backs FM FlexiMod with 30-day Money-back Guarantee

**BROADVIEW HEIGHTS, Ohio** MicroCon Systems guarantees that its new FM FlexiMod audio processor will improve the sound of any FM station, or the company will give the user his or her money back in 30 days.

The processing engine of the FM FlexiMod has been designed using new computer models of human hearing perception and fine-tuned under on-air conditions. The heart of the unit is the company's proprietary Turbo C-Limiter circuit topology, which combines the attributes of a fast, clean limiter with an effective, low-distortion clipper.

The C-Limiter module is more than a gain controller; it also provides a subtle signal enhancement by introducing a low-frequency time alignment to improve bass by clarifying the low frequencies. It also adds subtle high-frequency harmonics to the stereo baseband to replace those lost through multigeneration audio dubs.

The FM FlexiMod also contains MicroCon's Pilot-Lok circuitry, which keeps the pilot pristine for maximum stereo separation. Harmonics created by the unit are down more than 25 dB at 19 kHz.

A fully isolated test output is provided on the front panel. This port can be used for scope monitoring of the composite signal, or an FM demodulator can be fed for critical composite monitoring.

Installation and setup of the FM FlexiMod usually takes less than 15 minutes. After inserting it into a composite chain, the user advances the drive control for approximately 1.5 to 2 dB of processor activity, then adjusts the 10-turn modulation control for normal modulation.

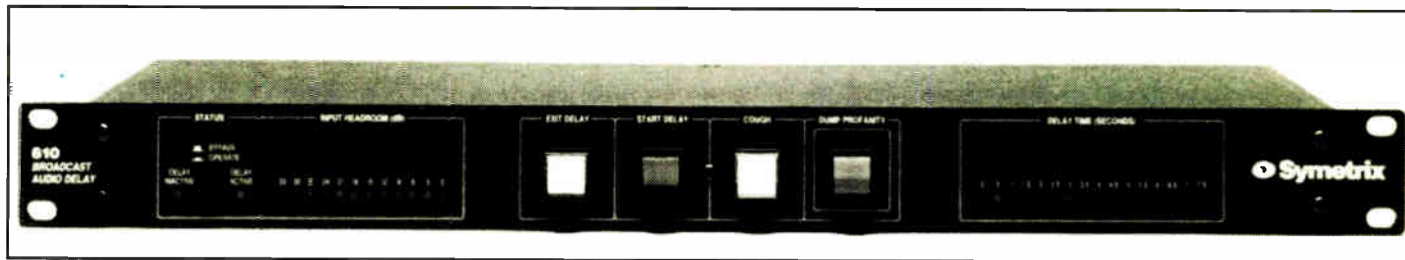
For information, contact Jim Somich in Ohio at 216-546-0967, or circle Reader Service 209.

**SYMETRIX**

**Symetrix Broadcast Delay Lets Host Dump Obscenity Without Dreaded Dead Air**

**LYNNWOOD, Wash.** The new Symetrix 610 stereo broadcast audio delay brings new features to talk radio. Selectable modes of operation give the host the choice of dumping all 7.5 seconds or only 3.75 seconds, half of total memory, when activating the Dump button. The host of a fast-paced show can

delete an obscenity and go right to the next caller without stalling or going to a commercial break because he consumed all the delay time.



The 610 provides four rates of catch-up to match the pace and program content of the show. The user chooses between music-quality audio or extra-fast buildup of delay time. The operation of the delay system no longer has to dictate the pace of the show.

The 610's new Cough feature allows the host to cough, sneeze or swear back at a caller without subjecting listeners to dead air. A relay bypass circuit removes the 610 from the audio chain when it is not in use. Eighteen-bit Delta Sigma A/D and D/A converters provide greater than 90 dB of

dynamic range. The 610 uses a Motorola DSO56002DSP chip; frequency response tracks within 1 dB from 20 Hz to 14 kHz. The stereo balanced bridging inputs accommodate up to +24 dBu input levels. The outputs drive 600-ohm loads up to +24 dBu. Inputs and outputs connect through XLR connectors; pin 2 is high. All control and status functions remote through a female DB-25 connector.

For information, contact Walt Lowery in Washington state at 206-787-3222; fax: 206-787-3211; or circle Reader Service 219.

**QEI**

**New Digital Stereo Generator From QEI Boasts AES/EBU Audio Input and CD-Quality Audio**

**WILLIAMSTOWN, N.J.** With the introduction of the 710 digital stereo generator, QEI Corp. offered a completely digital stereo generator. Earlier this year, QEI was awarded a contract to design and manufacture a digital stereo generator with AES/EBU input for use throughout the Swedish Teracom's facilities. This redesign of the 710 has led to the development of the U.S. version of the 710A digital stereo generator.

The 710A boasts the addition of an AES/EBU digital audio input along with increased apparent loudness, long-term stability and CD-quality audio performance. This unit offers noise measurements of -90 dB, distortion less than 0.008 percent and separation better than 75 dB.

Behind these specifications is a true numeric digital processing system. From the 64-times oversampled FIR (finite impulse response) filters to proprietary second-generation firmware and 18-bit D/A converter, the 710A generates and controls the signal

entirely in the digital domain.

The front panel offers recessed input and output level controls, stereo/mono switching, pilot and pre-emphasis on/off and composite output test sample. LED bar graphs provide instantaneous display of the left and right channel input level and output.

In addition to the audio level metering is a separate audio loss indicator. The output metering is selected by means of a composite/main/subchannel switch. Unique to the 710A's rear panel is the AES/EBU digital audio input, which allows direct connection to the Cat-Links D-Max AES/EBU digital audio input, analog left/right audio input, power switch and remote control connections for stereo/mono selection, mono left or mono right channel mode and a connection for stereo or mono default on power up.

For information, contact Jeff Detweiler in New Jersey at 800-334-9154; fax: 609-629-1751; or circle Reader Service 3.

**The Wizard™ has gone STEREO!**

The new DIGITAL FMSA-1 gives The Wizard System unmatched stereo monitoring capabilities. . .



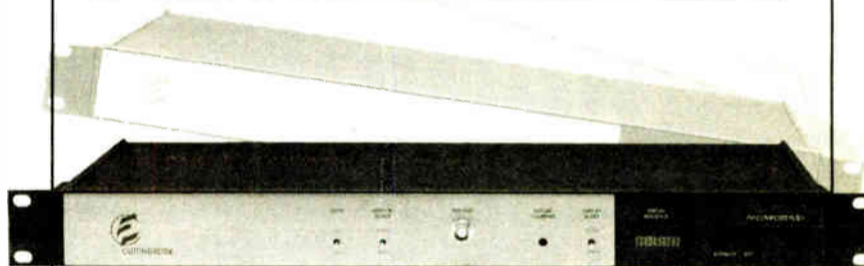
Superlative stereo performance. Linear-phase filters that reveal the true performance of your audio processing. The stability of digital stereo demodulation. The sophisticated graphical presentation of The Wizard. And—with the RS-232 port—operation on site or off.

Contact Belar today for more details on what should be your next modulation monitor.

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Circle (115) On Reader Service Card

**Who needs the Dividend Composite Filter?**



**every FM station that**

- Has subcarriers for RBDS, data services, or other applications, especially when those subcarriers generate revenue
- Uses a microwave STL
- Includes composite clipping in their processing
- Wants to regain lost modulation
- Seeks to reduce multipath related distortion

The Dividend Composite Filter reduces noise often generated by audio processing and STLs in the upper composite spectrum from 53kHz to 99kHz. Now you can protect your subcarrier signals, regain lost modulation, reduce multipath related distortion, and maintain signal integrity for only \$1195.

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**READER SERVICE NO. 178**

## The CircuitWerkes DTMF-16 TouchTone Decoder



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- Combine with an AC-2 auto-coupler for an economical dial-up remote control.

The DTMF-16 is perfect for interfacing networks to your automation, controlling remote satellite receivers, repeaters, etc. With a list price of only \$199, the compact, light & rugged DTMF-16 can be put almost anywhere to provide the remote controls that you need. For more info, contact your favorite broadcast supplier or call us.

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**EVENTIDE**

**New Software for DSP4000 Increases Processing Speed; DSP4000B on Its Way**

**LITTLE FERRY, N.J.** To create version 2.0 of the DSP4000 Ultra-Harmonizer Effects Processor's software operating system, Eventide teamed up with engineer and sound designer Jay Rose.

With the version 2.0 software, programs load 30 percent faster, and internal processing speed is increased. The patch editor function, with which users can create new effects, has been modified extensively to make it easier to use. Version 2.0 software also adds 40 new patchable modules—the building blocks used within the patch editor—for a total of 130 modules in all. The user interface has been enhanced in a number of ways to make the unit easier and more intuitive.



The new DSP4000B version, available later this year, will feature a set of software programs created especially for radio, TV and post production. The unit has a wide variety of pre-programmed sound effects and audio environments. It can create everything from an airplane captain speaking from the cockpit, to the sound of the kid in the drive-through window at a fast-food place.

Announcer voices do not just come in

**WARD-BECK**

**Wideband Audio Compressor Works in Harsh Environments; Compatible with M8200 Series Products**

**SCARBOROUGH, Ontario** Designed to effect a modest 2:1 compression ratio to the balanced input signal, the M8207 wideband audio compressor from Ward-Beck Systems is virtually transparent to program audio.

The M8207 offers a high-impedance bridging input and low-output impedance (60 ohms). It acts on input signals with input signal levels ranging from 0 to 8 dBu. The low-noise circuitry and industry standard gain control element results in 110 dB of dynamic range at unity gain.

State-of-the-art common mode rejection provided by the instrumentation amplifier input ensures that the M8207 will work in harsh environments. High-compliance output drive from the compressor allows a maximum of +30 dBu (+27 dBm) to be delivered to the load.

over the effect; they are part of the effect. Audio environments such as street traffic, a department store and computer sounds are ideal for local production and commercials. Even weather conditions such as rain and thunder, the seashore and wind are available with the push of a button. Unlike canned sound effects libraries, with the DSP4000B, the user controls where in the effect the thunderclaps should be, and exactly when the cash register rings.

Radio stations purchasing a standard model DSP4000 with 2.0 software now can start using this processor right away and convert at no charge to the broadcast version's features when released later this year.

For information, contact Gil Griffith in New Jersey at 201-641-1200; fax: 201-641-1640; or circle Reader Service 165.

The M8207 mounts in a standard Ward-Beck MF-82 rack-mounted frame. It is fully compatible with all members of the M8200 series amplifiers, including preamplifiers, amplifiers and oscillators.

For information, contact Eugene Johnson in Canada at 416-438-6550; fax: 416-438-3865; or circle Reader Service 15.



**8 TRACK DIGITAL EDITING BREAKS PRICE BARRIER \$5,495\***

- A digital audio editor designed for Radio production
- Learn to use in minutes, much faster than tape
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- Add Trak\*Star-8 software to a Digilink for only \$2,000

Trak\*Star-8 is the first cost effective multitrack digital audio editor designed for the radio broadcast professional. Fast and easy to use, produce your commercials on Trak\*Star and then transfer them in digital straight to the Digilink in your On Air studio. Dramatically reduce production time and save money !!!

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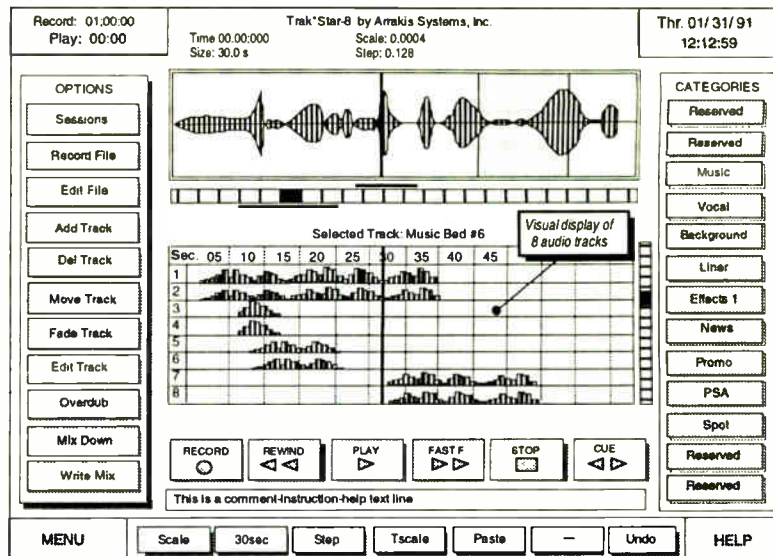
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**ENSONIQ**

**ENSONIQ DP/4+ Processes Up to Four Different Signals, Produces Any of 54 Various Algorithms**

**MALVERN, Pa.** The DP/4+ parallel effects processor from ENSONIQ Corp. incorporates the four-processor approach that revolutionized signal processing and many enhancements suggested by end users.

delays, chorus, flange, phaser, EQ and compressor, and guitar-style effects.

New to the DP/4+ are two algorithms designed to emulate the dynamic "crunch" of a Class A tube



The DP/4+ features four balanced (TRS) inputs and outputs and has a combination XLR/quarter-inch input on the front panel. With four independent 24-bit processors, the DP/4+ can process up to four different signals, with numerous choices for signal routing between processors.

Each processor is a programmable, high-quality custom DSP chip. The DP/4+ is capable of producing any of 54 different algorithms. The algorithms include a variety of reverbs,

amplifier. The processor holds 400 presets, with 100 each for 1 Unit, 2 Unit, 4 Unit and Config Presets.

Other new features include ground-compensated inputs/outputs, a +4/-10 dB switch, a headphone jack with the ability to mute the outputs for isolating signals, and seamless switching between effects.

For information, contact the company in Pennsylvania at 800-553-5151; fax-on-demand: 800-257-1439; or circle Reader Service 193.

# Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

## TWO NEW ADDITIONS TO THE COAXIAL DYNAMICS WATTCHMAN® TRANSMITTER PROTECTION SYSTEMS

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READER SERVICE NO. 6

**FM FLEXIMOD - destined to become as indispensable as your Swiss Army knife.**



Based on 10 years of experience in composite processor design and computer models of human hearing perception, the FM FlexiMod from MicroCon Systems is the FM signal management system that will add sparkle and body to overprocessed, multi-generation audio, and enhance all program material for a consistent, dynamic on-air sound.



- Can be configured in a wide variety of operating modes including both broadband & high frequency limiting applications with either and internally generated & phase locked stereo pilot or pilot reuse from the stereo generator.
- The only processor with the "c-limiter" a hybrid limiter-clipper with extremely low second harmonic distortion products.
- Combines high-speed limiting & ultra clean, low distortion-clipping for absolute modulation control.
- List Price: \$1395.
- Available direct from MicroCon Systems or from your broadcast equipment dealer.
- 30-day money-back guarantee.
- Demo units available.

For further information contact:

Jim Sonich, President, MicroCon Systems Ltd.  
1208 Stoney Run Trail, Broadview Heights, OH 44147  
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No specialized equipment needed to erect. No specialized training necessary to use.

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\* Power-Mac is a trademark of Apple Computer

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READER SERVICE NO. 18

**RADIO DESIGN LABS**

**ST-CLI Offers Protection Without Audible Effects of Tight Peak Control**

**CARPINTERIA, Calif.** The Stick-On series from Radio Design Labs (RDL) includes several audio processing modules, including the ST-CLI, an advanced line-level, low-noise audio compressor that has many in-studio uses.

Operation of the ST-CLI is virtually transparent to the ear, allowing it to be used in front of any input that might overload. Inputs to cart or reel-to-reel tape recorders are protected against input circuit clipping or tape saturation on peak material.

The ST-CLI protects digital equipment—including computer-based recording equipment, digital satellite uplinks and digital processing equipment—which may generate audible errors when peak material exceeds sampling input levels.



In the studio, the ST-CLI compresses preamplified microphone signals to provide constant mic levels or to yield a "beefier" mic sound for announcers. A pair of ST-CLIs installed between the

**ALESIS**

**Alesis Q2 Dual-channel Processor Features 24-Bit Resolution and Speed**

**LOS ANGELES** The Q2 Dual-channel Octal Processing Master Effects with Digital I/O is the new flagship of the Alesis effects processing line. Q2's new Alesis-designed DSP chip features 24-bit resolution and processing speeds of over six million instructions per second. With five full seconds of delay/sample time available, Q2 is able to produce lush reverb as well as powerful multi-effects.

Q2 has a flat frequency response from 20 Hz to 20 kHz. The dynamic range is better than 92 dB. Also, the Q2 operates at both +4 dBu and -10 dBV levels with balanced TRS inputs and outputs. Octal processing allows the user to use up to eight Q2 effect blocks simultaneously in any order using a unique digital patch bay in the LCD display. Each effect block lets the user choose from over 50 different effect

output of a console and the input of audio distribution equipment can protect all inputs fed by the distribution amp. Feeds from a satellite receiver, which may vary greatly, are substantially levelled by the

unit. Peak levels from audio power amplifiers are effectively controlled when the ST-CLI is installed at the amplifier input.

Soft-knee compression and automatically adjusting compression ratios afford unyielding protection without any of the audible effects typically associated with tight audio peak control.

The unit measures only 2.9 inches by 1.5

inches by 0.5 inches, allowing for easy mounting where compression is needed.

For information, contact Jerry Clements at 800-281-2683; fax: 805-684-9316; or circle Reader Service 116.

types, including chorus, reverb, delay, rotating speaker sim, pitch shift, parametric EQ, flange and overdrive. Q2 also provides five seconds of sampling.

There are a total of 300 programs on board, including 100 factory presets and 200 user-editable programs. Q2 offers the ADAT optical digital interface, which allows signals to be processed entirely in the digital domain with any ADAT-format recorder.

For information, contact the company in California at 310-836-7924, or circle Reader Service 59.



**Unlike any other.**



**VoxPro™ Digital Sound Editing System  
The Reel-To-Reel Replacement™**

VoxPro™ is the first digital sound editing system specifically designed to replace reel-to-reel tape recorders used on the air.

Now you can record and edit phone bits, contests, actualities, sound effects and more— on the fly, with speed and precision.

VoxPro operates like a word processor for sound. It begins by providing true one-touch recording.

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**YAMAHA**

**REV100 Digital Reverb  
Simple to Operate, Preserves Original Stereo Signal Image**

**BUENA PARK, Calif.** The Yamaha REV100 digital reverb features an extensive selection of 99 editable reverb programs, including stereo reverb, gated reverb, reverb plus flanger and delays. Each of these programs offers control of three parameters, including decay, delay time and balance of wet and dry signal, to allow the user to build custom programs.

designed for quick and simple operation, with rotary controls for the most significant effects parameters. An LED indicator next to each control illuminates when a parameter value matches the preset value, and an input level control and peak LEDs are included to optimize input signal levels.

A one-touch program selector changes program automatically.



For broadcast applications, the REV100 offers rack-mountable stereo processing with two inputs and two outputs. Full stereo in/out capability assures preservation of the original stereo signal image. The sound quality of the REV100 is provided by 16-bit A/D and D/A converters and a 44.1 kHz sampling frequency with a full-spectrum frequency response of 20 Hz to 20 kHz.

The front panel of the REV100 is

Along with the front-panel program select buttons, a MIDI IN connection is featured so effects can be selected using MIDI program change commands. Program numbers are conveniently displayed using two-digit, seven-segment LEDs.

(See the review of the REV100 in *Studio Sessions*, p. 26)

For information, contact Michael MacDonald in California at 714-522-9011, or circle Reader Service 82.

# MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

## Audio Cables

GEPCO International's new D72401EZ 24-gauge single-pair audio cables are designed for audio and broadcast applications. The stranded cable conductors are tinned copper with a tinned copper drain.

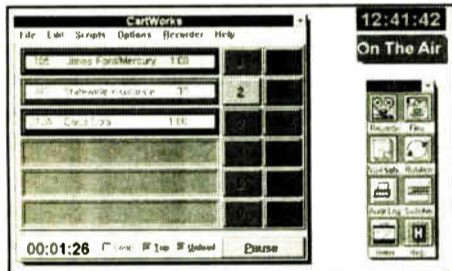


The new Model GA72402M completes GEPCO's multipair GA724M series of audio cables by adding a two-pair cable to the line. Intended for remote applications, the 24-gauge stranded tinned copper conductors are housed in a flexible matte finish PVC master jacket. Both new cables are designed for easy stripping. The cable shields are bonded to the pair jackets so both can be stripped in one operation, saving termination time.

For information, contact Greg Hansen in Illinois at 312-733-9555; fax: 312-733-6416; or circle **Reader Service 96**.

## Digital Audio System

The CartWorks PC-based digital audio system from dbm Systems works the way radio people think. It utilizes Windows' graphical interface to look and feel like a cart machine, resulting in a reduced learning curve and staff acceptance.



The unimposing operation of the system comes from two-and-one-half years of beta testing and user feedback, and a software development team with more

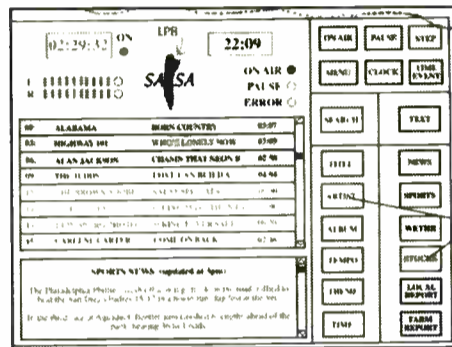
than 25 years of radio experience.

CartWorks offers features that make the transition to digital a smooth one. Live assist and satellite automation configurations are now available. CD automation is coming soon.

For information, contact Jeff Corkren in Mississippi at 800-795-7234; fax: 601-853-9976; or circle **Reader Service 86**.

## Live-Assist, Automation System

The SALSA digital audio system from LPB includes both hardware and software. The standard system features a 386DX33 PC system with 1GB internal hard drive, open-ended architecture, simultaneous record and play of audio, user-controlled variable audio overlap, the ability to accept downloads from all standard logging, traffic, billing and music scheduling systems.



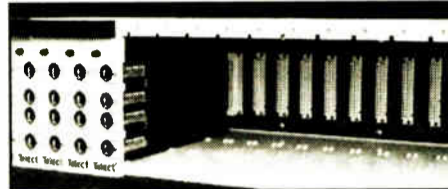
For live assist, the SALSA features as standard full-color graphics, control via mouse, identification of bad audio files and play of audio on the hard drive immediately or via schedules.

The standard satellite automation features include up to 15 stereo satellite networks, unlimited events per hour, 21 format clocks and up to eight control outputs.

For information, contact John Devecka in Pennsylvania at 610-644-1123; fax: 610-644-8651; or circle **Reader Service 199**.

## Digital Announcer/Repeater

The Racom Model 900 non-volatile digital message announcer/repeater does not require a battery backup or power to retain its message. The Model 900 can record a message up to three minutes long in its special EPROM memory array for automatic playback. This unit has a sampling rate of 64 kbps, and telephone line answer is available.



For information, contact the company in Ohio at 800-RACOM-OH (722-6664); fax: 216-661-1040; or circle **Reader Service 169**.

## Microphone Cable

The DGS Gotham GAC-2 V1 low-noise microphone cable from DGS Pro Audio, a variation of the company's GAC-2 microphone cable, includes a PVC separation made out of conductive material to enhance the mechanical/noise performance.

RF protection is assured through the design that features two opposing spiral-wound bare copper shields, also known as a Double Reussen shield.

The Double Reussen shield differs from conventional foil, single-braid or served shields. It offers better screening and RF protection up to 50 MHz. The bidirectional Reussen shield also enables the shielded conductors to move when the cable is handled or twisted.

The GAC-2 is designed with a minimum noise attenuation of 94 dB at 25 kHz and is effective up to 25 MHz.

For information, contact the company in Texas at 800-292-2834; fax: 817-473-7712; or circle **Reader Service 181**.

## Digital Audio Monitor

The Tektronix 764 digital audio monitor employs interpolation to calculate audio levels. Intuitive session, channel status and phase display screens, combined with a built-in CRT and VGA port, give the 764 monitor complete display capability.

The 764 operates as an audio phase and level meter and as a digital data monitor. The monitor also compiles statistics associated with an audio passage. Called the Session Screen, this display shows, in a single screen, key data, including session time, highest true peak, highest reading, number of clips and mutes, invalid samples, parity errors and the sample rate the 764 is measuring.

For information, contact the company's local field offices, or call 800-835-9433; or circle **Reader Service 49**.

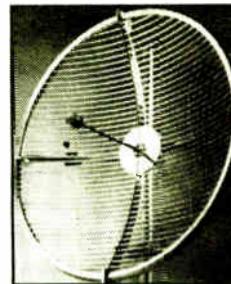
## Microwave Antennas

Andrew Corp. offers a new design for its GRIDPAK microwave antennas for the 820-960 MHz band. These antennas are particularly well suited for the 940-960 MHz band used for STL AM and FM broadcast applications.

The GRIDPAK antennas feature a patented grid rod retaining design that securely locks the grid rods to the antenna's outer frame.

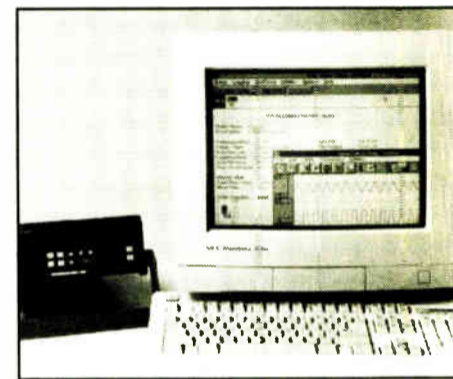
Aluminum construction and knock-down design ensure lower installation and shipping costs. The antennas have a type N female connector input and include a Helix coaxial jumper assembly to facilitate installation.

For information, contact the Andrew Customer Support Center in Illinois at 800-255-1479; fax: 708-349-5673; or circle **Reader Service 174**.



## Data Acquisition Software

Fluke Corp. offers the Windows-based data acquisition software package for its Hydra data acquisition product line—Hydra logger for Windows. Teamed with a Hydra data acquisition unit and a PC, this software package creates a 20- or 40-channel data acquisition system that gives the user complete control over a Hydra unit's functions, including scan-



ning, signal conditioning, sensor linearization and trend plotting. The package is compatible with all existing 2625A Hydra Data Logger and 2635A Data Bucket data acquisition units.

For information, contact the company in Washington state at 206-347-6100; fax: 206-356-5116; or circle **Reader Service 101**.

## Workgroup Architecture

Sonic Solutions' Radio Workgroup Architecture enables broadcasters to configure networks of radio production systems for preparing news, spots and longer-format radio programs. The Radio Workgroup Architecture is based on the company's Sonic System digital audio workstation and MediaNet, its networking system for high bandwidth multimedia applications.

Using this architecture, multiple digital audio workstations with different capabilities can be linked together. Users can share common sound files and access them simultaneously in real time, and share hard disk space, I/O devices and system processing resources. The production network can be bridged to a playlist management system so that finished products can move from production to on-air, without shuffling tapes or carts.

For information, contact the company in California at 415-485-4800; fax: 415-485-4877; or circle **Reader Service 149**.

## SINE SYSTEMS

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Gates TE-1 exciter, tuned to 95.2 MHz, as is, \$200. L Fuss, WDTL, POB 1438, Cleveland MS 38732. 601-846-0927.

Gates DC1G 1 kW transmitter, BO. H Shumway, KTIM, 801 W Wickenburg Way, Wickenburg AZ 85390. 520-684-7804.

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Phone: 214-630-3600 Fax: 214-226-9416

Motorola C-QUAM exciter, needs new meters for front, \$1000 or trade for carrier current broadcasting transmitter. J Kesler, POB 644, Livingston KY 40445. 606-843-9999

Powerpak SMG-40 stereo generator, good condition with manual, \$400/Best Offer. D Thompson, 510-609-8631.

**BEXT** Great new or demoed FM transmitters, exciters, amps and STL's, some at discount prices USA 619-239-8462 FAX: 619-239-8474

Marti RPT-25-R transmitter, tuned to 455.0875, no power cord, unit came with station when purchased 8/92, used once, unsure of actual time, good shape, \$350. K Riggs, KTBR, POB 1760, Roseburg OR 97470. 503-672-4427.

Used equipment for sale: Belar SCM-1, Belar RFA-1, Belar FMS-1, Belar FMM-1, Moseley MRC 1600 system, TFT EBS receiver/generator, Gentner patch panel, and Harris racks. Call Transcom Corporation 800-441-8454 or 215-884-0888.

INCREDIBLE FM RADIO TRANSMITTERS including Stereo Encoder, Deviation Limiter, Built in Tone Generator, Antenna Mismatch Protection, and other goodies. TAYLOR The Transmitter People. Taylor Bros. (Oldham) Limited, Lee St. Oldham Engand. Tel: 44 (0)61 652 3221 Fax: 44 (0)61 626 1736

Harris FM 2.5 k with MX-15 exciter spares, like new, \$12,500; ERI 2-bay low power Rototiller, 107.1 MHz, \$2200; Harris/Gates FM 2.5H3, ok condition, \$5995 Chns 816-628-5959.

QEI amplifiers, exciters and stereo generators. All are reconditioned and are tuned and tested on your frequency. 6 month warranty is included. If you want quality used equipment, call or fax 609-232-1625 and ask for Bob Brown.

New McMartin 20W, B1M-8000 FM exciter, New McMartin 18M1005D FM relay/rebroadcast sys; also some used McMartin B910 exciters, 15W. Goodrich Enter., 11435 Manderson St, Omaha, NE 68161. 402-493-1886 fax 402-493-6821

Gates FM-250C FM transmitter, works, compliant with TE-3 Gates exciter, on 91.7, spare power amp \$1500/all. M Taylor, KNEO-FM, Rt: #1 Box 1821 Hwy B6, Neosho MO 64850. 417-451-5636.

Harris stereo exciter, mint with manuals, \$200. G Collins, WDOC, Univ Dr, Prestonburg KY 41663. 606-886-8409.

Want To Buy 5 kW - 25 kW, any kind, STL xmtr & rcvr non type accepted ok; also STL dishes. Scott Comm, POB 10262, Amarillo TX 79116. 806-456-6916.

Used FM xmtr 15-25 kW, 99.3 MHz, w/exciter if avail & manuals. A Ward, 911 N Lake Havasu Ave., Lake Havasu City AZ 86403. 520-855-9000.

50 kW AM xmtr. A Weiner, 207-985-7547.

Used LPB AM carrier current, or Radio Systems, must be in good shape, also used LPB FMS 2000 cable FM mod. G Gajula, KLBN-AM, POB 1058, Lebanon OR 97355-0967. 503-258-2190.

McMartin AM/FM transmitter, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886

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TURNTABLES Want To Sell Russco TT (4), \$100. G Collins, WDOC, Univ Dr, Prestonburg KY 41663. 606-886-8409 Russco turntables (2) w/Shure arms & preamps, gd cond, \$110/ea. 813-732-5339. AR turntable on walnut base w/Shure RXT-6 cartridge. BO; Russco Cuemaster 3-speed It w/Grey tonearm, nice. BO. D Jackson, 203-762-9425.

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Country/AC morn AT/PD, creative hormones and brilliant phones, promotions, remotes. Mike, 510-432-6300.

Recently out of bdctg school, hard-worker, willing to travel, looking for on-air, prod, traffic. Joey, 405-449-3683.

Young, enthusiastic radio rookie looking to make name in broadcasting field, like central part of US but willing to move. Matt, 405-772-1630.

Innovative, leadership-oriented PD/morning air talent seeks Midwest challenge, turnarounds a specialty. Ron, 612-774-0673.

30+ year broadcast pro seeks new opportunity. Full knowledge FCC and FAA rules, construction planning, major equipment purchasing, turnkey construction, high power FM and AM DA construction and maintenance, will relocate. Radio World, P.O. Box 1214, Falls Church VA 22041. Box RW95-5-31-1RW.

Recent grad seeking on-air/prod position, ready to rock & roll your station, will move anywhere, interested? Matt, 405-755-8344.

Seasoned industry veteran looking for stable, career opportunity in management/programming/ownership, let's talk. Roger, 615-235-6889.

Over 5 yrs exper in live & satellite, excellent dj, prod, good at news too, please hire me. OH, IN, MI, Dan, 810-476-4498.

Versatile, intelligent, great for start-ups or existing stations, wants FT air-shift, 1st PD gig, never promoted, tired of unrated markets, uncompetitive pay. Janet, 502-895-5888.

Experienced engineer, directionals, RF, studios, computers, seeking full-time maintenance position with board shift, small community, easy living. Engineer, 7894 Palm Grove, Indianapolis IN 46219.

If you are in the NJ, PA, NY area & need an experienced radio professional who can do anything & everything, I'll help make your station #1 no matter what format. 919-310-5394.

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Talented on-air, creative in production, grad of bdctg school seeks ft employment w/your station. Brian, 405-789-3771.

Versatile, intelligent! Great for start-ups or existing stations, wants FT air-shift, 1st PD gig, never promoted, tired of unrated markets, uncompetitive pay. Janet, 502-895-5888.

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CE for major market AM/FM combo. Competency in: AM DA's, PC computer systems, PC computer networks, TVRO, studio/RF construction, maintenance, FCC compliance. Minimum five years experience & FCC General Class Permit. Resume, references, salary expectations, & credentials to: "Resumes" at 2950 SW 2nd Avenue Fort Lauderdale, FL 33315 or FAX to 305-524-8734 EOE

Groups of 6 radio stations in Northeast seeking experience chief. Knowledge of RF, studio maintenance, computers, digital audio a must. Good pay and benefits. Reply to: Radio World, P.O. Box 1214, Falls Church VA 22041. Box RW95-5-31-2RW.

Saga Communications, Inc. seeks a Chief Engineer for WNOR AM/FM and WAFX-FM, Norfolk, Virginia. The right candidate should have an excellent work ethic, thorough knowledge of all studio and transmitter site operations, and strong preventative maintenance skills. Saga Communications, Inc. is one of the industry's most admired companies and will provide excellent pay, benefits, and support. Please send salary requirements, resume and reference to Jeff Scarpelli, General Manager, Tidewater Communications, Inc., 870 Greenbrier Circle, Suite 399, Chesapeake VA 23320 or fax to 804-366-0022. EOE.

General Sales Manager for Texas medium market, adjacent to major market. All aspects of sales management. Must have excellent qualifications. Send resume to: Radio World, POB 1214, Falls Church, VA 22041 ATTN BOX #: 95-6-14-1 RW.

STAFF ENGINEER

Premier broadcast facility seeks person with studio and broadcast skills including ability to handle remotes and bench work. Understanding of LAN's and PC's a must. Good communication/people skills and positive "love what I do" attitude important. FCC license, SBE certification, Novell-friendly. Formal education a plus. Minimum 2 years hands-on experience required. Send resume and salary requirements to: Greg Savoldi, WTVN/WLVQ, 1301 Dublin Rd., Columbus, OH 43215. EOE

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Table with 4 columns: Page No., Advertiser, Reader Service No., Page No., Advertiser, Reader Service No. Lists various companies and their corresponding page numbers.

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