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For Complete
Coverage, turn to
pages 17-64.

RadioWorld

Vol 20, No 11

Radio's Best Read Newspaper

May 29, 1996

Localism, DARS Ready Guns

by Thomas R. McGinley

LAS VEGAS With a Federal Communications Commission decision on satellite radio just weeks away, NAB '96 tackled the thorny issue of direct radio DAB (Digital Audio Broadcasting) satellite delivery in an emotion-charged session complete with personal insults and follow-up apologies.

The forum was titled "DAB: A Turn Away from Localism?" Three broadcasters on the panel took dead aim at not only the lone DARS (Satellite Digital Audio Radio Services) representative, Lon Levin of American Mobile Radio Corp., but also at Scott Blake Harris, the FCC representative, who is recommending that FCC commissioners include a place for DARS in the S-band DAB allocation plan.

Who needs DARS

NAB Assistant General Counsel Valerie Shulte moderated the affair which included Randy Odeneal of Sconnix Broadcasting, Saul Levine of KKKO-FM, Los Angeles, and Cary Simpson of Pennsylvania-based Allegheny Mountain Network.

Shulte posed the basic question, "What is the need for satellite DARS?" Lon Levin cited as reasons that many rural areas in the country are still underserved and that there is a large demand for ethnic/foreign language programming.

Scott Harris maintained that at least three DARS applicants think there is a market for such service so the government is compelled to give them a shot at some of the DAB channels and then let the marketplace decide if they are right.

Randy Odeneal countered by arguing that American broadcasting does not really operate in a free marketplace and is burdened with significant FCC regulation. He pointed out that over half of the existing stations lost money in 1995 and that any further dilution of the market could doom many more stations close to the edge.

Odeneal asked, "Is DARS really in the public interest if it could negatively impact and damage the existing service when the FCC has publicly acknowledged that 80-90 was a disaster?"

Harris pointed to the recent NAB study regarding the impact DARS would have on existing broadcasting. That study concluded that the economic impact would be minor and after seven to 10 years, other media forces like the Internet would overwhelm DARS. He chided radio broadcasters for not giving themselves more credit in being able to fend off more ominous competitors like television in the 1950s.



And the
winners are...

RadioWorld

Cool Stuff
Award



NAB 1996

See pages 17-38.

Regulatory Refund Requested

WASHINGTON Lawrence Bernstein and John J. McVeigh do not believe the American broadcaster received his or her due this fiscal year.

The two partners in the communications law firm of Bernstein & McVeigh tallied up the number of days the Federal Communications Commission was closed because of a budgetary stalemate during the current fiscal year and told the FCC that broadcasters should be given a refund — or at least a credit — equal to one month of regulatory fees.

The two use the law that directs the FCC to collect regulatory fees as a basis for their argument. The law says the FCC must collect regulatory fees to recover the costs of "enforcement activities, policy and rulemaking activities, user information activities and international activities."

With the government closed from Nov. 14-20; Dec. 15-Jan. 6; and Jan. 8-10 and 12, Bernstein and

continued on page 11 ▶

EAS Mandate Generates Quest for Information

by Lynn Meadows

LAS VEGAS Interest in Emergency Alert System products was overwhelming at NAB '96.

Booths for companies like TFT Inc., Harris Corp., Broadcast Supply Worldwide, Bradley Broadcast and Gorman-Redlich were crowded with broadcasters curious about EAS.

Everyone wanted to know about the product that broadcast stations must purchase by Jan. 1, 1997. Generally, interest was higher than sales.

Just looking, thank you

Jim Woods, director of studio products for Harris Corp. said he was very pleased with the interest and success of EAS at the show. Harris carries the Sage Alerting EAS product and featured Sage Alerting Systems President Gerald LeBow at its booth.

"We received some orders, but I don't

think a lot of people came to the show with the express purpose of placing orders," said Woods. "We received quite a few handshake commitments and we talked to a number of very large groups and received verbal commitments that this was the route they wanted to go."

Woods pointed out that some groups have as many as 60 stations to buy EAS equipment. "It's not a trivial capital expense."

"The interest is picking up with phone calls and fax messages, but nobody is really in a hurry to buy," said Gorman-Redlich Owner Jim Gorman. The Gorman-Redlich EAS product cannot be sold until it is certified and Gorman expects that to be around mid June. "What they are mostly interested in doing is learning something about EAS."

Nobody was surprised by the interest EAS generated.

"We put EAS front and center at both of our booths because we knew that while it

continued on page 11 ▶

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NEWSWATCH

Evergreen Bulks Up In San Francisco

SAN FRANCISCO Evergreen Media Corp. recently announced that it will acquire KYLD-FM from Crescent Communications for \$44 million.

"KYLD represents an excellent strategic fit with our other San Francisco holdings, KMEL and K-101," said Evergreen Media CEO Scott Ginsburg.

Evergreen intended to operate the station under a time brokerage agreement effective May 1 whereby it provides all programming, marketing, sales and operations support for the station until the FCC approves the transfer of control.

Evergreen currently owns 34 radio stations and has agreements pending with several others.

U.S.-Mexican Satellite Agreement

WASHINGTON Thanks to an agreement signed in late April between the United States and Mexico, U.S. satellite companies will be able to compete in the Mexican market.

"Consumers will have more choices as a result of new satellite services entering the U.S. market and programmers will have more opportunities to distribute their programming to consumers," said

FCC Chairman Reed Hundt.

Hundt also suggested that the expansion of available satellites could lead to lower prices for satellite capacity and ultimately lower prices for consumers.

Dershowitz, Grant, Eisner Honored

BOSTON The National Association of Radio Talk Show Hosts (NARTSH) will present the Freedom of Speech Award for 1996 to Alan Dershowitz, Michael Eisner and Bob Grant.

Bob Grant has grabbed headlines repeatedly in the past few months for

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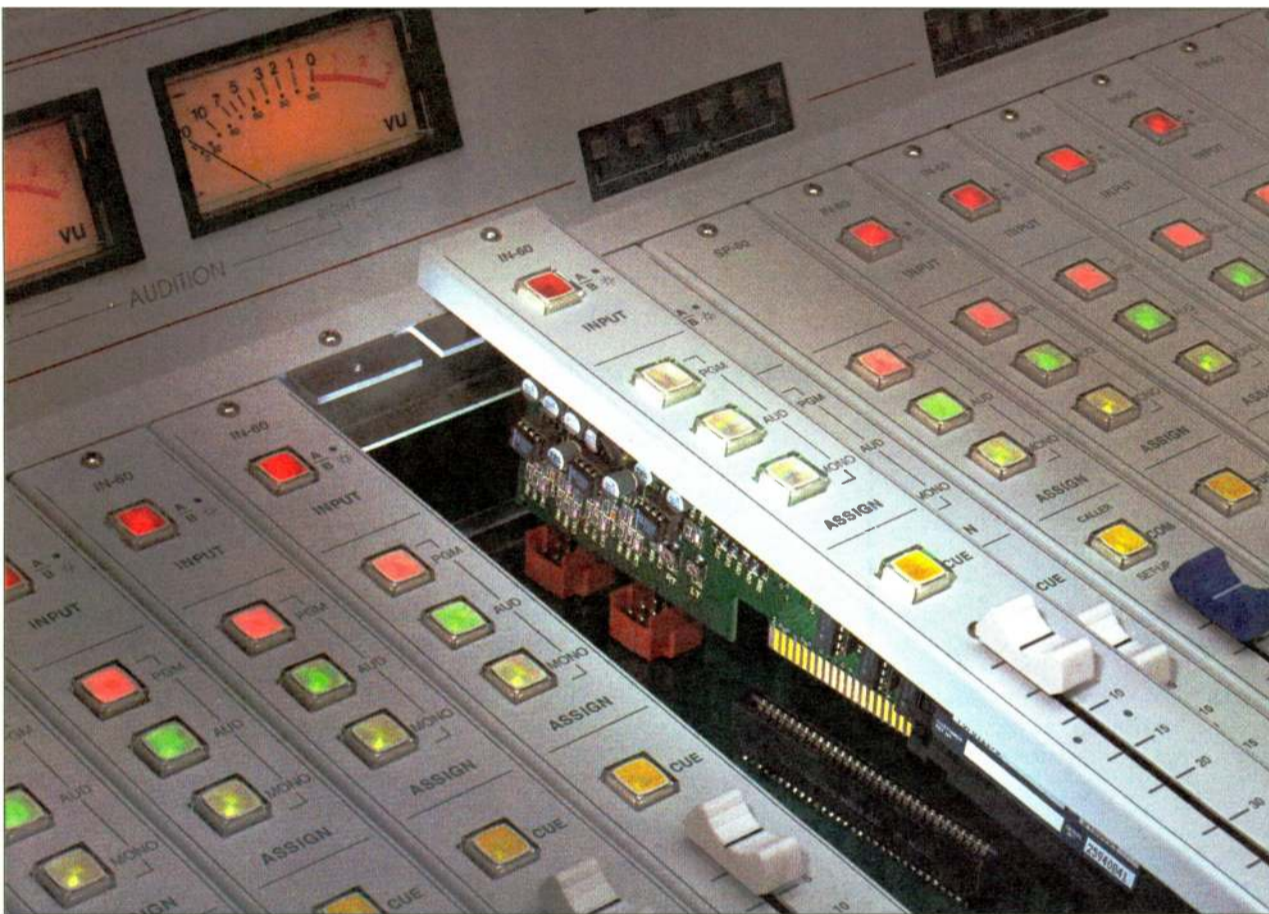
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AUDIOARTS ENGINEERING

Religious Wars over Licensing

by D.C. Culbertson

WASHINGTON Religious broadcasters want a fair per-program music license and they will not be stopped until they get one.

The latest vehicle for the NRBMLC (National Religious Broadcasters Music License Committee) is a bill in Congress intended to ease music licensing requirements for businesses that use radio as background music for customers.

The bill includes a requirement that music licensing organizations provide both a fair per-program license and an easy-access list of their musical repertoires — features religious broadcasters have wanted for years.

Businesses that play the radio as background music for customers are

supposed to pay a fee to music licensing organizations like ASCAP and BMI. Last August, Senators Hank Brown, R-Colo., and Craig Thomas, R-Wyo., introduced the Fairness in Musical Licensing Act (S.1137/H.789), which would eliminate that fee.

The senators and powerful lobby interests like the National Restaurant Association and the National Retail Federation believe the fee is unnecessary because broadcasters already pay songwriters and musicians for the rights to use their music.

Double dipping

"When a song is played over a radio or TV, the broadcaster pays for the rights to play that song. When we are at home and we turn on the radio, we are not expected to pay a second fee. Yet if a radio is played at a commercial establishment for no commercial gain, a second fee is charged for the music. This double-dipping smacks of unfairness," Sen. Brown said in his opening statement.

The legislation requires licensing organizations to offer "a per programming period license to perform nondramatic musical works in the repertoire of the performing rights society" to any broadcaster that requests one.

The license would include separate components for "incidental and feature performance" and would not be allowed to "exceed the fee that would be payable by the broadcaster under the lowest price blanket license offered to radio broadcasters."

Broadcasts of religious services or the recordings of religious services would be exempt from any fees. Further, the performing rights society would have to provide free repertory lists and free access to complete copyright and licensing information for any work both on-line and in a regularly updated printed directory.

Lastly, the Attorney General would be required to submit an annual report to Congress detailing "all issues raised or complaints filed with the Department of Justice relating to the operations of those performing rights societies."

Controversy brewing

Considerable controversy erupted over this bill, and the most vocal arguments against it have come from the two biggest licensing organizations, ASCAP and BMI.

The NRBMLC argues that the bill simply reinforces requirements ASCAP has legally been required to perform for some time but has not completely fulfilled. Those requirements include offering a reasonable per-program license and providing usable access to composition lists.

Ken Sunshine of ASCAP said the National Restaurant Association is the chief force behind the bill and their main motivation is "to save a little money."

The music licensing organizations argue that the amount of money restaurant owners would save is not all that much.

It amounts to about a dollar a day for the average restaurant owner, said Fred Cannon, BMI's vice president of Government Relations. Cannon said that calling the licensing fee "double-dipping" is unfair and incorrect because "it doesn't provide for retransmission in a commercial environment."

Licensing organizations point out that when one person plays the radio at home

or in a car, it is for their own private entertainment. A business plays the radio to attract or keep customers. ASCAP further argues that dropping the fee would result in a loss of 15-20 percent of its members' earnings.

As far as the suggestion that licensing organizations have not been willing to make repertoire lists or licensing information available, Cannon said BMI has always had a catalog available. He added that the 19-volume length of the catalog makes it financially impractical to make it available for free.

Russ Hauth of the NRBMLC said that ASCAP has never provided a list of songs "in any usable way for broadcasters." Hauth said that ASCAP put some of its repertoire on the Internet but does not guarantee the accuracy of it.

BMI recently instituted an 800 number and information about its repertoire is available both on the Internet or by a CD-ROM, which is available for \$25 and updated every six months.

Cannon is puzzled by the NRBMLC's support of the bill and does not understand why religious broadcasters would even be interested in such legislation.

"I can't see what they'd get out of it except to make more money," he said.

Organized opposition

According to Hauth, a big portion of the revenue at talk and religious stations that used limited music goes towards licenses

for ASCAP, SESAC and BMI.

Cannon said both ASCAP and BMI are working "pretty closely" together on this issue. Since last February, in addition to continuous lobbying, both organizations have aggressively urged members to write their senators and representatives describing why they are opposed to the bills.

Cannon estimates that about 22,000 letters have been sent to date. He said he feels the licensing organizations are "making headway," because, in spite of the initially large number of co-sponsors, only about 10 new people have signed on in the past four to five months.

Both the House and Senate versions of the bill were still in committee in early May and showed no signs of hitting the floor anytime soon.

The argument was further diluted with the introduction of a bill in the Senate that would only ease music licensing requirements for small establishments with limited square footage.

Hauth said the House bill has more than 170 co-sponsors and the Senate revision has good support. The NRBMLC has been told that even if Congress passes the bill, President Clinton is expected to veto it.

"Probably for this Congress, the chances of this getting through are diminishing," Hauth said. But the NRBMLC has one other card up its sleeve.

According to Hauth, the NRBMLC asked Congress to put a hold on a "Copyright Term Extension" bill supported by ASCAP until it, too, includes a provision on a fair per program license.

The legislative calendar, meanwhile, is slipping away.

NEWSWATCH

► continued from page 2

controversial comments that led to his termination by WABC(AM) and subsequent pick up by WOR(AM).

Alan Dershowitz shared the WABC airwaves with Grant until he was fired for speaking out against Grant's objectionable opinions.

According to NARTSH, Disney Chairman Michael Eisner is also being honored because despite Grant's high ratings and revenue-producing abilities, Eisner exercised his First Amendment rights by dismissing him.

DG Systems Has New System

SAN FRANCISCO DG Systems unveiled a new system for radio stations based on a client/server architecture and Netscape Navigator software.

The DG ADvantage Audio Communications Server (ACS) works like a local area network to allow desktop PCs throughout a station to access things like commercials, traffic instructions and new music singles.

ACS also provides the ability for two-way communication between a station and DG Systems; a station can create its own customized spots and send them to a sister station via DG Systems.

New Internet Service

ATHENS, Ga. Musictown Online Services planned to launch FM.NET on May 15.

The company anticipates that FM.NET will become the standard means for the public to find radio stations on the Internet.

The site — located at <http://fm.net> — will be an interactive and animated gateway to nearly all AM and FM radio stations on the Web. A companion site at <http://talkradio.net> will be a gateway to talk radio stations.

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Radio Could Take It on Chin, Again

WASHINGTON Chalk up another successful convention for NAB. There are almost not enough hours in the day to catch all the exhibits, sessions and keynote events anymore.

There was lots to see on both the audio



and video side of things — plus, the Internet pavilion and NAB '96 MultiMedia World (our complete wrap begins on page 17).

Once again, though, radio took it on the chin from Federal Communications Chairman Reed Hundt, who once again spent two hours talking about broadcasting at his Chairman's Forum and 0.0 percent of that time talking about radio.

What gives? There is obviously a lot going on with good old radio — deals happening right and left, DAB field testing about to begin, a good business climate, etc. But of course, that apparently is not enough to get his attention.

Well, somebody needs to pay attention. Just this month Sen. Larry Pressler, R-S.D., unveiled a "Grand Spectrum" bill.

Return to the consumer

In the draft, Pressler outlines a new national policy for managing and allocating electro-magnetic spectrum. His view of the current allocation process involves words like "rigid and outdated."

The system may not be perfect, but it has allowed this country to sustain the best broadcasting system in the world — and certainly the most emulated now

that privatization is spreading throughout the globe.

Of course, Pressler is concerned about the bigger picture. And there are some



NAB President and CEO Eddie Fritts (right) will once again have to lead the charge against spectrum auctions for broadcasters. Sen. Larry Pressler (above) is the latest in a line of Congressmen to try and let the marketplace decide when it comes to selling off radio frequency spectrum.

good ideas in the package.

But, read, the bottom line.

Pressler's solution is to return the management of spectrum to the consumer. Hah. What he means is to the marketplace where auctions decide who gets what.

As proposed by Pressler on May 9, the spectrum reform discussion draft would:

- expand and make permanent FCC authority to auction spectrum frequencies — originally granted in 1993 in the Omnibus Budget Reconciliation Act, that authority expires in 1998;
- require the FCC to "exhaustively" license all available spectrum by selecting bands of unallocated and unassigned

frequencies and auctioning them;

- allow "spectrum flexibility rights" for nonbroadcast licensees including the right to use the assigned spectrum for any service that is technically feasible (and does not go up against any international treaties);

- establish a special commission (a la Base Relocation and Closing Commission) to determine how the federal government should relinquish 25 percent of its exclusive or shared spectrum holdings below 5 GHz. The FCC would allocate the relinquished spectrum to private sector licensees using, you guessed it, spectrum auctions;

- consolidate federal management of the spectrum within the FCC and eliminate the National Telecommunications Information Administration (NTIA), and



- provide block grants to the states responsible for spectrum allocated within state boundaries for public safety use, such as for police and emergency transmissions.

Facile reasoning

In the Pressler release about the Electro-Magnetic Spectrum Management Policy Reform and Privatization Act, the chairman of the Senate Committee on Commerce Science and Transportation stated that "The spectrum is one of America's most valuable natural resources." In addition, Pressler warns that the resource is being mismanaged by the government because it uses a "1930's

regulatory system" to manage it.

Pressler goes on to state: "The government — not consumers — largely decides who uses spectrum frequencies." Excuse me, but am I to infer that by "consumers" he means people like you and me?

What nerve. When will everyday consumers ever have the opportunity to start a little radio or TV station again if we move to a "spectrum auction" system of frequency allocation?

If by consumer he means the TCIs, the Infinity Broadcastings, the Group W/CBSs, the Disney/ABCs of the world, who does he think he is kidding? When did big business become the best representatives of the American consumer? Or the "people" as he puts it?

"It is imperative that we replace our current system of central government planning with a market-based system," he states. "As with private property, the government should not tell people what they can do with frequencies."

Humble beginnings

I venture to suggest here that entrepreneurial companies like Infinity and the pre-merger Capital Cities and ABC were prime examples of what the spectrum allocation process we have now could allow you to become — but not at the expense of the small stations run by less well-funded entrepreneurs and minorities.

Many of today's top broadcast companies began with one citizen with a vision and a love for radio buying a single station and parlaying local success into a group of well-run radio stations.

The current system of allocating spectrum at least attempts to maintain the public service charter of broadcasting. It allows for a plurality of broadcast voices to be heard in a marketplace and it requires proof of public service effort at renewal time. Sure, it is a system that is less than perfect, but, would you rather be shut out merely because you don't have as much money as the phone company?

Write your congressional representative and raise you know what. Radio has been threatened by this specter before, and NAB has lobbied hard to defeat it. Somehow we need to find a way to kill this idea once and for all.

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GUEST COMMENTARY

Live, Local Radio: In Defense of the DJ

by Scott Clem

Frankfort, Ill. In "Forecast Predicts New Uses for Radio" (RW, March 6), a station manager suggested that, in the near future, announcers would simply no longer be needed. A station manager suggested this! It would serve this guy right if his whole crew walked out on him.

Are we to believe the role of the traditional radio DJ is destined for certain death? I do not buy this and would like to voice a second opinion. While many aspects of new technology will benefit both stations and listeners, the elimination of local announcers is a repetitive leap backward. We went through this once before; station automation didn't last in the 1970s and it is not going to last this time either.

I believe everyone connected with radio should realize that it is personalities, not specific stations, that attract listeners. Put simply, the progression of station automation means the death of local radio. This means a large void in public service, which in turn means a decline in listener interest.

This decline translates to a drop in ratings. A drop in ratings means a decline in advertisers, then loss of revenue and ultimately a station in danger of going dark. Inside the station is a manager beating his head against his desk and shouting, "What have I done?"

You may find a bit of humor in that, but we are talking about radio stations that hurt themselves very badly and fail to realize it until they have to pull the plug. There is no humor in that.

While computer and satellite automation are a much less expensive means of oper-

ating a station, certain tasks are necessary to the quality operation of a station that automation will never be able to perform.

I have a weekend job at our local computer-driven easy listening station. Upon arriving, I often stop and listen for the radio in the lobby. But one morning, I heard nothing but a chorus of alarms and buzzers. The computer was frozen, and we were airing nothing.

I threw a few switches, punched a few buttons, and we were back on the air. If someone had been there, a few seconds of dead air would have been the extent of our problems. But we aired a dead call for a long time before I got there. Well, worse things can happen, right?

They can. Imagine a community with two stations. One has live, local announcers, and the other is R2D2 plugged into a transmitter. Assume half the community is listening to the local station and half is listening to the robot station.

A tornado watch is issued in this area. The people of the community have two choices: a live announcer who can tell them about the situation, or a satellite network in a world of nothing but music. An hour passes and the real thing happens. A tornado warning is now in effect.

One group will be kept informed about the severe weather situation because their station can provide the information. The other group will become fully aware of the tornado only when the windows begin to rattle and a roar fills the air. By the time they hear it coming, there is no time to run.

If a killer tornado was coming to your town, which would be your best bet? Now tell me local impact and local announcers are no longer important in radio.

The suggestion that one announcer in a distant studio can customize for several stations scattered around everywhere is absurd. Okay; Rush Limbaugh, Howard Stern, Don Imus, et al., rake in numbers all over the country. I applaud them for that, but my argument is based on local impact.

In order to make a genuine impression on a community, an announcer simply must be in that community. An announcer with no access to a specific locale has no ability to serve it effectively. It is unrealistic to plug Mayberry radio into a 24-hour Los Angeles network and expect the local area to be served. What hurts is that the nation's radio moguls who have the means to preserve the local DJ are the biggest ducks in the puddle when it comes to crushing the DJ.

The bottom line is, a station that eliminates all of its live announcers is cheating the announcers, the listeners and itself. An automated station will be a gold mine for awhile, but the essence of any station is its means of serving the public interest. The value of a station with no local announcers is absolutely zero.

□ □ □

Scott Clem is an eight-year veteran radio announcer in the Southern Illinois area and is president of Trident Media and Broadcasting Ltd. in West Frankfort, Ill.

A Good Year for Radio

The radio economy continues to be strong, buoyed perhaps, by legislation this year that has dealmakers scrambling for the deal table. NAB '96 reflected that strength — when all was said and counted, more than 90,000 attendees converged on Las Vegas from around the world.

What could be said about technology on display at NAB '96 could be observed of the convention in general: It was a year of breaking new ground

and refining proven products.

New broadcast equipment was in evidence throughout the trade show. The "coolest" items were selected for awards by our panel of judges (see pages 17-38). A lot of the new gear, however, expanded on technology that has been driving the business — digital, PC-based technology. The increased number of exhibitors showing enhanced product lines indicates that the economy continues to be strong, and broadcasters are scrambling to reap the gains of new legislation designed to capitalize on the economies of scale.

The continued growth of the convention, particularly in the multimedia arena with an entire new service industry targeting broadcasters, is an encouraging indicator that that optimism is shared by the nonradio sector.

For their part, exhibitors noticed good traffic through all the halls this year, including the new Sands Expo one, with a growing presence of international attendees. Many of these attendees came to the show prepared to buy, with the intention of equipping their stations with the best the broadcast industry has to offer.

The high-tech parade of equipment innovations is a classic signature of a healthy NAB convention. But NAB '96 also was a place to sharpen skills in the other areas of radio. From the engineering sessions to the management presentations, to the legal forums to the sessions on opportunities overseas, the annual gathering once again offered something for anyone working in radio today.

The technology on display at NAB '96, the technology of the future — such as DAB and DARS — discussed and dissected at the many seminars, as well as the skills and techniques required to lead the industry to its next level of growth were all present at NAB '96. If this show is any indication of the state of radio (and we, of course, believe that it is) 1996 will continue to be a very good year.

— RW

Helpful FCC inspector

Dear RW,

Jim Juneau's half-baked criticism of FCC inspector Judd Mansbach is way out of line. It questions the ethics and performance of a long time engineer's friend at the FCC.

Many years ago, I met Mansbach when he inspected one of the stations I worked for in New York. I had worked Monday morning transmitter maintenance and was called back for an emergency at the studio. I lived about 35 miles away in a suburb. In the interim, Mansbach came by for an inspection. I arrived and the receptionist told me there was an FCC inspector waiting (gulp).

Mansbach very patiently sat in the shop while I affected the necessary repairs. Afterwards, we started with the inspection. The studio for this operation was in Queens, about 10 miles from the Chrysler Building, where the transmitter was located. Of course, we made the trip into midtown. We had an additional idiosyncrasy: The remote control point was at a co-owned AM station 45 miles to the east.

A long ride to the control point ensued. The inspection was professional, patient (I was scared), thorough and informative. Mansbach leads, he doesn't punish. That was in the mid '60s. Since then, Mansbach, through his patient, informative, leading, teaching ways, has helped many budding engineers, including those of us who as teens hooked a broadcast oscillator to a long wire and became a pirate. (I didn't get caught by the Feds, my dad shut me down.) I believe that incident helped peak a curiosity about broadcasting that has lasted for more than 35 years.

Mr. Juneau, I'm afraid you are way off base when you ask, "What the hell is going on with the FCC." What has been going on is an excellent example of how, "I'm from the

FCC, and I'm here to help" has meaning.

I have not spoken to Judd in over 20 years now, but I'll never forget his help, encouragement and leadership. I'm proud to be his friend.

*Edwin Karl
United Paramount Network
San Francisco, CA*

Canadian listeners

Dear RW,

I read with great interest the feature "U.S. Border Stations Cash In on Canada" (RW, April 3).

WNFA-FM is also a Canadian border station, but with a big difference: we're a non-commercial listener-supported 24-hour FM with an inspirational/Christian format. A format that is lacking in Canada due to CRTC rules (see story, page 14).

Our Canadian listeners are very loyal to the station and also take an active role in financial and prayer support. In return, we provide them with a balanced mix of the programming they desire and also involvement with the Christian community. To even further our relationship, we provide e-mail communication, which is cheaper than a phone call from Canada to the United States.

We value our Canadian listeners and go out of the way to serve their needs through the medium of radio.

*Jeff Jacobsen
Wonderful News Radio
Port Huron, MI*

Correction

An incorrect fax number for Airworks Media appeared in the March 20 issue of RW. The correct fax number is (403) 424-9993.

Radio World

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**Next Issue of
Radio World
June 12, 1996**

Receive Weather Free from NWS

by David Briggs

WICHITA FALLS, Texas Ever since the National Weather Service began being "privatized" in the early '80s, it has been increasingly difficult for local stations to get weather information at a reasonable cost.

The limited free images available on the Internet are usually 15 minutes to several hours old — not a good situation for those in storm-prone areas of the country.

When we learned of a new service to be provided by the NWS, it got our attention immediately.

EMWIN stands for Emergency management Weather Information Network, and it is being distributed free to any who

can receive it. Over the next few years, EMWIN is expected to evolve into a fully operational and supported NWS service, in partnership with the Federal Emergency Management Agency and other public and private organizations.

EMWIN is a live datastream of basic weather information that provides access to a set of National Weather Service warnings, watches, forecasts and other products at no recurring cost.

In Wichita Falls, the EMWIN datastream is received by satellite from the GOES 8 at 75 W. The satellite signal at 1690.6 MHz is received, downconverted and demodulated by noncommercial radio station KTEO(FM). The resulting analog signal is used to Frequency Shift Key (FSK) a 92 kHz subcarrier injected into the station's main 90.5 MHz FM channel.

Wealth of data

EMWIN started as an experiment in the Washington, D.C., area. A low-power transmitter on a government frequency began to send out the datastream to anyone with a police scanner capable of receiving the signal. The audio output of the scanner was converted to RS-232, fed to a personal computer and displayed. The raw data is sent in packet form as ASCII 1200,N,8,1.

It is easily received by older Bell 202 type modems. By using a compression scheme for nontext products, 30MB of data can be crammed through the system in a 24-hour period, which is a healthy amount of "free" weather data for any appetite!

The EMWIN datastream contains satellite pictures, watches, warnings, forecasts, statements and even some limited graphics. To learn more about what is available, check out the official EMWIN home page on the World Wide Web at: <http://www.nws.noaa.gov/oso/oso1/oso12/document/emwin.htm>

The Washington experiment soon led to a transmitter in Norman, Okla., with one following shortly after in the Tulsa, Okla., area. Both of these sites used VHF frequencies that could be picked up on consumer-grade scanner radios.

While the government frequencies and scanner radios proved that a low-cost hardware system for delivery of emergency weather information was possible, there remained the need for a national distribution of the data.

The data has been made available over the PBS Telstar 401 satellite: Transponder 5A, Channel 5, Secondary Audio Program (SAP), center frequency 11836.5 MHz (or 11.8365 GHz), vertically polarized.

However, the EMWIN signal presently is multiplexed as part of the PBS uplink, and additional costly (Digicipher) equipment is

thus required to receive and extract the EMWIN signal. The data is analog two-tone FSK that can be demodulated with that trusty Bell 202 type modem and routed to a personal computer for display. The data is also available on a private Ku band satellite, with downconverters to be available soon.

Right access

We were not able to take advantage of the PBS signal because we did not have access to the expensive digital satellite receiver required. However, when the NWS announced an experiment on GOES 8, our ears perked up.

The EMWIN datastream was placed 400 kHz below the 1691 MHz APT weather picture frequency. Because we already had a "coffee can" downconverter for this satellite, all we had to do to receive the data was connect a scanner to the IF line. Because most APT weather satellite receivers and downconverters use a 135 MHz IF frequency, tuning 137.1 MHz on the scanner brought in the signal clear as a bell.

We at KTEO were pleased to be the first radio station in the country to broadcast the EMWIN signal over our 92 kHz subcarrier. By taking the audio output of the scanner and routing it to an old SCA generator,

the emergency weather data is now available to anyone in our listening area. SCA receivers are relatively inexpensive compared to a scanner. Some FM receiver mod kits sell as low as \$15.

By being on the subcarrier, our emergency management officials (with little or no budgets) do not have to have satellite equipment to get EMWIN into the Emergency Operations Centers (EOCs). And the SCA receivers are usually powered by 12 V DC wall cubes, which means they can be mobile using the voltage available in most automobiles — a great advantage for emergency vehicles.

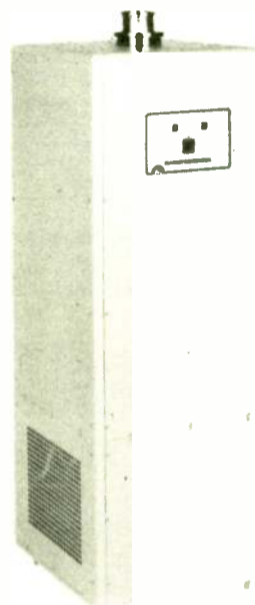
While the NOAA Weather Radio is still a fast route for emergency warnings, hard copy from a printer connected to EMWIN is ideal in an operational situation. It is even possible to consider some aspects of EMWIN for use in the new EAS plans being drawn up at local levels across the country.

The EMWIN data contains all of the current information that is available via the CONTEL Weather Wire, and, in some respects, is a better alternative because the Weather Wire is only a text product. ☺

□□□

David Briggs, Ph.D., is director of engineering at the KTEO Radio Red River Educational Media Foundation. He can be reached at (817) 723-5047; or kteo@qwikhomes.com or <http://www.qwikhomes.com/kteo>

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Circle (98) On Reader Service Card

New Home for Widmann

NEW YORK Nancy Widmann has found a new home at CBS/Group W or rather at a brand new CBS division.

The former president of CBS-owned radio stations is now senior vice president of Market Development for EYEMARK Entertainment. The Los Angeles-based EYEMARK, formerly known as MaXaM, was launched in October 1994 and became part of CBS in January.

The company produces, markets and distributes first run and off-network television programming.

In her newly-created position, Widmann will remain in New York and develop business and marketing opportunities on behalf of the division's worldwide programming and its syndication and advertising clients.

"I'm going to be working with this new division and all the divisions of CBS — the television stations division, the television network and the radio division — to work on some cross promotions and some programming concepts," Widmann explained. She will also be working on sales alliances across all of the CBS divisions.

"This has really all become possible because of the changes in the ruling at the FCC on financial syndication participation by networks," she said.

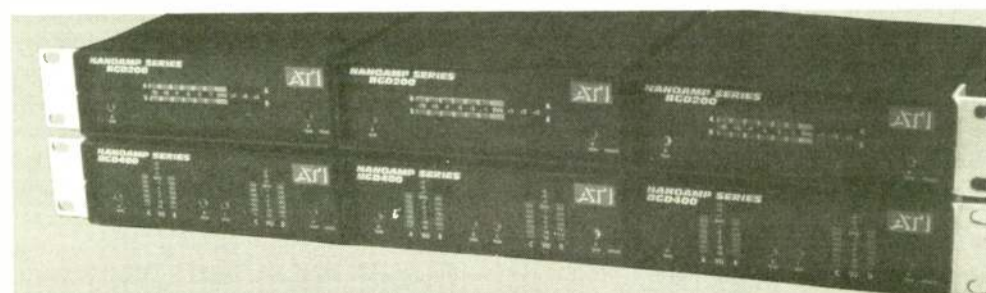
Widmann who joined CBS in 1972 was



Nancy Widmann

replaced as president of the CBS-owned radio stations by Dan Mason late last year after Westinghouse completed its purchase of CBS. At that time, it was announced that finding a place to use Widmann's talents would be a "priority."

"I'm completely out of radio but I will certainly be looking for opportunities to see if there are some cross promotions or cross sales opportunities that will work with television and radio," Widmann told RW. ☺



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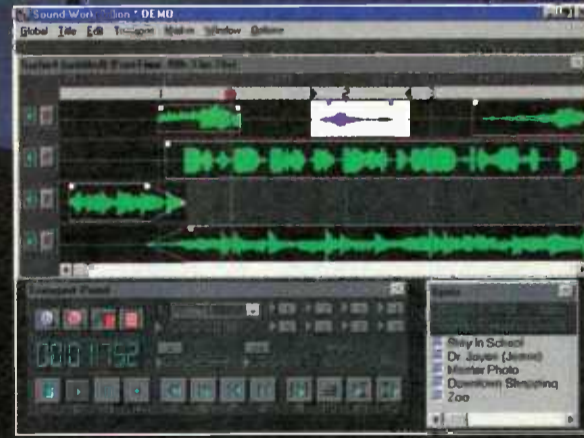
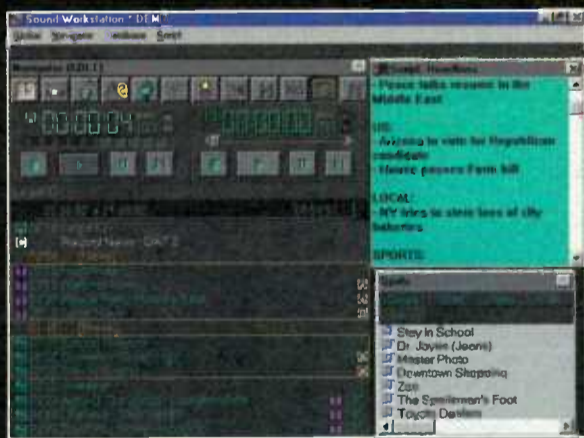
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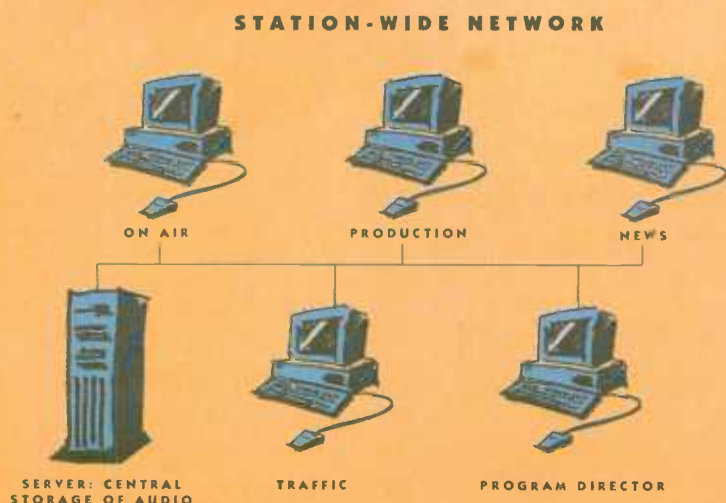
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Channel 4000: Ready for Future

by Frank Beacham

NEW YORK I've long felt that when the dust settles, the real pioneers to emerge from the golden age of the Internet will be innovative small entrepreneurs rather than big media companies. The little guys are often hungrier, more creative and unburdened by the committee mentality that plagues the corporate suite.

The little guys

I had the pleasure of meeting two such entrepreneurs about a year ago in Minneapolis. George Johnson and Reid Johnson (no relation) have been best friends since their college days.

Throughout the 1980s, George was a successful business executive in a health maintenance organization while Reid served as news director at television station WCCO in Minneapolis.

Looking for a new opportunity a few years back, George and Reid decided to buy a video business — Alpha Video in Edina, Minn. — and focus on the concept of desktop broadcasting. Though successful with Alpha as a video equipment sales business, they had their eyes on a much bigger prize although they were not quite sure what that was.

When I met George and Reid last spring, the Internet was not on their front burner.

What a difference a year makes! In mid-March, George and Reid, through their new Alpha Video subsidiary, Internet Broadcasting System (IBS), have joined with AT&T WorldNet and WCCO Radio and Television to create one of the most ambitious World Wide Web sites ever attempted.

Called Channel 4000, this sweeping site extends WCCO's broadcast franchise far beyond the airwaves. It begins to deal with the lack of depth that plagues broadcast news. Stories that are only skimmed on air can be developed fully on Channel 4000 even to the point of creating active links to sources and related subjects on the Internet. As the service expands, the

Web site will feature audio and video clips of WCCO's news programming.

Creating a community

The Web site is really the front door to what could become an Internet extension of the Minneapolis-St. Paul community.

Rather than existing in obscurity on their own, local Web sites can be linked to a highly visible central location. Some will be commercial and others will be public-service oriented. Just as in a real town, a lot of people, businesses and organizations come together to interact and trade with one another.

For example, there's a virtual version of the town auditorium where citizens can discuss issues important to the community. There's an e-mail system and an electronic calendar of community events. Byerly's, an upscale grocery store, offers home food shopping and Marquette Bank promotes on-line banking. The Minnesota Zoo has a branch on-line and there are bedtime stories for children.

Local consumer and business information is provided by MSP Communications, publisher of the Minneapolis-St. Paul and Twin Cities Business Monthly magazines.

Financial boom

Shopping and related advertising revenues are what the investors hope will support and grow this two million dollar venture. Businesses can have a presence on Channel 4000 for as little as \$300 a year for a two-line listing. Or they can have a small Web site called a "Visitor Center" for \$2,800 including creative services. Of course, the sky is the limit on what a business can spend; two advertisers signed \$100,000 ad contracts for the first year.

AT&T's role in Channel 4000 is to provide the Internet connection and the software to make it all simple to use. In fact, Channel 4000 is a subset of AT&T WorldNet's much-heralded national campaign to bring the masses on-line. The telecommunications giant teamed with the Channel 4000 creators to bring Minnesotans a special version of its branded Netscape browser, this one adapted for quick access to many Channel 4000 features.

George and Reid have high expectations for Channel 4000. Looking ahead, they hope to broaden it into local government. There is no reason, for example, that a citizen could not renew a driver's license or secure a building permit on-line. Many would gladly pay for such a convenience. The possibilities are virtually endless.

If it is successful, the Channel 4000 concept could be cloned in cities throughout the United States — a fact not lost on George, Reid or their partners.

I find it interesting to note that Channel 4000 was conceived and created by a few determined individuals meeting in coffee shops and restaurants in Minneapolis instead of the corporate offices of the big media companies in Manhattan. It is reassuring in this era of media consolidation that a couple of renegades can still take a great idea and run with it. Bravo to George and Reid. Who says the little guys can't win?

Channel 4000 is at <http://www.wcco.com>

Frank Beacham's e-mail address is: beacham@radiomail.net. Point your browser to his Web site at: <http://www.beacham.com> or write to him at 163 Amsterdam Ave. #361, New York 10023.

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Interest in EAS Explodes at Show

► continued from page 1
is not the most popular capital expenditure in the next year, it is something that everybody has got to get done between now and Christmas," Woods said.

TFT Director of Marketing Darryl Parker said both interest and sales were "fantastic" for TFT. TFT has agreements with other manufacturers and distributors like BSW to market its EAS product.

"We thought there would be more sales activity," said Tim Schwiager, vice president of Marketing for BSW. He said his company was very impressed with the amount of interest EAS generated.

Parker said he had expected a lot of interest from radio stations at the show, but was surprised at the large number of TV stations who came to the audio hall to visit the TFT booth and find out more.

According to Parker, several radio stations said they were waiting to make a decision because their state plan had not been finished.

Extension rumor

Rumors of an EAS deadline extension circled the floor during the spring show. Some broadcasters believe the deadline will be extended.

Both Woods and Parker made a point of saying their companies will be able to meet the demand for product.

"It is our intention to have enough product available to supply the market," said Woods. "Everything that we have been told by the FCC and everybody who knows the inner workings of what's going on have told us that there is no intention of extending the deadline."

Parker agreed. Everything that he has heard indicates that there will not be an extension. TFT announced several alliances at the show and will also be able to meet demand.

Asked what he was telling broadcasters who asked about the extension, Woods said, "I wouldn't wait until a week before the end of the year counting on an extension."

Gorman, however, had a different impression.

"I thought the deadline has a good chance of being postponed," he said. "I base that on what people who showed up at the show knew about it and how much they are going to have to learn."

Local approach

Gorman said he was going to be exhibiting his equipment at SBE shows in West Virginia and Kentucky and added that both states had told him they had not started on their state plans.

"This is so important and affects so many people that getting an extension might be a little difficult," said Schwiager. He added that he does not doubt that the topic will come up.

At a meeting with FCC Acting EAS Chief Frank Lucia, some state emergency coordinators talked about requiring stations to monitor more than the two sources mandated by the FCC. Plans are still up in the air but all the companies said they could accommodate more sources.

"The solution that we are offering provides up to six," said Woods. "There are a lot of people trying to put their plans together right now and the indications are that there are people who will need to monitor a lot more than two sources but we don't know whether that is going to be

just a small percentage or half or the lion's share."

Said Gorman, "We are going to make our standard model capable of four inputs. There are locations like here in Athens, Ohio, where the CPCI station is supposed to listen to six audio inputs. Our model will be expandable to six inputs."

Do not delay

Parker said TFT identified early on that probably somewhere around four inputs will be sufficient especially for the new "web" system replacing EBS.

As for any advice for broadcasters prepar-

ing for the new system, Woods said stations should select the best product for what they need to do.

"There will be product available," he said but cautioned buyers not to wait until the last minute.

Parker said the key has to be ease of operation. "All of the system is going to go for naught if people can't use it easily," he said.

Gorman encouraged broadcasters to be there when local area plans are being drawn up and make sure they get assigned stations to monitor that put a strong signal in their area. He also said stations should try to avoid being assigned a distant AM station

to monitor because one lightning strike can wipe out a complete header code.

Asked when sales will take off, Woods said he expects they will heat up this summer and reach their peak by fall. His expectations are that by the fall show in October, most people will have decided what they are going to do and when they are going to do it.

Gorman said that if the FCC sticks to the Jan. 1 deadline, it will probably be the end of the third quarter when sales take off. Schwiager jokingly predicted sales would take off on Dec. 15. He said he thinks sales will be big in the fourth quarter.

Parker said his company did get a lot of orders from the show, but several stations asked TFT to wait to ship their new equipment until October.

Credit Requested for FCC Shutdown

► continued from page 1

McVeigh calculate that for a total of 34 days, the FCC was officially not in operation, and therefore not conducting any regulatory functions.

"Requiring licensees and permittees to pay regulatory fees for these 34 days of official shutdown, when no regulatory business could be conducted, constitutes unauthorized and illegal taxation," the team wrote in its comments to the FCC.

The comments were submitted in response to the open Notice of Proposed Rulemaking on regulatory fees for fiscal year 1996. Congress directed the FCC to collect \$116.4 million in regulatory fees for fiscal year 1996 — the same amount as in 1995.

Instead of a refund which would be cumbersome, Bernstein and McVeigh suggest that the commission credit one-twelfth of the 1995 fees which each payor has already submitted toward the fiscal year 1996 fees (see chart for amounts).

"We thought about this extensively and we can't find anything inappropriate about our argument," said Lawrence Bernstein. He added that while the commission with its limited budget will not gladly grant

refunds, legally, the firm's filing is "on extraordinarily solid ground."

Asked if the law firm would be willing to take legal action if necessary based on precedents cited in the filing, Bernstein said "absolutely."

Requiring licensees . . . to pay regulatory fees for these 34 days of official shutdown . . . constitutes unauthorized and illegal taxation.

days, technically, FCC employees were off only 23 days if you leave out Saturdays (5), Sundays (4) and Holidays (Christmas and New Year's day).

Thirty-four or twenty-three, however, the premise does not change.

— Bernstein & McVeigh

Bernstein said no one broadcaster could be expected to initiate this kind of filing because it would not be cost effective to pay thousands of dollars in legal fees to recoup a couple hundred dollars. In their filing, he and McVeigh estimate that a blanket one-twelfth credit of 1995 regulatory payments will return "some \$10.8 million to deserving payors" and "preserve the legality of the entire 1995 regulatory fee program."

The FCC could dispute the total number of days off cited by the law firm. Although the agency did not have funding for 34

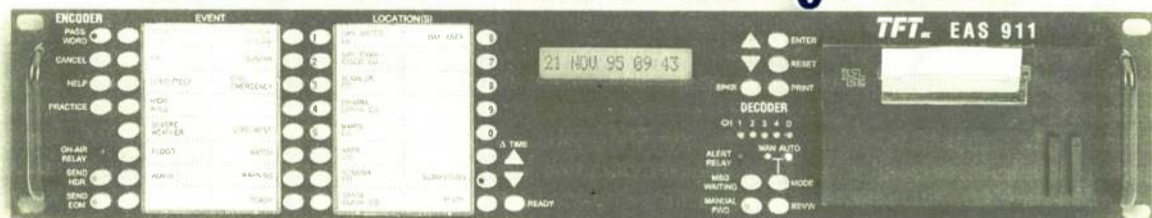
"Licensees and permittees forced to pay a year's worth of regulatory fees have a reasonable expectation that they will receive a year's worth of regulatory services in return," write Bernstein and McVeigh.

What could this mean for non-owners who did not pay regulatory fees, but did pay taxes?

"I don't know that one could make the same argument about the income tax," said Bernstein reiterating that the firm is focusing on regulatory fees which are collected solely to pay for regulatory activities.

— Lynn Meadows

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INTERNATIONAL UPDATE

EuroDAB Expanding Scope, Focus

MUNICH, Germany The EuroDAB group is expanding its focus as the organization formed through the European Broadcasting Union moves into its second year.

EuroDAB is delving deep into questions of what services should Digital Audio Broadcasting (DAB) offer other than audio programming and how such services be implemented. The group will also examine consumer demand, an area until now not reviewed in depth.

EuroDAB, which is developing a new name to reflect its new scope, currently boasts more than 100 national forums, manufacturers, broadcasters, network providers, media regulators and administrators from 24 nations as members. Franc Kozamernik, project manager of the group, is extremely pleased with its progress.

"I think we are really finding out what our role is in DAB," he said.

Different aspects

To better deal with the various aspects of DAB, the group divided itself into several modules.

Module 1 is divided into two ad-hoc groups, the first of which is led by Per Eric Selemark of the Swedish public broadcaster Sveriges Radio and is charged with identifying features and applications for the first generation of consumer DAB receivers.

Already the group, which consists of broadcasters and manufacturers, determined several features to be implemented in consumer receivers such as offering bit rates from 32 to 256 kbps and the ability to reconfigure a multiplex without interrupting a signal.

The group agreed that if DAB is not fully implemented in a certain area, it must be able to link with existing FM and AM services. The first-generation receivers will also offer traffic message channel (TMC) capabilities.

Receiver features

Kozamernik is pleased to see the work being done on the receivers as he feels it will help make DAB more successful.

"Take the example of RDS," he said. "Manufacturers and broadcasters did not work together on this and, as a result, what the broadcasters understood the features to be and what the manufacturers implemented were not at all the same. It turned out to be a real mess for the marketplace."

The EuroDAB group would like DAB to be seen more as commercial multimedia and less as another audio service. Consequently, data services are becoming more important in the development of DAB.

The second ad-hoc group within Module 1 focuses on this aspect of DAB. Led by Ruud Vader of Nozema in the

Netherlands, the group is looking into the DAB receivers and data services.

It has suggested to manufacturers that DAB receivers should look different than conventional analog receivers do. That way, when consumers enter a store and see the receiver, they will immediately realize that DAB is something new not just a replacement for FM radio.

Module 1 recommends that text displays be larger on the receivers allowing for more text to be presented. Graphical display for maps and additional text are a possible option for the first group of receivers.

A further recommendation is to put solid-state memory into the receivers to record audio. A possible application for this could be the planned BBC NOW station which will offer news, sports and information in 10-minute blocks.

The recording function of the receivers would allow consumers to record this information with the DAB receiver in their car, for example, and then listen to it at a more convenient time.

Another topic Module 1 is examining is conditional access to certain parts of DAB, which would provide for pay radio.

Consumer needs

Module 2, headed by Mark Thomas of the U.K. Radio Authority, is watching the various governments of the countries implementing DAB. The goal is to ensure that various government regulations do not hamper the growth of the new medium.

This includes convincing governments to help stimulate investment in DAB-related enterprises and improving the chances of freeing more frequencies for DAB in some nations.

It is clear to the module that regulating DAB will differ from nation to nation, but it hopes to provide useful guidance as

to the advantages and disadvantages of the various approaches.

Module 3 is headed by Michel Tremblay of the Canadian Broadcasting Corp. This module is preparing a market survey of what the public actually wants or feels they need in a DAB-type service.

Remarkably enough, no such survey is known to have been done until now.

After years of technical research, committees and development work, consumers will finally have their say about DAB. Scheduled to be conducted in the near future, the survey will determine which aspects of DAB hold the most interest for consumers and how much consumers are willing to spend for special pay radio services that may be offered in the future.

Pinpoint needs

Kozamernik hopes the survey will help pinpoint consumer needs enabling EuroDAB to concentrate on what consumers really want.

That, he said, is one of the key tasks facing the EuroDAB group.

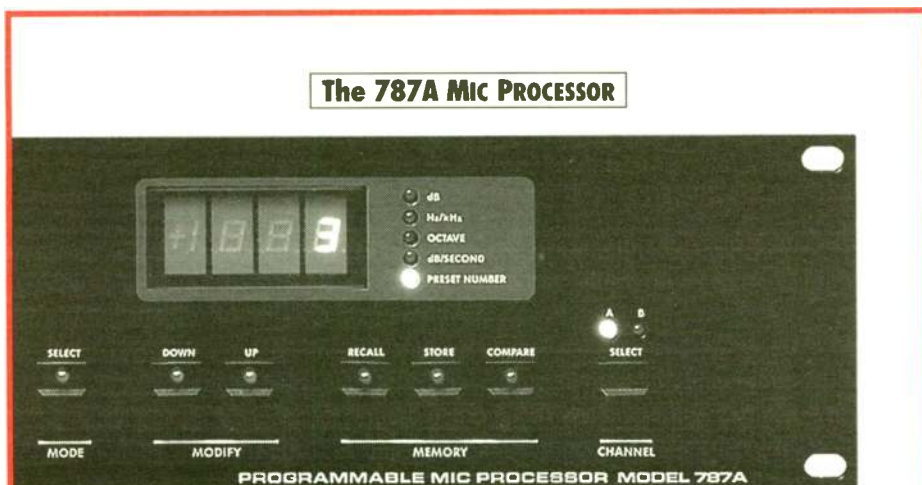
Finally, Module 4, led by Peter Senger of Deutsche Welle, is reviewing existing satellite DAB projects.

"Overall, the group, with all its different module sub-committees, has plenty to celebrate on its first anniversary," said Kozamernik.

With all the work done to hone the focus of the group, a decision has been made to change its name.

According to Kozamernik, the focus of the group stretches far beyond the European continent. Since its founding in 1995, membership in EuroDAB has expanded beyond Europe to include Canadians, Australians and Americans.

With an ever-increasing international membership, EuroDAB plans for a name change to reflect its international base. The new name is expected to be settled upon at the next general assembly meeting in October, and Kozamernik said that it will definitely convey the group's global identity.



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Broadcasters Bemoan Nationalistic Quotas

by Jean-Michel Sauvage

PARIS In the "better them than me category," U.S. broadcasters will be interested in the new hoops French broadcasters are jumping through.

As of Jan. 1, a new act requires private music-formatted radio stations in France to broadcast at least 40 percent of their songs in French during prime listening hours. Half of this must be by new artists or new releases.

Not surprisingly, numerous objections have been raised since the new law became effective.

Controversial situation

For the national networks that target young people, the quota is seen as a death sentence for their format.

According to the stations, the volume and quality of the French musical product — particularly that directed toward youths — makes it nearly impossible to adhere to the quotas. In the hope of finding some relief, they turned to the

Conseil Supérieur de l'Audiovisuel (CSA) which enforces the law.

Thus far, the council has been lenient in implementing the quota. Before the new year, the CSA implemented an "ascending scale" scheme to phase in the quota. The CSA had all private radio stations sign an authorization agreement defining their commitments and obligations. The council also opened a dialogue with Musique France Plus, an association of radio stations and musical professionals.

Musique France Plus proposed a number of possibilities to the CSA to take different formats into account in determining prime listening hours.

Some proposals, however, like those regarding instrumental music led by a French-speaking composer or songs performed in a foreign language by a Francophone singer do not legally meet the quota requirement.

"It is required by statute to enforce the law," said the CSA. "Yet we will show the greatest possible flexibility in the

continued on page 14 ►

INTERNATIONAL UPDATE

Broadcasting in a War-torn Zone

by Charles Recknagel

SARAJEVO, Bosnia and Hercegovina Broadcasting in a war zone or what until recently was a war zone poses special problems.

Just ask U.S. Army Specialist Darrin Mattea of Radio IFOR in Sarajevo. As the voice of the NATO-led Implementation Force (IFOR) in Bosnia and Hercegovina, Radio IFOR tries to build peace by keeping citizens informed of international community efforts to rebuild the country.

With the economy in the nation shattered by the war, Radio IFOR has to do

minimal supplies to do repairs, the radio is on its own with no hope of getting any additional parts.

"All we have to work with is what we brought with us when NATO deployed in the former Yugoslavia in December," said Mattea. Plus, because of weight restrictions, equipment for Radio IFOR was limited to what could be transported on two pallets.

With a 10 kW transmitter on the roof, the Radio IFOR team of three Army broadcasters and three native Bosnian journalists stays on the air 18 hours a day. The team intersperses self-produced news programs and public service segments to provide listeners with objective information about the peace process — something not available from most local stations.

After more than three years of war, radio stations in Bosnia and Hercegovina are partial — or at least seen by listeners as partial — to one of the three former enemy sides of the country: the Bosnian Serbs, the Bosnian Croats, or the Muslim-led Sarajevo government.

"We try to provide a credibility check on the local radios," Station Manager Sgt. Rich Greene said. The station offers news about Bosnia and Hercegovina direct from Western wire services and airs live press conferences with international peace officials. As a public service, the station teaches listeners how to recognize and avoid the tens of thousands of mines deposited across the countryside.

"It is human interest programming with a positive message," said Greene. "We try to let people know that because IFOR is here, things can now start to get better."

Acceptable language

The station builds listenership by offering a wide variety of top 40 hits direct from a music service in the United States,

airing some of the most up-to-the-minute music in the Balkans.

To get its message beyond Sarajevo, Radio IFOR rebroadcasts its programs from three other sites in Bosnia and Hercegovina. IFOR uses a 10 kW transmitter in Tuzla and a 400 W transmitter near Banja Luka to reach parts of Serb-dominated northern Bosnia. A 400 W transmitter covers the western Bosnian town of Mostar which is divided between Croats and Muslims.

While that leaves much of the mountainous Bosnian countryside uncovered, the station tries to compensate by supplying programs to any local stations that will agree to air them unedited. So far, 40 stations have agreed and Radio IFOR sends them a 45-minute cassette program each week over land by way of IFOR logistical services.

In a country as recently war-torn as Bosnia and Hercegovina, the Radio IFOR relationship with its affiliates is a cautious one.

"We have our own people listening every time (the affiliates) air one of our tapes to make sure they do not use just part of it or put their own spin on the information," Greene stated. If affiliates do that, the relationship is terminated.

There are other challenges to broadcasting the IFOR message in Bosnia. Possibly the biggest, according to Network Operations Officer Maj. Steve Collins is finding the correct language to use on the air.

While all of Bosnia and Hercegovina speaks the Serbo-Croatian language, the years of war prompted all three sides to seek to distinguish themselves by promoting the use of words and regional variations unique to themselves. The result is a verbal minefield for any broadcaster now trying to address all three audiences simultaneously without offending anyone.

Must be sensitive

"We have to be sensitive to the language variations that occurred since the beginning of the war," Collins said. "Our translators agonize over passages to make them as acceptable as possible."


The translators try to satisfy everyone by using standard Serbo-Croatian as it existed before the war. That standard may

sound strange on the airwaves of Bosnia and Hercegovina today but, Collins explained, the audience recognizes what the radio is doing and understands it is an attempt to be even-handed.

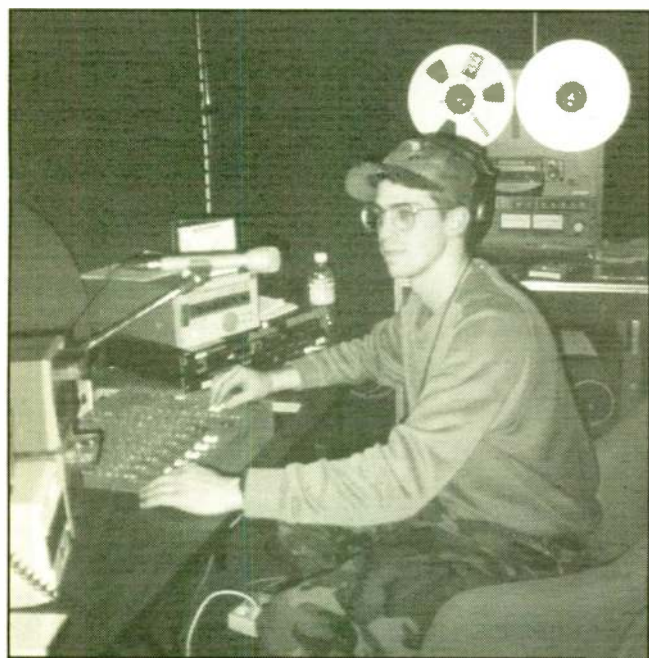
Radio IFOR uses one other trick in its effort to be a credible radio station beyond the ethnic rivalries of the region. All of its news programs are aired first in Serbo-Croatian then repeated immediately in English. The English-language version — understandable to many well-educated Bosnians — protects the station against being misquoted by any party eager to take advantage of ambiguities in translation.

The Radio IFOR attention to detail and its minimum amount of studio equipment show that the operation is no stranger to working in trouble spots. For several staff members, Bosnia is just the latest stop in their own personal history of broadcasting in conflict spots around the world.

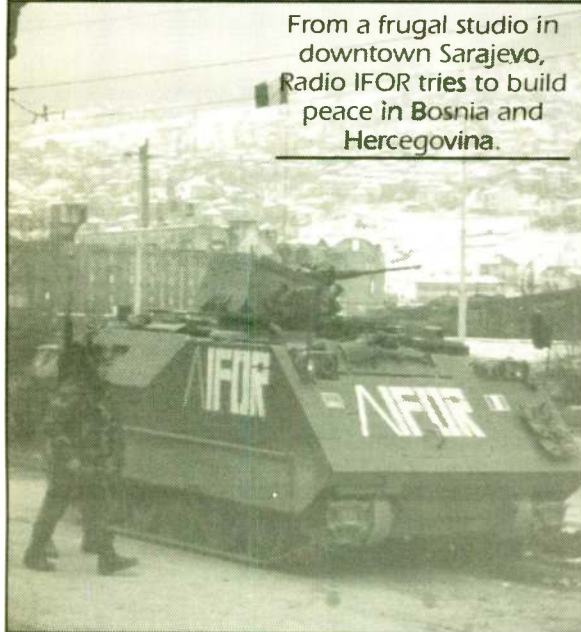
Mattea, working under his soundproof tent, previously did public television spots as part of the U.S. Army peacekeeping mission in Haiti. Station Manager Greene was most recently broadcasting as part of U.N. peacekeeping efforts in Somalia.

"The radio will be here as long as the IFOR mission runs in Bosnia," said Greene. "After that, we do not know where we will be next." 

Charles Recknagel, a journalist based in Prague, Czech Republic, regularly reports on the industry for RW. This report is based on a second trip to Sarajevo for RW.



From a frugal studio in downtown Sarajevo, Radio IFOR tries to build peace in Bosnia and Hercegovina.



its work with a minimum of facilities.

A quick look around the Radio IFOR facility in a NATO-occupied office building in downtown Sarajevo illustrates some of the challenges. The station has two small rooms on a top floor. In the center of one room, Mattea and his fellow broadcasters set up a portable broadcasting facility that looks more like a camp site than a radio studio.

They erected a tent of aluminum framing covered with sheets of soundproof foam. Inside the tent, they squeezed a Soundcraft 8100 mixer, a pair of cart machines, a TASCAM CD player and two chairs for broadcasters.

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INTERNATIONAL UPDATE

CTRC Foils Single-Faith Stations

Canadians Determined to Avoid 'Excesses Often Found in American Televangelism'

by James Careless

OTTAWA For single-faith religious broadcasters considering setting up a commercial Canadian radio station, the message is clear: forget it, you simply cannot get in.

Unlike those in many other nations, broadcast regulations established by the Canadian Radio-television and Telecommunications Commission (CRTC) make it virtually impossible for such stations to get a license.

Clear rationale

Commission Chairman Keith Spicer clearly stated the rationale behind the CRTC position in 1993, when the CRTC slightly relaxed its rule: "Canadians do not want our system to imitate the hardcore fund-raising, intolerance, and other excesses often found in American televangelism."

This hostility is a long-standing Canadian tradition; in fact, the first Canadian task force on broadcasting, the Aird Commission, was established in 1930 in response to the "hate harangues" of some single-faith stations.

Along with the eventual formation of the Canadian Broadcasting Corp. (CBC), the Aird Commission proposed that "there should be regulations prohibiting statements of a controversial nature or one religion making an attack upon the leaders or doctrine of another."

The 1993 rule revision reflects this view. As Spicer said, "our increased flexibility will allow an individual faith group to have a broadcasting service expressing its own point of view, provided they pay for it and no one is forced to receive it."

But if a religious programming service is broadcast over the air or put on basic cable, it will have to be balanced and provide diverse points of view on issues of public concern ... including religion."

What does balance mean in the context of the CRTC decision? In practice, it is realized by one of the few major-market openly religious broadcasters in Canada, Radio Notre Dame in Montréal, Québec.

According to Program Director René Barbin, "we are an inter-religious station. On Sunday morning we have Lutherans, Jews, Anglicans, Muslims, Orthodox Christians and Catholics."

By contrast, "in the United States all the (religious) stations, except very few, are fundamentalist and Baptist. They are

preacher-owned stations," Barbin said.

"We are very, very far from this philosophy. We are not preaching. We are not asking money for any church. We are open to all denominations. We do not make controversial programs."

This kind of feel-good religious broadcasting suits the CRTC, but it does not sit well with the few single-faith broadcast-

These stations exist because of an oddity of history. Both were established before Newfoundland joined Canada.

ers who have managed to wheedle their way onto the airwaves and who feel that the 1993 revised rules are not much better than the ones they replaced.

"I remember when they got this thing going," said Don Millar, general manager of the campus community Christian station CJOS in Karenport, Saskatchewan. "All the Christians were jumping up and down, saying 'now we can have all kinds of stations.' And I looked at the balance requirements. I thought, 'The CRTC giveth, and the CRTC taketh away.'"

Everything for everybody

Under the revised rules, religious broadcasters have "to be everything for everybody," said Millar. "The problem is, once you have everything for everybody, you end up with nothing for nobody."

Worse yet, to single-faith broadcasters, promoting other faiths is akin to an advertiser promoting a competitor's products.

Pointing to the CRTC rules for religious television, Rob Du Broy said, "they insist on programming that would appeal to non-Christians at times when an audience would tune in which includes prime-time."

Du Broy, who is spearheading the push for a Christian music station in Ottawa, added, "to Christian broadcasters, that would be rather painful ... essentially you are required to be an evangelizing tool for contrary perspectives."

Handful of stations

Judging from the firmness of the CRTC position, one would believe that there are no single-faith radio stations in Canada. There are some but only a handful.

Generally, these stations fall into two

categories: openly licensed single-faith stations and "quieter" Christian music stations.

Two types of stations manage to be openly licensed as single-faith broadcasters under the CRTC rules. The first are small market outlets like CJOS.

Run by the Briarcrest Bible College, the station serves an audience of about 2,500. CJOS received a license under the new rules because Karenport's population "is 100 percent evangelical Christian," said Millar, eliminating any concerns about balance.

Also, the actual signal strength of CJOS is only 5 W, about the power emitted by an average Christmas tree lightbulb.

"Our signal does not get beyond the dump, really," said Millar. "We just serve this area. So the CRTC is not as concerned that the non-Christians or those who do not share our point of view will receive programming that is unbalanced."

The second class of openly religious broadcasters are located in St. John's, Newfoundland: VOAR 1210, which is operated by the Seventh Day Adventists, and VOWR 800, which is run by Canada's United Church.

These stations exist because of an oddity of history. As their call letters imply, both stations were established before Newfoundland joined the Canada confederation in 1949.

When Newfoundland joined, "one of the

conditions was that the existing radio stations would continue to operate as they had," said VOWR Station Manager John Tessier. "And this has been the case."

Make a joyful noise

The general category of single-faith broadcasters are those that sing their beliefs, but do not speak them: stations such as CJCA AM 930 "The Light" in Edmonton, Alberta.


While the CRTC may frown on single-faith broadcasters, it has nothing against religious music formats.

As Du Broy noted, under the rules "it is possible to be a contemporary Christian music formatted station, and our programming can be exclusively Christian music. The spoken word component of the program, however, is supposed to be neutral on religion."

For that reason, playing religious music instead of delivering religious opinions is the path many Christians broadcasters are following in their quest for CRTC licenses.

This back-door approach may also explain why CJCA General Manager Doug Main would rather talk more about sales than faith.

He admits that "the people who own, manage and, by and large, work here are Christian people," said Main. "but this is not a charitable exercise. This is a commercial venture. It is a faith-based motivation just as it would be if you were a Christian bookstore or if you were Amy Grant."

The bottom line is that in Canada, single-faith radio stations are essentially unwelcome on the airwaves, unless they promise to sing about their faith rather than talk about it. 

James Careless covers the radio industry for Radio World from Ottawa, Canada. Contact him via e-mail at careless@magi.com

French Broadcasters in Governmental Headlock

▶ continued from page 12

assigned framework. We will try to bend the letter of the law to the utmost and to regulate on a case-by-case basis."

Rescue plan

This effort will hopefully benefit some Parisian radio stations with very specific formats like the world music station Radio Nova; rock-formatted Oui FM; dance music-formatted Voltage and the Arabic-language station Radio Orient. Radio Latina, which airs Latin music, remains the only station entirely exempt from quotas because of its format.

The nine CSA members have no intention of relaxing their interpretation of the law for youth-oriented FM stations such as Fun Radio, NRJ and Skyrock.

Patrick Zelnik, CEO of Virgin France and president of the National Association of Record Producers (SNEP), claimed that broadcasters failed to honor private agreements brokered 18 months ago between the radio stations and record producers. That led to the institution of the current quotas.

"The quotas represent an acknowledgment of failure, a punishment when an

incentive would have been appropriate," said Zelnik.


Zelnik emphasized that in France, French music easily makes up less than 50 percent of radio programs and that "laissez-faire in the field of culture and communications is impossible. The quotas are an answer to a crisis situation for French record producers."

Game rules

On Jan. 19, the CSA published the new rules of the game. To determine what the prime listening hours are, the council will consider the diversity of a format and any efforts made to broadcast work by new artists.

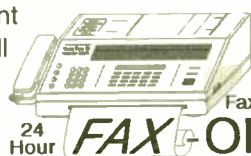
Compliance with the quotas will be subject to detailed monthly accounts. The CSA will compute quota compliance from data gleaned over three consecutive months.

The CSA publication did not satisfy most radio stations so lobby efforts to get the law changed continue through the organization Vive la Radio.

But the French radio industry does not speak with one voice on this issue. Many independent local stations already broadcast more than 40 percent of their songs in French. 

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New Internet Technology Coming

by Angela Novak

LAS VEGAS Broadcasters interested in sharing their audio with listeners on the Internet will soon have a new option to consider.

Telos Systems unveiled its Internet Audio Suite, currently under development, which will provide users with a method for broadcasting professional sound on the Internet. Telos President Steve Church presented details of the system during the Broadcast Engineering Conference at NAB '96.

Church began by presenting an overview of current Internet audio services and discussing the problems

involved with turning the Internet into a broadcasting system.

He described the Telos Internet Audio Suite as an evolving range of hardware and software solutions to the challenges presented by Internet broadcasting.

The Internet Audio Suite is designed to provide improved Internet audio broadcasting. The technology includes encoding systems, an audio server and client software. The system uses MPEG Audio Layer III coding to make both real-time streaming audio and stored audio files accessible via a Web Browser and decoder software.

One reason for the difficulty in broadcasting over the Internet, said Church, is that CD-quality sound requires 1,400 kbps

while modems max out at 28.8 kbps.

Church said that solutions to this problem include compression techniques and faster connection methods like ISDN. He mentioned that cable companies are working towards providing high-speed connections over their fat-capacity coax cables which could make cable a high-bandwidth path to the Internet.

With the Telos Internet Audio Suite, explained Church, audio is transmitted via the usual Web HTTP file transfer over standard TCP/IP. The audio can pass any firewall that permits Web browsing.

The system serves multiple users simultaneously and is capable of various bitrates to handle different delivery pipe

speeds. Either stored files or real-time audio can be served on a streaming basis.

The software-only coder converts PCM audio files into Apple AIFF, Unix .AU or Microsoft .WAV format and stores them for subsequent downloading or streaming. Versions of the software are available for PCs running MS-DOS or Linux, Sun workstations running Solaris and machines running NeXTSTEP 3.

Execution time depends on the computer being used: a one-minute audio segment, for instance, takes 14 minutes on a 486/66 and five minutes on a Sun Sparc 10. Bitrates from 8 kbps to 320 kbps are supported.

Much of the flexibility of the ISO/MPEG Layer III approach, said Church, comes from not being constrained to a general-purpose PC platform for real-time encoding.

The server duplicates the input bit-stream in order to serve multiple simultaneous listeners. The present implementation uses a Pentium PC running a modified Web server under the Unix variant Linux. Church said that the configuration is expected to be able to support up to 200 real-time connections.



Despite buzzards, RF interference, and abandoned coal mines, the crew at K-LAKE 97.7 FM broadcast 24 hours per day, 7 days per week in Mount Pleasant, Texas. Clockwise from left, Bobby D. Moore, morning DJ and Program Director; Mary O'Connell, Traffic Coordinator and Office Manager; Donna Hill, Sales Manager and Co-Owner; Bob Hill, Co-Owner and General Manager.

The Buzzard Damaged Everything, But We Still Kept Broadcasting

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-Bob Hill

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Moving and Grooving at ABC Radio

NEW YORK Robert Callahan, president of Capital Cities/ABC Radio announced a reorganization of the ABC radio division to be phased in during May.

John Mitchell Dolan, president of WPLJ(FM), will now also be president of another New York property, WABC(AM). Dolan succeeds Don Bouloukos who is leaving the company after 22 years.

Maureen Lesourd was promoted to president of KABC(AM), KMPC(AM) and KLOS(FM) in Los Angeles. Most recently, Lesourd served as senior vice president of Affiliate Relations of the ABC Television Network Group. At one time, Lesourd was general manager of WRQX(FM) in Washington.

Lesourd replaces two executives: Bill Sommers, general manager of KLOS since 1986, who had announced a desire to retire last year. KABC(AM) and KMPC(AM) General Manager George Green is being named vice president of Sales Training for the Capital Cities/ABC Radio Division.

Bart Catalane, who has been executive vice president of the ABC Radio Networks, was promoted to executive vice president of the overall Capital Cities/ABC Radio Division.

John McConnell, previously vice president of news for the ABC Radio Networks, was promoted to vice president of programming for WABC Radio. McConnell will also serve as vice president of news talk for the Radio Division and contribute to group strategy for that format.

In addition to overseeing WKHX-AM-FM and WYAY(FM) in Atlanta and WLS(AM) and WKXK-FM in Chicago, 33-year ABC Radio veteran Norman Schrott will be responsible for the development of key aspects of the company's international radio business.

The newly-positioned executives and their operating units will all report directly to Callahan.

On the Slow Track with U.S. DAB

by Lynn Meadows

LAS VEGAS Even as out-of-band Eureka-147 gathers speed in the rest of the world as the standard for Digital Audio Broadcasting (DAB), the United States continues to strive for an in-band, on-channel (IBOC) solution.

The reality of the tough road still left to travel for IBOC proponents set in at NAB during the Broadcast Engineering Conference.

Papers covered issues from coping with multipath in satellite radio to a brief mention of a new technology that some believe could make the Eureka-147 DAB system more palatable to U.S. broadcasters.

Tom Keller, consultant to the Electronics Industries Association DAB test process, opened the conference with a discussion of the DAB lab test data.

He compared dual sideband systems from AT&T/Amati and USA Digital Radio (USADR) FM-1 and how they performed in digital to host and second adjacent channels tests. He called the significant degradation of the second adjacent channel by in-band, on-channel systems "probably a solvable situation."

Keller said that he thinks the IBOC to host FM degradation problem will be more difficult to fix.

David Layer of the NAB said, based on the press coverage, he is not surprised by the negative view people are taking of IBOC systems.

Making comparisons

While the lab data indicates the IBOC systems from USADR and AT&T/Amati need to be improved, Layer said to remember the systems are still new technology compared with Eureka. Plus, he said, IBOC does not require new spectrum, preserves the landscape of U.S. radio and still allows broadcasters to be independent.

"The reaction to problems uncovered should not be the abandonment of IBOC," Layer concluded.

Bob Greenberg of the Federal Communications Commission said he believes everyone in the industry and at the FCC is hoping for a consensus on DAB. Greenberg said the commission has granted temporary authority to two stations in San Francisco to take part in DAB field testing. Unfortunately, the stations have since been sold, and the new owner is not interested in taking part in the IBOC tests.

Greenberg tossed out 20 questions for the audience to consider covering the public interest, designing multistandard receivers and phase-in plans. He asked the audience if the FCC should be more involved in the test process. To date, Greenberg said, commission staffers have held two meetings to discuss DAB issues. He said the staff would really like the industry and proponents to recommend something.

The new on-carrier digital technology being proposed by Sanders, a Lockheed Martin Co., and WCRB(FM) in Boston quieted the room as one engineer pointed out. The presentation by the team brought out the who's who of DAB: Bob Culver,

Don Messer and Ralph Justice all came to the mic with follow-up questions.

Bert Goldman of Patterson Broadcasting held the most melancholy session of the day. He said he was embarrassed the field tests had not yet begun and predicted that even optimistically, it could be 90 days before the van being built in Cleveland would be toddling over the hills of San Francisco in the field tests.

Proponents have until early May to sign their agreements to take part in the field tests. Goldman said temporary authorities and experimental licenses including the L-band for testing of Eureka are expiring and will have to be renewed.

The second half of the seven-and-a-half hour seminar focused on Eureka implementation throughout the rest of the world.

David Witherow of the BBC said Eureka was "gathering speed" and outlined its progress in the United Kingdom, Germany, Sweden, Norway, France and Australia.

"Eureka-147 is the best candidate for a

world system," he told the somewhat-skeptical crowd. "I think it would be a great shame if we see a separate standard develop here in the United States."

Franc Kozamernik, a key proponent of DAB at the European Broadcasting Union, also pushed the Eureka system adding that it could be introduced as a new service so AM and FM would not be disrupted. According to Kozamernik, satellite DAB was another option that might work in the United States but not without the use of complementary terrestrial transmitters for mobile reception.

New development

Kozamernik mentioned a new development very briefly called time division multiple access (TDMA). The idea was picked up quickly by Scott Wright, project engineer, Audio & Communications Systems Engineering at Delco Electronics.

Wright pointed out that with TDMA, U.S. broadcasters could preserve the current radio landscape. Preserving the

landscape — both financially and in terms of signal coverage — has been a prime interest of U.S. broadcasters during the entire DAB discussion. With TDMA, Wright said, broadcasters would be able to emulate conventional AM and FM channelization and still be compatible with the world market — something manufacturers would definitely appreciate.

Several attendees were not so sure that DAB is really necessary.

"To me, there are a lot of solutions looking for problems," said Carlos Altgelt, supervisor in the Automotive Components Division at Ford. Tom McGinley, chief engineer of WPGC-AM-FM in Washington, added that AM radio is really where DAB will be most beneficial.

Joseph Huk, product design engineer with Ford, said that running at reduced power was not a good solution to digital to analog interference as had been suggested. He pointed out that would not be useful in an automotive application.

"The only one that is going to succeed," said Huk of the proponents, "is the one that doesn't cause interference and provides a better quality service."

High Noon Nears for Radio, DARS

► continued from page 1

Radio has successfully reinvented itself several times in its long history and has the awesome ability to serve its local markets better than other media with the power of "bundling." Listeners get a package or bundle of offerings from existing radio including music, news, sports, weather, traffic, talk, etc., most of which is local. The Scott Harris question kept coming up again and again: "Why won't localism beat the pants off DARS?"

"Hey, he's got more bullets than me..."

Odenaal responded by insisting that radio with DARS will not be a level playing field: "The DARS operator will have up to 60 channels in each of hundreds of markets when I can have only eight in a market." Plus DARS can "spot-beam" service to specific markets thus enabling localized service via DARS.

Cary Simpson, whose company consists of stations in very small markets, emphatically stated that Scott Harris's mind is closed, a charge for which he later apologized. Simpson cited the long litany of FCC inconsistencies including the 80-90 docket which forced many small stations to abandon much of their local service in favor of homogenized satellite-fed programming.

Simpson pointed to the Wal-Mart phenomenon and the death of main-street as a negative impact on local radio. He asked, "Why should only one DARS operator be awarded all 60 proposed channels when we (existing broadcasters) must compete with dozens of other applicants for only

one radio channel?"

Saul Levine, self proclaimed "owner and operator of the last mom and pop station in a major market" (KKGQ-FM), admonished Scott Harris for being "dead-wrong" and declared that, "DARS will destroy the finest broadcasting system in the world."

Levine admitted that he could make



five to six times as much money by changing his classical format, but the traditions of rich public service provided by his station for some 37 years were much more valuable.

Levine promised that "if DARS sucks only 10 percent of my business away, I will be forced to change format." He predicted that "DARS will make 80-90 look like a picnic," and that "it is baloney to accept that DARS might serve a Korean audience in a place like Montana." Said Levine, "They will go where the money is and they will be predatory."

When asked why DARS would not negatively impact local radio, Lon Levin predicted that existing radio would strengthen its local service to

compete with DARS and thereby become stronger. Levin admitted that there may be no new formats offered by DARS but that Americans have an insatiable desire for choices which DARS can help fill.

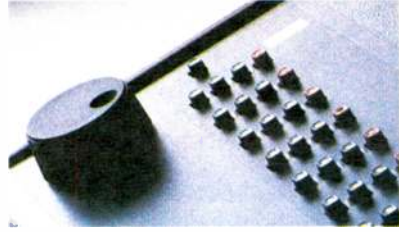
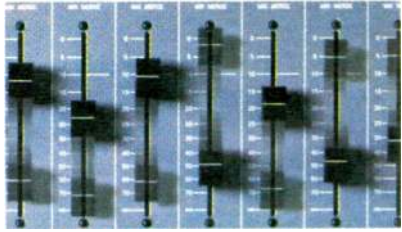
Shootout begins in four years

Levin reminded the panel that DARS could not localize its programming with very much spot-beaming because that technique consumes too much satellite power. Levin indicated that DARS would include data services and stated that if his company is awarded the allocation, it would be operating in about four years.

Randy Odenaal predicted that if DARS merely tries to duplicate existing satellite fed formats, it will fail, but that it would likely evolve into something else. Some formats will likely splinter even further.

Odenaal warned broadcasters that any success they achieve is always fragile and that "there will always be a new threat to worry about which could appear at any time." Scott Harris also predicted DARS would fail if it merely duplicates existing services without localism. Harris pointed out that only 20 to 30 channels would be allocated for DARS not 60 as some had suggested.

Saul Levine summed up the session by asserting that "in 10 years, American radio will be very different with DARS. Many stations will go bankrupt or go dark. Quality will diminish because localism costs money" and many stations will simply not be able to afford it.



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Multimedia Pizazz Livens Up Web Sites

by T. Carter Ross

LAS VEGAS For many people — from broadcasters to corporations to publications — establishing a presence on the World Wide Web is vital to business in the '90s.

But with the number of people using the Internet these days, it is more and more necessary to add something special to liven up standard hypertext.

Differentiate your site

That was the theme of the NAB '96 session, "How to Differentiate Your Web Site with Multimedia Objects."

As panel moderator Joe Dunn of Macromedia noted, "This year Web sites are radically different, with radically different content than last year."

On the panel were Jonathan Lane from 2-Lane Interactive, Yakov Tsalalikh from IBM, Aaron Singer of ad-hoc interactive and Rob Glazer of Progressive Networks.

A massive leap in technology has occurred over the past few years, and the panels agreed that this progress would continue in the coming years.

In particular, audio and video streaming technologies are allowing animation while broadcast feeds and audio tours are adding to the Web.

"More stations are broadcasting live on the Net than can be received in any U.S. city, probably than in any city in the world," Glazer said.

According to Glazer, putting audio feeds on the Internet is making broadcasters reconsider their roles. They can either use the Internet to further explore their local community, or they can look to far-flung audiences around the world.

"You don't have the same limits as broadcasting ... anyone, anywhere in the world can receive this signal," Glazer said.

Tsalalikh predicted that by the end of the decade, "every Web server will be a TV station."

More bandwidth, information

As ISDN and cable modems increase bandwidth and allow larger amounts of information to be received more quickly, the possibilities for multimedia on the Web will increase too.

In the meantime, however, Singer said that it is worthwhile for people to begin adding multimedia to their Web sites now, comparing the current state of multimedia on the Internet to 1X CD-ROMs.

"It allows us to start training for when the bandwidth opens up," said Singer.

Examples of multimedia-enhanced Web sites demonstrated during the session included a Beavis and Buttthead page, the General Motors corporate Web page, an interactive Etch-A-Sketch and a RealAudio-based virtual turntable.

The latter two examples allowed visitors to the Web sites to manipulate images and sounds on the page. As Singer noted, "Interactive TV is here, and it is the Internet."



• The **Marti Electronics** "Smarti" telephone codec is capable of sending and receiving 7.5 kHz audio over a single standard analog phone line. Utilizing the latest MPEG compression algorithms, the Smarti offers three different operating modes, one with very-low delay and 7.5 kHz audio, one with less delay and only slightly lower quality performance, and the third mode is a direct analog telephone interface. Four audio



inputs are standard and front panel switchable from microphone to line level.

Smarti also includes two relay contact closure switches that allow control of equipment at the other end of the system. Front panel controls include a compression algorithm selection switch, two headphone jacks with program and return mode select switches, a monitor jack with level control, return audio and line output level adjustments and a timer that allows events such as breaks to be accurately timed via the LCD display.

The Smarti utilizes an internal switching power supply meaning it can operate from 90 to 264 V (50/60 Hz) or any voltage between without setting switches or jumpers. Pictured, Jim Godfrey with the Smarti.

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The Annual RF for Radio Ritual

by Thomas R. McGinley

LAS VEGAS The annual RF for Radio Ritual at NAB explored new discoveries as well as new ways of fine-tuning established technologies in seven must-see presentations.

New facility

The session began with Grant Bingeman of Continental Electronics describing how a real-time computer has completely tamed a 600 kW, seven-tower, five-pattern

directional medium wave facility just installed in Kuwait.

"Dr. Bingo" offered a colorful slideshow of the operation of this cutting-edge mega system. A 486 personal computer samples and monitors RF impedances, currents, phases, voltages, powers, VSWR, tower lighting, arcs, interlocks, air pressure, variable capacitor positions, RF switch positions, RF sample selection, antenna monitor mode, etc. Almost every conceivable parameter is included.

An operator can perform all control functions from local, extended or remote control locations via a color-coded graphics screen, mouse, and/or keyboard.

Extensive RFI filtering, including double-shielded cabling in conduits was required. This computer control and monitoring concept greatly reduces adjustment and maintenance time in such a complex system.

Stan Salek of Hammett and Edison presented an improved hi-tech method of transmitter site selection and coverage analysis which joins the advantages of a spectrum analyzer and the precision of GPS (global positioning satellite system) with the power of a 486/66 notebook PC.

This is a mobile coverage data collection system which overcomes the limitations of fixed frequency or scanning receivers typically used for this task. A Tektronix 2710 spectrum analyzer feeds analog signal data to a custom DSP module which then outputs serial data to the notebook. A Magellan GPS receiver also connects serially to the notebook which uses custom multitasking software operating on Linux to initialize and control the system.

The output data is processed and scaled to provide graphical and mapped results on a more powerful PC which can be used to evaluate station coverages of home market, adjacent markets, weak signal areas and FM booster transmitter performance. Other applications include total market signal comparisons and interference analysis.

Wide application

This technique can be used to evaluate any communications coverage issue for virtually any VHF or UHF system.

America's first fulltime AM expanded band station is up and running. WJDM, Elizabeth, N.J., is operating with 10 kW daytime and 1 kw nights and is diplexed with its 1530 kHz parent, which runs 1000 W daytime and 670 W critical hours.

Consulting Engineer Charles Hecht described the WJDM installation and the challenge of diplexing two stations only 130 kHz apart on an electrically short tower, only 62 degrees at 1660 kHz. The task was complicated by the requirement that both stations operate with full fidelity stereo and utilize new solid state transmitters, which are more load sensitive than older tube designs.

Hecht discussed the diplexer design and performance, citing specific tricks employed to flatten the bandwidth for good stereo on both stations. The same unipole feed tap-point was used for both frequencies, which yielded compromised, yet reasonable, impedance matching and bandwidth characteristics.

Phasetek constructed the diplexer and was instrumental in helping to achieve the required performance which included 60 dB of isolation between input ports. The shunt leg of each frequency's T-net included a series trap for the other channel. And a series "inverse-slope" network at the tower base helped flatten the overall response.

The available space for LTU and diplexing components was very limited. Initially some arcing occurred because of the high voltages present on the filter components. Turning off the lights to observe the arcs and then repositioning the critical areas solved the problem.

Hecht concluded his presentation with many helpful suggestions on project management when building a new transmitter facility. A thorough site inspection will reveal many possible problem areas. Obtain the best possible site access you can. Keeping complete and well-organized project files with all contact names and phone numbers is critically important. Be sure to obtain all required local building permits. Give the building contractors and utility companies clear written instructions on what is needed, along with plenty of lead time to accommodate weather delays to help avoid unpleasant surprises. And finally, do not sign-off on completions until they are done right and are fully acceptable.

Exciter technology

Recent advances in FM exciter technology have pushed the performance envelope to new limits. In the past, standard off-the-shelf test equipment could be used to adequately test FM signal quality. Edwin Twitchell, Lead EE for Harris Corp. broadcast division discussed how a misaligned FM modulation monitor and stereo demodulator with non-linear response can actually cause an engineer to degrade the performance of his station.

Current FM exciter performance has now exceeded the capability of industry standard measurement practice. Just assuming that your FM modulation monitor and stereo decoder are perfect can lead to a degraded FM signal, especially when adjusting the stereo generator or an older exciter with "predistorted" modulator circuits. Such designs may include filters with non-linear phase response.

Twitchell provided a tutorial on how the Harris Digit all digital FM exciter overcomes such problems with the use of DDS (direct digital synthesis), which allows the traditional PLL (phase-locked loop) to be eliminated, along with the higher levels of undesirable phase noise. All of the older analog circuits that are prone to drift are eliminated. He identified the Belar model FMSA-1 stereo demodulator as the best such unit to evaluate exciter and stereo generator performance.

Low profile

A brand new entrant into the low profile AM antenna arena made its appearance at NAB '96, escorted by its inventor, Marshall Cross of Megawave Corp. in Boylston, Mass. The LPASA (low-profile antiskywave antenna) is an attempt to address two concerns of AM broadcasters: reducing skywave interference for improved nighttime coverage and reducing the visual profile of the traditional AM antenna system of tall steel towers, especially multi-element directional arrays.

According to Cross, "antennas close to earth radiate 'backwards' from conventional designs." A horizontal wire radiates vertical polarization because the earth effectively "shorts out" the h-pol component. And its directivity is "end-fire" rather than broadside. LPASA was modeled by NEC 4.1 and achieves omnidirectional surface wave vertically polarized gain about 6 dB below the standard quarterwave vertical, but with a height of only 10 feet. And it cancels most all of the vertical skywave components. Its architecture consists of two sets of three horizontal wires at right angles, forming a 3 X 3 overlaid crosshatch. The wires

continued on page 30 ►



• The affordable **AEO BC-300** mixer is suitable for small- and medium-sized radio stations. The BC-300/6 and the BC-300/12 are the BC-300 two standard configurations that allow easy handling in AM and FM.

The BC-300 series is user friendly, and it incorporates a telephone hybrid, an integrated monitor and a connector for a headset. Also, the series comes with up to two BC-311 and two BC-322 modules for a total of 11 mono inputs, 17 stereo inputs, three mono outputs and eight stereo outputs. Pictured with the BC-300 are Peter Howarth, Rogelio De La Fuente and Gerardo Vargas.

Contact: Gerardo Vargas, 2211 South 48th Street, #H Tempe, Arizona 85282
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Eye-opening Site: internet@NAB.96

by Bob Rusk

LAS VEGAS Walking through the internet@NAB.96 pavilion at NAB '96 could be overwhelming.

There were so many new developments — yes, new developments in what is a relatively new field for broadcasting.

Radio with pictures

The words "Radio with pictures" cropped up everywhere. Of course, radio does not have pictures — until it combines with the Internet.

CompuServe, one of the exhibiting companies, was offering radio stations free membership through its Interactive Broadcast Network if stations promised to provide five free mentions of CompuServe each day.

"It's very easy for broadcasters," said Kimberly Scher, manager of Corporate Information. More than 400 radio stations have already signed up for the program and more were added at the convention.

CompuServe offers over 3,100 services — news, weather, sports, to name just a few. One of the most attractive features for radio stations is the creation of an "alias address" — an address made up of call letters rather than the typical address made up of numbers.

PsiNet was another Internet-savvy exhibitor. The company can set up a

World Wide Web page for individual stations and take the headache out of what can be a difficult experience. Many broadcasters are not familiar with the nuts and bolts of putting a page together.

As Jim Bergmann, sales consultant for PsiNet, explained, a Web page is the key to creating an interactive relationship between stations and listeners.

"With the graphics, this truly makes radio like TV," he said.

With a Web site, listeners can use e-mail to send requests or enter contests and management can hear feedback from listeners.

For listeners without access to the Internet or those who do not know the first thing about it, station promotions offer an excellent chance to show them what it is all about. During appearances at fairs, remotes, and other events, stations can display their Web page on screen.

Stations can also have a staff member on hand to explain the Web and answer questions. An excellent tie-in is to have listeners who want to access the Web hook on through the station home page.

More sound applications

While many stations talk about the "pictures" the Internet can display, additional audio opportunities are another big plus. How about Peter Jennings and ABC TV's "World Peter Tonight" on your Web page?

During a floor demonstration of the Real Audio system, a station executive asked why people would listen to TV news on the Internet. The reply was that many people are simply too busy to be able to watch the news. Radio — through the Internet — allows this growing audience to tap into the news whenever they have the time.

Talking to various exhibitors and asking

questions took much of the mystery out of the Internet. One of the biggest eye-catchers this year was the "What's New, What's Cool" Theater where attendees could see and compare the most innovative products Internet companies have to offer.

There were Internet sessions aplenty for novices and experts: One Internet basics session guided newcomers through the basics of the Internet and the World Wide Web. Another session showed old-hands how to use the Web externally for promotions, sales and client relations.



• The **MYAT** E-Star Hybridless Power Comway is designed for FM, VHF and UHF applications. A typical four-way VHF setup using an E-Star combiner can deliver as much output power to the antenna as a five-way system using a conventional combiner.

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Contact: Phil Cindrich, P.O. Box 425, Norwood, New Jersey 07648
For information circle **Reader Service 60**.

Best and Brightest Engineers Honored

LAS VEGAS The NAB spring show is a time for broadcasters to honor some of their own. This year was no exception.

It began with the opening ceremonies when Charles Kuralt, longtime CBS correspondent and host of "Sunday



his tenure as chief scientist of the Advanced Television Test Center, received the Television Engineering

Achievement Award.

Gerald R. Robinson, former vice president/director of Engineering for Hearst Broadcasting, received the Engineering Achievement Award for Service to Broadcast Engineering.

FCC Commissioner James H. Quello received the 1996 Belva Brissett Memorial Award at the Policymakers' Breakfast.

Former NAB Radio Board Chairman Robert L. Fox, chairman and CEO, KVEN(AM)/KHAY-FM, was honored as the recipient of the TARPAC Grover C. Cobb Memorial Award during the Legislative Liaison Committee dinner.

Bill McClenaghan, senior vice president for Research & Development at ABC Radio, received the Hugh Malcolm Belville Jr. Award at the Broadcast Education Association Awards Ceremony.

The NAB International Broadcasting Excellence Award went to La Cinquieme, a French public television network while "Laser 101," a radio station on the island of St. Maarten in the Netherlands Antilles received a special NAB International Broadcasting Award for Exceptional Public Service. Those awards were presented at the International Broadcasting Leadership Dinner.



Ogden Prestholdt received the NAB Engineering Achievement Award for Radio.

Morning" who retired in 1994, received the prestigious NAB Distinguished Service Award.

Three awards were given at the NAB '96 engineering luncheon. Ogden Prestholdt, a pioneer in the radio broadcast antenna industry, received the NAB Engineering Achievement Award for radio.

Charles W. Rhodes, who just completed

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DTR-8 DAT Recorder



MR-10 Mini-Disc Recorder/ Player



CDC-600 CD Changer

Expert Tips on Station Upgrades

by Thomas R. McGinley

LAS VEGAS A blue-ribbon panel of legal and engineering experts gathered Wednesday afternoon for the annual NAB ritual regarding station upgrades and related Federal Communications Commission rulemakings.

Ask the FCC

The National Association of Broadcasters' Barry Umansky moderated the laundry list of issues, posing both hypothetical and rhetorical questions to the FCC's Robert Greenberg, senior engineer Susan Crawford with Denny and Associates, along with attorneys Ashton Hardy, David O'Neil and Linda J. Eckard.

Bob Greenberg launched the proceeding with an overview of FCC tower registration rulemaking, set to take effect on July 1. Seventy-five thousand towers across the United States will require formal registration with the FCC/FAA which will act as a single point of contact to build and maintain the master database of all towers supporting FCC licensed operations requiring marking per FAA requirements.

Tower owners will be primarily responsible for painting and lighting requirements and maintenance. Electronic filing of the registration form promises to streamline the process for all tower owners and should save millions of dollars.

Greenberg offered an update on average processing times presently required for various FCC filings: nine months for new station facilities, four months for modification of existing facilities, 60 days for "routine" applications, and 45 days for assignment of license apps. Auxiliary services 313 applications can now be filed electronically and are being processed very rapidly, some within two weeks.

The commission has streamlined the application process for various types of proposed changes to speed things up. For example, a station may increase power up to the maximum allowable for its class without a 301 permit, and simply file the 302 for station license within 10 days after construction if it qualifies for automatic program test authority. FM direc-

tional antenna applicants can go ahead and operate with program test authority after construction, without having to wait for the previously required telegram of authorization. Class A FMs can increase power if a limiting station has recently moved and then file the 301 application after the fact. The window for changing FM antenna heights has been relaxed to +2 and -4 meters, without having to file a 301. And a request for waiver of a main studio location can now be made by letter, rather than construction permit application.

Linda Eckard offered a possible upgrade tip for stations presently blocked by an existing unused allocated channel, or by a station that has been dark for a long time. File a Petition to Delete the unused or dark channel!

That will force the commission to re-examine the allocation. If no applications are pending for such a channel, or if it has been dark for 12 consecutive months, the commission is now more inclined to delete such allocations.

Frivolous filings

Frivolous filings to merely block or slow down a competitor have unfortunately not abated, despite the fact the commission has warned all communications law firms not to engage in such practices. The FCC is being forced to streamline many of its operations with the recent deep budget cuts. In July many of the FCC field offices will be closed or consolidated, with only two full-time staff to remain at open offices.

As a result, Bob Greenberg advised broadcasters to become more proactive in "self-regulation and policing." He warned station operators that although section 318 has been modified to allow unattended operation via modified remote control rules, stations must still maintain a meaningful presence at their main studio locations, including a general manager and at least one announcer/staff person during normal business hours Monday through Friday.

Susan Crawford offered an update on the pending changes in AM directional antenna rules. In 1993 a Notice of Inquiry was

issued, proposing to modify the longstanding rules to reduce the burden of full field proof of performance measurements and close monitoring, instead relying more on computer models and predictive methods. The issue is back in the Mass Media Bureau and an NPRM (Notice of Proposed Rulemaking) should be issued later this year, pending available resources.

Unfortunately those resources have diminished with the retirement of Bill Hassinger.

The news regarding the AM Expanded Band is more promising, with the March 22 release of the public notice that identified 87 stations receiving assignments in the newly revised allotment plan. The top

two stations with the highest priority on that list are already on the air, using STA authority. These stations will shortly be receiving formal notification, requiring that they return in writing within 60 days their intentions to implement expanded band operations.

They will then have 18 months to build the expanded band facility and thereafter five years to operate both the existing and expanded band stations simultaneously, after which they will have to surrender the license of one or the other.

The panel discussed at some length the problems encountered by stations wishing to apply for an open channel and the very short seven-day window afforded competing applicants after the first application is filed.

After 80-90, the FCC did not return to

continued on page 29 ▶

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An editor designed for the broadcaster, Shortcut features a familiar tape-recorder interface with "real buttons," professional 16-bit linear recording, digital and analog I/Os, high-resolution waveform display, 10 hot keys for instant access to edited cuts, real-time editing including cut, copy, paste, insert, erase and loop, insertion of edit markers "on the fly," a "bleep" button to override obscurities, hard-disk storage of up to three hours of 20 kHz stereo audio, built-in mic preamp, speakers and keyboard for titling. To record in the field, just plug in a microphone, and produce the final edited recording on the spot. Pictured from 360 Systems is Steve Cunningham.

Contact: Steve Cunningham, 5321 Sterling Center Dr., Westlake Village, California 91361-4613

For information circle **Reader Service 140.**

Fruitful Search for Low-power Gear

by Peter Hunn

LAS VEGAS It was not much more than a dozen years ago when, seeking small-wattage FM equipment, I attended my first NAB show.

While some ideas were gleaned, I ended up constructing my little, upstate New York commercial FM from odds and ends intended for larger applications. The resulting one-person station (WHRC-FM, Port Henry) was housed in a tiny garage and boasted a mighty 800 watts.

While the facility was certainly undersized, the attention it drew from curious visitors, the New York Times and "Evening Magazine," might seem misplaced in 1996.

Today, due to new FCC rules and a robust marketplace, there is a wider selection of appropriate low-power and PC-based station control technology. This brand of local broadcasting has become much more cost efficient and time effective.

Plus, it opens a legitimate piece of radio's world to a broader spectrum of eager participants.

No matter how strong, the life of every station comes from its transmitter. In the early 1980s, finding an economically priced RF generator often meant buying "used" and dealing with a ton of expensive tubes.

Not so today with a new generation of cool running, compact, solid-state units exemplified by the Crown family of fully integrated FM transmitters.

Known for ages by its audio amplifiers, Crown entered the FM avenue through the urging of HCJB, the renowned Ecuadorian religious station. HCJB engineers developed an easy-to-carry FM transmitter capable of quickly mating with an antenna and audio source to create a plug-and-play, mini radio facility.

In fact, HCJB technicians put the low-power FM transmitter in one package and audio gear in another for a literal "two-suitcase stereo station."

Crown was asked to further refine the HCJB design and put it into production. The result is a series of field-proven FM transmitters from 30 to 500 W.

A built-in stereo generator and audio compressor/limiter, as well as optional direct DC power input (for solar or wind power applications), make equipment like Crown great for a main transmitter or a frequency-agile backup.

New York firms

The Empire State was well represented at NAB '96 with a number of low-power FM manufacturers such as the Syracuse-based Armstrong and Energy-Onix of Hudson Falls.

The Armstrong Transmitter Corp. first earned its good reputation through remanufacturing transmission equipment. Not long ago, the firm began offering its own brand of solid-state exciters of 10 to 100 W and power amps in 300, 500 and 1,000 W versions.

Already, an encouraging number of units are in service around the world.

Energy-Onix builds exciters from 30 to 150 W while providing FM broadcast amplifiers up to 500 W. These too, are very versatile and are designed for low-power broadcasting, stand-by use or as a driver for higher-output FM stations.

Marti, a name synonymous with remote (RPU) transmission, joined the low power FM broadcast industry with its ME-40, 3 to 40 W exciter.

An early entrant in the field of 1 kW or less FM transmitters was QEI. The Williamstown, N.J., firm enjoys a long history via its FM exciters/transmitters keyed by the Quantum E series delivering 2 to 1,000 W.

Many veteran broadcasters fondly recall the wall-mountable Gates (now Harris) 10 and 50 W FM transmitters, often the heart of 1960s and '70s student-run stations.

Harris combined these rugged roots with state-of-the-art offerings in the 100 to 1,000 W range. The Harris Quest series, for example, is available in main or alternate transmitter configurations with automatic switching suitable for even the most remote of sites.

Bext Inc. produces a wide line of FM exciters and low-power transmitters. One of the San Diego-based company's most portable models is a 12 V DC, 1 to 1.5 W programmable exciter that weighs less than 6 pounds (2.7 kilograms). More than one such unit has been quickly called upon for emergency backup via a car battery.

The well-known CCA Electronics was present at the show with a number of low-power FM products such as the 100 W FM 100GS exciter. A broadcaster-friendly, three-year warranty is included with each unit in the CCA line.

Other respected firms including Continental Electronics Corp. of Dallas and Broadcast Electronics of Quincy, Ill., also market quality FM exciters and transmitters for low-power broadcasters.

ning dissipation system called the Lightning Spur.

Jampro Antennas Inc. has the JLST low-power — up to 500 W input — model. Made of aluminum or hot-dipped galvanized steel, it is designed to withstand almost any environment.

SWR Inc., based in Ebensburg, Pa., also features a low-power FM antenna line. Dubbed the FME series, they are available in circular, vertical or horizontal polarization.

All the above products use simple, type N input connectors and are ideal for translators, boosters or small FM broadcast outlets. Plus, they are typically ready for immediate delivery.

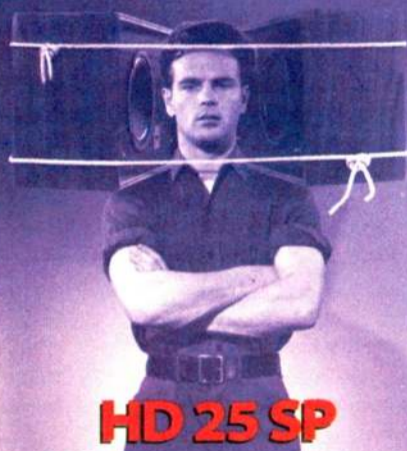
Trusted manufacturers

Many medium-wave outlets could benefit from a new, svelte, solid-state AM transmitter from trusted manufacturers like Harris, BE, Nautel or Continental.

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Circle (65) On Reader Service Card



The Continental Bytecast Series 802D

Digital FM Exciter produces an FM broadcast signal using digital signal processing (DSP) technology. Based on an industry standard PC motherboard, the 802D features open system architecture, expandability and ease of use. Added to the PC is a powerful floating point DSP board, using four analog devices super harvard architecture computer (SHARC) chips to perform the signal processing — FM generation, interpolation, stereo generation, pre-emphasis, composite processing, audio processing, SCA generation and filtering, etc.

The exciter hardware includes a pioneering direct conversion board that converts the digital output from the SHARCs directly to the operating frequency, without the use of an intervening intermediate frequency (IF) or heterodyne system.

The 802D is software expandable and upgradable. Bytecast software upgrades are handled by uploading software over a serial cable from another PC. The 802D contains a solid-state hard disk that replaces conventional mechanical drive with Flash memory technology. Dan Dickey (pictured) is one of the two designers of the 802D. Contact: Steve Claterbaugh, P.O. Box 270879, Dallas, Texas 75227

For information circle **Reader Service 112**.

Some years ago, Nautel began a trend that has mushroomed at recent NAB shows: offering FM gear with an international flavor. Nautel maintains a manufacturing lab in Nova Scotia with U.S. facilities in Maine.

The 50 W Nautel NE 50 exciter is just one reason why the organization enjoys a favorable reputation with broadcasters around the globe.

The Radio/Audio Exhibit Hall included FM exciters and smaller-wattage transmission equipment from DB Elettronica Telecomunicazioni, R.V.R. Elettronica and CTE International from Italy, as well as from LYS Electronic of Brazil and OMB Broadcast of Spain. LYS Electronic has U.S. offices in Long Island, N.Y., and OMB has U.S. offices in Miami.

Each of these companies stresses quality performance and all helped to make NAB '96 a truly world-class exhibit. It was evident to attendees that this year's show provided a richer-than-ever variety of RF choices for foreign and domestic low-power broadcasters.

Those looking for FM antennas also noticed bigger options in the small wattage category. ERI Inc. is displaying its two-bay CP-11 series, which really fills a void in low-power FM antenna availability.

The Chandler, Ind.-based company also markets a low-cost, tower-mounted light-

Each offered their latest designs and electricity-saving performers capable of brightening almost any local AM broadcaster's signal.

Adding a Delta C-QUAM AM stereo exciter, for example, will cause listeners to take pleasant notice of the upgrade.

The low-power broadcast spectrum would not have been complete without a visit to the LPB display at the show. Since 1960, this Frazer, Pa.-based company has provided first-rate AM components for stations ranging from carrier-current school stations and traveller information services to local facilities requiring between 5 and 60 pre- or post-sunset watts.

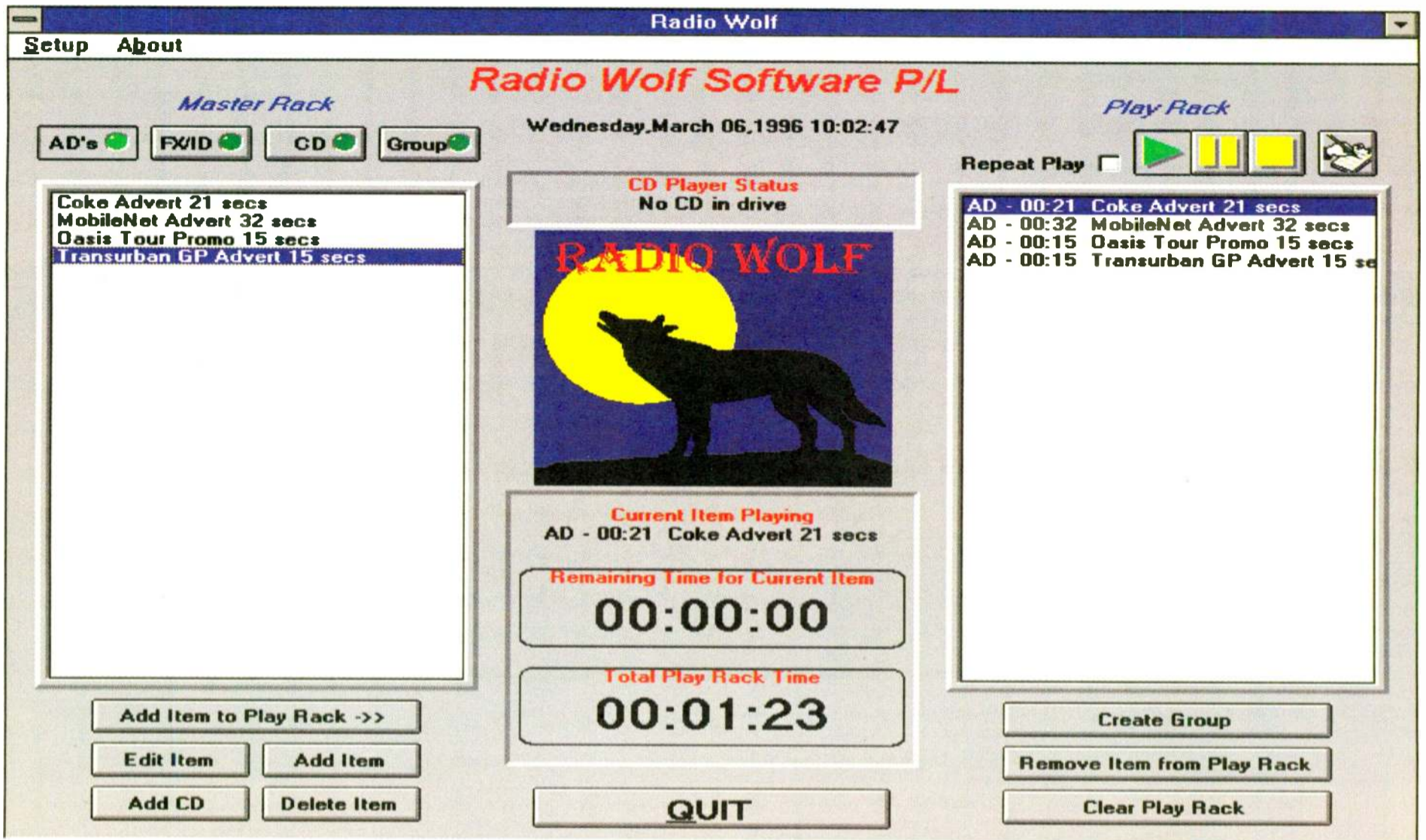
Incidentally, all the available smaller station packages become more efficient when coupled with a PC-based control system, such as SmartCaster's digital audio. Demonstrated at NAB '96, this unit essentially combines most station operations — from production to satellite network control to billing — into a single computer.

The firm recently delivered one to the new owner of an AM daytimer. The station now lets SmartCaster do so much of the station work that the owner decided to keep his full-time job elsewhere.

In the meantime, the little station serves its community nicely, and with almost zero payroll, it is profitable.

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Hassinger on How to Play the Game

by Christopher Nicholson

LAS VEGAS "Be Reasonable: Do It My Way" was the title of the keynote address at the opening of the 50th Annual NAB Broadcast Engineering Conference in Las Vegas.

William Hassinger, former assistant bureau chief for engineering at the Federal Communications Commission, offered broadcasters an insider's perspective on how the agency views its role. He explained how broadcasters must play by FCC rules when going to the commission.

Abide by the rules

The first and most general rule, according to Hassinger, is to keep in mind that the FCC has laws, statutes and acts by which it must abide.

"These principles empower the commission and set boundaries," Hassinger said.

Next, Hassinger explained the FCC must

act in the public interest. He said many people who approached the commission with new ideas were welcomed with less than open arms because their suggestions "weren't in the public interest."

Hassinger described fairness as one of the factors in the rules of the game. "Life isn't fair," Hassinger said, but the FCC must always act fairly. "We must pay a price for fairness, though," Hassinger said. That price, he noted, comes in the form of delays, money and competition being allowed to move in.

The final rule Hassinger discussed was that the commissioners and their staffs like to be good guys. "They like to say yes, and they like to receive praise," said Hassinger.

Hassinger described how to get around playing the game. The first way is by not getting into the game at all. Hassinger expressed surprise at how many people jumped into the broadcasting arena without realizing what they were getting into.

"Minimize your participation in the

game," he said. He advised his listeners to solve problems independently so they do not have to go to the commission.

Speed the process

"If you have to play the game," Hassinger said, "try to play strictly by the official rules and regulations." Hassinger said the FCC "loves it" when rules and procedures are strictly adhered to, because doing so speeds the process.

Hassinger said that if you cannot play

by the rules, then you must ask to be excused with a waiver. "The FCC has an inborn opposition to waivers," he said. He cited the excess paperwork and time that waivers necessitate as the source of much of the opposition.

If a broadcaster must apply for a waiver, Hassinger noted two things will help their case. First, he said, "Take care of the opposition, and cut a deal if you have to."

Second, "Make a convincing case to the FCC that there is no harm in what you are asking for," he said. If the commission is convinced that what the broadcaster is requesting does not violate the public interest, the chances of receiving the waiver will be greater.

Osgood, Imus Bring Laughs to Luncheon

by Whitney Pinion

LAS VEGAS With Don Imus looking on, Charles Osgood said he hoped not to offend anyone during his keynote address at the NAB '96 Radio Luncheon. If he did, he laughed, Imus would smooth things out for him.

People matter

Osgood, the voice of the CBS Radio Network "Osgood Files" and a longtime broadcaster and poet, urged those in the audience not to forget that radio is about people both within and outside the station.

"Yes, people are trouble," Osgood said, "but they're the stuff of which broadcasting is made. There is no other Don Imus or Howard Stern or Rush Limbaugh or Paul Harvey."

There certainly is no other Imus.

This year's inductee into the NAB Broadcasting Hall of Fame, Imus greeted NAB CEO Eddie Fritts on stage with a handshake.

Imus graciously thanked his longtime friend and colleague Charles McCord whom he called one of the best satirists in the history of satire. He also thanked the "courageous and honest" Mel Karmazin of Infinity Broadcasting.

Reflecting on his career, Imus said that work in radio is not what he had planned. He set out to be a musician, forming a band with his brother Fred. Compared to the Beatles and other hit artists of the late '60s, Don and Fred realized they "sucked" and dropped out of the music scene.

Imus then started looking around at some of the radio greats at the time.

"I thought, 'how hard can this be?'" he smirked.

During his address, Osgood remarked that in the midst of all the fascinating technology offered by a show such as the NAB, everyone should remember that radio's greatest assets are not transmitters or digital editors, but people.

"The most important people," he added, "are those whose lives we touch each day."

In keeping with that spirit, NAB acknowledged radio stations providing exemplary service to their communities with the NAB Crystal Awards.

Of the 44 finalists, this year's Crystal Radio Award winners are: KCUE(AM), Red Wing, Minn.; KIRO(AM), Seattle; KOEL(AM), Oelwein, Iowa; KSDR-FM, Watertown, S.D.; WBEE-FM, Rochester, N.Y.; WOKO-FM, Dayton, Ohio; WQCB-FM, Brewer, Maine; WRAL-FM, Raleigh, N.C.; WSYR(AM), Syracuse, N.Y.; and two-time Crystal Radio Award winner WUSL-FM, Philadelphia.



• The **Hafler P-1000 Trans Ana Amplifier** is designed, for among other things, broadcast studio monitoring and recording or critical listening. The unique TRANSc conductance Active Nodal Amplifier topology operates the output stage with its full voltage gain, allowing the input stage to operate from a low-voltage regulated supply. The signal is then shifted up in level to the high voltage section by the driver stage that forms an active node at ultrasonic frequencies.

The patent-pending NOMAD (Non-multiplying Advanced Decision) system very accurately computes the allowable device current for the device voltage and clamps the gate drive when the actual current exceeds this value.

The P-1000 Trans Ana specs include: signal-to-noise ratio of 100 dB below rated output "A" weighted; +/-0.1 dB, 20 Hz to 20 kHz and +0/-3 dB, .1 Hz to 100 kHz; 29 dB maximum gain and -41 dB minimum; balanced two-way XLR and quarter-inch input connector and a tip ring sleeve unbalanced RCA connector and screw terminals mounted on barrier strip output connectors as well as a quarter-inch headphone jack. Steve Alexander accepts the award.

Contact: Rick Gentry, 546 S. Rockford Drive, Tempe, Arizona 85281

For information circle **Reader Service 135**.

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VOICE PROCESSOR

The Missing Digital Radio Link

by Thomas R. McGinley

LAS VEGAS An All Points Bulletin for the missing links in the all-digital air chain was clearly sounded at Tuesday afternoon's NAB '96 radio engineering session.

A veritable digital potpourri featuring seven timely topics included discussions on dedicated versus general purpose hardware, the NPR digital satellite system, the real worlds of ISDN and T1, the Next Radio Station Electronic Communication System, and what issues must be considered when building the all digital radio station.

Steve Epstein, technical editor for Intertec, led off the affair with a look at the merits of choosing dedicated hardware solutions over general purpose or computer-based platforms. The dedicated arena includes things like mechanical patch panels, distribution amps, consoles, tape decks, mics, transmitters, etc. They are task-specific devices, usually rugged and reliable but with limited functionality. They generally carry a higher cost to acquire and maintain and are not easily upgradeable.

General purpose hardware includes CPU-based computers that are

configurable for a wide variety of tasks, usually with customized graphical user interfaces (GUI). They are mass-produced with lower costs and are normally easy to upgrade via software. However, many of the tasks that can be handled by PCs around a broadcast plant need specific I/O boards. They may be single-sourced and difficult if not impossible to repair. The level of quality and dependability can vary widely and the user interface via mouse or keyboard can be much slower and more awkward.

The upgrade myth

Epstein pointed to what he called "the upgrade myth," in which software providers promise that improvements will always be available via a new version of the program on floppy disk. With software needing dramatically higher memory resources and computing horsepower, we are finding that hardware upgrades are needed before many new or enhanced software applications can properly run.

Epstein advised that whenever you buy a hardware solution, be sure you know what your upgrade path will be. Focus on both short- and long-term needs. Devise a plan of action and be creative.

Greg Monti, former projectsupervisor for the new NPR satellite network distribution system, offered a "what we learned" assessment of the conversion to a digital-based system. NPR installed its original satellite system in 1979 and was the first major network to go satellite. It consisted of 12 analog mono channels with one 1200 baud data channel. NPR decided to switch to digital because Westar IV was coming to the end of its life and a one-time financing opportunity to build a new system was available. In addition, 3,000 receivers were growing

very old and were rapidly becoming unmaintainable.

The new system is built on Comstream hardware and provides 24 SCPC stereo DATS channels using ISO/MPEG Layer 2 compression at 256 kbps. The quality is obviously much better than the old analog. The custom Comstream ABR-700 demod card still uses 70 MHz input and includes RS-485 serial data output with autobaud detection. Several minor snafus showed up after the system was implemented.

The data display screen on the user terminal is hard to read because it was not back-lit. Cooling fans in the Comstream box are a bit noisy in a quiet control room environment. Unlike most reel recorders, RDATE machines do not auto-restart in record after power bumps, so control modifications are required. And it was discovered that unsynched digital audio cannot be directly sent through a T1 link. It must first be converted to analog and then reconverted in synchronized form.

Windows-like

NPR devised the "SOSS" (satellite operations support system), which provides a "Windows-like" OS-2 based graphical user interface at the station end to control and monitor network feeds. It was developed by IBM and has proven to be user-friendly for even computer illiterate users at the station level.

Telos System's Steve Church offered an engaging report on "ISDN for Broadcast. The Real World and What We've Learned." Church's company builds the Zephyr, a popular and widely used ISDN codec. In many areas, ISDN still stands for "I Still Don't No," but according to Church, things are rapidly getting better. This year over 750,000 ISDN lines are presently in use. By 1999, that number will grow to 2,300,000.


Church lamented there is still a lot of ignorance when dealing with the local phone company regarding ISDN. The "BS" interface (Business office/Service call) can be frustrating. In the Bell Atlantic region, repairs are promised within four hours, or charges may be dropped if full service is not provided and/or the customer is not satisfied. Steve also reported that a new national SPID format has just been announced, which will consist of the full number including area code, followed by 0101 as the standard suffix. He also mentioned that a revised national ISDN protocol is coming, called "ISDN 96," although it could be released as late as next year.


Troubleshooting

When ordering ISDN, choose a long-distance carrier, and be sure that choice is registered. If you don't do this, you may not receive any trouble-shooting help for long-distance remotes. Church also offered several valuable trouble-shooting tips when ISDN doesn't connect. Use a telephone test butt set to "listen" for trouble. Connected across a good ISDN line in the hi-Z bridging mode, you should hear a two hertz clicking sound. If no clicks, no ISDN carrier is present.

In the loaded or "dial-tone" mode, you will first hear noise for about 30 seconds, and then the two hertz clicks to verify a good ISDN connection. Learn the TA (terminal adaptor) "cause codes" for additional clues regarding trouble. If at first your ISDN circuit will not connect, try dialing in the other direction, especially with LD circuits.

continued on page 33





• The **Orban** Optimod 2200 Digital Audio Processor delivers sound quality, programmability, precision and stability. Unlike analog systems that can be temperature sensitive and prone to drifting, digital circuitry offers precise control and stability once the unit is set to the users desired settings. It also offers the ability to change and save different audio settings. There are eight factory presets for those looking for a "plug and play" operation. Users can connect the 2200 to their remote control system and change from one processing preset to another with push button convenience. With digital input and output, the 2200-D can be connected to digital STLs and exciters. The Optimod 2200 inherited some of the Optimod 8200 features and processing sound. Two-band processing includes a bass equalizer to add punch and a high-frequency enhancer that automatically adds sparkle. A transparent protection limiter offers peak modulation control. The unit generates the stereo composite signal digitally, meaning it is drift-free and clean. Standing with the Optimod 2200 is Martin Acuff.

Contact: Amy Huson, 1525 Alvarado Street, San Leandro, California 94577
For information circle **Reader Service 164.**

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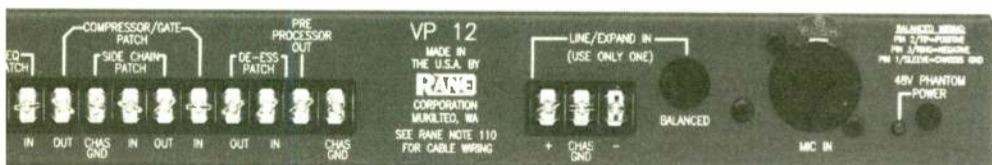


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P U R I T Y B Y D E S I G N



DAB Transmitters from Around the World

by T. Carter Ross

LAS VEGAS It's the perennial word for NAB '96 — digital.

Digital automation, digital processors, digital editing, digital consoles, digital media, digital everything.

But all these 1s and 0s remain locked in analog world once they reach the transmitter. Or do they?

A careful examination of NAB '96 reveals that people were not just talking about Digital Audio Broadcasting: This year a number of manufacturers are offering DAB transmitters, making radio's digital future a reality.

Flexible transmitters

On the Harris stand was the DAB 2000 Series of DAB transmitters. A line of flexible 300 W to 2 kW transmitters allows broadcasters to transmit multiple CD-quality radio programs and data services simultaneously over one channel of a Single Frequency Network (SFN).

Harris is working with the British telecommunications services provider NTL on its private radio DAB multiplex in London. Previously, Harris and NTL teamed up for a DAB trial in Birmingham, England, during the 1995 Sound Broadcast Equipment Show (SBES) there.

The DAB 2000 makes use of a fully

Eureka-147 compatible COFDM encoder and can operate in either the L-band or VHF band III.

Itelco, based in Orvieto, Italy, brought its new DAB transmitter to the show. Available in L-band and VHF band III models, Itelco offers 100, 200, 250, 300, 500 and 1,000 W models for VHF band III and 25, 50, 100, 200, 400 and 800 W models for L-band.

According to the company, field pilot tests conducted in March confirmed that Itelco DAB transmitters are fully compliant with ETSI 300 401 DAB specifications. The transmitters are also fully compatible with SFN operations and with other ETSI 300 401-compliant transmitters that follow Eureka-147 requirements.

Also involved with DAB in the United Kingdom is GEC-Marconi. GEC-Marconi, its subsidiary Eddystone Radio and the British Broadcasting Corp. (BBC) cooperated to develop the B6800 Series, two-times 1 kW Band III transmitter for the BBC's U.K. DAB project.

By the end of 1998, the BBC plans to have 60 percent of the United Kingdom covered with Eureka-147 DAB, mostly using GEC-Marconi/Eddystone Radio DAB transmitters.

GEC-Marconi also showed an L-band version of its DAB system, which is

expected to find a home in other DAB projects around the world.

No market

Dick Brown of GEC-Marconi noted that while the company is talking with other DAB project organizers across Europe, the market for DAB transmitters is not quite there yet. He expects the market to develop significantly over the next two years.

On the Continental/Telefunken Sendertechnik stand, the German half of the partnership showed the S 5375 200 W DAB L-band transmitter.

Telefunken is involved in the ongoing DAB projects throughout Germany as well as with DAB trials in Korea, Australia and elsewhere.

Brand new from Larcant-TTC is a

Eureka-147-compatible DAB transmitter available in both a 125 W L-band version and a 250 W VHF band III model.

CCA built an in-band, on-channel (IBOC) DAB transmitter for AT&T. However, because the unit was in San Francisco for the upcoming NRSC/EIA DAB subcommittee field tests, the company did not bring it to the show.

Digital exciters — one step shy of a DAB transmission system — were also present at the show. Harris showed its well-established DIGIT, and Nautel showed the new NE 50.

Both units are designed for operation with traditional, analog FM transmitters and both allow broadcasters to keep a signal all digital until it reaches the transmitter.



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TuneBuilder system requirements include 18MB of hard disk space, SCSI host adapter card, spectrum board, sound card and SCSI CD-ROM drive. Pictured at the Airworks booth is Darryl Goede.

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First-timer Reflects on NAB '96

by Bob Rusk

LAS VEGAS The hypnotic sound of coins sliding through slot machines is almost out of my mind.

Last night, I woke up certain that I had hit it big; I'm told that this, too, shall pass.

Before too many memories get away, now seems like a good time to reflect on NAB '96. For this reporter, it was a double dose of excitement: not only was it my first NAB convention, but it was my first trip to Las Vegas.

I accurately imagined the roulette tables and miles of neon that line the Strip; however, I never could have imagined the slot machines in the corner drug store. But there they were, inside the front door, right across the street from the Debbie Reynolds Hotel.

When you think about it, that is actually a great spot for the slots. If you lose more than you win, the bottles of Bufferin are just an aisle away.

My prior knowledge of Las Vegas was limited to what I had seen on TV travelogues. I remember one tour guide warning about the long lines at hotel check-ins. With that in mind, I brought a Louis L'Amour novel to read while waiting my turn at the CircusCircus front desk. To my surprise, there was no one else waiting when I arrived.

Bumpy ride

On Monday morning, I hopped onto the shuttle bus expecting to reach the Las Vegas Convention Center in just a few minutes. It did not arrive until 40 minutes later after first driving over a curb and heading straight into a lane of oncoming traffic. That woke up some sleepy-eyed conventioners who watched as approaching motorists slammed on their brakes.

The next morning I decided to walk the mile to the LVCC which turned out to be a good move. I met some folks along the way who were also heading there including the engineer of a college radio station in the Midwest. It was enjoyable talking with many people I probably would not have met otherwise.

As an RW writer, I regularly talk on the phone with industry leaders. Walking the floor at the LVCC and Sands Expo Center

offered an excellent opportunity to meet many of them putting faces with names.

I took the bus to the Sands, but this time, it was a quicker and calmer ride. Once inside the hall, my first stop was the Internet Pavilion which proved to be a fascinating look at the new developments in this ever-expanding world of information and communication.

Radio heaven

Going from booth to booth, I felt like a kid in a candy store seeing so many products that were being shown for the first time. Radio has been a big part of my life since the early 1970s when I walked into the 1,000 W station down the block from my house in Astoria,

Ore., at the tender age of 12.

In those days, music on cart was still somewhere off in the future. At NAB '96, I saw something called Radio in a Box which is an economical way of operating a station — complete with music, commercials and announcers — in a box not much bigger than some radios.

What a great piece of equipment, I thought, for competing in today's marketplace. For years, doomsayers have been predicting the death of radio. It goes back to the beginning of television.

More recently, with the rise in FM popularity, there have been predictions of the imminent demise of AM. But news, talk and nostalgia music are among the formats that have made some AM stations

more popular than ever.

I stopped for a moment to take in what I was seeing — and it was a bright picture. Whenever there is a challenge, radio accepts it and comes out even stronger than before. That is what the new equipment at NAB '96 was all about.

More than 90,000 people were on hand to look — and buy. The college engineer I met on my walk to the LVCC was very excited about taking some merchandise home that would make his station a better operation.

All in all, NAB '96 was a wonderful experience for me. If I had to pick one thing that stood out, it would be the people I met at the booths who are dedicated, creative and firm believers in the future of our business.

I'm looking forward to attending next year's convention. I only wish now that I could get the sound of the slot machines out of my mind.

Do-it-yourself Upgrade Primer

▶ continued from page 23

the traditional A/B cutoff process that allowed competing applicants a 30-day opportunity to cross-file.

Greenberg defended the commission by pointing out that the A/B cutoff was dispensed with to eliminate "copy-cat" applications. Ashton Hardy has filed a petition to extend the seven-day limit to 14 days.

"Your worst nightmare" was the phrase engineer Susan Crawford applied to the ordeal some stations have faced when ordered to comply with blanketing interference resolution. After moving or building a new transmitter site, licensees are required to satisfy ALL written interference complaints received by the station within one year of commencing operations.

In some egregious cases of ignorance and neglect, some stations have had their program test authority revoked and their license cancelled.

Linda Eckard offered her CARE prescription on the thorny issue of blanketing: First Call your engineer to determine your 115 dBu blanketing contour. Then Alert your staff on how to handle complaints. Then Review all complaints and follow up by having a responsible person go through each one. And finally Educate the people in your community on how to resolve interference themselves, without

having to get the station or the FCC involved.

Barry Umansky reminded everyone that the FCC makes available its Guide on Solving Interference free, now available on the Web at www.fcc.com

The issue of translators came up, with David O'Neil advising station buyers to check any translators involved with the station that might be outside the protected contour (usually 1 mv/m). If so, you must remove yourself from having any contact or control of such translators. In cases where a translator interferes with the secondary service of a fully licensed station, the FCC can be

notified, after which it will send a formal request to the translator licensee to eliminate the interference within 30 days or shut down.

The panel concluded its deliberations with a quick look at FCC/FAA relations and the old backlog of applications for FM CPs being held up by the FAA. Bob Greenberg reported that after the FCC staff and members of AFCEE met with the FAA over a year ago, no new holdup cases have surfaced and most all of the old issues have been quietly resolved.

Tom McGinley is the director of engineering at WPGC-AM-FM in Washington and the technical advisor for RW.

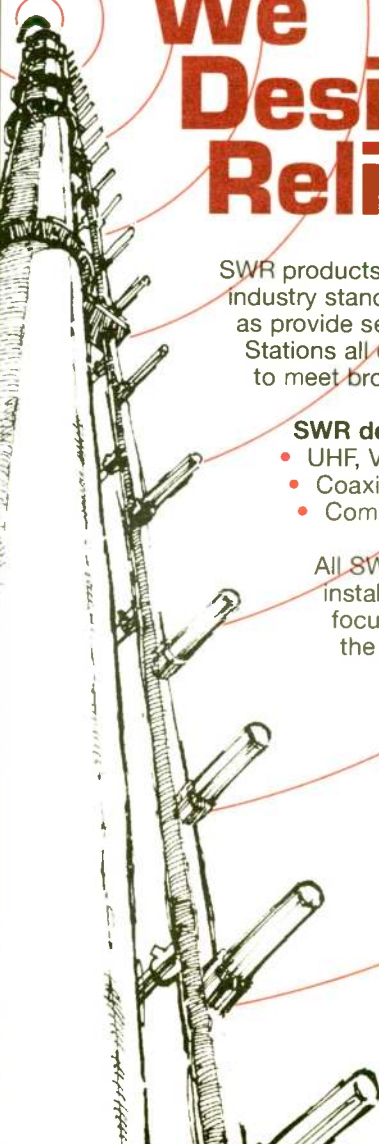




• The **Gentner** GSC-3000 Remote Control is a smart system that allows users to operate transmitters from many locations. The GSC-3000 starts with an embedded micro-controlled platform. Its I/O unit provides eight or 16 analog metering inputs, eight or 16 binary status inputs and 16 or 32 command outputs configured as eight or 16 raise/lower command channels. In addition, the embedded digital platform provides networking capability.

Features include: site expandability that is easy to manage, operation of one to 256 sites, eight to 256 logical channels of metering, status, and command, per site, single or multiple PC monitoring sites, friendly Windows based operation — simply click on the desired area and the information pops up on the screen, PC-based voice/DTMF option allowing monitoring and control of multiple site locations from a single dialed number.

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RF Session Highlights

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are spaced about a quarter wavelength and are 1.5 wavelength long for the maximum gain model, which has a 50 ohm feedpoint. At 1660 kHz, this model requires 9.6 acres of land.

The trick that makes this design work is based on the finding that, as an antenna gets closer to the ground, its velocity of propagation decreases. Capacitors are placed at varied intervals along each wire to modify the radiation velocity characteristics, thereby enhancing the surface wave and suppressing the skywave.

Other configurations using smaller dimensions to conserve space and form directional patterns are possible. A three-

acre array using 3 kW exciting each wire set produces reasonable skywave suppression and useful groundwave in the expanded band.

One caveat for such an antenna is the requirement that it be placed over very poorly conducting earth, but the consolation is no ground system is necessary.

How it works

Any radio RF technical session would not be complete without a nuts and bolts overview of how AM directional arrays really work. George Whitaker, a well-known contract engineer and writer with Practical Radio Communications in Dallas presented "A Beginners Guide to

Directional Arrays." While there are many text books on directionals that discuss theory and design with heavy mathematics, there are few resources for the working engineer who has to maintain and hopefully understand his DA system.

Whitaker provided just enough theory for a basic understanding and instead concentrated on maintenance hints and advice. He underscored the importance of maintaining parameters within five percent for loop currents and three degrees for phase angles, as well as keeping monitor point readings below authorized maximums.

A two tower system was broken down into a block diagram, with analysis of power division, phase control and tower base impedance matching. Whitaker likened the Ohm's law power divider to a "volume control" or resistive voltage

divider. Tower base networks, designed as L, pi, or T, match the transmission line to the base driving point.

Inductive reactance present at a tower base can simply be canceled or tuned out by a series capacitor with an equal amount of capacitive reactance. Tower spacing, tower height, power distribution and phasing between the tower bases all determine the shape of the pattern. Adjusting phase will position the null in a pattern while adjusting loop current will adjust the depth of the null.

The question of whether an AM antenna system using a skirt feed or folded unipole versus base-insulated series feed performs better has been debated ever since AM was invented. Tom King of Kintronic Labs, along with three other antenna system scientists teamed up to investigate this issue in a nine month effort, using a fullscale actual antenna located at KTL in Bristol, Tenn. The team included Ron Rackley, PE; Bobby Cox, PhdEE; and James Moser, MSEE; in addition to King, who holds an MSEE.

A 400 W transmitter operating on 1680 kHz excited the radiator which was configured both as base-insulated series-fed as well as skirt-fed at tower heights of 60 and 98 degrees. Three ground systems were evaluated for each mode: a single copper ground rod, 30 standard radial wires, and 120 standard radial wires.

Analysis

Each configuration was first analyzed using NEC 4.1 method of moments computer modeling. These analytical results for driving impedances, bandwidth performance and radiated fields were compared to actual measurements.

The results confirmed the computer model predictions that there is little difference in radiation efficiency between the two feed methods using the same radiator height and ground system. With abbreviated or missing ground radials, the folded unipole produced less than 1/2 dB greater radiation.

Bandwidth performance comparisons revealed that the folded unipole is not the panacea many of its proponents contend. VSWR bandwidth was only slightly better over a 60 kHz bandpass, but virtually the same within 10 kHz of carrier frequency. This occurs because of the very large inductive reactances exhibited by the feed wires. The best bandwidth was obtained when the unipole wires were configured as an extended wire cage, connecting every 20 feet to the series fed tower, thereby "fattening" the effective cross-sectional tower width.

One anomaly discovered during the study was that ground currents in the folded unipole antenna were actually higher than series-fed, even though the base current was much lower (higher driving point impedance).

Ron Rackley also refuted the claim that folded unipoles are more lightning damage resistant because the tower is grounded. He related that field experience shows both feed methods are vulnerable because lightning currents flow on both the tower and the skirt wires. The only real advantage the folded unipole has over series fed identified by this study is the ability to hang other antennas and feedlines on the tower without the need for isocoupling.

□ □ □
Tom McGinley is the director of engineering for WPGC-AM-FM Washington as well as RW technical advisor. Reach him care of RW.

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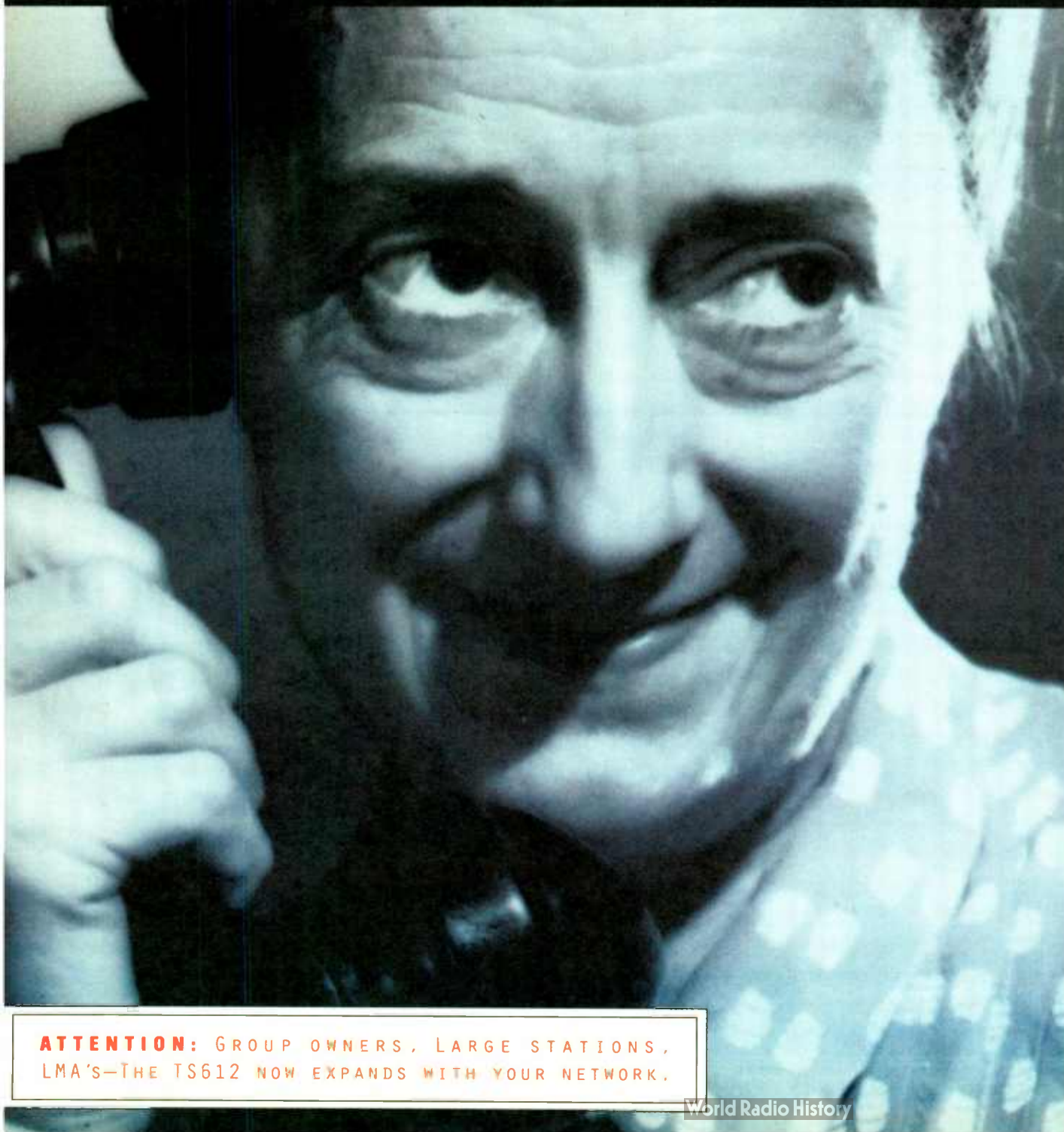
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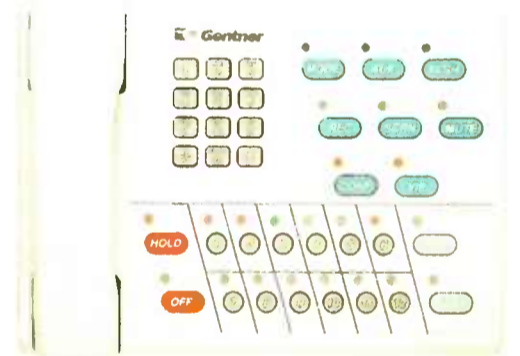
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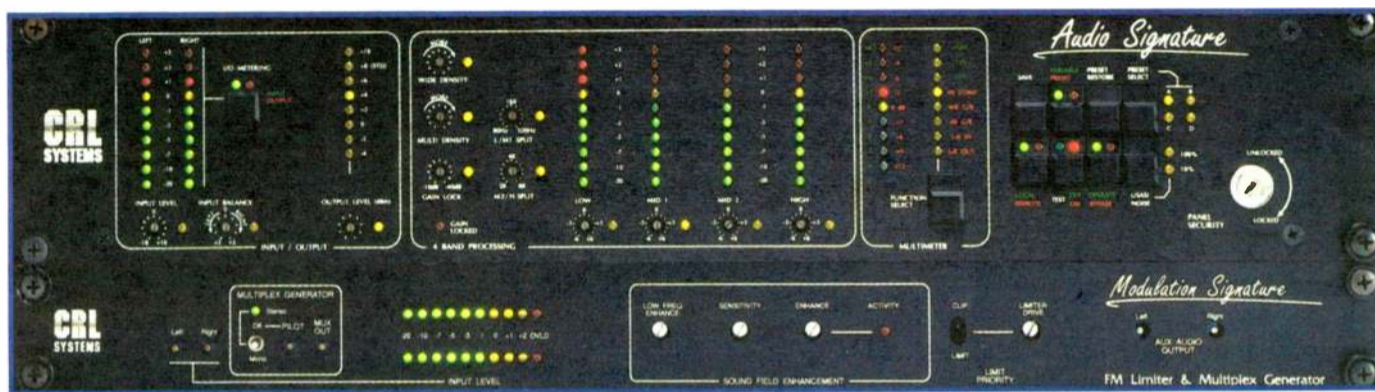


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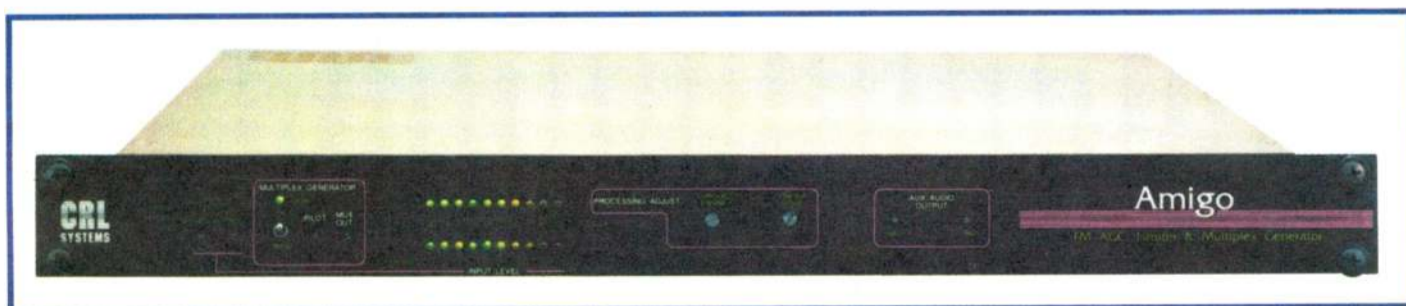
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Exploring the Digital Air Chain

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On the Telos Zephyr, Church suggests using the serial data port to connect to a PC for a detailed analysis of your circuit. If there is no connection at 64 kbps, try 56 kbps. Fifty-six kbps is the standard default bit-rate for Pac Bell in California. When using ISDN for international remotes, it is wise to register with all three LD carriers (AT&T, MCI, & Sprint). Try connecting with each one and use the carrier with the least amount of delay for the highest reliability and quality.

"Practical Considerations of Using ISDN Codecs as Backup STLs" was another new ISDN issue thoroughly explored by Larry Paulausky of Greater Media's WMGK/WPEN. Stations wanting better redundancy for STL systems, without putting all their eggs in one basket are turning to ISDN. Equalized lines are simply cost-prohibitive nowadays, with ISDN costs averaging about double a standard POTS line and less than 10 percent of an EQ program line in most Bell regions. Most local phone companies are making no secret of the fact they don't want to sell analog program loops anymore.

ISDN circuits offer the additional advantage of bidirectionality, so program sources such as satellite feeds and high-quality transmitter audio output monitoring can be backhauled for free to the studio, along with the main STL program feed to the transmitter. Paulausky advises using a logical control interface for hot-standby or automatic switching to place a backup ISDN STL in service. The squelch contacts of the STL microwave receiver, or an audio silence sensor on the receiver output are two easy sources to control such logic.

Paulausky calculated that it would only take an average of 16 months for ISDN or a microwave STL (\$10,000 hardware costs for either) to be cheaper than an equalized program line. He also pointed out that obtaining "Centrex" ISDN service for a backup STL will eliminate any usage per minute charges, if the studio and TX are in the same telco CO. He also suggested that ISDN (in 15 kHz joint stereo) usually achieves better performance specs than EQ lines, even though data compression is used.

The only downside to ISDN for STL is the delay, which forces jocks to monitor console program in lieu of an off-air receiver. ISDN is particularly well suited for STL service when a main studio location is lost

for whatever reason and another station's facilities must be temporarily used. Always use UPS units for ISDN units used as STL backup and automate regular off-line routine testing.

Ken Cheng of Digital Generation Systems Inc. unveiled the "Next Generation Radio Station Communications Network." He identified the industry and business trends which will make this cutting-edge concept a reality in the very near future. We are now witnessing the convergence of content, communications, and computer power, with wide use of the Internet and corporate intranets, along with the emergence of audio and communications systems standards.

Business trends that are driving commercial radio advertising include increasing last minute copy changes; the need for fast, low-cost affidavits; the need for spot regionalization; the co-oping of networks and stations; collaboration in content production and the mixing of real-time and store/forward material.

Seamless network

DGS has built perhaps the most widely used advanced station-based audio communications and delivery network in the world, using digitally delivered content via both ISDN and POTS lines systems. It is a seamless radio network, compatible with existing radio station business processes, is highly reliable and cost efficient.

The Next Generation DGS System will be a hybrid network, using ISDN and satellite delivery for both realtime and store/forward content, including new music singles, ads and copy instructions, affidavits, and news copy. The new ACS (audio communications server) will interface both ISDN and satellite, using Dolby AC-2 compression. All participating stations will be part of an Intranet, with http servers like the Internet, using a Web/Netscape browser for spots, music, news stories and production previewing.

The use of T1 for broadcast STLs and other communications services is a burgeoning area for radio broadcasters. Once only a proprietary Ma Bell internal system used to multiplex many telephone lines onto literally a common carrier, T1 is now being routinely ordered by broadcasters, just like POTS and ISDN.

Intraplex's Robert Band offered some technical background on how T1 works

and compared the advantages of using discrete channel transmission over T1 versus sending composite stereo. A full T1 carrier delivers essentially 12 ISDN circuits, with a total bandwidth of 1.536 Mbps divided into 24 "time slots," each supporting 64 kbps of digital data.

Cost considerations

Microwave STLs are either unavailable or not reliable in many larger markets. With the prices of digital services dropping steadily and the inherent bi-directionality of T1, the cost of one T1 is very often less than multiple equalized program loops or wireless STL/ICR circuits. And 16-bit linear audio always sounds

better. One can use T1 configured for discrete channels or for composite stereo, although there is some degradation when doing composite, including a lower SNR, less headroom, and lower separation.

A one db variation in response can result in a loss of up to 26 dB in effective stereo separation because of the resulting L+R/L-R matrix errors. Band also cited the T1 ability to carry SCA, SAP, telephone POTS circuits, data channels, etc. And it has proven extremely reliable, failing only perhaps twice a year for very brief periods on average.

Bringing together all of the elements of an all-digital broadcast chain was the concluding topic of the session, presented by Jim Hauptstueck of Harris Broadcast. The advantages of going digital are now easily recognized by virtually everyone:

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Quantum FM

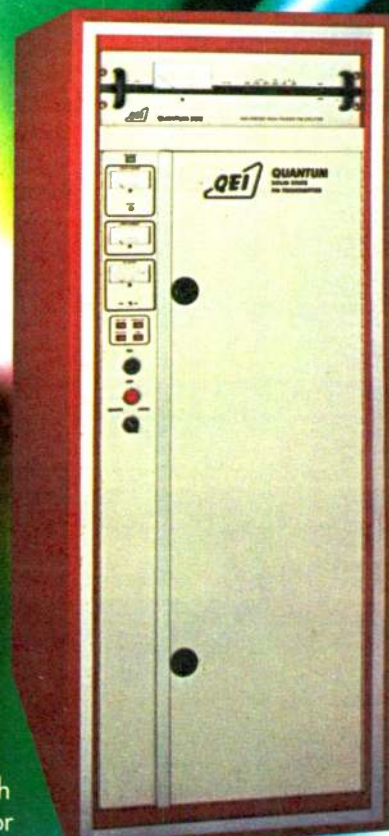
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Radio World

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• The **Yamaha** 02R digital recording console is aimed at broadcast facilities and independent broadcast production studios. The board offers state-of-the-art digital flexibility for a fraction of larger and more expensive consoles.

Features include 24 analog inputs, 16 digital tape returns, eight direct digital outputs, eight aux sends/channel routing to a pair of internal multieffects processors. Other controls include four-band parametric EQ per channel. The 02R can accommodate Alesis ODI (ADAT), TASCAM TDIF (DA-88) and AES/EBU Yamaha Y1 digital formats. Pictured is Jim Prestley.

Contact: Peter Chaikin, P.O. Box 6600, Buena Park, California 90622

For information circle **Reader Service 133**.

Processing Gear Shines

LAS VEGAS The thing about audio is not everybody hears things the same way.

And for a lot of people, the science of audio lies in adding just the right amount of processing to make a station's signal or an audio item sound as loud and clean to as many ears as possible.

Audio processing — from small DSP options to new transmission chain boxes — abounded at NAB '96.

Drawing much interest was the new Optimod-FM 2200, an affordable processor targeted toward small- and medium-market stations from Orban. It



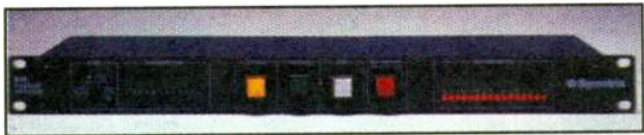
DP-100 FM Digital Processor from Circuit Research Labs

features eight presets, two-band processing and an all-digital stereo encoder/decoder.

Innovonics brought its comprehensive line of processors for AM, FM and SW to the show, including the new two-channel

1066 compressor/limiter/gate.

Cutting Edge showed the full line of Unity 2000i audio processors for AM and FM, while **Modulation Sciences** highlighted its MYB-2 StereoMaxx



Symetrix 610 Broadcast Audio Profanity Delay

spatial image enlarger and CP-803 composite processor.

On the **CRL Systems** stand was the all-digital DP-100 all-digital FM audio processor, along with the Amigo AM and FM processors.

Tieseci brought from Italy its new Digimod 8300 processor, and **Aphex** brought its line of airchain equipment, including the Compressor, the Aural Exciter, the Dominator and the Digicoder.

Aphex also showed its Model 109 parametric EQ, featuring Tubessence, and the Model 661 tube compressor/limiter.

For the studio end of processing, Symetrix showed the 528 voice processor and the 422 stereo AGC/leveler. Also new from Symetrix was the 610 broadcast audio profanity delay. **Eventide** also

offered a new profanity delay, alongside its line of digital processing gear.

Benchmark showed a new digital-to-analog converter, as well as its System 1000 modular DA and processing package. New from Lexicon was

the PCM 90 digital reverberator, which was shown alongside the established line Lexicon gear.

Superscope/Marantz showed the Philips IS5022 and IS5021 digital sound processors.



• The **Penny + Giles** PP-10 multiprocessor is a powerful digital audio system, capable of performing multiple independent and simultaneous processing of up to 16 separate signals. The individual processors exist only in software, enabling maximum flexibility and future proofing.

All processor routing is user controlled, allowing many separate processors to be chained into the same signal path or spread across multiple channels. Processors also can be cloned and linked, to enable tightly synchronized stereo and surround sound processing.

The user interface on the PP-10, which is duplicated on the PP20R remote, is based on the "select and dial" principle.

Other features include: up to 16 channels of real time processing; control levels via a straightforward interface and large LCD screen; massive headroom from 32-bit floating point processing; 24-bit digital I/O or 20-bit A/D-D-A; expandable digital and analog I/O facilities; AES/EBU and SPDIF interfaces plus external wordclock synchronization; RS-422 and MIDI remote control options and bus expansion capability to allow for multistandard custom-bus interfacing. Buddy Frisbee accepts the award for the PP-10.

Contact: Neil Handler, 2716 Ocean Park Blvd., Suite 1005, Santa Monica, California 90405

For information circle **Reader Service 181**.

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Building The Digital Air Chain

► continued from page 33

It delivers better and more consistent sound quality, is more efficient, and requires less maintenance. And much of the equipment now actually costs less than their analog cousins.

While there are many sources that are digital, there will remain some analog sources, such as telephone calls and microphones for a long time. The typical modern air chain includes mostly digital sources for music (CD, DAT, and MiniDisc), and now spots and other local DAW production via hard disk, along with digital audio processing and a digital exciter. The mixing consoles are still largely analog because it has been easier to handle analog feeds rather than using multiple D/A converters and getting everything boiled down to a common digital bitstream. Just within the past two years however, flexible and affordable digital mixing consoles have appeared.

De facto standard

AES/EBU is the de facto digital format standard, but it is not yet widely used, in part because of the connector incompatibility problem. The unbalanced circuit uses 75 ohm video coax cable with BNC connectors while the balanced AES/EBU standard uses 110 ohm XLR connectors. Yet many stations are now taking advantage of direct AES/EBU file transfer, the most efficient audio transfer method, which is faster than real time. The Orban DSE-7000 workstation can do direct digital audio file transfers to both the BE Audio Vault and the ENCO DAD system.

Other issues every station must deal with when using digital and building the all digital chain include choosing an appropriate sampling rate, from which there are many: 44.1 and 48 kHz are both popular for recording studios, while 32 kHz makes sense for FM production and transmission, yet 16 kHz may be fine for AM. Most digital consoles can now do automatic sample rate identification and conversion.

The question of which data rate reduction or compression scheme to use poses various choices, including linear or no compression at all. ISO/MPEG Layer 2, Dolby AC-2, and apt-X are all widely used. But there is still some concern about the fallout from "dueling algorithms." And finally there is the need to network digital workstations and audio file servers in the all digital station. Training and redundancy are the two most important requirements in this rapidly accelerating arena.

Tom McGinley is the director of engineering for WPGC-AM-FM in Washington and RW technical advisor. Reach him care of RW.



• The Arrakis DigiLink 4 workstation offers simultaneous triple play and record, shares drives between two and 32 workstations, and offers record, and offers record and store forward capability.

Applications include storage for up to 2,000 songs on one drive, using ISO/MPEG Layer II audio compression. It connects up to seven drives. The DL4 also can be used for on-air operations or production, and the unit can



function as a jingle box. The DigiLink 4 has a digital satellite, ISDN and modem interfaces.

For information circle Reader Service 52.

Honorable Mention

• The Radius line of studio furniture from Arrakis Systems is designed for very high-end, major-market radio stations. Radiused table surfaces and end panels, extra large and deep pedestals and tabletops, combine with designer styling to create an attractive but ergonomic studio.

The heavy aluminum post and panel construction makes the furniture quite sturdy. Accepting the award are Shannon Russell, Jon Young and Michael Palmer. Contact: Mike Palmer, 2609 Riverbend Court, Fort Collins, Colorado 80525
For information circle Reader Service 23.

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Sennheiser MD 421-U Dynamic Cardioid

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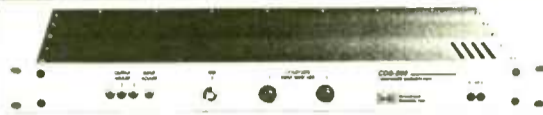
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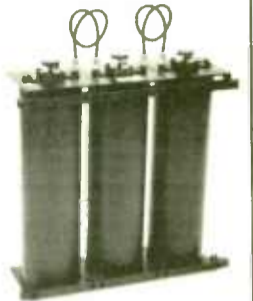
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Metering has both coarse and fine scales for monitoring near FSD. A selectable hold function can retain the highest peak until manually reset. FSD detection is exact.

The AD2004R has the same performance as the AD2004B but has an 110 Ω AES3 reference input, two 110 Ω AES3 outputs, and a word clock output.

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READER SERVICE NO. 105

Studio Automation Systems Thrive at NAB

by Val Davis
Broadcast Automation
Consultant

LAS VEGAS Having just returned from NAB '96, I feel a lot like a guy who just watched a UFO land in the middle of an earthquake: I'm pretty sure about what I saw but I still haven't got my legs back.

What a show. The number of live-assist and automation systems available today

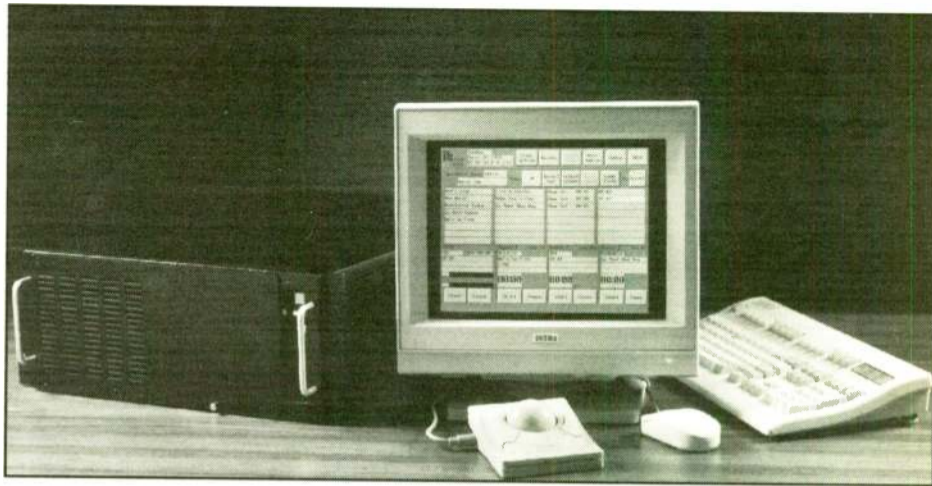
storing hours of digital audio and playing back audio simultaneously on all three audio outputs. You can even play back one audio cut on all three audio outputs at the same time.

The DigiLink IV is great for live-assist and can be used for on-air playback and production simultaneously.

Broadcast Electronics offers a complete line of digital audio products for everything from live-assist to full automation. The AudioVault air control screen handles full automation with ease with automated audio source switching and unattended recording and can also be manually controlled for live assist.

The AudioVault is Windows-based and offers on-screen digital recording with two track editing available on some of the systems. The AudioVault systems are perfectly suited for almost any broadcast application.

CartWorks started as a simple cart replacement system but has now gone far beyond that offering full satellite automation. The Single Live Cart



The DigiCenter from ITC



Dalet Navigator Control Panel and Screen

is overwhelming. The system prices start at \$5,000 and go well over \$100,000 for some of the more advanced systems. The price does not necessarily reflect the systems capabilities. There are systems that cost \$60,000 that are outperformed by \$20,000 systems.

Apples to apples

Be sure you compare apples to apples when you are shopping. One system might claim to store 30 hours of audio, but is it stereo or mono? And what is the sampling rate?

Asking the right questions is important too. Is it a satellite automation system or a live-assist system? Can it do both? How easy is it to operate? Make sure you Really understand what you are buying.

Support is a very important feature. Will support technicians be available after 5 p.m.? How much is support? These are just a few of the questions you should ask.

The following is a brief description of each system, what operating system it uses and what applications it might be best suited for.

Instant Replay from **360 Systems** is primarily a digital editor while DigiCart II is a digital cart machine for on-air audio playback. You record your production on the Instant Replay and it is immediately available for on-air playback on the DigiCart II system. For live-assist — no automation — this is a very cool setup. Fast, easy to operate and the price was low enough that I was surprised.

Slick operation

Arrakis has been the broadcast automation business for many years. Its automation systems are complete and interface with its broadcast consoles for very slick operation. You can control the digital output level of the audio cards with slide faders on the audio console as well as loading, starting and stopping audio cuts all from the console.

Arrakis' newest release, the Digi-Link IV, is a self-contained triple output, playback and record audio device capable of

StudioFrame, a complete digital recording studio with 8-24 tracks of digital audio.

StudioFrame does flawless on screen waveform editing and offers eight-in, eight-out audio capability to work with your station mixing console. The Digital Mixer has high and low shelf EQ as well as a sweepable midrange, pan and volume controls for each track.

Dalet has not been in the United States very long, but already it is making some big waves. This Windows-based system is easy to use, does great live-assist and offers remarkable production capabilities with its

on-screen mutitracking waveform editor.

Networking the control room to the production studio means that the spots are available in the control studio instantly. You can even record from the control room, edit and playback on audition channel. Dalet is easy to use and pleasing to the eye.

No lockups

Most of the live-assist and automation systems in the world today run on DOS or Windows operating systems. Not the **Radio Systems DDS**. This is a Unix based-system. Unix is a powerful multithreading operating system. What that means is that it can handle many complicated processes all at one time without any fear of lockups or crashes.

Unix is much more complicated than DOS or Windows, but it is also much more powerful. The DDS system takes full advantage of that power. One main computer handles all functions: production, traffic and on-air playback.

DDS will play from hard disk, CD juke box, satellite, live feeds, and other audio sources. It can play back up to 16 channels of stereo audio simultaneously. It is very expandable and surprisingly, it is easy to use.

Radio Wolf International has new software that manages commercials, special effects and adds music. The system offers the ability to assemble groups of items into playlists and effects options that include more than 3,000 music beds, stingers and sound effects.

continued on page 54 ▶



RadioWorld
Cool Stuff
Award
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- The **Roland** VT-1 Boss vocal processor is specifically designed for altering and affecting the human voice or any audio source.
- Large sliders for pitch, format, effect balance and reverb control provide simple and complete control over all voice shaping. Four preset locations and four user memories are easily selectable from the front panel. Rear panel features include jacks for input, mic output, line out and remote, as well as an input level knob.
- A single user providing dialogue can create an ensemble cast of character voices. Sounds range from a slight detuning for voice thickening to a full one-octave pitch shift for duet voice over. Also, included are separate pitch control and format control to reduce the "chipmunk effect." Tom Stephenson and Dave Forazo are behind the VT-1.

Contact: Laura Tyson, 7200 Dominion Circle, Los Angeles, California 90040
For information circle **Reader Service 137**.


Replacement unit has a 630MB hard drive and will record 10.5 hours of CD-quality stereo audio. This unit is great for live-assist operations.

The more sophisticated Dual Workstation Satellite Automation System will completely automate your station. With one unit for production the other for control, this system offers everything from satellite switching to internet audio file transfers to e-mail from station to station.

Computer Concepts has some great new Windows-based products available. The lineup includes Maestro, a control room system that operates on top of the DCS audio engine; Voice Tracker, which allows you to easily and quickly record voice tracks to create a live sounding automated program; Newsroom, a complete electronic news center that records actualities, receives audio and text from wire services, creates story lists and can be installed as an add-on at any time; and



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Honorable Mention

- The VS-880 multitrack disk recorder from **Roland** offers up to 64 tracks of digital hard disk recording with eight primary tracks and eight layers of virtual tracks per primary track. For a final mixdown, any eight of the 64 tracks can be accessed.
- Features include non-destructive editing, time stretch and time compression, available on-board effects and 14-channel mixer. A 1GB Jazz drive version and 540MB version are available. Laura Tyson is with the VS-880.

Contact: Laura Tyson, 7200 Dominion Circle, Los Angeles, California 90040
For information circle **Reader Service 217**.

New Models, Lines of Microphones

by Ty Ford

LAS VEGAS There is always too much to look at NAB and too little time to do it, but if you've been thinking about wireless and hard-wired microphones, read on to find out some of the newest and latest models and designs.

From **Soundelux** comes the U95 (including external power supply, shock mount and wooden case) a vacuum tube amplified, three-patterned condenser mic with 1-inch diameter capsule. The mic has a total of nine patterns including omni, cardioid and figure of eight. Sensitivity 17Mv/Pa with maximum SPL 135dB. Dynamic range is 117dB.

New wireless systems

Following the wireless string, **Audio-Technica** was showing three new wireless systems in its 1100 Series: the ATW-1100 and ATW-1237 VHF's and the ATW-7174 16-channel UHF system. The ATW-7174 features true diversity reception, 16 switchable channels and squelch. Also new was the Audio-Technica AT4041 cardioid condenser.

Updates of the original large capsule Oktava MK 219 condenser mic were shown at the Harris booth. The new model has gold-plated connectors for improved connectivity and the exterior has undergone a smooth refinishing.

The **QUADBOX** from **Lectrosonics** is a one-box, battery-powered convenience tool that provides one antenna and power supply and RF distribution for up to four wireless UHF or VHF receivers. The QUAD195 is a larger system for housing the 195 series receivers.

Assorted offering

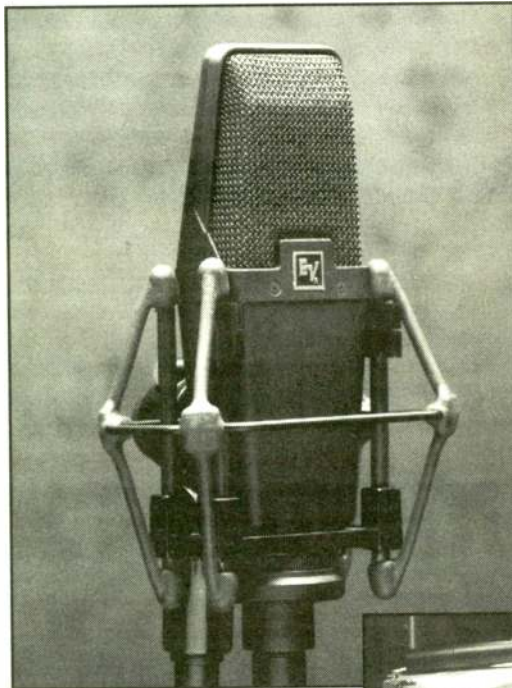
Lectrosonics was also showing the 815DC Plug-On transmitter for any mic and the SR175 non-diversity receiver. The M175DC belt-pack transmitter works with any lav mic and comes with choice of two omni or cardioid lav. The DR175 ratio diversity receiver uses a common oscillator with separate front ends and IF stages to the outputs of both receivers that favors the best receiver.

Soon to ship will be the Lectrosonics UDR200B synthesized UHF single-spaced, half-rack receiver that is switchable among 256 frequencies. It uses an auto-tracking front end that retunes as you change frequencies over a 25.6 MHz range. It also offers an RS-232 serial port for communication with Lectrosonics, LecNet software interface for monitoring and controlling the receiver remotely.

Electro-Voice was on hand with the RE1000 studio condenser microphone along with the RE2000 true condenser,

probe microphone for studio and live work. EV also displayed the CO2 omnidirectional, ultraminiature lavalier microphone as well as the 635L (a version of the 635A with better reach) and the CT30 boundary microphone for stage and table miking.

From **Posthorn Recordings** comes the Schoeps CMBI battery microphone amplifier with unbalanced outputs for DAT



Electro-Voice RE2000

machines without phantom powering. This in-line amplifier works with the Schoeps Colette Series except for the active accessories and the BLM 03 C.

Easy battery replacement (6V IEC 4 SR 44) provides up to 80 hours of use. Features include low battery warning light, -15 dB pad and mini five-pin connector with a variety of cable options.

Also new was the Schoeps CCM series of compact balanced 12-48VDC condenser microphones. The CCM series, although not interchangeable with the Colette Series, includes all of the same polar patterns with the exception of the MK6. The most notable advance is that the CCM does not require a CMC microphone amplifier. Add a CCM with a figure of eight capsule and clip mount to your existing shotgun for high-quality M/S recording.

The new **Sanken** CSS-5 stereo shotgun microphone is adjustable for normal, mono and wide patterns. Its short design is due to the use of multiple cardioid elements in a front/back array. The three capsules are arranged vertically along the same axis to ensure mono compatibility.

From **beyerdynamic** comes the new S

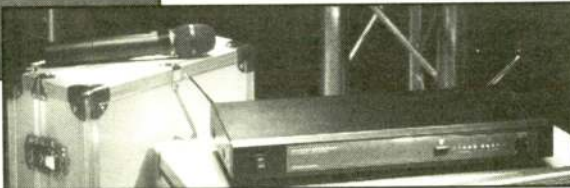
600 and SEM 600 UHF handheld transmitters. The S 600 allows selection of one of 16 UHF frequencies from a single control. The LCD display on the transmitter shows the frequency and battery usage.

A number of dynamic, electret and condenser heads are available. The S 600 transmitter features four frequency banks with 16 switchable frequencies per bank, integrated antenna, quick open battery compartment, automatic limiter and LCD frequency display.

The less expensive SEM 600 has a fixed capsule and no LCD display. The ZCI 600 computer interface for the U 600 system is now shipping. The PC-based software allows the user to view and select frequencies being used, activate the mutes, view individual battery status and list by name the users. Real time logging software documents problems.

The latest **AKG** dual diaphragm condenser microphone, the C577, is being called the world's smallest dual diaphragm condenser microphone. The design incorporates two side-mounted diaphragms for increased sensitivity and reduced self-noise.

AKG was also showing its new



Audio-Technica ATW-7174 Professional UHF Wireless System

WMS 300 wireless UHF mic system that offers up to 16 frequency options and the ability to operate up to eight different units.

Ten-set support

The SR 300 receiver is a half-rack width unit that supports up to 10 microphone sets. Users can choose between three mic heads for the handheld design and six for the bodypack wireless.

The WMS 300 transmitter is designed to provide up to 12 hours of continuous operation with alkaline batteries and more than five hours with rechargeables.

Sennheiser showed the new MKE104 named "The World's Smallest Cardioid Lavalier Mic," for both wired and wireless applications. Consisting of a removable miniature cardioid capsule and cable, the capsules are interchangeable with the MKE102.

Also new was the Sennheiser DAS4015 portable multichannel RF wireless system. The DAS4015 is designed for use with up to four EK4015 frequency agile, diversity receivers. The DC-powered package is designed for location film and broadcast work.

The new Sennheiser EM2004-UHF, true diversity receiver for use with SK50-UHF, SK250-UHF body packs and handheld SKM5000-UHF mics, can be tuned to one of 16 preprogrammed channels. Phase lock loop design provides stable on-frequency operation.

Still waiting

Neumann was showing its latest tube-powered large diaphragm studio condenser microphone, the M 149 — seen last year at AES, but still not shipping.

The new **Shure** frequency agile, microprocessor-controlled 188-frequency UHF wireless mic system is available in single and dual-channel configurations. The diversity receivers use tone-key squelch and proprietary MAR-CAD (maximum ratio combining audio diversity) circuitry. Shure offers a handheld transmitter with industry-standard elements like the Beta 58A and Beta 57.

Bodypack transmitters are compatible with a full range of lav and headset mics. Optional accessories include an antenna distribution system, active antenna kit, extension cables and remote mounting kit. As many as 20 systems may be operated simultaneously. Both receivers and transmitters include user-programmable LCD displays for setup, information and control.

More wireless from **Telex**. Its new ENG-500/UT-500 broadcast wireless microphone system saw its first light at NAB. The ENG-500 is a true diversity receiver with patented Posi-Phase auto diversity and diversity status indicators. The system operates in the 524-608 MHz and 614-746 MHz ranges with a 15-15 kHz frequency response.

The UT-500 transmitter comes in a metal case and is designed to accept any standard low impedance dynamic or electret condenser microphone. The UT-500 is crystal-controlled and runs for six to eight hours on one 9 V battery.

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• The **Harris** Platinum Z Solid State FM Transmitter series launched with the introduction of the Z5CD, a compact 5 kW transmitter equipped with the DIGIT digital FM exciter.

Priced on par with vacuum tube models, the Z series was designed using the latest, Z-axis/three-dimensional design tools. Platinum Z transmitters replaces a single RF power amplifier tube with multiple solid-state modules that operate in parallel. Modules are based on technology that has achieved an MTBF exceeding 250,000 hours. Hot pluggable modules can be safely removed and inserted during transmission, and the transmitter will continue to operate at reduced power.

Dual regulated power supplies are standard and the series is available with optional dual exciters and IPAs. Next to the Platinum Z is Daryl Buechting. Contact: Ron Frillman, P.O. Box 4290, Quincy, Illinois 62305-4290
For information circle **Reader Service 101**.

Digital Editing Units Make the Cut

by Alan R. Peterson

WASHINGTON Mylar and oxide grudgingly continue to give way to silicon as the digital revolution displaces tape in even more radio production studios. Manufacturers of digital editing products had plenty to show off this year at the Las Vegas NAB show.

Tape was not yet down for the count, as several manufacturers continue to offer tape-based digital audio recorders. Among them, the **Fostex CX-8** ADAT-compatible digital multitrack recorder, first introduced at the 1995 AES show in New York. The latest incarnation of the **Alesis ADAT-XT** was also being displayed. Both systems use S-VHS tapes as recording media.

TuneBuilder from **AirWorks Corp.** drew a lot of interest. This is not a library, but a management system/editor that loops, edits and creates openings and closings for production music. The computer assembles music beds based on criteria and definitions entered by the producer.

Tascam demonstrated its own modular digital multitrack recorder, the **DA-88**. The company also came to Las Vegas with some intriguing digital recording/editing devices designed around MiniDisc (MD) technology.

The **Tascam 564 Digital Portastudio** continues the legacy of the company line of portable multitracks, but puts four digital tracks onto a removable MD instead of a cassette. The 564 combines a mixer and recorder in one unit. A single MD provides about 37 minutes of recording time.

Also shown was the **MD-801R** two-track MD recorder/editor, with a front panel similar to the widely used **Tascam DA-30 MKII** DAT recorder.

The big buzz on the floor was the **Shortcut** from **360 Systems**. The two-track digital recorder/editor is being marketed as a telephone playback editor but has many other applications in editing voice tracks. The unit is equipped with internal speakers, cut/copy/paste editing, a "bleep" button and dedicated keys for playback.

Fairlight took the opportunity to introduce software upgrades to its **MF3** workstation. Enhancements include more powerful editing capability and the means of triggering external cueing devices. The **Fairlight Dali-2T** two-track recorder was also available.

Micro Technology Unlimited displayed the **MicroSound** system. **MicroSound** designates audio as segments that can be stacked up to 64 deep at any point, thereby providing 128 tracks when using stereo segments.

Innovative Quality Software (IQS) released its **SAW Plus** hard disk editing and multitrack software for Windows.

The system allows EQ, compression, limiting, panning and fade. Simultaneous playback of up to 16 mono or stereo tracks (32 tracks maximum) is possible.

TimeLine Vista launched several new products in Las Vegas, including software **Version 6.20** for its **Studioframe DAW-80** workstation. The upgrade includes fast waveform display, wave file transfer, a user-configurable editing interface and support for removable media.

Timeline also debuted the **MMR-8** eight-track modular multitrack recorder. This unit has been designed for post-producing audio for film, but may well have applications in radio broadcast production.

Computer Concepts Corp., maker of the **DCS** commercial storage system, is also including the **TimeLine Studioframe** eight-track editor as part of its digitally integrated radio station package. The optional **DSC-100** controller performs jog/shuttle functions and edit decisions.

The incredible shrinking DAWs from **Roland Corp.** have yielded the **VS-880** workstation. The device is optimized for musicians but is attracting huge interest for broadcast and personal production. The **VS-880** has internal effects, an integrated mixer, the option for external storage media and a price point far less than last year's **DM-800** workstation.

continued on page 41 ▶



Fairlight upgraded the MF3 workstation.

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Circle (196) On Reader Service Card
World Radio History

Get on Track with Digital Editors

► continued from page 39

SADiE Inc., from Studio Audio, introduced its modular digital editor OCTAVIA at the NAB show. OCTAVIA software is an evolution of the original SADiE, which combines more powerful DSP with a clearer and faster user interface. SADiE also returned to the show with its established disk editor and Portable systems.

Sonic Solutions entered the broadcast radio production market with SonicStudio OnAir, developed in partnership with National Public Radio. SonicStudio OnAir

optical (MO) disks. Non-destructive "Laserblade" editing is featured on the D424-2.

Sonic Foundry, makers of the Windows-based Sound Forge editor, have collaborated with **QSound Labs** to develop a new plug-in for Sound Forge. QTools/SF combines a set of three plug-in tools that add virtual audio technology to the palette of wave editing, modification and effects capabilities.

Fostex drew attention at NAB with new products and a surprise announcement. The company introduced the D-80 rack-mount hard disk recorder/editor with removable front control panel, simultaneous eight-track recording and 850MB or

1.3GB drive. Software upgrades and a new price were announced for the DMT-8 portable multitrack recorder.

Prior to the show, Fostex announced the final software release for the Foundation 2000 product line. Support for the Foundation line will continue, but no further releases are being planned.

Digram introduced the new PCX19 digital audio card designed for the PCI bus and XTrack digital multitrack software for OEM integration.

Audio Processing Technology (APT) also introduced new soundcards. The ADK 200 range of cards are integrated 16- or 20-bit full-featured digital audio cards. These are designed for workstations and

automation systems and feature multi-channel record/playback on a single card.

Analog to digital conversion was addressed by **Apogee Electronics** with the AD-1000 Platinum Edition stand-alone conversion system. The unit combines a fully upgraded AD-1000 and an FC-8 converter for ADAT/DA-88 format.



The Micro Technology Unlimited MicroSound System

Manufacturers of digital products had plenty to show off this year.

performs multiple simultaneous record and playback with timecode, two-track cut-and-paste and multiple panel production with live recording.

The classic **Orban DSE-7000** returned as the DSE-7000FX. A built-in effects module contains the equivalent processing power of eight external rackmount devices and includes Lexicon reverb, Orban EQ and compression.

Dalet Digital Media Systems introduced the Surfer8 eight-track digital editor as part of the company's networked live-assist walk-away automation system. Surfer8 includes such desirable radio production features as time compression/expansion, adjustable EQ and punch-in/out record.

Creamware came to Vegas with a new



Fostex debuted the D-80 recorder/editor.

digital editing system with realtime DSP suite. This is a PC-based system with both analog and digital I/O, and also features an infrared remote control.

The **Doremi Labs DAWN** digital recorder/editor turned up in two places. The Doremi exhibit displayed Version 4 with enhanced features more appropriate for video and film than radio.

At the **Pacific Research and Engineering** booth, the Doremi DAWN was dressed as the powerful PR&E ADX line of radio workstations. The ADX Ensemble is a fully integrated editor and automated mixer with motorized faders.

Otari Corp. debuted the new UFC 24 universal digital audio format converter and returned to NAB with the RADAR multitrack hard disk recorder/editor.

Studer Editech has built upon its Dyaxis DAW line to create the modular PostTrio system. The device plays and records eight to 24 tracks of digital audio and can now sync to video for TV post production.

Meanwhile, the Studer D424-2 studio recorder was also being shown. This recorder uses 5.25-inch magneto-

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Prophet Systems Inc. announces

PAGE #1	Record	Autoroll	Cuts List	Swap		Option Menu
POT 1 (A/S)	POT 2 (A/S)	POT 3 (A/S)	POT 3 (LOCAL)	POT 4 (LOCAL)	POT 4 (LOCAL)	
A APRIL BLOSSOM 00:15 1	B WAGON WHEEL 00:19	C KARLS APPLIA 00:59	D BAKERY CAFE 00:19	E CINNAMON 00:02	F JACKS PLACE 00:08	
G LARRYS RV 00:31	H HDA 00:03 2	I VoiceTRAC fo 00:15 3	J DUDDENS 00:45	K EBS 00:50	L HIRSHFELDS 00:03	
M RADIO SONG 04:08	N DAYBREAK 03:41	O NOTHING'S NE 02:59	P MANDY 03:14	Q WALKIN' AWA 02:47	R NOBODY'S HOM 03:26	
S LINER A	T LINER B	U LINER C	V LINER D	W LINER E	X LEGAL ID	
1 2 3 4 5 6 7 8						
Sat Mar 2, 1996						
55° High: 58° Low: 32°						
06:36:32 PM						
23:28						
KOGA FM # 2						
SHIFT #04 BILL SMITH	MANUAL MODE					
Block Fill ON	Default Source 01	Resync Mode ON				
Run UDE	Special Menu	Play F9				
?	Station Data	Stop F10				
EXIT	Reports	End F11	Skip F12			
		Clipboard-0	Last Delete-0	Hold Bin-27	-02:31	Play - Pause

Version 5

Live Show Interface (LSI)

The centerpiece of Version 5 is the new Live Show Interface (LSI). This new interface allows the D-J to run even the most high energy shows smoothly. Fully utilizing the power of Windows, the Live Show Interface features:

- ◆ **Drag and Drop Commercials and Songs**
Audio events can be easily moved around in the log using the mouse or touch screen. They can also be moved to the button bar and the holding bin.
- ◆ **Audio Source Management**
Version 5 allows the D-J to specify which audio card a commercial or song will play out of ahead of time. It is easy to pre-position sliders and to crossfade items. Plus, Version 5 actually allows six stereo audio events to play simultaneously for each control room!
- ◆ **Fully Touch Screen Compatible**
The Live Show Interface was designed from the ground up to be totally touch screen compatible.
- ◆ **Expanded Button Bar**
Forty-two pages of buttons for immediate access to 1008 liner, jingles, laugh-tracks, etc.—PER SHIFT! And you can have up to 99 shifts!
- ◆ **Auto Roll of Buttons**
Auto roll allows the D-J to mark buttons that will playback one after the other automatically. Mark up to 24 buttons which will all play back in order.
- ◆ **Quick Record**
Take phone calls, edit them with our wave form editor, and place the event on log...all in just seconds.
- ◆ **Holding Bin**
The holding bin is temporary storage for items that the D-J can't get to immediately. He can move them to the holding bin for easy retrieval later in the shift.
- ◆ **Macro Buttons**
Accomplish complex tasks in one click of the mouse with macro buttons. Tasks such as changing from manual to satellite or auto control, changing the active station, turning on and off sources or relays, etc. become effortless with Version 5.
- ◆ **Pause/Reposition**
Pause a spot or song, fast forward or rewind to a new point, begin play from a designated point using the pause/reposition button.

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- Jeff Hutton, KLTJ/KWMQ, Southwest City, MO, KTLQ/KEOK, Tahlequah, OK

Live Show Interface.

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- Norm Laramee, KKPT/KSYG/SRN, Little Rock Arkansas

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Console Technology Evolves at NAB

LAS VEGAS 1996 was the year digital technology and consoles merged at NAB.

From small, two-channel ENG mixers to fully digital, 48-channel post production studio boards — and, of course, traditional 12-channel on-air boards — consoles were everywhere on the exhibit floors.

Internally digital

New from **Wheatstone** was the D-500 digital audio console, which is capable of handling analog, digital or mixed format signal sources, and the A-300 and A-500 radio on-air consoles. The D-500 features fully digital internal processing and delivers analog and/or

digital output. It has the power of four 40-bit floating point DSP processors and 25 microcomputers to handle the complex tasks. The D-500 can be provided with RS-232 ports for each channel, providing control between it and the source machines it commands. Both channel and machine status can be reported to an external PC, allowing the console to integrate with a larger system. Operators can save an entire control surface setting by hitting the Save button on the master module for instant retrieval of personal setups or for the retrieval of multiple settings for different segments of the same show.

Wheatstone displayed the A-6000

Master Control Console and the SP-4 stereo production console.

Studer brought its new D940 digital console, and **Harris** returned with the DCR1000 digital audio console, which drew much attention last year. The DRC1000 digital radio console, manufactured by Zaxcom Audio, includes features chosen especially for radio broadcasters. Although the DRC1000 looks and feels like an analog console, it features 11 stereo digital input channels and seven stereo digital output busses, as well as seven stereo analog output busses.

An assortment of options enables the DRC1000 to accommodate specific

operating requirements. These options include analog inputs, reverb, time compression, redundant power supply and a 10-fader control extender. Also available as an option is a direct serial interface to Radio Systems' DDS (Digital Deliver System).

Both digital and analog

Logitek introduced the Serial Sound all digital on-air console. The unit features both analog and digital ins and outs, up to 40 stereo inputs and up to 20 program and mix-minus outputs.

Korg USA showed the 168RC recording console, which is designed for use with the Korg SoundLink. The 168RC is a fully digital 16 x 8 x 2 device equipped with two ADAT optical inputs, eight analog inputs with 18-bit A/D converters, two internal effects processors and full console automation capabilities.

Arrakis introduced the new 22000



Wheatstone introduced the D-500.

Gemini series console line. An optional 14-inch color VGA monitor can be a dedicated display or an optional switcher can be used to select monitor-keyboard-mouse for up to six computers or workstations.

Alongside its established Arria and DMX1000 digital audio consoles, **Zaxcom** introduced the Deva, a four-channel portable digital audio mixer and removable hard disk recorder for fieldwork.

Multiformat

AMS Neve showed its Logic 2 multiformat digital mixing console with optional AudioFile recorder/editor. AMS Neve also displayed the Capricorn digital console and the Logic 3 compact digital mixer along with the Series analog broadcast console.

Yamaha highlighted the new 02R digital recording console, which features 40 analog and digital inputs, digital bus outputs, eight digital direct outputs and eight aux sends.

Traveling from Down Under was the **ABC-Digital D-Radio** system, an integrated digital console and live-assist system.

While digital consoles drew the attention of many visitors, innovation did not end on traditional analog boards.

Many on-air mixers also were on display. **LPB** showcased both its upgraded line of Signature III series audio consoles and its upgraded line of 7000 series consoles.

LPB Signature consoles are designed for rugged reliability, simple installation and easy maintenance. They feature three-input per channel, two output busses, plug-in output cards, built in 12 W monitor amplifier and outstanding RFI resistance.

The 7000 series consoles feature two inputs per channel, three stereo output busses, each with independent tape outputs, a standard mono-mixdown (two optional).

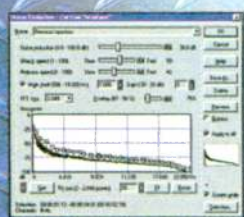
Fidelipac presented the series of Dynamax MXE consoles with three new optional modules — five-band mic EQ with pan, a talkback/studio monitor and a telephone interface module.

We've Strengthened Our Cast

Sonic Foundry's Sound Forge™ 3.0

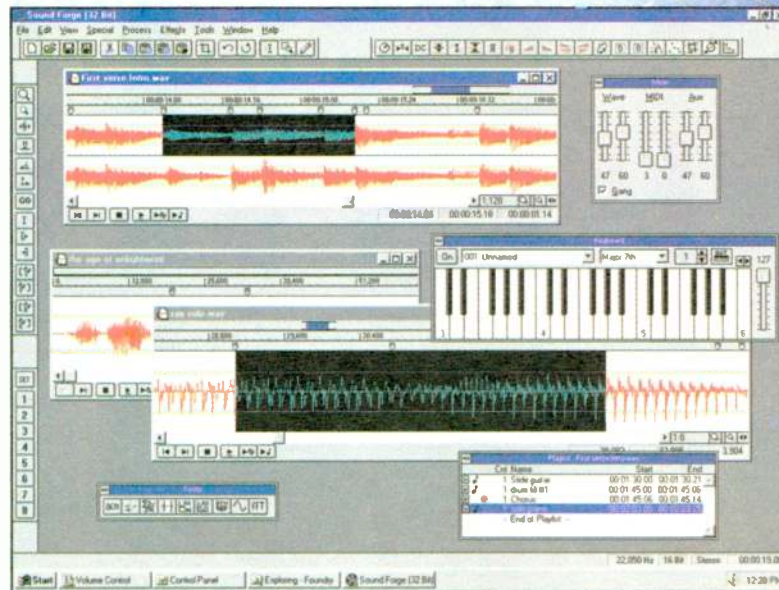
Whether you're a musician, sound designer or multimedia developer, full-featured sound editing for the Windows® platform has never been easier. Sound Forge offers editing, application of audio-processing effects, creation of loops and regions, and generation of playlists. An expandable plug-in architecture tailors Sound Forge to any application. Both a 16 Bit (Windows 3.1 or Windows for Workgroups™ 3.11) version and a 32 Bit (Windows® 95 or Windows NT™) version are included.

Noise Reduction Plug-In



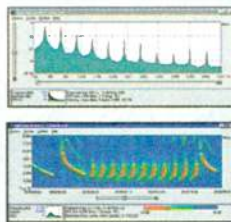
Now there's no need to slave away filtering noisy

recordings. Sonic Foundry's Noise Reduction Plug-In is designed to automatically remove background noise such as tape hiss and electrical hum. Click Removal is also included, allowing you to eliminate clicks and pops automatically.



Spectrum Analysis Plug-In

And if you need to identify that particular frequency component, you'll find the Spectrum Analysis Plug-In a great addition.



Spectrum Analysis includes Spectrum Graph and Sonogram display for easy frequency (or pitch) identification.

Batch Converter Plug-In

The Sonic Foundry Batch Converter Plug-In is a time saving utility for those needing to convert tens, hundreds, or even thousands of sound files to a different format automatically. All Sonic Foundry plug-ins require Sound Forge 3.0.

Sound Forge XP

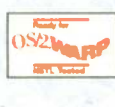
Sound Forge XP, a general purpose sound editor provides the same easy to use interface found in the professional edition. Sound Forge XP is intended for sound designers, multimedia developers, and hobbyists requiring a powerful yet affordable sound editor.

For more information call Sonic Foundry at

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respective manufacturers.
<http://www.sfoundry.com>



Audio Developments showed the new Mercury, a two-output, dual-aux mixer, with electronically balanced I/O. Also new was the AD149 mixer with transformer-balanced I/O, comprehensive equalization and Penny + Giles (P+G) faders. Audio Developments brought several of its established console products including



BC-300 from AEO

the AD261 M-S stereo ENG mixer and AD146 four-output M-S compatible location mixer.

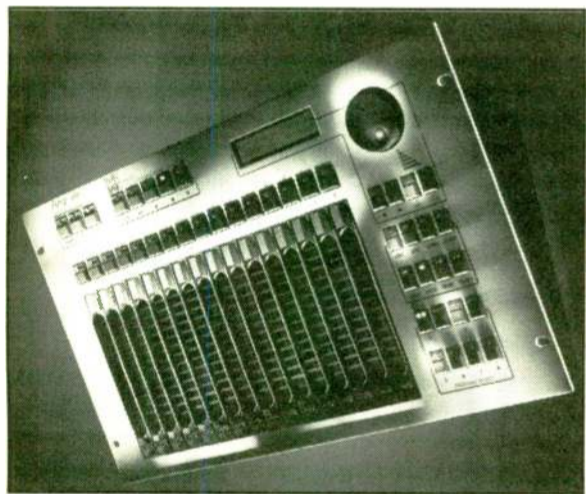
The Canadian company Videoquip highlighted its new MX-G audio mixer.

New from the Spanish company AEO was the BC-2500 and BC-300 mixing consoles. From Italy, AEV showed the new Excalibur console, along with the established BC-2000 and BC-500 mixing consoles, and the new PME-02, TLE-02 and MP-10 portable mixers.

Work horses

Among the new equipment on display at NAB this year were many consoles that could be considered the work horses of the industry.

In addition to the 22000 Series digital console, Arrakis showed the 1200 and



The Penny + Giles MM16 Control Surface

12000 Series consoles.

Audio Technologies Inc. (ATI) offered the Vanguard Series of broadcast on-air consoles. Vanguard boards are available in six-, eight- and 12-mixer, dual-channel stereo versions. New to the NanoAmp Series of portable and desktop mixers from ATI was the MXS100 stereo, three input mic/line mixer, which was shown alongside established ATI NanoAmp products.

Well-known

Pacific Research & Engineering (PR&E) exhibited the well-known BMX III and RMX RadioMixer on-air consoles as well as production mixer and production multitrack consoles. PR&E boards also were on display at the Broadcast Supply Worldwide (BSW) stand.

Autogram showed the established

Mini-mix, IC/AC series, Pacemaker and R/TV audio console lines.

The Audioarts line of studio mixing consoles was showcased at the Bradley Broadcast Sales booth, including the R-60 on-air console, the R-16 on-air console and the MR-40 production console.

The new R-60 offers extensive features, including: standard six-line selector, module extenders, gold contact switches, Penny & Giles Faders, Sifam meters, true modular construction and better-than-16-bit digital audio performance.

The R-16 is the company's most cost-effective on-air console and also delivers better than 16-bit digital audio performance. A fully modular console, it comes in two standard formats: six- or 10-input modules.

The Audioarts MR-40 production console features four-track bus assign, better than 16-bit digital-quality audio performance and multitrack mix-down with full metering. All input modules include: EQ, stereo effects sends and on-air monitoring with a built-in cue speaker.

The 2500 Series audio console system and the new MM-10 mini-mixer from Auditronics were on display, alongside the 210 Series audio console system and 801/851 Series audio console system.

Broadcast Electronics exhibited the established Mix Trak and Air Trak on-air consoles.

The Renaissance line of radio consoles was at the Ward-Beck Systems booth.

Production boards

Otari showed the B-10 production and on-air console. Otari also displayed the Status digitally controlled analog console and the Concept 1 digitally controlled two-bus analog console with fader, mute and snapshot automation.

Euphonix showed the CS2000B broadcasting system, a complete on-air broadcast audio mixing system.

On display at Cooper Sound Systems was the CS 106 + 1 audio mixer and the CS 104 ENG-style four-channel stereo mixer.

Sony Electronics was in attendance with its line of on-air consoles.

Soundcraft was back this year with models including the RM100 on-air radio console and Series 10 on-air consoles. Soundcraft also displayed the B-800 compact production console, Ghost professional recording console and DC-2020 automated post production console.

Production consoles were among the gear that was up front and center at NAB.

The SL 9000 J Series total studio system from Solid State Logic (SSL) was new at the 1996 show. Shown alongside it was the established SL 8048 series console and the 48-channel Axiom board.

The U.S. arm of Amek introduced a working version of the Digital Mixing System, a 32-bit system with control surface, host Pentium computer and DSP engine. Also on display was the Rembrandt post production mixing console.

New from DDA was the CS3 console that features true LCR panning and four stereo effects returns. It is available in 16-, 24-, 32- and 40-input versions.

On the Tascam stand was the M-5000 production console and the M-2600MKII recording console.

Features

Penny + Giles returned with the assignable 16-fader MM16 Digital Controller for MIDI music and digital audio workstation control.

Midas showed the new XL-200, XL-4 and XL-42 consoles, all of which have four-band parametric EQ and a host of other features.

New from Yamaha was the EMX3500



The Soundcraft RM100

mixer, available in 12- and 16-channel versions. Established Yamaha consoles being shown included the PM4000 and PM3500 live mixing consoles, RM800 eight-bus analog recording console and the ProMix 01 digitally programmable mixer.

Mackie, whose consoles were on the Harris, BSW and Bradley stands as well as at its own booth, showed the new SR40-8 40-channel, eight-bus console along with the established SR24-4 and SR32-4 consoles for sound reinforcement and/or live mixing.

New from Calrec was the T Series digitally controlled production console, the Q Series production and dubbing console and S Series production and dubbing console.

Out in the field, the 12-channel board you know and love in the studio simply will not do. There was a variety of portable and ENG mixers on the floor.

New from Studio Technologies was an audio mixer for ENG, SNG and small production vehicles. Calrec Audio also had compact and minimixer modular audio consoles to take into the field.

Micron Audio Products showed the new SQN Series IIIa portable stereo location audio mixers. SQN location audio mixers for other applications also were on display.

Comrex showed the Codec Buddy cue system, a small console designed for use on outside broadcasts.

JK Audio showed the RemoteMix professional mixer for quick remote broadcasts, and Dongseo Electronics promoted its portable audio mixer.

Soundcraft displayed its LMI and GPI location recording mixers and the GPI portable console.

Keeping Tabs on Transmission Technology

by Tom Osenkowsky

LAS VEGAS Whether your studio facility is analog- or digital-based, you still need a transmitter to deliver your product to your audience. NAB '96 saw no shortage of new technology for radio transmission products.

Harris Corp. proudly introduced its Platinum Z 5 kW FM transmitter. Totally solid state and sporting the field proven Digit digital FM exciter,

the Harris Z5CD transmitter features improved overall efficiency, multiple stages of redundancy and reduced cost, on par with that of 5 kW tube transmitters.

The solid state technology used in the Platinum Z was born out of the famous Platinum TV and FM transmitter series. The Platinum Z is microprocessor-controlled and employs identical RF modules in the IPA and PA sections.

Harris also introduced its 55 W Superciter, an analog FM exciter with superb specifications for those broadcasters favoring an economical, state-of-the-art analog based exciter. The Superciter is microprocessor-based with built-in overload and VSWR protection, Automatic Power Control and synchronous AM noise nulling. The Superciter will be distributed from the Harris Richmond, Ind., office.

Harris also displayed other AM and FM transmitters in its line of high and low power devices, including the renowned DX Series all solid state, digital AM models.

Transportable

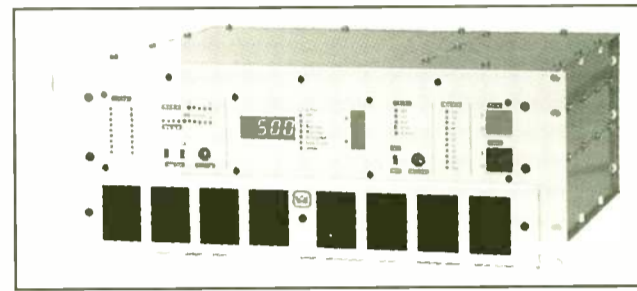
When your needs call for low power or transportable FM transmitters, Crown Broadcast rises to the occasion. Crown introduced its FM-500, a 500 W solid state transmitter complementing its line of 19-inch rack-mountable, portable units that have power ranges from 30, 100, 250 and now 500 W.

Crown transmitters have been employed by low power, educational, translator and emergency transmission facilities. Crown also manu-

factures the Nearcast 1 W model intended for low-power applications such as language translation, sports-casting and other localized broadcast needs.

Anniversary line

In celebration of its 50th anniversary serving the broadcast industry, Continental Electronics debuted a new line of all solid state AM transmitters, the "D" Line models, with power ranges from one to 50 kilowatts.



The FM-500 from Crown

Also debuted was a line of solid state FM transmitters, with power ranges from 500 W to 10 kW, and the new Bytecast 802D digital FM exciter. The Bytecast unique design is PC platform-based and features RF direct conversion, eliminating the requirement for an IF frequency or heterodyne conversion.

Continental also commenced its new full product line supply division offering turnkey sales for studio, transmitter and auxiliary accessories.

Most broadcasters know LPB for its AM low-power, carrier current and Traveler's Information Service line of solid state 30, 60 and 100 W transmitters. NAB '96 saw the introduction of the LPB FM Advantage stereo FM transmitter. Sporting a length of only 5.5 inches, with a rubber duck antenna, the FM Advantage is ideal for rebroadcasting (how about at those AM remotes inside a mall ... just feed a clean AM signal from the mall roof into the LPB and pick up a clean off-air signal inside), sporting events, advertising systems or real estate sales. LPB also manufactures FM cable transmitters and a full line of audio consoles.

Energy-Onix unveiled a host of new FM transmitter products. The SST-150 150 W exciter/transmitter features extremely low distortion and front panel agile frequency control. This makes the SST-150 ideal as a backup transmitter for several stations at one site.

Field-proven parts

The new ECO line of economical, single tube, grounded grid transmitters are attractively priced and utilize a single, long-life tube. The ECO 15, 22, 25 and 30 models are easily serviceable using field-proven standard parts, have built-in filament regulator, and have a 2 kW solid state independent driver capable of directly feeding the antenna in the event of a PA failure.

The ECO-2 is a 2 kW, single-cabinet single-tube transmitter with an SST-150 exciter. The new high power ECO-40 and ECO-50 transmitters are two cabinet self-contained grounded grid transmitters utilizing a 4 kW solid state driver capable of

directly feeding a 50 W antenna.

Lys, from Brazil, was also on hand with its range of transmission equipment.

Broadcasters needing a boost — in power that is — can turn to Elenos for help. The new HF-1000 FM power amplifier is a MOSFET-based system featuring automatic power control, VSWR protection and front panel metering. The HF-1000 can be remote controlled and operated from either 110 or 220 volts AC.

Broadcast Electronics debuted the

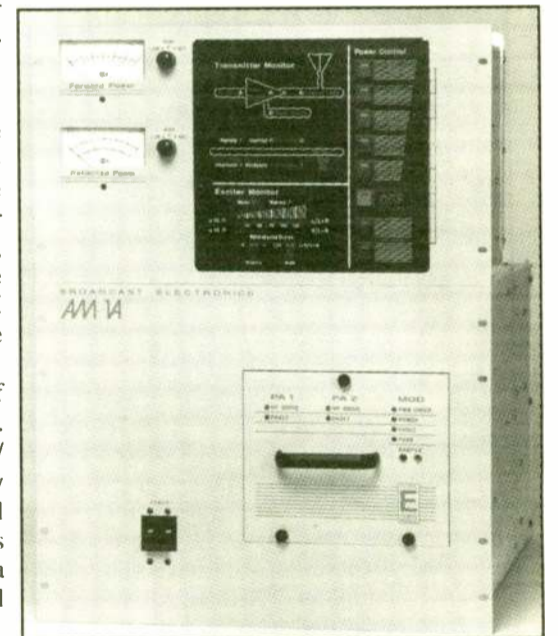
PowerMiser rackmount version of its field-proven, popular AM-1 solid state AM transmitter. The BE AM series of transmitters were on display, as were the well-known FM series of transmitters.

BE, based in Quincy, Ill., manufactures a full line of AM and FM transmitters, FM exciters and AM stereo exciters and modulation monitors.

Big debuts

Also debuted at NAB '96 was the Lynx digital FM stereo generator. The Lynx accepts any sampling rate from 32 to 48 kHz or analog input. The BE AM series of transmitters have AM stereo as standard equipment.

RF Plante Industria E Comercio, a Brazilian-based FM transmitter/exciter manufacturer, debuted its LPFM/HPFM series of solid state FM transmitters. The low-power models feature 10, 25, 50, 100 and 250 W, while the high-power model features a 1 to 10 kW power rating.

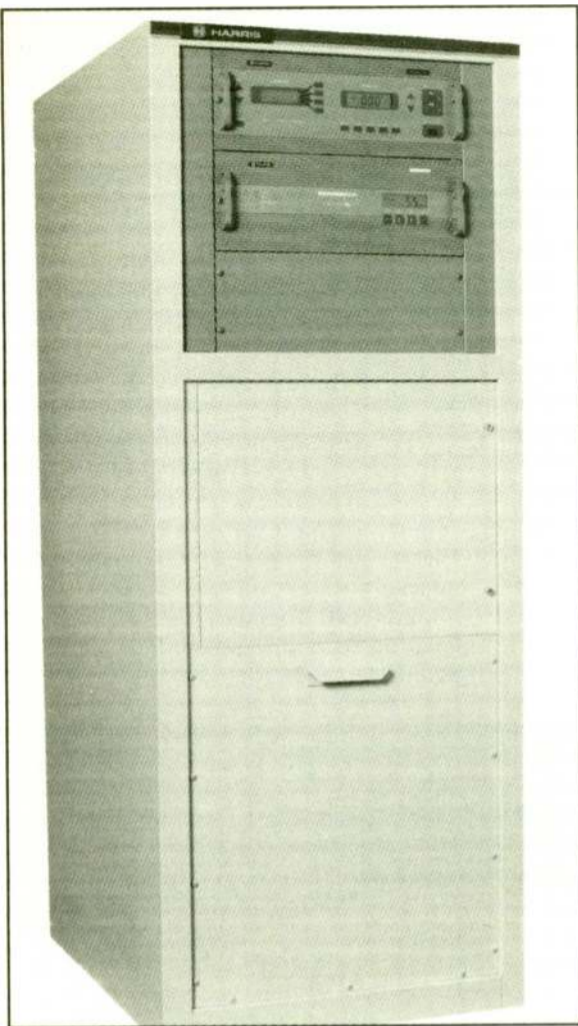


The 1 kW AM PowerMiser from BE

The model 438 exciter/transmitter was displayed, sporting a front panel frequency selector. This feature can be important to broadcasters wishing to share a backup exciter/transmitter or for portable use in a multistation chain. RF Plante also manufactures digital codecs and digital STL links as well as VHF/UHF TV converters.

Nautel unveiled a number of new products at NAB '96. Kicking off on the FM side, the Nautel NE-50 digital FM exciter is sure to draw attention. The 50 W power level makes the NE-50 perfect for use as an exciter or low power transmitter.

continued on next page ►



The Harris Platinum Z FM Transmitter



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The NE-50 features AES/EBU digital inputs capable of accepting any sample rate from 25 kHz to 55 kHz, an on-board DSP and composite digital stereo signal generation.

On the AM side, Nautel debuted the XL series of totally solid state transmitters. The XL series incorporate a complete standby exciter section, making this unique feature only second to the high overall efficiency of each transmitter in the series.

The XL family consists of 12, 30 and 60 kW models, each with extremely high positive peak capability. The XL transmitters are able to be serviced on air should an RF amplifier module fail. Each module is fully-protected from short or open circuit failure, with modulation capability and spectral purity preserved in the event of a failure. The Nautel XL series highlights its continuing 25-year tradition of solid state leadership.

OMB America is a manufacturer of FM exciters, transmitters, FM, STL and RPU antennas and FM modulation monitors. The OMB EM FM transmitter series range in power from 20 W through 10 kW.

Building block

OMB products include the EM-20/30 FM 20/30 W exciter, which serves as the building block for the EM higher power transmitter series. OMB manufactures cost effective antennas for broadcast RPU and STL service in the domestic and international bands.

CCA debuted its FM60G and FM100GS high performance solid state FM exciters. Featuring a three-year warranty and modular construction, FM60G and FM100GS are FCC type-notified from 3 W to 60/100 W, making them ideal for operation as a standalone transmitter.

Also introduced was the CCA model 1000SS 1 kW solid state FM transmitter. CCA has long been known for its complete line of reliable AM and FM broadcast transmitters with power levels up to 100 kW for AM and 65 kW for FM.

Linear Equipamentos Eletronicos S/A was present with an extensive line of transmission and microwave equipment.

BEXT introduced the model TEX 150 150 W FM exciter/transmitter and the HPT-EXO 20/40/60 W FM exciter/transmitter. BEXT debuted its SF series of FM MOSFET-based amplifiers in the 800 and 1200 W range to complement their series with power ranges from 150 W up to 5000 W. Also debuted was the model DE2/16 and DD2/16 digital encoder/decoder for use with ISDN lines or analog STLs.

BEXT manufactures a complete line of FM and TV transmitters with power combinations to suit every need.

From abroad

Itelco is an Italian-based manufacturer of FM, VHF/UHF/HDTV TV and DAB transmitters and turnkey transmission plant installations. The Itelco line of solid state FM transmitters range in power from 10 W to 1 kW. A new 10 kW solid state FM model was debuted at NAB '96. Tube FM models range up to 30 kW and TV transmitters range up to 40 kW in the IOT configuration.

Many broadcast transmitters, especially high power and older designs, employ power vacuum tubes. Svetlana manufactures over 50 different tube types from its plant, the largest in Russia. All types are available for shipment from USA stock and offer a generous warranty and economical pricing.

Comark Communications displayed its line of AM and FM transmitters with power ranges up to 2 MW. Comark manufactures digitally based AM/medium wave transmitters as well as DAB

line voltage stabilization and power conditioning gear. Superior manufactures uninterruptible power supplies (UPS), which are critical to computer and digital-based equipment. Every studio and transmission

transmitter/exciter that can be supplied with a built-in stereo encoder. Also on debut was the model MOD.VL3000 solid state 3 kW FM amplifier. CTE manufactures FM, TV and STL transmission equipment.

Inovonics is well known for its complete line of AM and FM audio processing gear, modulation monitors and encoders. On display at NAB '96 was the Model 630 FM translator for those applications where rebroadcast of an FM signal on another frequency is required.

NAB '96 saw no shortage of new transmission products and every manufacturer proudly displayed its time- and field-proven products. Whether your needs are for low power, high power, multistation, domestic or international needs, a variety of equipment from the above manufacturers is available to meet your needs.

NAB '96 saw no shortage of new transmission products, and every manufacturer proudly displayed its time- and field-proven products.

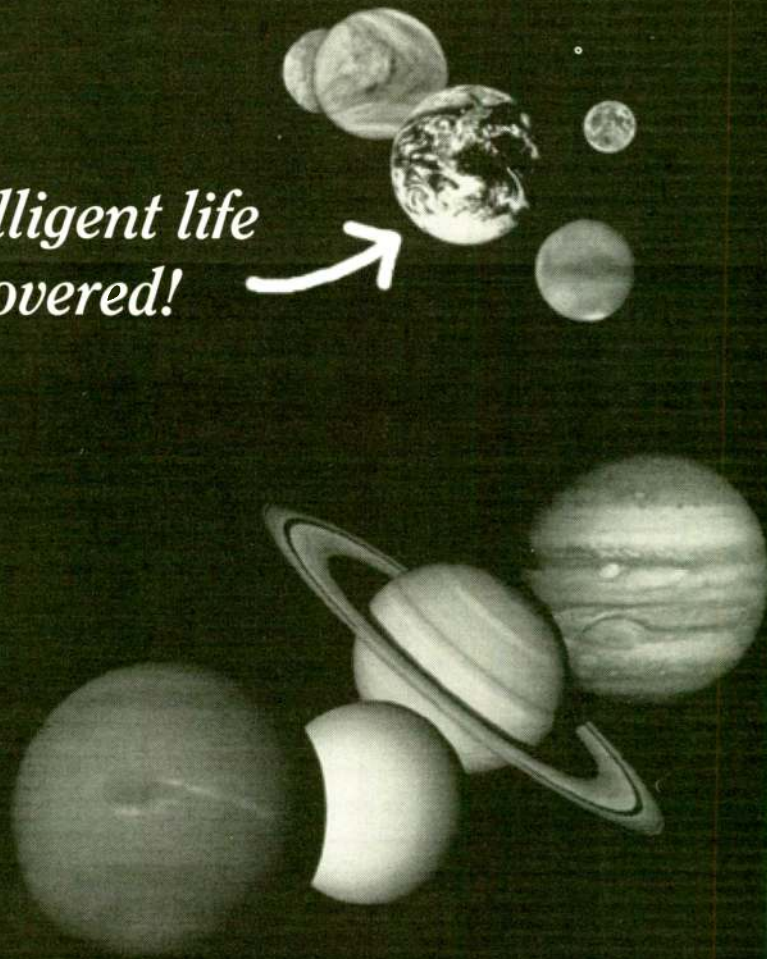
transmitters for international use.

Superior Electric is a Connecticut-based firm manufacturing a complete line of AC transient/surge suppression equipment and

facility should be fully protected against power line disturbances and outages.

CTE International debuted its MOD.VL62 60 W premium quality FM

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ISDN Advances Link Remotes to Good Sound

by Paul Montoya
President
Rocky Mountain Technical
Services

LAS VEGAS ISDN was everywhere at NAB '96.

I thought I knew a fair amount about this technology until I met a few of the manufacturers. From 7.5 kHz talk remotes to 20 kHz stereo for music broadcasts or recordings, ISDN can get us there.

Lynn Distler of Comrex gave me a tour around the Nexus ISDN unit. By far one of the most compact all-in-one units, it is well suited for in-the-field applications. The Nexus uses the G.722 coding and as this type of coding is less complex than Layer II or Layer III coding, audio delay time is minimized.

The Nexus is designed for remote broadcasts requiring either 7.5 kHz or 15 kHz bidirectional audio.

With XLR connectors for audio in and out right on the front and controls that

additional features to go into more detail in this article. As with most of the ISDN equipment, I suggest that if you are in the market for equipment, have the manufacturers drop you some literature and lock yourself in a room for a few days. It's truly amazing what you can now do with this equipment.

I found the folks at Telos once again addressing the needs and concerns of the typical broadcaster. As most of you know, the biggest hassle with taking most ISDN equipment into the field has been the packaging of the equipment. It normally is not very well suited for typical remote broadcast operation, so we package it up in anvil style cases and hit the road.

Telos, which is also distributed by Bradley Broadcast Sales and BSW, has come to our rescue with the new ZephyrExpress. No, it is not a new Telos credit card, but a compact and well-built unit made to hit the road with your Shure M262 mixer. (The designers at Telos must love that comparison.) But

The ZephyrExpress offers the same level of sophistication as the standard Zephyr using ISO/MPEG Layer III, Layer II or G.722 encoding; running stereo or dual-mono; and using one ISDN



The Nexus from Comrex

B channel or two. Now the bad news. It probably won't be available until fall of this year.

Telos is also working with new audio transfer systems for the Internet using MPEG compression over the World Wide Web. I'm sure we'll hear more about this in the future.

Dolby Laboratories launched the DP503 multirate, multi-algorithm digital audio encoder. It features Dolby AC-2, AC-3 and MPEG Layer II audio compression algorithms and front-panel interface to an ISDN terminal adapter. Dolby also displayed the Dolby Fax system for sending high-quality digital audio in real time via an ISDN line.

Intraplex demonstrated the model 4464 digital audio codec. The Model 4464 features a built-in terminal adapter and MPEG Layer II encoding of 15 and 20 kHz audio.

SystemBase displayed the C300xr audio codec with an ISDN terminal adapter, keypad and VFD display. The unit is housed in a one-unit-high rackmount enclosure and is based on the apt-X 100 coding system. The C300xr can provide a 7.5 kHz mono link over 64 kbps ISDN channels.

RE America featured the RE660 series MPEG Layer II audio codecs along with the linear PCM RE8930 audio/data/voice codec.

Audio codecs from Madrid-based Cemty were also on display.

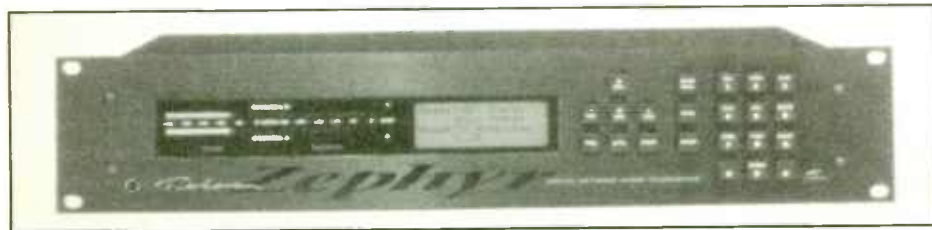
Audio Processing Technology introduced the hardware implementation of the apt-Q audio coding system which, in cooperation with AT&T,



The CDQPrima Plus from MUSICAM

delivers stereo at low bit rates over a single, direct-dial ISDN or Switched 56 channel.

These are just a sampling of the many ISDN Codecs available on the market. As you would expect, the one you need depends on your individual application.



The Zephyr was on display at the Telos booth.

allow a mix between local audio and return audio, this unit works well in the field. Comrex even built in an audio peak limiter.

This unit has a built-in terminal adapter and NT1, so all you have to do is plug the line in and away you go.

I headed to booth 3020 to visit the folks at MUSICAM USA. There I saw the complete CDQ Prima line of equipment. There are four different models available depending on your need for sophistication and the size of your checkbook.

I was first shown the Model 230 with optional Psychoacoustic parameter adjustment and optional Windows remote control software, which allows the operator to adjust 22 additional parameters above the standard eight ISO parameters. This allows you to tailor the sound incredibly precisely to fit your individual needs.

I imagine you would have to have a very golden ears to take full advantage of this package. MUSICAM USA told me, however, that there are many networks that can use this amount of sophistication.

The CDQ series allows for data transfer rates up to 384 kbps if you can provide that high a data circuit. MUSICAM USA uses its modified ISO/MPEG Layer 2 encoding algorithm — MUSICAM — in its products, claiming it to be the best. Sampling can be adjusted from 16 to 48 kHz depending on your needs.

The nice thing about this series of products is the capability to have the manufacturer upgrade the product through software revision either by loading from a laptop you might attach via an RS-232 port or, even better, directly over phone lines from the factory into the unit.

The CDQPrima series has too many

they've really thought this out with the inclusion of a three-channel mixer and two separate headphone outputs.

Furniture Adapts to New Technology

LAS VEGAS There was plenty of furniture to see at NAB '96. Racks, shelves, canopies, desks, cabinets, drawers, doors and modular furniture were all over the exhibit floor, offering lots of alternatives for station organization.

Arrakis Systems introduced the Radius line of furniture and displayed a variety of modular furniture and Deskstar series products. The Radius line of studio furniture from Arrakis Systems is designed for very high end, major-market radio stations. Radiused table surfaces and end panels, extra large and deep pedestals and tabletops, combine with designer styling to create an attractive but ergonomic studio.

Pacific Research & Engineering showed its line of custom cabinetry.

Modular electronic cabinets were on hand at the Zero Stantron booth, including vertical racks, low profile and slope front consoles and instrument cabinets.

In addition to its modular studio furniture, Wheatstone displayed a new line of high-end, high-style custom furniture for radio. The line is a "highly stylized" approach, according to the company, and includes a combination of hardwoods and laminates. The cabinets have hardwood rounded corners and the U-shaped counter array of the line includes a sweeping curve toward the interview area and the interview counter is kidney shaped. The furniture is designed with a substantial amount of storage space as well as generous

wire raceways and hinge-punched block panels.

This year, Anthro Corp. introduced the Anthro Console, designed to support multimonitor systems. It comes in four color combinations with two shelves and a keyboard surface. The company also introduced the Anthro Rack-N-Stack, designed to support and move 19-inch rack equipment and non-racked hardware on the same cart.

Many alternatives for stations could be found.

At the, Fidelipac booth, Murphy Studio furniture was on display.

Solutions Custom Furnishings Inc. introduced monitor bridges in two new sizes. The single monitor stand can be added to an existing system. A larger Crescent monitor bridge holds up to three 20-inch monitors on a height-adjustable base. Solutions also showed new components for the Crescent product line, as well as a collection of ready-to-assemble furnishings including the Slimline,

Diamond and Crescent product lines. Solutions also provided information about available custom design and installation options.

KD Kanopy Inc. presented the KD Majestic canopy, which, according to the company, weighs 48 pounds and is 40 percent stronger than steel framed units. The canopy has a one-piece, scissor-like design with no loose parts or ropes that is water resistant and fire retardant.

Wenger Corp. returned to the show with its line of acoustic treatment and equipment mounting components, including the V-Room sound isolating modular broadcast booth, computer/synthesizer workstations and quadratic room diffuser panels.

In addition to its familiar workstation furniture for audio production, Nigel B. Furniture introduced product furniture for distance learning and video conferencing applications. The company also exhibited new monitor display systems including mobile, wall and ceiling mounts.

Bretford Manufacturing Inc. displayed multimedia workstations, which are available in a variety of colors.

A variety of accessories including doors, drawers and shelves for studios were presented by AMCO Engineering Co.

Winsted Corp. introduced an expanded line of Digital Desks for linear and non-linear editing systems, including corner consoles and low-boy racks under the work surface.

EAS Technology Ready for Implementation

by Paul Montoya
President
Rocky Mountain Technical
Services

LAS VEGAS It is an exciting time as we get closer to implementing our new Emergency Alert System (EAS) technology. NAB '96 offered a venue to see this new technology firsthand and compare the attributes of each manufacturer. Many original players and some new faces are getting involved with EAS and preparing for implementation in January.

I started off by visiting the folks at TFT as they were front and center when this latest wave of new technology in Emergency Alerting evolved. The TFT EAS 911 is the heart of the product line, offering a single unit that scans the required two inputs from the communications web, two minutes of digital voice storage, two RS-232 interfaces, a front panel printer and a fairly easy-to-operate front panel.

The panel makes encoding EAS messages easy to do utilizing friendly help screens along the way. A Practice Key allows the operator to try just about everything without really sending an alert.

Economy unit

TFT also offers an economy unit without the digital voice recorder and printer. For larger markets, the input capability can be expanded from two to four.

For those not wanting to provide receivers/sources for the inputs to this unit, TFT offers the EAS 930 "Multi-module Receiver" which has a built-in AM receiver, FM receiver and NOAA weather radio, all in separate modules. Darryl Parker of TFT tells me the company will soon be offering VHF, UHF and TV Aural modules for this unit.

Other options include an RS-485 interface module and a four-port COM expander for extra serial interface. TFT claims no problem in handling the end of year rush, but as all the manufacturers suggest, "Don't wait until the last minute!"

Surprise announcements from TFT at NAB 96 included an alliance with Burk Technology to continue to improve the user friendliness of the unit. The Burk software savvy will be put to good use also.

An alliance with CUE Network Corporation to provide EAS equipment for industrial and public safety applications and an alliance with the Broadcast Supply Division of Continental Electronics to provide marketing and distribution support was also announced.

Driving force

It was then off to visit the folks at Sage Alerting who demonstrated their equipment within the confines of the Harris Broadcast booth. Sage Alerting was one of the driving forces at the Denver and Baltimore tests and has been very involved with this generation of EAS equipment development. Both Jerry LeBow of Sage and Jim Woods of Harris showed me around the Sage ENDEC.

The ENDEC is an attractive unit offering a two-minute digital audio recorder, six audio inputs, printer and six serial ports. Again, this unit was easy to use and offered a practice mode that allows

operators to become familiar with this unit.

One nice feature I found in the ENDEC was the ability to preview the audio received in the absence of the operator. Audio could even be replaced with station originated information if desired. An optional second non-volatile memory, 40-second recording can also be added. This enables stations to customize their alert with a station alert sounder of other announcement.

Sage also has an optional ENDEC receiver unit that allows interface to the main ENDEC unit and provides AM, FM and VHF audio to the scanned inputs. This unit also has an optional UHF module.

Another option for multistation operation was an RS-232-based remote control system that placed a simple pad in each control room and requested operation of the

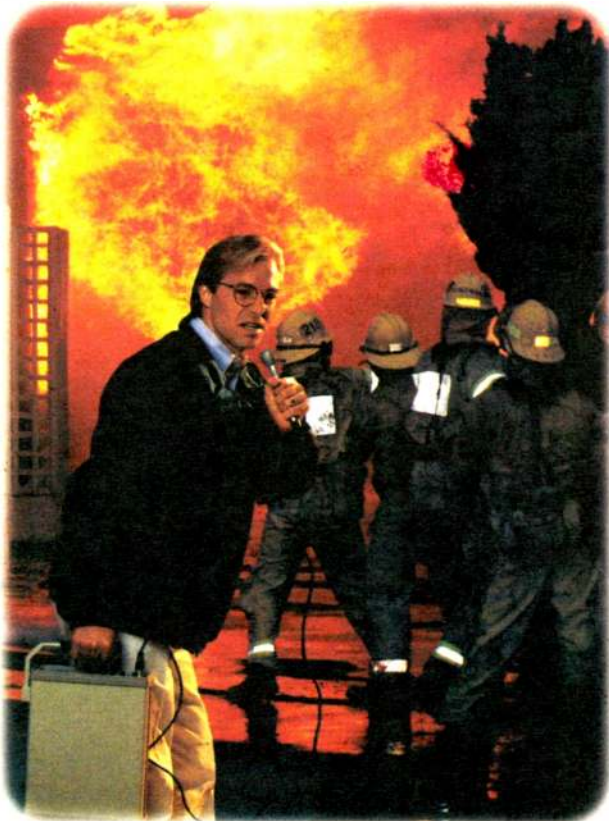
main unit in cooperation with other control rooms on the system. With the aid of a multistation relay panel, this allows for
continued on page 50 ►



The Sage Alerting EAS unit was displayed at the Harris booth.

[quality]

the best sound



[now shipping]



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Line Input:	+21 dBu maximum, 600Ω or >20kΩ, selectable, balanced
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Line Output Level:	0 dBu, nominal
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Power:	90-250 VAC, 50-60 Hz
Dimensions:	4.5" H x 11" W x 13" D
Weight:	12 Pounds



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MUSICAM USA, 670 N. Beers Street, Building 4, Holmdel, NJ 07733 USA

Implementing EAS Technology

► continued from page 49

orderly operation in this most common environment.

Jerry pointed out that Sage had done extensive RF testing at the WKPE(AM) transmitter site in Cap Cod. He indicated the unit performed well in the high RF environment.

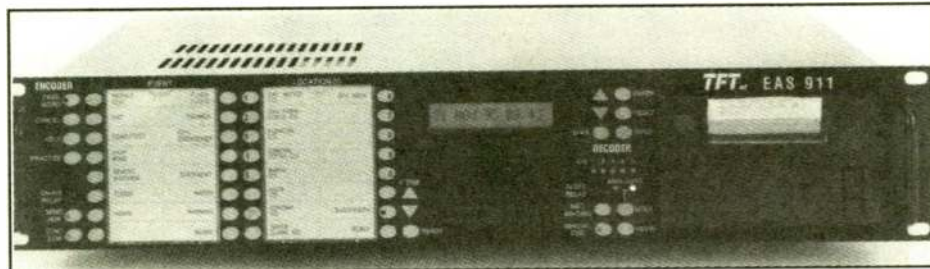
Confidence

Harris is the exclusive distributor of the Sage unit and it is the only unit it sells. Harris feels confident it can supply the upcoming demand and anticipates as many as 80 percent of broadcasters will wait until the last minute to order their equipment (see related story, page 1).

Jim Gorman of Gorman-Redlich tells me he is very close to FCC type certification of his unit. Gorman-Redlich has been a provider of EBS equipment for years and was also very involved in the Denver-Baltimore tests.

Gorman had displayed a working prototype of his EAS unit but much of the software program had not been completed at showtime. I found his unit to be simply laid out and easy to use.

It will come with four audio inputs and



TFT demonstrated its EAS unit.

soft key front panel controls. Five serial ports, each labeled for different interface capabilities, including PC, sign board, modem and character generator, are included. A standard PC-type parallel interface is also included.

All connections are made via Buchanan connectors on the rear panel. All connections were well-labeled and include a connection for muting the audio as interfaced to standard control room muting systems. Audio outputs are provided both in a 600 W and 8 W domain.

I found no other manufacturers showing equipment at NAB '96 but rumors of other companies providing EAS equipment were heard. The clock is ticking.

65 Years Ago

Reprinted from Radio World
May 30, 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.

PRESS GATHERS DATA TO DRIVE OUT LOTTERIES

Washington.

The American Newspaper Publishers Association has taken up the Federal Radio Commission on its declaration to set down for a hearing the application for license renewal made by any station about which lottery complaints have been made in considerable number.

Through Elisha Hanson, its counsel, the association has asked members to gather the local information concerning offending stations, and it is to be submitted to the Commission. In this way complaints from "a substantial number of listeners" are expected to be lodged with the Commission.

When the stations apply for license renewal, instead of the formal granting of the application, a hearing will be held at which the lottery complaints will be considered, and the stations' license will be in danger. Without a license the station dare not broadcast, as it is a criminal offense.

Says More Than 50 Offend

According to Mr. Hanson more than 50 stations are broadcasting such objectional programs, including lotteries, lucky number prize awards, jack pot drawings and other schemes of chance. All these come under the Commission's warning. They are prohibited from the press by the Postal Law, rendering any publication containing them unmailable, and the offender liable, but no similar provision was put into the Radio law, through oversight. The Commission has framed a comprehensive bill to be introduced at the next session of Congress to include a restriction in the Radio Law as well.

While the Commission under the Radio Law is specifically denied any censorship authority, this is legally construed as a restriction against editing a program before it is broadcast, but not as preventing the Commission from punishing a station for issuing an objectionable broadcast.

Public Service Is Criterion

In fact, a few stations have been denied license renewals because they broadcast programs including profanity or advertisements of quack doctors.

The Commission's authority to act in respect to the type of broadcasts already radiated arises under the provision of the law requiring that the station's service be in the "public interest, convenience and necessity." That lotteries and other schemes of chance are inimical to this requirement is expected to be the Commission's contention if and when any stations are cited for defense of their license application renewal.

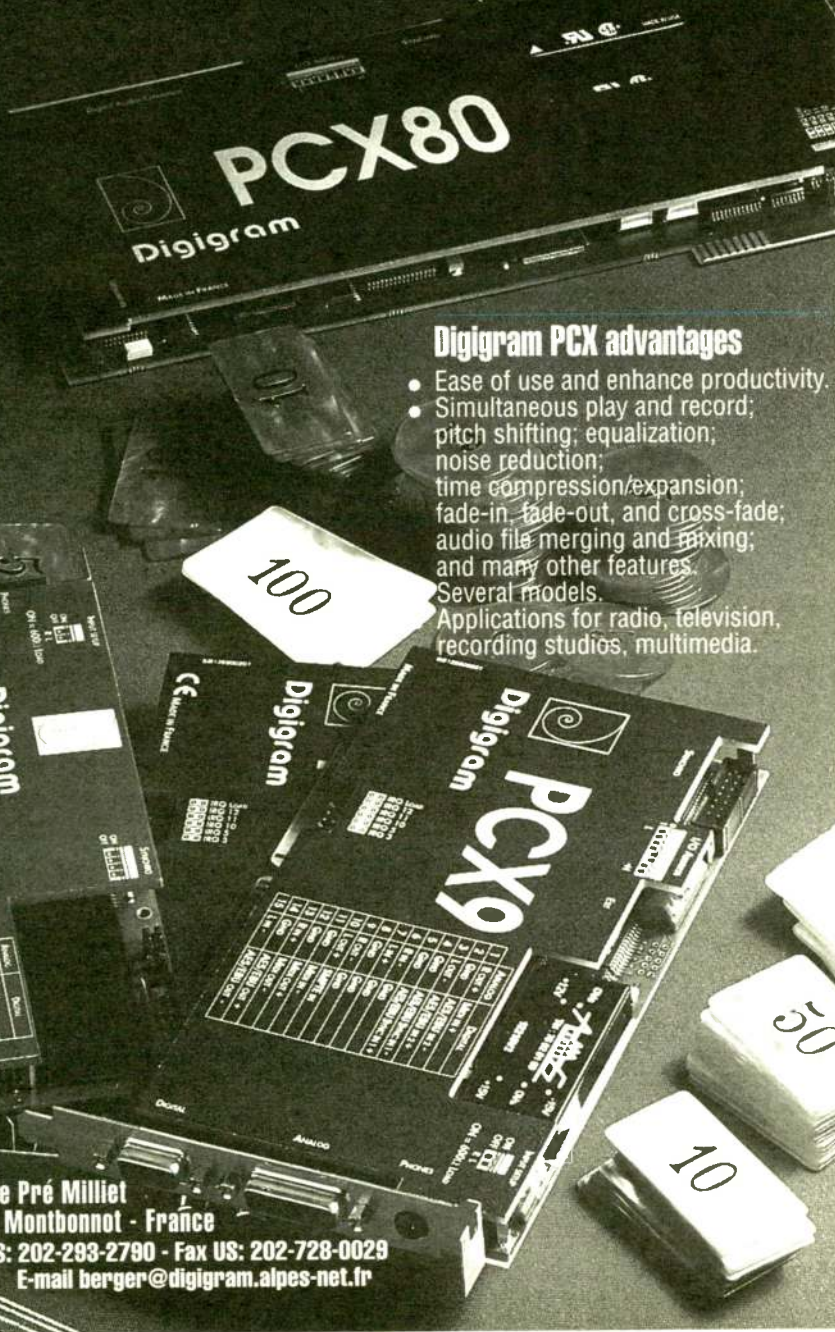
Audio quality and processing power

Digigram PCX audio. It's all in the cards!

When you choose a workstation that uses Digigram PCX digital audio cards, the deck is stacked in your favor.

Digigram PCX audio cards, installed on the PC platform, compress/decompress digital audio data using world-standard MPEG-Audio, in addition to supporting uncompressed audio. Professional level analog and digital hardware interfaces, carefully crafted design, and innovative software drivers provide stellar audio performance and outstanding features. With Digigram PCX audio cards, you're assured a winning hand. Draw on a host of audio and multimedia applications of the more than 80 developers who bank on the Digigram platform.

Contact Digigram to learn more about how to make your next workstation less of a gamble.



Digigram PCX advantages

- Ease of use and enhance productivity.
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Telco, Remote Technology Evolve

by Dwight Weller

LAS VEGAS NAB '96 was the showcase for new products for both broadcasters and audio producers concerned about gathering high-quality audio and transmitting it from a remote site to their home studio using telco lines and remote pick-up (RPU) RF links.

New for getting audio from a remote site to the studio was the **A.E.T.A. SCOOP Reporter**, distributed in the United States by **Harris**. The unit sends and receives 7.5 kHz audio on a single POTS line via an internal V.34 modem with extremely low (40 ms) delay. A built-in mixer provides on-site production of complete news feeds and remote shots.

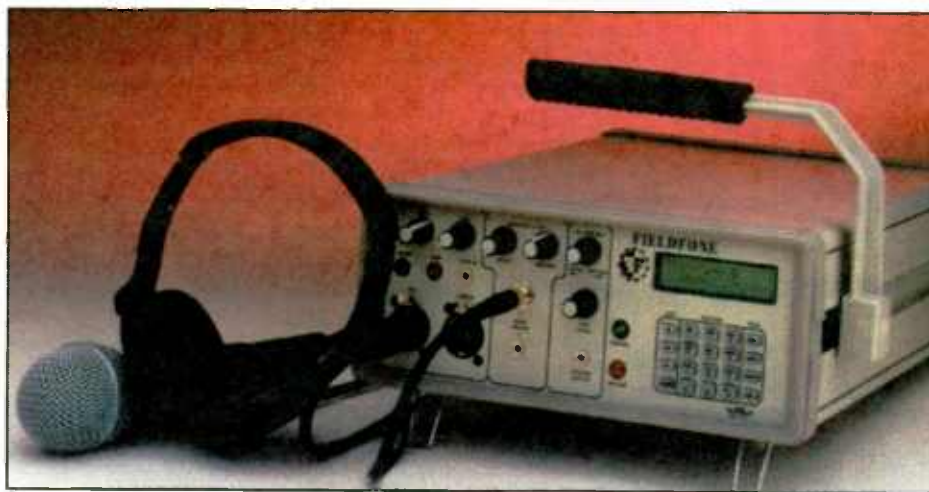
A working demo of the SCOOP Reporter in the exhibit hall was connected to a radio station in Texas. It rivaled ISDN and Switched 56 systems of similar bandwidth.

Superb audio

Marti Electronics President Jim Godfrey was on-hand to demonstrate the new Smarti bi-directional POTS codec due for delivery in July. Similar in size and weight to an RPT-15 RPU unit, the Smarti supports on-board mixing and monitoring with full-fidelity audio. The convention demo units were connected end-to-end with no telco line between them to yield superb audio in a simulated

remote-to-studio configuration.

Making a return appearance to Las Vegas was the **MUSICAM USA FieldFone POTS audio codec** that is designed to outperform two-line frequency extenders. FieldFone combines in a lightweight package a fully bidirectional unit that simply plugs into a standard phone line to send/receive 19.2 to 24.0 kbps compressed, broadcast-quality digital audio to/from another FieldFone at the studio. A less-expensive rackmountable



MUSICAM USA showed its FieldFone POTS audio codec.

version is planned for later in the year.

If POTS codecs sound a little too futuristic for you, **Comrex** showed its established line of frequency extenders.

If telephone lines are not your choice

for remote-to-studio links, good old airwaves are still in use with RPU and non-licensed wireless spread spectrum systems.

QEI Corp. unveiled the QEI Quick Link II this year. This system uses digital direct sequence spread spectrum in the 2400 to 2485 MHz band to transmit 20 Hz to 15 kHz stereo audio up to 30 miles over a line-of-sight path at relatively low RF power levels.

Given the proper terrain, noise-free

remotes can be reliably sent. The key to success with the Quick Link II is a line-of-sight path because microwave propagation is employed.

Moseley Associates gave us a first

glimpse of the StarLink 9001 digital RPL spread spectrum system. The StarLink 9001 provides CD-quality stereo remotes from distances up to 30 miles over an unobstructed path in the 2.446 to 2.482 GHz band of unlicensed frequencies using BPSK or QPSK direct sequence modulation.

With a maximum effect radiated power (ERP) of 4 W, receiver sensitivity of -98 dBm is measured. This system uses linear and ISO/MPEG Layer II or subband ADPCM data coding methods.

Reduced fear

Marti Electronics entered the arena of frequency-agile RPU equipment in the 450 to 455 MHz range and plans to offer similar products in the 161 MHz VHF band later this year. Frequency agility greatly reduces concerns about congestion in the available spectrum.

If your primary channel is occupied you can select a second channel from the remote site and the unattended receiver will track the change. Even the best SBE frequency coordination effort often goes off-course when visitors, without telling the coordinator, come to town and occupy channels used by local stations.

Telco lines and RF spectrum are not, by any means, just for remote broadcasting. Any material that is to do any good must still get to the transmitter, and the transmitter needs positive control — two more uses for new RF and telco products shown at NAB '96.

Dolby Laboratories introduced the Dolby DP5503/DP5504 DSTL digital

continued on page 54 ▶

AEQ Digital Hybrids show the way to be followed



Digital Hybrid TH-02EX Mk-II

- ▶ Frequency Extensor included as standard.
- ▶ Works with one or two telephone lines.
- ▶ Second line provides true multiconference. Simultaneous speech between operator and two listeners.
- ▶ 60 dBs hybrid null.
- ▶ No previous re-alignment required.
- ▶ Ideal companion for remote connections with the Portable Mixer-Extensor TLE-02.



Frequency Extensor TLE-02

- ▶ On Air phone call with audio presence, depth and clarity of voice. No "telephone sound".
- ▶ Designed for non-technical users. Ideal for field reporters.
- ▶ Light weight (3.3. Lb) and great autonomy, using 8 AA batteries.
- ▶ Dialing pad in front panel (pulse/tone selectable).
- ▶ Independent level control of Mic/Line input, auxiliary input and headphones.



Portable Mixer PME-02

- ▶ Three independent Mic/Line switchable inputs (XLR connector) electronically balanced and one unbalanced input (mini-jack) for line level portable stereo tape recorder.
- ▶ Independent input level control.
- ▶ Electronically balanced output (XLR connector) and follow up output (mini-jack).
- ▶ Connectable to other PME-02 or to the TLE-02 (optional accessory for mechanical coupling).
- ▶ Great autonomy, using 8 AA batteries, external transformer or car battery adaptor (12 V).
- ▶ Low level battery indicator.



AEQ AMERICA: 2211 South 48th Street, Suite H - Tempe, AZ USA 85282

Phone: (1 602) 431 0334 - Fax: (1 602) 431 0497

NEW !!!

Trak*Star III-

**4 x the power
& On Sale !!!!**



- **The #1 selling Trak*Star II has a NEW big brother !!!**
- **Trak*Star III has 4 times the power of Trak*Star II with...**
 - **Real time fade** • **Effects bus** • **New screen design**
 - **Edit & assemble files up to 6 hours long**
 - **many other powerful new features.**
- **Complete backup capability for your On Air Digilink**
- **Trak*Star III now comes with a 1.2GB drive standard**

Trak*Star III is a *NEW* multipurpose digital audio workstation for multitrack mixing and editing. Fully compatible with the #1 selling and industry standard Digilink & Trak*Star II, the Trak*Star III has four times the raw processing power of the Trak*Star II with many new features that utilize this remarkable new power... *real time fade, effects loop, 4 autolocator points, edit files up to 6 hours long, punch in-out, a 1.2GB drive standard, Digilink backup software, & 100's of others.*

Trak*Star, by Arrakis Systems, is the first cost effective multitrack digital audio recorder, mixer, and editor designed specifically for the radio broadcast professional. Also, Trak*Star is the only multitrack editor that is a complete backup to your Digilink on air workstation in every way right down to the audio routing switcher and control logic. More than just a digital editor, a Trak*Star digital workstation is a completely integrated digital solution that interfaces throughout your station to On Air, News, Editing, Traffic, etc. for transfer of digital audio, schedules, text, E-mail, and News wires.

With Trak*Star, creating spots, jingles, and liners has never been easier. Record and store on disk all of your standard music beds and sound effects. Select any combination of up to 4 stereo or mono sound files for editing and mixing. Once selected, you can easily scrub, cut, splice, copy, move, delete, fade, and mix any combination of these files to create your new spot or jingle. Record or overdub new voice tracks into the system while simultaneously playing back your preassembled mix. No matter how much you cut, splice, or throw away pieces of files... non-destructive digital editing leaves your original files unchanged. With Trak*Star you have unprecedented levels of control when you cut and splice by expanding tracks and actually working with the waveform itself. Trak*Star completely revolutionizes multitrack audio production for radio.



*The 22,000 series console can add even more functionality to Trak*Star by providing video & audio monitoring, plus audio input & output feeds*

Trak*Star is literally a complete multitrack studio in a compact box. As a radio specific product by Arrakis Systems, the Trak*Star works the way you do with the features and price that you need.

Call now to find out how this amazing new workstation can be made to work for you.

Sale !!!

TS3-600 **\$5,995**
(a \$7,995 value)

for more information call... (303) 224-2248

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STUDIO
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Audio Consoles

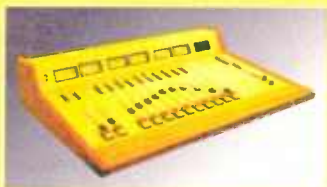
The standout #1 leader in reliable, high performance, digital ready consoles for radio, Arrakis has several console lines to meet your every application. The 1200 series is ideal for compact installations. The modular 12,000 series is available in 8, 18, & 28 channel mainframes. The 22000 Gemini series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

1200 Series Consoles



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

12000 Series Consoles from \$3,995



22000 Series Consoles from \$6,995



Digital Workstations

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

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

Satellite Automation



CD Automation



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



Digilink & Trak*Star Workstations

Studio Furniture

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

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

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

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

Desk*Star studio furniture systems



Modulux studio furniture systems

Complete systems...

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

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

Sony Worldwide Networks
Manhattan, New York



Telco, Remotes Evolve

► continued from page 51

studio-to-transmitter-link. This four-channel set will convey four program channels and two RS-232 data channels, taking advantage of new FCC rules that affect LMA and duopoly practices.

The Dolby DP5500 Series DSTL systems are fully integrated aural digital STLs that use Dolby AC-2 audio coding and state-of-the-art modem and RF technologies. Dolby AC-2, which provides the necessary data rate reduction for spectrum-efficient operation in the STL band, ensures that audio quality satisfies the most critical applications.

The combination of AC-2 coding, sophisticated 9-QPRS digital modulation, and ultra-linear RF amplifier sections yields an occupied bandwidth of only 400 kHz while retaining the ability to carry four program data channels.

Gentner Communications demonstrated the GSC3000 site control system which takes VRC2000 transmitter remote control unit to the next level. The PC-based GSC meets the needs of customers who require extensive control abilities at up to 256 sites.

The monitoring demands of today's duopolized stations, or the multiplied corporate engineering staff's need to see what is going on at their many sites, make this an excellent tool to monitor and control everything from a central point. The system features Windows-based operation and a PC-based voice/DTMF (Touch-Tone) option to allow monitoring and control of multiple sites from a single dialed number.

Also on hand were **Burk Technology** and **Intraplex** with their respective lines of remote and STL equipment.



Harris distributes the A.E.T.A. SCOOP Reporter.

WHY SETTLE FOR A FEW TOOLS WHEN YOU CAN HAVE THEM ALL?

Most digital audio systems provide the basic tools to accomplish specific functions, but only DAD486x gives you all of the tools you'll ever need to perform virtually any task imaginable: On-Air, Production, Library Management, Interface with Scheduling & Billing - and for any format; Live Assist or Automated - small or major market. It offers the ultimate in flexibility without stifling creativity.

Any digital audio system is expected to provide immediate operating efficiencies and improve the bottom line. But systems are often selected without giving proper credit to the role as a platform for future capabilities and expansion.

Can the system adapt when you decide to change formats or automate overnights via satellite... or accept and delay more external feeds? What if you do your own in-house automation? Can it handle an LMA or duopoly, integrate a new station, maybe even simulcast with the present one? How flexible will it be for the new PD, or that hot morning jock... both of whom will likely have strong opinions on how to best utilize the system? Most digital audio products just don't adapt very easily, and you will most certainly be faced with additional software and/or hardware expenses for any changes... not with DAD.



DAD486x is the ultimate Master Toolchest for broadcast professionals. Your staff may not use all of the tools at first, but as proficiency is achieved, they'll come to apply them in more and better ways to improve your entire product. DAD doesn't dictate an operational structure.

For any given task there are multiple tools and solutions. It runs on standard, non-proprietary computer hardware, easily interfaces with other professional equipment and systems, and can implement various levels of redundancy and fault tolerance. Featuring a completely open architecture, it maximizes future adaptability, is easily maintained, and can readily be configured as anything from a stand-alone workstation to any number of networked workstations, each optimized for specific tasks.

Best of all, DAD486x costs about the same as systems with far less features.

Software upgrades and improvements are free for the first year, plus there are no hidden monthly fees. Call ENCO and find out why so many stations and groups throughout the world have standardized on DAD486x, the Ultimate Broadcast Audio Toolchest!

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SYSTEMS, INC.

24403 Halsted Road, Farmington Hills, MI 48335 USA • Tel: 800-ENCOSYS (800-362-6797); 810-476-5711; Fax: 810-476-5712

Automation Systems Thrive

► continued from page 37

All control takes place from a single screen with Radio Wolf software while an optional LAN card is available. Modem cards are also optional so the Radio Wolf software can be controlled from any sight.

Cart replacement

AXS from Electric Works is a powerful cart replacement system that allows stations to use their existing computers. AXS can run from a mini-log, no-log or an automated traffic system.

AXS can operate as a music-on-hard drive system or control up to 32 Pioneer multi-disc players or the Pioneer 300 disc dual platter jukebox.

AXS uses apt-X audio compression. In short, AXS is an excellent live-assist solution for stations looking to replace their cart machines with digital audio.

The DAD system from Enco is complete. While it is not a Windows-based system, it is a nice "Windows looking" system that is mouse-driven for point-and-click ease.

DAD is both a live-assist system or a complete automation system. It will operate as a music on hard drive system or as a satellite automation system. Production is made easy with an on-screen digital editor that is efficient and simple to use.

The system can be networked in a building or a wide area network can tie stations across the country together. This a powerful and capable system that should be considered by any station looking into partial or complete automation.

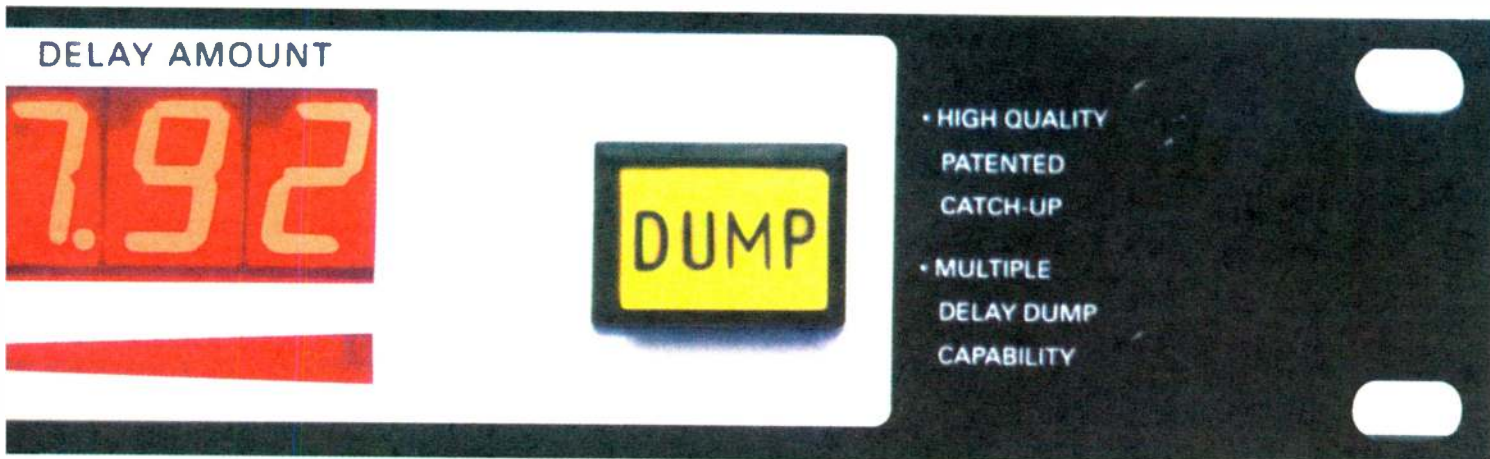
The DigiCenter from ITC is a full-featured automation system as well as a capable live assist system. The network configurations allow a station to put the main server in the control room with a networked workstation in production. Up to

continued on page 60 ►

THE ONLY TALK SHOW DELAY THAT CAN MAKE THESE STATEMENTS.

Bad words, **#@\$^&*%!** like bad news, often come in threes. The new Eventide BD500 is the only obscenity delay in the world that can eliminate them. Now, when you hit the Dump button, you don't lose the whole delay and the obscenity **%#^!@*\$!** protection that goes with it. You can divide the total available delay time into not one, or even two, but several discrete segments. You still have protection even after dumping two consecutive **&*\$%#@#!** no-no's.

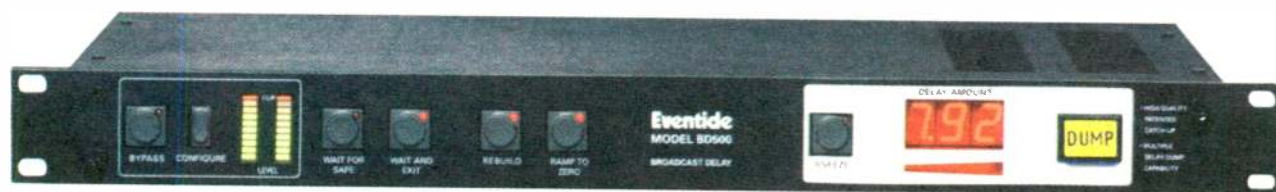
You also get the cleanest, quickest delay catch-up you can buy. Because there's only one way to maximize audio quality and still catch-up rapidly after a delay dump... and Eventide owns the patent. Over the years, several other brands of delay have come and gone. But the simple fact is that the catch-up methods others use must be painfully S-L-O-W to avoid serious audio problems.



And, because you may not be using that analog console forever, the BD500 is also the only broadcast delay that's digital-

ready with optional AES/EBU digital audio inputs and outputs. It's stereo, of course. A convenient new "sneeze" button allows the talent to sneeze, cough, etc. without being heard on air, and without dead air. All front panel switches (except configure) and all status indicators can be remoted (both RS-232 and dry contacts are provided.) Plus, only the BD500 gives talent both a digital readout of delay time and a "quick read" LED bar graph that shows "you're safe" at a glance.

For all these features and quality, you'd expect top-of-the-line pricing. But surprise! The BD500 costs thousands less. It's the best value ever in a broadcast talk show delay. Exactly what you'd expect from the people who invented digital broadcast delays in the first place. Call your distributor, Eventide direct, or check it out on the Web at <http://www.eventide.com>



BD500
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the next step

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Scouting Out Studio Components

LAS VEGAS For those looking for the latest innovations in studio components, the bounty was fruitful at NAB '96.

New products from **Acoustical Solutions** included AlphaSorb wall panels and hanging baffles — rigid sound absorbing panels available in custom sizes up to four feet by 10 feet in a one-inch or two-inch thickness and covered in Guilford fabric with a wide color selection.

Also displayed were two feet square AlphaTec ceiling tiles made of sound-absorbing foam panel mounted against a rigid fiberboard backing and designed to drop into a standard grid. Both products are Class I fire-rated.

Acoustical Solutions also exhibited

established products including AlphaPyramid and AlphaWedge acoustical foams, Sonex acoustical foams, AudioSeal sound barrier, Soundtex fabric wall covering and modular broadcast recording booths.

GEPCO International Inc. exhibited its new GEP-FLEX jacket compound for 22-gauge and 24-gauge series multipair audio cable. The company also showed its audio cable, custom audio cable assemblies and breakout boxes and panels.

Studio Technologies Inc. had a variety of studio equipment on display, including a line of professional audio products such as the Studiocomm Series and the Studio Tools series of digital audio

workstation accessories.

Audio Accessories Inc. showed its collection of audio patch panels, pre-wired audio panels, patch cords, project patch and RS-422 units.

The new AD2004 quad 20-bit A-to-D converter from **Benchmark Media Systems Inc.** made its debut at the show. Familiar Benchmark products were also on display, including true VU meter systems, mode controllers and the System 1000 modular DA and processing package.

New from **LPB** is the SHA-1A stereo headphone amplifier with the ability to drive headphones of 32 W or higher impedance. The SHA-1A includes balanced input and sensitivity selection.

Thousands of Broadcasters Worldwide Rely On LPB Consoles



*The 18 Channel 7000 Series Console pictured above was used for live US/Hong Kong broadcast from BSW's booth at the 1995 NAB Convention.

Since 1960, LPB has developed a reputation for building durable and ultra-reliable broadcast equipment. Superior RF immunity, outstanding durability, excellent features and easy maintenance are all combined in the LPB Signature III and 7000 Series Audio Console lines to create an unmatched value for your money.

Signature III and 7000 Series consoles offer a standard features list that outdoes other companies' options lists. Every LPB console features a

complete pre-shipment performance test report, fully socketed ICs and RF immunity that's second to none. The 7000 Series offers programmable remote starts and muting, as well as a 5,000,000 operation rating on all switches used.

Whether you choose the rotary fader Signature III Series or the linear fader 7000 Series you'll find out what thousands of broadcasters from all over the world know from experience...

You Can Rely On LPB!

Call Today For More Information On LPB Consoles

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Circle (68) On Reader Service Card World Radio History

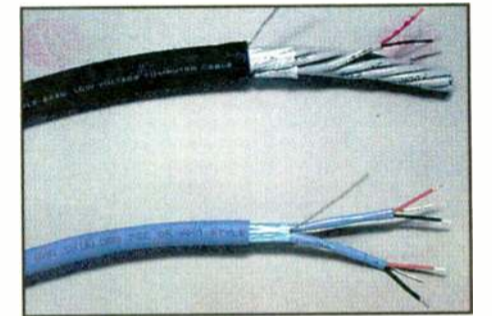
Autogram Corp. had its collection of RP series audio switchers, clocks and timers on display.

In addition to its familiar master clock systems, audio D.A. family and timers, **ESE** presented its new ES-160 master clock with one sec/mo. accuracy. Other new items at the ESE booth included the ES-245 quad 1x6 audio D.A. with individual gain pots and a four-inch display family of clocks, timers and slaves.

Neutrik USA Inc. exhibited its NPP-TT-14-PT, Easy Patch panels. The company also had several connectors on display including its Speak-On speaker connectors, Minicon 12-pin miniature connector, XY Series of IDC connectors, the Neutricon eight-pin modular commercial connectors and Nanocon three-pin miniature connectors. ProFi professional RCA connectors and A and B series center-to-center connectors were also displayed. Neutrik also showed its Easy Patch panel accessories and a complete line of XLR connectors, accessories, adapters and wall plates, as well as a wide assortment of quarter-inch jacks and plugs for high-end audio applications.

Bradley Broadcast Sales had the Excalibur HA-1 hybrid adapter on display at its booth.

Datatek Corp. returned with its D-2800 series routing switchers for analog and digital audio systems and its D-2400 series control panels. Also displayed were analog and digital audio modules.



Gepeco Gep-Flex Outer Jackets

Datatek introduced the D-2600 series analog and digital audio routing switchers and the D-2800 series eight-character alphanumeric keypad control panels.

There was a plethora of new products from **Wohler Technologies** this year. Wohler's new alarm systems that identify audio error conditions and location were displayed. Also showed were new horizontal level meters from one to eight full range (analog or digital) in IRU at this booth. Wohler introduced the AES/EBU 1U or 2U digital level meters — the difference is decibels.

There are new digital audio routing switchers, a serial digital audio extractor, phase flipper, and digital source selection switch DSS-8. In addition, several established Wohler products including level meters, phase indicators, audio routing switchers and source selectors were on display.

ADM exhibited its stereo source selector, mix-minus IFB system and bar graph meters.

Wireworks Corp. brought its selection of cables, cabling assemblies and cable testers. The company also showed multimedia cabling assemblies, control cables, coaxial cables, broadcast quality sound and communication cables, custom broadcast panels and cable testers for every application.

The Rip-Tie Co. introduced Rip-Tie Lite Cablewrap, which is designed for less demanding use in terms of release cycles — it will withstand approximately 300 —

continued on page 57 ▶

New Music, Computers Boost Libraries

by Alan R. Peterson

WASHINGTON New musical styles and computer integration added a fresh and exciting dimension to production music libraries shown at the NAB convention.

A number of companies specializing in music for commercials and promos turned out in full force in Las Vegas. Many worked with data management companies to create databases, allowing each company's collection to be accessed and edited by computer.

TuneBuilder from **AirWorks Corp.** drew a lot of interest. This is not a library, but a management system/editor that loops, edits and creates openings and closings for production music. The computer assembles music beds based on criteria and definitions entered by the producer.

TuneBuilder is available for DOS, Windows and Mac, and already has support from 13 music library providers.

Sonic Science has also turned to the computer for managing a station's music and effects collection. Sonic Search allows exploration of a library for a specific song or effect by using keywords then retrieves the desired cut from a CD jukebox. Sonic Search also features a one-million word thesaurus and can network to multiple CD jukeboxes.

The M&E System from **Gefen Systems** also performs search and play functions by keyword, category, catalog number or by synonym. M&E Professional is run on the Mac platform and M&E Windows on a 386 PC or better.

Thompson Creative brought new jingles and a new library to NAB. The jingles were customized for tejano, contemporary Christian and light rock stations. The Thompson Creative Fresh Tracks library consists of 50 tracks on one CD grouped by tempo, style and texture.

Killer Tracks was also showing the TuneBuilder at its booth. The new 70-disc Atmosphere CD Music Library was on display as well.

"Spike and Glide" are new arrivals from **Network Music, Inc.** Spike is a four-CD collection of hard-edged production elements, while Glide is a softer collection of hits and winds to accentuate copy points. The Spike and Glide Comedy Pack is a collection of comedy and cartoon effects.

Presentation Audio, also from Network Music, is a CD-ROM collection designed for desktop multimedia.

"Tune Ranch" is a new ten-disc collection from **The Production Garden**, and features mostly acoustic music performed by Nashville players. Several new collections were debuted, including In Your Face, Real Rock and Urban Rave among others.

The buyout libraries from **River City Sound Productions** include commercial music beds and specialty cuts; like Wedding, Christmas, Sports and Classical. Each disc is \$59 each and available direct from the company.

New from **Manhattan Production Music** is the Apple Trax CD library, aimed at alternative rock, techno and urban stations. The collection consists of 15 CDs with two more being produced now.

Aircraft Production Libraries flew

into Las Vegas with its new "Co-Pilot" feature that allow customization of music mixes. Co-Pilot presents elements



Spike and Glide from Network Music Inc.

from each cut, isolated as a solo or a split mix. These can be synchronized back into the main mix to sound like a custom arrangement.

"Connecting Flights" from Aircraft are footnotes inside each CD that link you to cuts on other CDs with similar styles and arrangements.

The Jinglefile Series debuted in Las Vegas, courtesy of **Match Production Music**. The company also exhibited the Producer Series interactive CD library, the Broadcast Box CD set and the Power FX collection.

For sheer numbers, **TRF Production Music Libraries** could not be overlooked. The company claims over 50,000 selections over a number of

libraries: including Bosworth, Black Rock, MP 2000, Prime Time and Tele Music. The newest addition to the TRF collection is the Pyramid Production Music Library.

Ten new music CDs and four new effect discs joined the **Valentino** product line-up. Valentino returned to the NAB show with its classic sound effects and music library.

Libraries from **Omnimusic** and **Non-Stop Music** were also on exhibit at the NAB show.

TM Century presented the Country House Band Promotion library while also displaying the GoldDisc music format on CD and HitDisc weekly music updates along with its jingles and production libraries.

Halland Broadcast Services introduced its Hit Drive service comprised of custom music libraries preloaded on hard drive. Halland also has libraries for oldies, classic rock, 70s gold, AC, Hot-AC and hot country radio formats.

Studio Components Abound at NAB

► continued from page 56

than the original Rip-Tie Cablewrap. The original Rip-Tie Cablewrap with adhesive back used to organize bundles of cables in coils or harnesses was also on display.

Lexicon presented its new Lexicon 300L digital effects system that supports the LARC remote controller. Lexicon also displayed its Pitch FX card for the PCM 80 Digital Effects Processor.

SMARTS Broadcast Systems showcased a new switcher and a new temperature announcer, along with a new log manager designed for interfacing music and traffic logs in an automation system.

ADM Systems Inc. had its collection of bar graph meters on exhibit along with its stereo source selector and mix-minus IFB system.

International Tapetronics Corp. had its new audio routing switcher on display. It was on display alongside the company's established audio routing switcher that is expandable to 512 x 512. Also at the ITC booth were the RS-232 control and 124 custom remote control units.

The TTP96 audio patch — new from **Switchcraft Inc.** — was displayed at the show. The company also showed its wide collection of familiar studio gear including audio connectors, jacks, plugs, audio patch panels, patch cords, molded cable assemblies and audio accessories, switches, jack-fields, jack panels, power cords and EAC power receptacles.

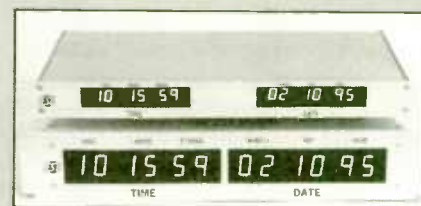
Sandar Electronics AS had a host of new routers to introduce, including 32 x 32, 64 x 64 and many other sizes for audio as well as 34, 140 and 155 Mbps. The company had new AES/EBU routers to show along with its preexisting analog and digital audio routers on hand too.

New products on display from **Clear-Com Intercom Systems** included the Tel-1000 auto-nulling telephone interface for Party-Line and Matrix intercom systems, the

TW-20 two-way radio intercom interface and Windows 95 programming software for the Matrix Plus II Intercom.

Clear-Com's P1-Pro party-line intercoms with two- to 12-channel stations with linking features were also on display. The company also displayed the ICS-92 nine-key programmable intercom station and the XPL-12 and XPL-22 expansion panels with electronic LED labels to add 60 keys to Matrix Plus II.

New products on display from **Leitch** included VIA 32 Series Routing Switchers; XPress Series Monitoring Routers; Smart Panel Controller, a programmable, push-button control panel; Router Works, a



Clock Systems from EXE

PC-based routing switcher control program; DigiBus, which allows users to transition between almost any digital and analog standard for both audio and video; time and temperature option and VBI control features to LogoMotion; video and audio distribution amplifiers and various compatible frames; Routing Scheduler; adaptive comb filter module; X plus 16 x 16 analog video and audio routers; AES digital-to-analog converter; StillFile Gateway object server; MediaPort; EDH Mix Box; EDHview Software; and ADM-6800 audio signal monitor.

Nemal Electronics International introduced composite audio/video cables with extra-flexible jackets. The new products are available from stock in 15 versions with no minimum order, or in custom constructions with a 1,000-foot minimum and

two-week lead time. Also displayed were serial digital audio and video patch panels.

Henry Engineering introduced the new StereoMixer eight-input, three-output stereo mixer for line-level sources. The mixer can combine four stereo, eight mono or a combination of stereo and mono sources to produce both stereo and mono outputs simultaneously.

Torpey Controls & Eng. Ltd. introduced NPR code compatible time displays, developed to offer NPR stations an alternative, operating from their OS2 computers. The company also showed a wide range of digital or analog clocks, running from SMPTE, DQS, ESE or NPR codes.

J.N.S. Electronic Industries Pty. showed its 8000 System, a modular system with the new RFM-8323 FM receiver module, DTM-8552 FM composite monitoring module and 8310B 10 x 1 matrix switcher.

Best Power debuted the Unity/I three-phase uninterruptible power systems (UPS) with range in single-module capabilities from 10 kW to 220 kW. The systems may be operated in parallel for total system capacities approaching 2,000 kW (2 MW). The company also showed the Ferrups uninterruptible power systems (UPS), which deliver no-break computer-grade power to vital broadcast equipment while providing lightning and surge suppression.

CANARE showed Star Quad mic cable, cable reels, snake systems, tools and cable strippers.

New on display from **EDAC Inc.** included a shielded rack and panel connector and cover set, a combined audio/video rack and panel connector and a new three-pin audio connector. EDAC also exhibited audio rack and panel connectors.

Lemo USA Inc. showed high-quality, self-latching circular connectors for audio and video applications.

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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DustALL - Precision air duster. Remove dirt, dust & particles.

FreezALL - Locates intermittents, cools circuits to -54°C.

CircuitWriter - Conductive ink dispenser pen, makes traces on most surfaces.

CircuitSealer - Conformal coating pen, protects & insulates.

CalKleen IPA - Ultra-pure alcohol for cleaning & degreasing.

CalKleen 47 - Contact cleaner/degreaser - approved TF replacement.

CalKleen TRP - Degreaser/Cleaner/Defluxer - citrus-based.

CalKleen A/V - Cleaner for magnetic & optical read/write heads.

CalKleen RBR - Rubber cleaner/rejuvenator for rollers & platens.

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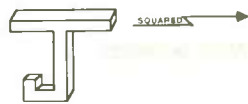
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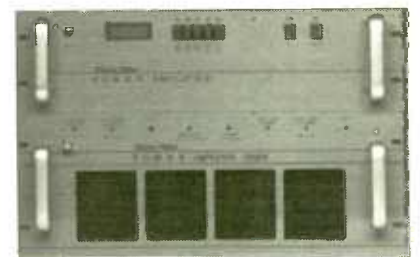


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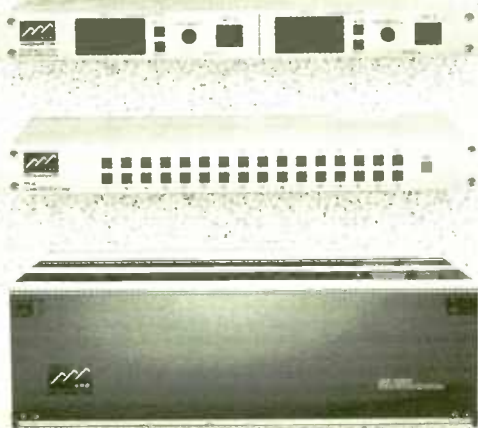
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- Serial RS-232 ports for terminal and modem control; RS-485 for local panels.
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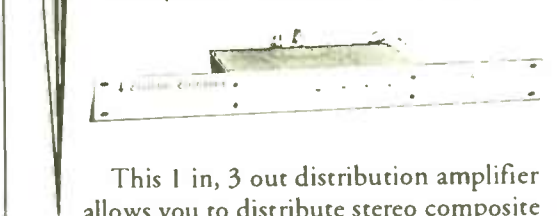
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World Radio History

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READER SERVICE NO. 29

NAB Hot Source for Studio Gear

From Staff Reports

LAS VEGAS Alongside all the new computerized offers for radio, NAB '96 brought together a number of studio source equipment, monitors, headphones and accessories to make studios as easy and efficient to work in as possible.

New from LPB were the latest nearfield studio monitors from Hayes of Australia. The f80B monitors feature patented new diffusion technology to create spatial imaging in a compact speaker. The monitors measure 6.5x36x25 inches, reach 60 Hz and feature SEAS drivers and Phillips tweeters.

Apogee Electronics Corp. was on hand with a number of different A/D and D/A conversion systems and accessories. The company also showed its DAT tapes along with its Wyde Eye line of bulk and preconfigured cables.

A Department of Defense-approved Type III tape degausser designed to purge Types I, II and III magnetic media with coercivities of up to 1,700 Oe was introduced by **Data Security Inc.** The unit works with a wide range of media, including 8mm, 4mm, S-VHS and DLT. The company also displayed its established line of bulk tape degaussers.

DGS Pro Audio introduced its channel identification system for **Deltron XLRs** and 1/4-inch plugs along with halogen-free installation cable from **Gotham Audio**. Also on display by DGS were Deltron XLRs, 1/4-inch plugs, RCA and MIDI cables and and Gotham mic cables.

Denon Electronics introduced the DN-1100 MD recorder/player. The DN-1100 has 10 independent Hot Start buttons to which any 10 tracks can be assigned. Also making a debut were the DN-610F CD/cassette combo deck and the DN-045R MD replicator for digital-to-digital dubs. In addition, Denon showed the DN-995, -990, -981, -961 and -951.

Along with the Denon DN-1100, **Bradley Broadcast Sales** showed the **Sony TCD-D8** portable DAT recorder and **360 Systems** Instant Replay playback system, which features 16 hours of storage time. **Broadcast Supply Worldwide (BSW)** also displayed Instant Replay.

Established products were on display at the **Studio Technologies Inc.** booth, including the IFB Plus series of mobile talent cuing systems and a line of professional audio products.

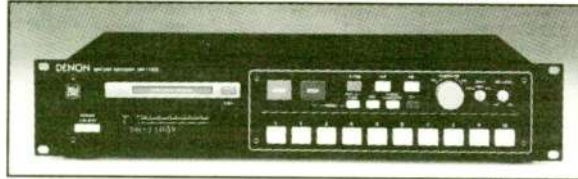
360 Systems showed its Instant Replay and DigiCart/II hard disk digital audio recorders. **Radio Systems** displayed its Digital Delivery System (DDS), which is also distributed by **Harris**, and **Tascam** introduced its DA-38 multitrack recorder along with the 564 digital Portastudio.

The new 610 Broadcast Audio Delay from **Symetrix** was on offer at the show. It eliminates profanities and unwanted comments on live or taped conversations. The company also demonstrated its 528E voice processor.

Wegener Corp. debuted the V-Room sound isolating modular broadcast booth and its quadratic diffuser panel. **Illbruck Inc.** displayed its Sonex acoustical materials for the complete

sound treatment of radio, audio recording and video studios.

Studio mastering tapes and digital media were on display by **BASF Magnetics Corp.** and **DIC Digital** demonstrated its DAT media and cleaners along with recordable CDs, 4mm



Denon DN-1100 Recorder/Player

DDS-MRS data cartridges and 8mm data cartridges.

Audio Technologies Inc. introduced a number of new studio source accessories along with an established line of products. **Fidelipac Corp.** debuted the MO version of the Dynamax DCR series digital cartridge machine and also featured **Murphy Studio Furniture**.

Otari Corp. introduced the UFC 24 universal digital audio format converter.

Otari also demonstrated the MR10 MD recorder/player; the CDC-600 dual drive, 360-capacity CD changer; MX-50II two-track tape recorder; and the DTR90T time code DAT recorder. **Studer** was on hand to introduce its D424-2 stereo MO recorder and the second generation D741 CD recorder.

Fostex Corp. debuted the D-80 rackmount hard disk recorder with a removable/removable front



The D424-2 Stereo MO Recorder Controller from Studer

panel and the CX-8 ADAT-compatible digital multitrack recorder. **Fostex** also displayed its studio time code DAT recorders and the PD-4 portable time code DAT recorder.

Clark Wire & Cable showed new and established lines of cables and connectors for remote and studio applications.

Group One Ltd. introduced the **KRK** powered monitors along with its 245 A/D 20-bit converter. A full line of speakers and sound reinforcement equipment were on display at the **JBL Professional** booth. **Electro-Voice Inc.** displayed the Sentry and S series of studio monitors.

Industrial Acoustics Co. Inc. introduced its high-performance modular studios complete with diffusion and appropriate acoustics. The new construction features a deeper panel system to obtain good low frequency attenuation.

AKG Acoustics displayed its full line of professional headphones and **beyerdynamic** demonstrated the DT 200 series monitoring headphones/headsets.

Various products and services for recorder care and head reconditioning, including new DAT head reconditioning, were demonstrated by **Sprague Magnetics Inc.**

New Antennas Get Warm Reception

LAS VEGAS With all facets of radio making great strides in technology, the area of antennas, towers and associated lines is no exception.

MYAT Inc. exhibited its new E-Star Power Combiner along with its complete line of rigid coaxial transmission lines, systems, components and accessories, including 7/8-inch 50 ohm through 12-inch 100 ohm lines; patch panels; power dividers; and test quality adapters for EIA and DIN standards.

Andrew Corp. displayed the new dual HMD antenna along with the ALPac antenna and tower system. The company also showed a new 2.4 meter SNG antenna.

Scala Electronics exhibited a series of FM antenna systems, as did **Kathrein-Werke KG** and **Sira Sistemi Radio**.

TRW Lighting displayed FAA-approved and ETL-certified aviation obstruction lighting.

Design and manufacture

Stainless was at NAB promoting tower design, fabrication, construction and maintenance. The company also inspects and provides structural analysis of existing towers and conducts field operations for antenna installation, repair and maintenance.

From **Will-Burt** was the new Night Scan ENG lighting unit for directing a powerful wattage under 20 seconds. The company also exhibited pneumatic telescoping masts from 20 feet to 134 feet to elevate antennas and cameras.

Lightning Eliminators and Consultants promoted its existing line of lightning protection and prevention products and related services including Dissipation Array, Chem-Rod Grounding Electrode, Spline Ball Ionizer and AC/DC Power Surge protection.

Davicom Technologies exhibited FM antenna systems and site monitoring systems.

Micro Communications showed

new high-power FM multiplexers, a FM broadband dipole antenna, a FM switchless combiner and coaxial transfer switches.

SWR showed high-power and low-power FM antennas and associated equipment.

Shively Labs showed the Model 6832 broadband FM antenna and its range of traditional systems for radio.

Cable and line

Clark Wire & Cable showed the MINK jacketed cables.

Belden Wire & Cable Co. displayed a variety of new products including 9913A high-flex coax cable, which the company said provides the lowest cost of any flexible RG-8/U type cable on the market.

Doty-More Tower Service, a full-service broadcast communication tower maintenance company, promoted its range of RF services, including Naptex RF protective clothing, RF analysis and troubleshooting services and RF mapping.

Antenna Concepts introduced the LPSaver and Ultra Tracker, along with a range of low- to high-power directional and omnidirectional broadcast antennas.

Phasetek promoted a motor-driven detuning system and high-power switching system, with its existing line of antenna phasing equipment.

From Italy, **ABE Electronica SpA** promoted a line of antennas and microwave equipment.

In addition to showing its omni and directional FM antennas, lambda mounting systems, towers, filters and combiners, **ERI** debuted the CP-11 series low-power, circular-polarized antenna. The CP-11 is a low-weight windload FM antenna available in pressurized or nonpressurized options with an input power to 2 kW. The company also introduced the Lightning Dissipation Spur.

Central Tower had a comprehensive range of antennas, filters, combiners, rigid line and components.

Dummy loads

On display from **Kintronic** was weatherproof medium-wave dummy loads and associated gear.

Altronic Research introduced the Model SW77300 shortwave band, 300 kW air-cooled dummy load. The company also displayed its 6700 series of air-cooled loads.

New on display from **Coaxial Dynamics Inc.** were terminating RF liquid/air loads.

Dawn Satellite Inc. introduced a Foxcom satellite fiber link, which allows satellite dish antennas to be located away from receivers. The company also exhibited a Coversat snow cover for satellite dish antennas and a motorized inclined orbit tracking satellite downlink.

Jampro Antennas Inc. exhibited new HDTV antennas and dual-mode UHF/VHF antennas. Also on display was a JUHD-UHF panel antenna, a JTW slot antenna, frequency-matched tower sections, waveguide, rigid transmission line, filters and combiners.

Facility design

Kline Towers introduced a prototypical transmitter facility design, developed and copyrighted by Thomas G. Crowder, AIA, of ARCHITEKTUR. The design uses the latest advances in ice protection and component-style construction, allowing Kline Towers to now provide a complete turnkey transmitter site. The company also displayed guyed and self-supporting towers for broadcasting and communications.

New on display from **LDL Communications** were antennas manufactured by Alan Dick & Co., which are designed for HP or CP operation stations; and towers for both guyed and self-supporting applications, up to 2,000 feet.

Heavy Traffic for Test Technology

by **Dane Roach**
Technical Director
Smarts Broadcast Systems

LAS VEGAS Most of the test and monitoring equipment manufacturers and distributors exhibiting at NAB '96 were swamped with customers looking at Emergency Alert Systems. For most managers and programming people, it may have been their first exposure to these systems.

Even engineers that have complied with EAS at their own stations came by the booths to see other systems, if for no other reason than to reassure themselves that as early adopters, they hadn't missed important features.

The classic devices were all present along with the latest devices destined to be classics. **Dorrrough** was present with old and revised versions of the LED bargraph loudness meters. The new microcontroller-based design features no calibration, precise display, sum and difference detection and peak hold and is drift-free.

Dorrrough also showed its new Big LED giant audio meters for scoring, rerecording and concert or location situations and the Model 40-A2, a software version of the standard Model 40-A.

Established **Dorrrough** products also at NAB '96 included AES/EBU digital meters and the Model 1200 Stereo Signal Test Set.

New words

Tektronix was set up to show-and-tell about the AM700 audio set, while we all learned a few new words at the **Hewlett-Packard** booth looking at the new MPEG test products.

Keldon Paxman, vice president of engineering for **Gentner Electronics**, took a few moments off the floor to show me the GSC-3000 system. If you need 256 radio stations monitored from one point, with each of the stations having 256 control functions, then this is the system for you. The server computer of this system is a Windows-based PC and a demo disk is available to show you the ropes of this product.

While having a few less than the 65,000 plus control channels theoretically possible with the GSC-3000, **Burk Technology** was proud to show the latest enhancements to the ARC-16, its top-line remote package. This unit has been here a while, but **Burk** continues to provide new functionality for this system.

Davicom Technologies demonstrated its new MAC 16/32 site monitoring system for RF communications. The system can alert via phone, computer, pager or fax and can monitor up to 16 analog inputs, 32 digital inputs, 16 audio inputs and can control up to 32 relays.

The Enhanced Speech Interface (ESI) represents a great improvement in speech interfaces, while still allowing data connections with a modem. If you are not a Windows software fan, the Autopilot software is a DOS application and does support a mouse.

Logitek introduced the VU-TRAX vertical audio meter line. Established products from **Logitek** on display included the Bright-VU, Super-VU and Ultra-VU horizontal bar-graph LED meters in rack-mount and desktop enclosures; 2VUB and 4VUB dual- and quad-powered mechanical meters with phase display; and the MON-10 expanded range meter with 10-input stereo selector.

Potomac Instruments displayed a wide

assortment of gear including its AT-51 audio test system, the SMR-11 synthesized AM monitor receiver and the QA-100 program audio analyzer.

For years the EBS generator of choice for plenty of radio properties was the unit from **Gorman-Redlich**. Also on display were digital antenna monitors for AM directional arrays. As I was in the booth trying to get a look at the directional AM monitors, I was in danger of being overrun by EAS seekers. Mr. Gorman just smiled when I asked about traffic on the floor this year.

Loral added the 8844D-0.5 to its line of personal and area monitors. The unit features a frequency range of 100 kHz - 220 MHz and comes with an earphone, batteries, weatherproof carrying case, manual and a multilingual operation sheet.

Loral also demonstrated its new model 8712 survey meter. The meter operates from a standard 9 V battery and comes with a shielded, foam-lined case that holds the 8712 and two probes.

Many uses

Audio Precision was on hand with its System Two dual domain audio analyzer with the Intervu digital interface analyzer for AES digital signals. System Two tests analog and digital audio devices, generates and measures signals in both domains and tests AES interface.

Established products from **Audio Precision** also on display included the System One, the Portable One, the ATS-1 audio analyzer for rackmount applications and the Portable One Plus for field and bench applications.

Established products from **Asaca/ShibaSoku Corp. of America** on display included the AM51A two-channel audio generator/analyzer.

In the digital domain there was also the DRFL 700 digital microwave system from **JNS Electronics**. This unit — shown in the 1.4GB or "L" band configuration — used almost half the "typical" bandwidth, and this without digital audio compression.

The engineer I spoke with in the booth was excited about the interface possibilities with this device, the "all digital signal path," and the technology of digital in general. **JNS** has also expanded the Euro size card line for the 8000 series rack system. There are now 30 devices available for this rack: meters, DAs, limiters, tone decoders and encoders and the list goes on and on.

Full slate

Belar is a company with a full slate of modulation monitors. Now RBDS and other digital products have been added to its line.

Circuit Research Labs had a new handheld digital audio tester that is a tool we all better learn how to use.

All of the exhibitors had more information jammed into the booths than ever before. More and more of them also banner their e-mail addresses and web site URLs. This is a great way to visit the manufacturers you didn't get to see at the show. Get a computer and find a geek to show you how to run it; you need a computer link at your studios now.

Eric Small, president of **Modulation Sciences**, has done a great deal to ease my mind on the "lost" modulation involved in SCA. After reading his paper, I can see that we do not have to give up our SCA income to become the "loudest on the dial." Look at the charts and you'll be out there beating the SCA revenue tree Monday.

Seeing everything on the floor at NAB is no longer possible, and hasn't been for years, but do yourself a favor next time you are at a show: stop in to a booth that is displaying some technology you have never seen before, pick up some info packets and look at the material; you are never wasting time gathering knowledge. It is like the "Word of the Day" vocabulary builders — you'll be amazed at how soon someone will bring up the subject you just studied.

Delta Electronics offers RF transmission

accessories for testing and measurement of AM, FM and TV systems. For the AM broadcaster, **Delta** manufactures the SM-1 Splatter Monitor. The SM-1 is used to measure compliance with FCC 73.44 "NRSC" spectral purity standards. For measuring antenna impedance and currents, **Delta** manufactures the OIB impedance bridge series and TCA toroidal RF ammeters. For testing of AM, FM and TV transmission lines and antennas, the PRH-1 pulse reflectometer can pinpoint faults and components eliminating the need for costly disassembly and dismounting.

For accurate RF signal generation and detection, there's the digital-based RG-4 bridge oscillator/receiver. **Delta** also manufactures AM stereo exciters/monitors and RF coaxial switches.

In addition the company's line of level meters and phase indicators, **Wohler Technologies** introduced a line of alarm systems that identify audio error conditions and locations at NAB.

Whirlwind gave away samples of its \$89 cable testers to lucky booth visitors throughout the show. And **Wireworks Corp.** displayed cable testers for every application.

Holiday Industries Inc. introduced the HI-3702 induced current meter. And **Coaxial Dynamics Inc.** showcased RF test and measurement equipment and filters.

Radio Design Labs (RDL) exhibited the ACM-2 amplitude component monitor.

Moseley Associates introduced new transmitter remote controls.

New from **Standard Communications Corp.** was Windows-compatible software that, used in conjunction with the CAM830 module, provides remote control of all features and functions of the Agile Omni Global VU satellite receiver.

Pulizzi Engineering Inc. unveiled the microprocessor-based IPC 3300 series for monitoring and programming up to 2,000 ports remotely from one telephone line. The company also launched a microprocessor-controlled RS-232 remote power on-off intelligent system that provides individual outlet control via an RS-232 port.

Automation at NAB

► continued from page 54

255 workstations can be connected and managed.

When audio is recorded in production, it is placed on the server in control and is immediately available for playback on-air. The system will handle satellite automation and automated switching of audio sources as well as unattended recording and delayed playback. This is a capable system that would serve almost any broadcast need.

SALSA, from **LPB**, stands for Satellite Automated Live Studio Assistant, and as the name implies, this system is great for live-assist or automation.

Salsa is Windows-based for easy operation and will run as live assist, satellite automation or music on hard drive automation. It uses the ANTEX audio cards which record at a 4:1 compression ratio and allow for overlap audio and simultaneous record and playback. **SALSA** will record in 22 kHz, 32 kHz or 44.1 kHz. **SALSA** interfaces to most traffic and billing to allow for easy traffic automation and runs on a 486 with a

1GB hard drive.

Full automation

Media Touch is a Novell Network-based automation or live-assist system that delivers all the power necessary to fully automate. It will interface to several traffic systems and offers complete broadcast automation, satellite linking, instant access to music and commercial libraries, on-the-fly programming adjustments and touch screen control.

The production unit features full production functions including cut, paste and copy with two-channel mixing and will operate in Windows.

Wizard for Windows is available from **Prophet Systems**. As the name implies, this is a Windows-based system that features drag-and-drop audio cuts for both commercials and songs. Audio events can be easily moved around in the log using the mouse or a touch screen. It will automatically record network feeds and run music on hard drive automation.

The system will do time and temp announcements as well. **Wizard for**

Windows is a capable system that should be considered for any automated or live assist application.

Radiomation is a new company from Ireland. It currently has systems in all of the stations in Ireland as well as the BBC in the United Kingdom. **Radiomation** is a Windows-based system that features four separate workstations: traffic, production, on-air control and news. These systems all network together via a LAN.

Cool editor

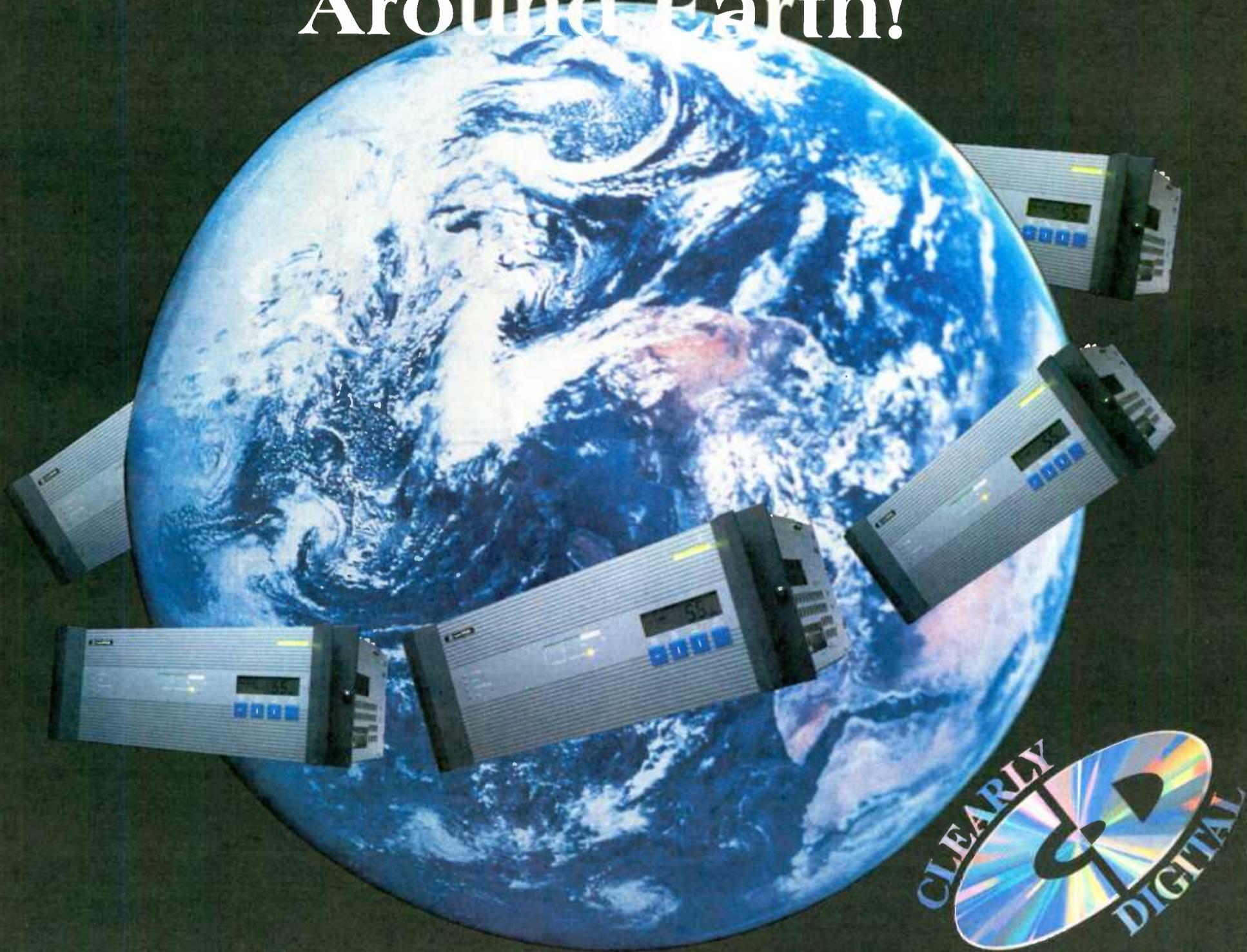
The on-air system will run either automated or as a live assist system with a very well designed screen that is easy to learn. The production node includes a very cool digital editor called **CoolEdit**. This editor will save audio files in .WAV format, .VOC format or as an MPEG file.

After your spot is recorded, you can add echo, reverb, delay or filtering. The completed audio file is then transferred to the control room unit.

The news node features a text editor that allows news stories to be entered and timed. There is a full-featured digital editor in the new node as well

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Scientist Discovers Ring Around Earth!



Harris Senior Scientist Hilmer Swanson recently discovered that there are Harris digital FM exciters on the six unfrozen continents of the earth, creating a virtual ring. Many people still don't know that DIGIT™ is the only truly field proven digital FM exciter in the world.

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Automation on Show

► continued from page 60

for recording and editing news actualities.

The traffic system is easy to use and allows for quick and easy order entry. Best of all, this is a software only system that runs on any 486 or better computer and it can use any audio card.

Master Control from **Radio Computing Services (RCS)** is a DOS-based automation system that uses Novell Netware Ethernet protocol. The system features background recording, phone-in recorder/editor, live assist and automation modes, hot keys for live audio, voice track recording and a long list of other features. Master Control also interfaces

directly with Selector.

Talk Back is the RCS talk show software that includes a caller database, tracking tools, timers, and a host's e-file cabinet.

Solid performance

The **Register Data Systems (RDS) Phantom** is a DOS-based automation system that provides solid performance in almost any application. The system can be used in both live-assist and full automation environments, but it excels in full automation. It handles automated switching of satellite or other audio sources, will automatically record satellite feeds for later playback, and features simultaneous record

and playback of audio. The system's splice editor allows you to trim dead space from the head or tail of an audio cut or to assemble segments from various cuts to create a composite.

Scott Studios is a DOS-based live-assist/automation system that utilizes a touch screen and apt-X audio cards. The system was first designed as a live assist system but has added many automation features including network capture and playback, voicetracking, a phone-in editor and Scott Studios interfaces to almost any traffic system.

In addition to its great control room setup, Scott Studios interfaces to a number of digital audio workstation editors like SAW, Orban, Card-D, as well as other Windows 3.1 and Windows 95 editors. This is a popular system that is very powerful.

SMARTS is an acronym for Small

Market Accounts Receivable & Traffic System, but that was a long time ago. Since then SMARTS has gone on to become one of the most complete automation/live-assist systems anywhere.

Live audio

This automation system is capable of actually playing live audio over a network without transferring the audio files first. When you are done recording, your spots are instantly available to be played on-air right off the production hard drive.

In addition, Smarts operates as a live assist system with its new live assist screen or as a powerful automation system featuring unattended record and playback, simultaneous record and playback, network switching, and the Smart Touch offers complete remote control of your control room from any touchtone telephone. A Smartcaster will work in almost any broadcast operation.

The **Tiesseci** system is from Italy and is very impressive. Its capabilities include full automation, satellite switching, voice track recording, time announcements, on screen editing, music scheduling (it's a nice scheduler), instant play palette, verification logs, and much more than I can list here.

Tiesseci uses proprietary audio cards and even its cases are custom-made. The system is not Windows-based but, it does have a beautiful GUI (graphical user interface) that features point and click and drag and drop. The system works well as a standalone or with a file server and many networked workstations. I think we will hear a lot from these guys.

UDS from **TM Century** is The Ultimate Digital Studio. This system is based on CD servers. The reason being that some people think digital audio sounds harsh when being sampled at 32-48 kHz rates.

CD server system

UDS has been built from the ground up as a CD server system to be used in a live-assist environment, but its automation capabilities allow for up to seven day walk-away programming. The system interfaces to virtually any traffic system.

While all the music is on CD, the commercials are recorded to hard drive and are available instantly. Pop-up windows allow for weather, news and copy to be entered and retrieved quickly. The UDS is a great alternative to satellite programming and allows jocks to run a truly live show.

TM Century also displayed the **CoSTAR** digital audio and text management program from EDS. The CoSTAR system is file server-based and offers critical mirrored redundancy and centralized audio and text files. It allows the editing of compressed files without leaving the compressed domain.

The modular configuration of the system allows each broadcaster to custom-design the system to fit station requirements. The most popular modular components on the CoSTAR are: two-track and 48-track recorder/editor for compressed or uncompressed files; automatic player with playlist editor; group, block and system supervisor; audio express (WAN communications) and news collector and audio text editor.

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DN-1100R MD Recorder *The DN-1100R MD recorder offers 74 minutes of stereo recording time with a 44.1 kHz sampling rate, 16-bit linear (A/D converter) quantization and ATRAC compression. The unit also features 10 independent "Hot Start" buttons to which any 10 tracks from a total of 255 can be assigned. This feature is ideal for sound effects libraries, sound bytes and announcements.*

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PRODUCER'S FILE

Audio-Technica for Talk and Tunes

by Ty Ford

BALTIMORE Mics are like golf clubs. Not that I play golf. The closest I get is to stop once a year at a driving range between Baltimore and Washington, where I drive a bucket of balls until my hands sting.

But the importance of having the right club for the job is part of what golf is all about. That, of course, and knowing how to use it. Such as it is with microphones.

So when Peter Sabin from Audio-Technica wanted to send me a couple of new AT mics, I said, "Fine."

Looks familiar

Within the 800 Series, the AT859b (\$260) and AT831b (\$200) have some similarities. Both are miniature cardioid condenser mics. Both use AT charged fixed backplate design. The charge is now on the backplate instead of the moving element.

A new low-mass, gold-plated diaphragm two microns thick is used. It is a thinner diaphragm, which apparently translates to improved frequency and transient response.

They both operate with the help of phantom power or an AA battery. They both have a flat black finish. From that point on, they differ quite a bit. Even so, I recently used them on the same job.

I fielded a call from a local studio who was swamped with more profitable projects. They needed someone to record the president of a company in his office for use in a radio PSA. Could they hire me to retrieve the voice tracks?

Location recording

Sure, but what mics to use? I own a lot of high-quality studio mics, but they are visually imposing and they require phantom power. There are a lot of battery-powered phantom supplies on the market, but until now I had never needed one.

Because both of the AT mics were battery-powered, they were a good match for my Panasonic SV-255 portable DAT machine; a recorder with fair, but not wonderful, mic preamps.

The A/D conversion in the SV-255 was designed one iteration before the 1-bit converters used by the Panasonic SV-3700 and SV-3900 studio DATs. Still, the SV-255 does a serviceable job. So, with my relatively unobtrusive rig, I made my way to the president's office.

Once at the office, I had the computers and HVAC turned off and set up both mics, one per channel to the SV-255 DAT deck.

The AT859b is almost 16 inches long with a half-inch diameter shaft on the end of which sits the condenser element. It sort of looks like one of those butane fire-place lighters.

I used a small circular desktop mic base with a 12-inch gooseneck and attached the mic clip to the top. I positioned the mic about 45 degrees off, with the tip of

the mic about eight to 10 inches from the president's mouth.

Frequency response for the AT859b is listed as 70 Hz-20 kHz, with 6.0 mV open circuit sensitivity. That makes it hotter than a Sennheiser 421 but not as



Audio-Technica AT831b Lavalier Mic

hot as a Neumann U87.

Basically, I aimed the mic at the president's mouth and turned it on. There is a small slide switch on the barrel of the mic. The AT859b is sensitive to low frequencies, so I also put on the small foam pop filter that comes with the mic.

Next I unpacked the AT831b lavalier. Unlike the AT859b, which comes in a long cardboard box, the AT831b comes in a small vinyl-covered case.

The mic is not alone in the case. There are also the tie-clip, a felt-lined pop filter and an adjustable clip that slips over the edge of a guitar sound hole.

The AT831b has a frequency response of 40 Hz-20 kHz. The mic is cylindrical, less than an inch long and less than one-half inch in diameter. The mic element is hardwired to the power module with a four-foot-long cable.

The power module has a belt clip, an XLR connector and a three-position switch: Off, On with flat response and On with bass rolloff.

Setting up

I attached the mic element to the tie-bar clip. While the president rehearsed the script, I put my headphones on and found the best place to position the mic; about eight inches below his chin, clipped to his lapel and with the head of the mic angled slightly so that it was aimed at his mouth.

That worked very well, until I started hearing noticeable rhythmic ticks in the headphones. Although not documented by the literature, the ticks appear to be a condition that occurs at low battery levels. Putting in a new battery eliminated the ticks.

I had the usual clothing noise problems (tie against shirt, shirt against jacket). Because the president was not on-camera, I had him remove his tie. That, combined with a little extra tape to isolate the mic element and cord from his clothing, kept

the noise to an acceptable minimum.

We then proceeded with the session, with the PR agency listening in on the speakerphone. I let the president find a comfortable position from which to read his scripts and repositioned the long-bar-

reled AT859b, while listening in the phones to find the best spot.

I ran a numbered take sheet, including references to the DAT ID numbers and comments about performance and noise, which I submitted with the DAT masters to the studio. Both mics did a more than acceptable job.

Miking music

The next step was to try the AT831b clip-on with its guitar clip. My main acoustic is a Martin D-28S, which is the 12-fret version of the D-28. Its body is slight different than the D-28, which also makes its tone different. The standard D-28 has a more pronounced thumpy bass, to the point of being a bit bottom-heavy. The D-28S, on the other hand, has a more balanced response.

I put on a new set of bronze strings, waited for them to settle down, and experimented with noodling, finger-picking, flat-picking and strumming. The best

continued on page 66 ▶

Which Digital Audio Workstation Allows Professionals To Be Productive In 1 Hour?

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Two New Audio-Technica Microphones

► continued from page 65

place to mount the clip was on the lower side of the sound hole, from about the 3 o'clock to 5 o'clock position, as you face the guitar.

The felt-lined clip allows you to change the angle of the mic towards the bridge or nut (towards the bottom of the body or the top of the neck).

A thumbscrew on the clip can be loosened, which allows the two pieces of the clip to slide. This lets the mic element be moved about an inch closer to, or further away from, the strings and sound hole.

After a bit of twisting and sliding, I found an acceptable position.

The good news is that this kind of rig is

great in situations where you don't want to worry about keeping the guitar "on mic" when you're playing.

The bad news is, getting any mic that close usually results in bass overload. Even with the bass roll-off, the bottom was too big.

I pulled out some more bottom from the board EQ, which helped a lot. Attempts to reduce bottom by moving the mic element away from the sound hole resulted in the instrument sounding too distant for me.

Even though the cardioid pattern did a very respectable job of minimizing ambient and reflected sound, I would have to say that the AT831b will probably find its

best home in live performing and non-critical recording. If you are deliberately looking for that "mic in a sound hole" sound, this is one of the better ones.

A vocal mic

The long-neck AT859b makes a nice-looking interview mic, and it works really well in that "TV host holds mic handle at waist level with mic element under their chin" mode.

You absolutely have to keep this mic away from the mouth to keep it from popping. In fact, it is so low-frequency sensitive that moving it even moderately quickly ruffles the capsule, even with the foam filter on. I found that it worked best

at a minimum of six inches from the mouth and to the side.

If you are doing lots of talk radio, try pinning the AT831b on your guests. That way they never have to worry about where the mic is. Get four of those and one AT MX341a Smart Mixer and you will be surprised at how much better your talk segments will sound. Just remember to stop them from standing up and walking out of the studio or yanking on the cords.



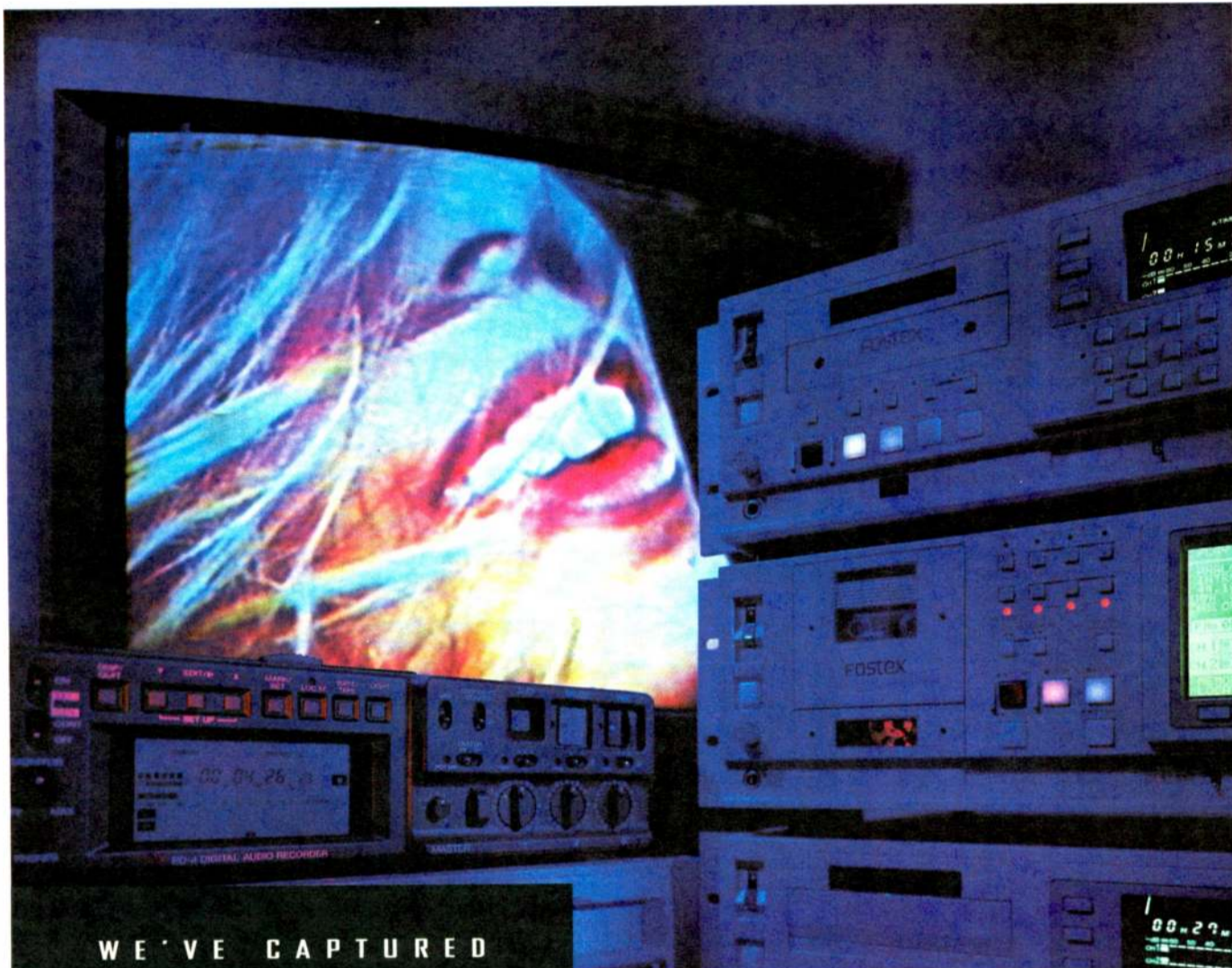
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For information, contact Audio-Technica at (216) 686-2600 or circle Reader Service 86.

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Ty Ford's new e-mail address is tford@jagunet.com. Ty Ford's "Advanced Audio Production Techniques" can be found at <http://www.bh.com/bh/fp/24080082.htm> and his AIFF V/O demo is at jagunet.com in the [pub/users/tford](#) directory.



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IN EVERY ISSUE OF

RadioWorld

The Legal Aspects of Commercial Music

by Craig Johnston

MEDFORD, Ore. I may be able to save you a bundle of money.

As the very thought of a discussion of music licensing strikes most of us a full shot in the sleep gland, I thought I'd better use an attention-getting lead.

My personal experience with this began recently when a small commercial production client wanted a television spot that imitated the opening title scene to *Bonanza*. As a map of the local county burned away, there he would be, riding up on a horse. So far, so good.

What would we be hearing in the background? Why, the *Bonanza* theme, of course.

Finding the song

The song can be easily obtained off a CD of TV show themes that can be purchased at any record store. The client loved the finished product, and all we had to do was get clearance to use the music.

The Bonanza theme is not available at any price.

The CD listed the *Bonanza* theme as an ASCAP piece, so I called the company. ASCAP quickly steered me to the Harry Fox Agency that handles all sync rights. Because we were synchronizing pictures to the music, that was the place to start.

The Harry Fox Agency explained that it represented 50 percent of the music rights fee. The other 50 percent was represented, in the *Bonanza* music's case, by MCA. (The show must have been produced by the MCA Universal Studios).

In any case, what I needed to do was contact MCA, find out what it felt the *Bonanza* theme was worth, then contact the Harry Fox Agency to see if the split of that amount was acceptable to them.

Of course, I called the MCA music licensing department just as it was moving from one part of Los Angeles to another, so it put off any decision for a week. My client did not like this delay — who would? But I faxed my request and was told MCA would get back in touch with me.

Sorry, Charlie

The company sure did. The decision was that the *Bonanza* theme was not available, at any price, for a local commercial. It seems there is still a lot of national interest in that music, especially by restaurant chains (our client was a BBQ rib place), and our use of it in Medford, Ore., might scare the big guys off.

A couple weeks later I heard the music in a national commercial playing behind a shot of Shaquille O'Neal riding through a burning map. That certainly lent credence to the MCA "national interest" assertion.

If you are easily felled by "sticker shock," you may want to skip ahead a few paragraphs.

Realizing that the *Bonanza* theme was

not available for a local commercial, what would a piece of music of similar age and fame cost me to license for a local spot in Medford, I asked.

The answer: \$15,000.

As if anything over a couple hundred dollars was in the ballpark for such a local commercial, I asked if the \$15,000 would be for the life of the commercial or just one year.

"Clean the wax out of your ear," was the reply. "It would be \$15,000 for a year. We don't license anything for life."

The commercial in question now runs with original music (cost: \$150 for lifetime rights), which imparts the original flavor desired without stepping on the *Bonanza* theme.

To wake those of you who have taken a hard one to the sleep gland so far, I should tell you that the scariest part is coming up.

Catch us if you can

What would happen if we went ahead and used the *Bonanza* theme? Let them catch us if they can. Would they come to Medford, Ore.?

As the old Magic Eight Ball used to reply, my sources say yes.

I mean, if music licensing folks can come after my friend the aerobics instructor for using unlicensed music (not the *Bonanza* theme) to bounce to, coming after a real business would seem a natural. It would be easy to prove the music was actually used in the commercial. All they would have to do is tape it off the air.

The potential cost? Throw out the \$15,000 figure; That was only for the local spot we were told we could not make.

As there had been no price established, and because their lawyer is going to insist that the music's exposure in Medford has run off national clients who were lined up around the block ... well, it's going to cost a bundle.

Cost who? There is a good question. Even if the initial legal assault is against the restaurant, the restaurant owners were

eventually going to come after us.

Years ago, NFL Films solved the music licensing problem for themselves once and for all by having music composed and recorded overseas. The music sounded enough like the licensed music they wanted to use, but it was not identifiable as that music.

By the way, to use the NFL Films music, you and I have to pay a license fee.

The solution is simple enough. There are three smart choices: Buy a music library, have original music composed and recorded, or pay for the clearance.

The not-so-smart fourth choice of using the music anyway will incur a hefty fine. Not at all recommended.

The Harry Fox Agency handles clearances and licensing for established music. Contact them at (212) 370-5330. Craig Johnston is the production manager at KDRV-TV in Medford, Ore., and a regular contributor to TV Technology, RW's sister publication.

EDITOR'S NOTE: This article addresses music as used in television commercials. Radio commercial production also requires permission and licensing for use of established or popular music. Clearance for a radio commercial is not as expensive as a synchronization license for film or video but must be considered when doing any kind of campaign.

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LINE OUT

Studio Corridor Is Music 'Hall'

It Is Not always Necessary to Book a Concert Hall When Your Station Wants to Broadcast Live Music.

by **Bruce Bartlett**
with **Jenny Bartlett**

ELKHART, Ind. Putting live music on the air is a thrill. At our local public station, WVPE-FM, we produce "Corridor Concerts." A band comes in and sets up in the corridor or hallway outside the control room. There, I mic and mix them as they play. The mix is sent live over the air.

In order to see the performers for cues, I set up in the hallway with them. This makes monitoring the mix a serious problem. I use two sets of headphones. One is the Grado SR-125, which is accurate enough for setting EQ. But it is an open-air design with poor isolation, so I can't use it for mixing.

Instead, I use the Etymotic Research ER-4S. It inserts like earplugs and has great isolation from outside sounds. You can hear what you are mixing with almost no leakage.

Since the Etymotic sounds a little bright, though, I use the Grado for EQ decisions.

A pair of mic cables runs from my mixer to the control room patch bay. Because the mixer line outputs are RCA jacks, I put an RCA-to-XLR adapter between the mixer and each mic cable. At the other end goes an XLR-to-phone adapter. This plugs into the patch bay's stereo input for pot 4. When it is time for the concert, the DJ pots up input No. 4.

The first time I tried this connection, it was a disaster. The DJ announced the band and turned up the pot. Silence. Lots of silence. I tried to find the problem while the jock played CDs.

As a last-ditch effort I recorded the concert on DAT and gave it to the DJ, who ran it on the air. It was "almost live."

Why no sound? Before the show, I had searched the station looking for an XLR-to-phone adapter. I found one that had a mysterious jumper wire clipped onto it.

It worked during the sound check. But the jumper wire fell off before the show, and we lost audio. The moral: Be prepared; have the right adapters ahead of time.

Pre-show prep

Here are some tips on mixing live. Before the show, write a numbered list of your mixer inputs. Next to each input number, note the instrument or vocal for that input, and the mic you plan to use on each one. Put the list by your snake box and plug in mics accordingly.

You will need to mic close to avoid phasing between mics and to reject room acoustics. Close miking can color the sound, so be prepared to use a fair amount of EQ. Most mics will need some bass rolloff to compensate for their proximity effect (up close bass boost).

Following are some mic techniques that have worked for me, but your mileage may vary. Cardioid dynamic mics are popular on vocals, electric guitar and drums; cardioid condensers work well on acoustic instruments and cymbals.

- Bass guitar or synth: Direct box.
- Electric guitar amp: 1 inch away, slightly off-center of a speaker cone.
- Acoustic guitar, mandolin: A few

inches from where the fretboard joins the body.

- Hammer dulcimer: About 6 inches out from the front edge, 8 inches up.

- Banjo: About 6 inches out front, halfway off center.

- Upright piano: A few inches from the soundboard on the bass and treble sides. Face the soundboard toward the room, not the wall.

- Grand piano: Boundary mics on the underside of the raised lid. One over the treble strings about 8 inches horizontally from the hammers; the other over the bass strings about 2 - 3 feet horizontally from the hammers.

Always have the right adapters ready to use ahead of time.

- Kick drum: Mic a few inches from the beater head, inside, with a pillow pressing against the beater head. Use a wood beater for more attack.

- Drum set: Two mics overhead. Or clip a mini omni condenser mic to the snare-drum rim, in the middle of the set,

about 4 inches above the rim.

- Vocals: Put on a foam windscreen, and have the vocalist sing with lips touching the windscreen. Angle the mic up to reject the guitar and monitors, if any.

- Sax: About 8 inches above and 8 inches in front of the bell.

On the level

Turning from mics to mixing, be sure to set all the mixer levels correctly.

First put the master faders and channel faders at design center (at 0, or about 75 percent up). That way, the gain staging of the board is set for the best compromise between headroom and noise. Pan each mic where you want its image to appear in the stereo stage.

Time for a sound check. Ask the band to play its first number. Use the gain trims to set a rough mix and overall level. This method keeps

the faders in the optimum range of fader travel. Also, the faders will line up visually during most of the mix, so it is easy to get back where you started.

Setting the gain trims just under clipping is wrong because you have no headroom. How do you know that something

louder will not come along later? Also, if you set the gain near clipping, the signal level is very high, which makes some mixers sound bad.

Most groups can work without monitor speakers in a small hallway or room. But if you need to use monitors, use Aux 1 or Aux 2, pre-fader, as a monitor mix.

For posterity

You might record the concert on DAT while going on the air. It is hard to anticipate sudden high levels, so put a limiter between your mixer and DAT or use the built-in limiter if it has one.

If you prefer not to use a limiter, set the recording level a little lower than usual to allow for surprises.

Fade down mics not in use by about 10 dB. This gives a cleaner sound and reduces phase interference between mics. Do not turn the unused mics all the way off, or you may miss cues.

As for effects, a little reverb goes a long way. Over-producing can lose the live feeling. Turn down the reverb returns when the band members talk between songs.

Technicalities aside, mixing music live to air is on-the-edge radio. That makes it fun for both the performers and your listeners.

□ □ □

Bruce Bartlett is a mic engineer, writer and recording engineer, and the author of Practical Recording Techniques published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at (219) 294-8388.

Conscientious Couple Into Recycling Reels

by **Alan R. Peterson**

MILWAUKIE, Ore. If your station is running out of room due to the volume of five-inch agency dubs and PSA reels hogging the closet, resist the temptation to simply throw the whole pile into the Dumpster.

Instead, box them all up and send them to Corky and Karen Coreson, founders of Reel Recycling.

For years, Coreson — a former air talent and production director — was bothered by the number of five-inch plastic reels and boxes stations were dumping into landfills. Even more irritating, these stations would simply turn around and buy new reels at higher prices.

He and his wife Karen felt it was time to do something and thus founded Reel Recycling; a company that strips and cleans five-inch analog tape reels, then puts them back into circulation.

Getting it done

The old razor blade treatment is all right for stripping a few reels, but the Coresons needed a way to strip many reels quickly and efficiently. To do this, they created Buck.

"Buck is a giant machine," explained Coreson, "so named because it looks like something out of a Buck Rogers movie. It is the only one of its type."

Coreson took a five-inch, large-hub reel to a machinist and asked for a method to get the tape off fast. Working together, Buck was born. The

machine removes tape by backspinning the reel and can strip nine reels at a time.

Reportedly, Reel Recycling is close to a method of also recycling the five-inch boxes those reels come in.

"We are working with a number of box and label manufacturers to find the best way to recycle the five-inch boxes as well," said Coreson. "Looks like we have a method in the bag for recovering areas of the box that are written on or have labels on them. It will look like a new box."

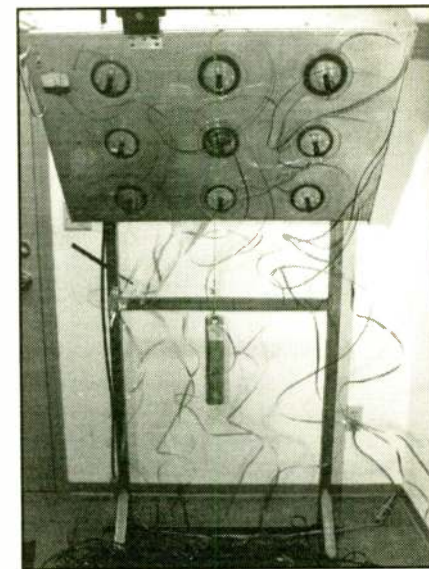
Shipping out

Reel Recycling arranges to have reels picked up at stations in the Pacific Northwest, Northern California, Nevada and parts of New Mexico, Arizona and Utah.

"Demand is no problem; supply is," said Coreson. "We talk to a radio station and they all go 'This is a great idea! We'd be glad to send you our reels.'" He has spoken to hundreds of stations, but heard back from very few of them.

Coreson said, "I can't supply 10 percent of the reels I have a demand for, because the radio stations have to send them to us."

Presently, Reel Recycling takes care of shipping reels within its locale. While it is not cost-effective for Reel Recycling to pay for shipping from the rest of the country, the Coresons do suggest stations box and ship old reels to them. In turn, Reel Recycling pays



Buck unrolls those reels.

seven cents for each reusable five-inch reel.

The amount may not completely cover the station's cost of shipping, but it may offset the garbage bill somewhat and make a station more ecologically aware.

Not every reel is a candidate for cleaning and recycling by Coreson's company. There is little call for small-hub reels, so he does not accept them. Broken or damaged reels are, for the most part, useless. But even then he is reluctant to simply throw them out.

"The ones that are busted or gummy we throw into a box," says Coreson. "They go in a plastic recycling bin, just like you would throw away milk jugs." So even unusable reels get a second lease on life as any other plastic product.

If your station or facility has tapes to dispose of, contact Reel Recycling at (800) 898-7815.

'Please Send Photo': An Ethical Practice?

by Alan R. Peterson

WASHINGTON The debate began in April with a station looking for a new p.m. drive DJ and production director. A classified ad was placed in **RW** requesting a tape, résumé, references ... and a picture.

A picture? For radio? Some broadcasters said they feel a photo is a necessary piece of the entire audition package when considering new talent for their stations.

Others claimed it is a discriminatory practice which skirts equal employment opportunity laws. They maintained managers could use pictures to weed out minorities, gender and people they judge to be unattractive or "imperfect."

Are photos enough to instigate discrimination? Is it appropriate or even legal for stations to request one? The topic was volatile enough to touch off an emotional thread in the CompuServe Broadcast Professional Forum (BPForum).

RW obtained permission from participating BPForum members to include their comments. Several consultants and legal representatives were also asked to join in on the topic. The answers given add up to an interesting conclusion:

Requesting a picture is not illegal. What is done with that picture can be a very different story.

Job qualification

Should — or can — a person's looks be taken into consideration as criteria for hiring a DJ?

John Leslie of World Radio Inc. launched the BPForum thread by asking about the legality of such an advertisement. While requesting photos may be the way business is done, Leslie noted that he prefers the way things should be.

"Should an overweight guy be ruled out?" suggested Leslie, who also saw the danger of a photo clearly revealing racial identity. Stations would be able to side-step the law by seeing this in a photo without having to ask, he stated.

"You could not ask about gender," Leslie continued on his posting. "but a picture would tell the tale. And hope there is no wheelchair visible in the picture."

BPForum member David Blair concurred with Leslie. He cited the potential for discrimination during the screening process.

"If I can do the job, but don't look right — I'm Black, Asian, Jewish — it's okay?" wrote Blair. "Or suppose, like one reasonably well-known major market PD, I have a deformed eye?"

"Suppose they cast John Candy, Roseanne Barr, Randy Quaid, or John Belushi based on the photo they had. What I look like shouldn't mean squat," Blair continued.

According to Leslie, none of the previous criteria would make a difference to him in the hiring process, but there are those who do not care about violating discrimination laws.

"Asking for a picture says 'We want to see what you look like before we consider

your application. We will stand in judgment on how God put you together,'" posted Leslie.

In short, Blair stated, "Photo requests come from the unethical," while Forum member Bill Nesbitt saw it as a "shamefully tangible way of circumventing the laws of fair employment."

The owner of the station that placed the ad said, "My first reaction was 'what?' Then I wondered who had the time to find that little ad and sit



down at the Internet and talk about this. Get a life!

"If a guy's got a set of pipes on him, I don't care if he looks like the Ape Man. If he's got a lot of talent, I definitely want to meet this person," he said.

Because the position is still open, the owner requested the station not be identified.

Not an option

Other BPForum members claimed that anonymity behind the mic is no longer an option. The "face made for radio" rationale of the past may now be an obsolete concept and a good photo might tip the scale in one's favor when job hunting.

These views are shared by air talent Drew A. Durigan.

"Being an on-air personality these days consists of a lot more than sitting in a

continued on page 71 ▶

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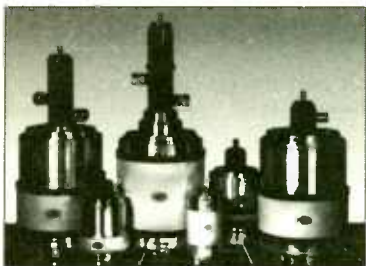
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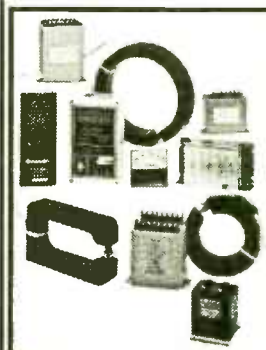
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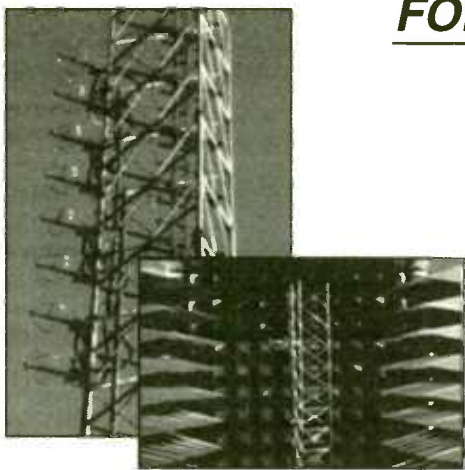
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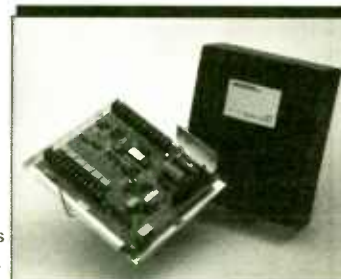
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READER SERVICE 100

Photo Request Causes Lively Debate

► continued from page 69

small booth and playing records for four hours a day," stated Durigan. "There are appearances, paid remotes, charity events and TV commercials. That is certainly legitimate grounds for removing them for consideration."

Nesbitt suggested, "Doesn't a prospective employer have the right to 'cast' the proper individual for the 'part?' Radio today is much more a visual medium with personal appearances and the like."

Glynnis Walker joined the BPFForum discussion and offered, "It is not only what you look like but how you had yourself shot that tells something about you."

Blair disagreed, and referred to one participant who continued to send pictures to stations as "a facilitator of prejudice."

"It is the fact that you and others do it that allows this stuff to continue," Blair maintained.

Getting the job

Sex discrimination is probably not a real issue when photographs are requested, as an applicant's sex is easily identifiable by other means. The name on the résumé and the pitch of the performer's voice obviates the need to check against a photo.

Should a person's looks be taken into consideration as criteria for hiring a new air personality?

The best type of photograph an air talent could send would show that person on the job and in performance, according to consultant Donna Halper of Halper and Associates.

"I don't see the harm, as long as it's a shot of you doing something; working the crowd or shaking hands with the president," she said. "That's what I'm hiring. That is preferable to someone looking young and cute."

Halper suggested a picture will not change anything because a station will eventually know what you look like. "Depending on how it is handled, a picture is another way of saying, 'Here is what you are getting when you hire me. I am a professional.'"

Jim Richards of Valle-Richards Consulting said, "What we mainly focus on is what comes through those speakers. That is the most important thing, no matter what. A secondary issue to the station is going to be how that person presents him or herself. I would think presentation is important, but that is probably true for any job in America."

Richards believes a station's choice of asking for a picture is based on its own priorities. But he went on to say, "I don't even recall a time where someone said, 'This person doesn't look very good. We're not even considering them.'"

What if a person is qualified but really

does not look the part? Consultant Jay Mitchell of Jay Mitchell Associates works with talent to achieve a crisp public appearance.

"If we are looking for a prominent air personality, we are taking appearance into account; not from a discriminatory standpoint, but we want this person to represent the image we are trying to create with the station," said Mitchell. "There are a lot of different ways of getting that information without insisting on a photograph."

Mitchell's firm helps groom a personality toward a particular image. This could include suggesting a different hairstyle, clothing or even personal hygiene.

"A lot of it does involve 'Would you please take a shower?' There is still a lot of that going around," said Mitchell.

The legal take

"I do not believe that asking for a picture — in and of itself — is inherently discriminatory," says Harry Cole, principal with the Washington law firm of Bechtel and Cole and author of the "Cole's Law" series in RW.

"If there is a racial issue or a disability issue — say they are wheelchair-bound or blind or they have three arms — you are going to find out about it sooner or later. The fact you are asking for a picture up front doesn't necessarily mean that

there will be discrimination on that basis," said Cole.

Say for a moment a minority person sends a résumé and photo; the résumé is clearly deficient but the photo demonstrates the person is a minority. What happens then?

"If the résumé is deficient and you decline to interview this person, they could come back at you saying, 'You didn't interview me not because of my résumé, but because I'm a minority!' Stations leave themselves wide open for this to happen," stated Cole.

People tend to be very careful these days, which explains the low number of ads requesting photos. "My gut reaction is, I am not aware of any legalities that say you can't ask for a photo," said Cole.

Michael Widomski of the Media Office
continued on page 73 ►

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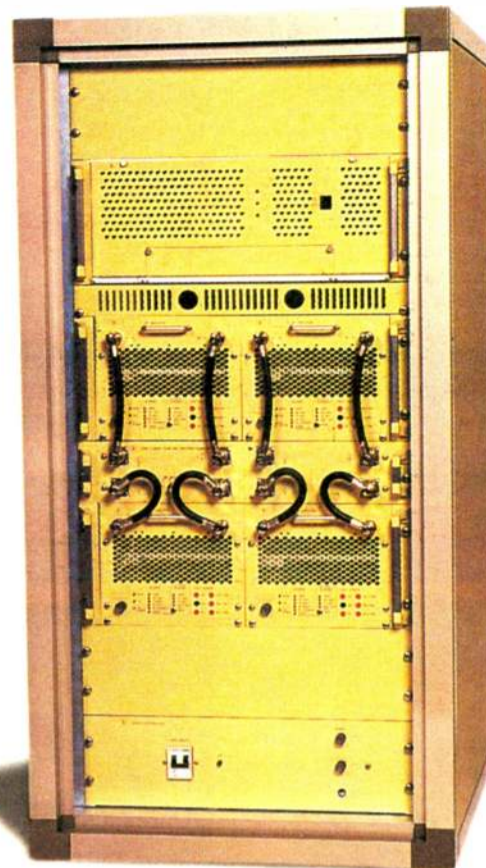
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Are Photographs Discriminatory?

► continued from page 71

of the Equal Employment Opportunity Commission in Washington said, "There is nothing on the books that says it is illegal or legal, one way or the other. It ties in with information on an employment application, like asking someone their age or race; Asking that information in and of itself is not illegal, but if you then go and use that information in a discriminatory matter, then it becomes illegal."

"It is a very fuzzy area, but that is the way the law is written. If people ask us, we always suggest they don't ask specific questions unless it is job-related and consistent with business necessity," said Widomski.

Cole suggested, "It is more of a protective matter that you don't ask for the picture up front. You can always talk to an employment discrimination lawyer. It is possible there are further subtleties and complications that you might find out."

Common sense

Not surprisingly, stations are more likely to reject an applicant due to what might be called a lack of common sense when sending a T&R than sending a photograph.

For example, Halper said she is truly appalled by applicants who send cover letters filled with errors.

"If they are functionally illiterate, what good are they?" Halper said. "If they are a pretty face but frogs jump out when they open their mouth, how does that help me? Good looks alone in most cases won't get you the job."

BPFForum member John W. Nelsen has his own philosophy of soliciting for new jocks: he wants to be sure they can follow instructions and get them right.

Nelsen posted, "My policy in writing help wanted ads over the years has been: Be very specific about what you want from applicants."

Nelsen wants prospective employees to understand his criteria as written in his ads. A jock who responds in some manner other than advertised goes into Nelsen's "File 13" and the package is discarded, regardless of the jock's talent.

"Yeah, we're in a creative business," stated Nelsen, "but can you follow basic instructions?"

Instant turn-offs for many program directors normally are cover letters that include disclaimers like, "I had a cold that day and I wasn't really 'on' and the CD machine jammed."

Sloppy editing of an aircheck will normally kill a tape, as will including on-air mistakes and mispronunciations. Long introductory setups such as, "Hi, I'm Joe Jock. I am 26, single and I want to thank you for listening" will take an applicant out of the running faster than any photograph will.

Final choices

Is it illegal to request a picture? No, according to the EEOC office, but it is illegal to use that picture against somebody in a discriminatory manner. Stations must be very aware of the ramifications of asking for such material.

Widomski does recommend checking with a legal adviser on the matter.

"Even though EEOC may not have anything written on it, there may be case law out there or there may be cases that someone

filed in a private lawsuit," he said.

Other sources of broadcast employment listings have run ads in the past paraphrasing, "Send tape, résumé and

applicant's ingenuity.

Is a photograph necessarily a good thing to include in an air talent's audition package? It can be if it shows a performer at

If they are a pretty face but frogs jump out when they open their mouth, how does that help me?

— Donna Halper
Halper and Associates

anything else you think will help you get the job." Such wording sidesteps the issue of a photograph while testing a job

his or her best, according to Halper.

Halper's suggestion that an action shot will draw more attention than a model-like

posed headshot has validity. Radio may be a business, but for the talent it remains a performance-related occupation. With air personality jobs rapidly thinning out, any edge an applicant can have over the competition will likely be explored.

In spite of the fears and concerns expressed in the CompuServe BPFForum, most people interviewed here agree a photograph is only what it appears to be: a single element of the overall package.

Donna Halper and Associates can be reached at (617) 268-4497. Jay Mitchell Associates can be reached at (515) 472-4087. Valle-Richards Consulting can be reached at (703) 802-0700.

Harry Cole can be reached via RW. All participants who posted on CompuServe can be reached on that service by typing Go BPFForum.

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Management Issues
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PROMO POWER

Conquer the Crowded Concert Scene

by Mark Lapidus

WASHINGTON "Sometimes I wonder what I'm gonna do cause there ain't no cure for the summertime blues." Every time I hear The Who do that old Eddie Cochran song from "Live At Leeds," I'm reminded that there is a cure for summertime blues ... live concerts!

Emotional bond

When presented correctly, core artist live performance promotions are terrific because they create an emotional bond between the artist, the listener and the radio station.

Many radio stations attempt to own the concert position for their format, but few succeed. Why? They forget the basics of concert promotion.

The main problems are poor planning, worse execution and almost no discussion about what can be improved for the next effort. Maybe it is time for a review of what you are trying to accomplish when you try to own a concert for your station.

Should every station in every format do concert promotions? Absolutely not.

It doesn't take a huge research project to discover that most concert goers are under 35 years old. If your target is older, it doesn't mean you should ignore shows, but you should carefully examine how much time, money and airtime you're using. Most 40-year-olds have busy lives with kids, jobs and multiple responsibilities.



WMZQ-FM call letters dominate the scene at the annual Bull Run Country Jamboree.

For example, Oldies stations should only focus on a few key acts each season. On the opposite spectrum, an 18-34 Modern Rock or Urban station should make the commitment needed to capture shows.

I've often wondered what it would be like to develop a concert department within a radio station that would become its own profit center. We certainly can promote shows cheaply and know which acts are likely to do best. This is risky business, but also quite lucrative for those

in the know.

That concert department should be run by someone with a lot of experience in the booking and production industry. (The opposite would also probably work. Somewhere there must be a concert promoter that owns a station.)

What does owning the concert position mean? With so many stations claiming to be the "concert leader," listeners have become cynical and disinterested. A common remark heard in focus groups is: "All stations say they present concerts, but I don't really care about that." Listeners see no benefit for themselves. They understand that it's good for the station's publicity. Probing further, you may find some even know you're doing this for your image. Neither of these concepts means anything positive to them.

There must be a listener benefit for a concert (or any) promotion to be meaningful. This benefit can be small or large. The best benefits have to do with saving listeners money, giving them something free or making their concert experience more convenient.

Listener benefits

Here are just a few tried and true benefits:

1) Free parking. Greet each car with a smile and a bumper sticker. Tell them their parking has been paid for by W—. Don't announce this prior to the show. This works best as a surprise.

If this is too expensive to do alone, maybe you can get a sponsor to take care of half or more of the cost. In return, the sponsor gets coupons handed to each car, a quantity of tickets to give to customers through their stores and announcements on the air the day after the show thanking them for helping to provide free parking. Be careful that the client doesn't overshadow you.

2) Ticket discounts. This can be as simple as having listeners write your call letters on a piece of paper and getting a couple of bucks off each ticket. Arrange this in advance with the promoter so the prices can be adjusted accordingly.

Another method is to use your frequent listener card for all concerts in your format. After they use the card a number of times per season, they get a free station T-shirt, movie tickets or perhaps a pair of free tickets to your anniversary concert.

3) Free tickets — on-air or through retail locations. Obviously, the more you are able to give away, the better the impact. Make the contests simple. Stations with an older demo should try to include a limo and babysitting money.

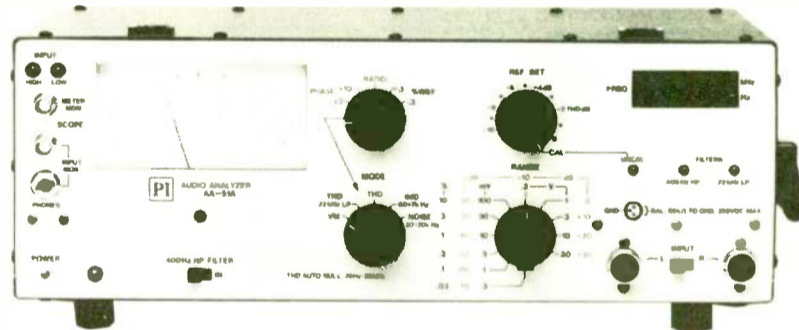
4) Upgrades at the show. Tell listeners that you'll be looking for people in the

continued on page 79 ►



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Get Creative with Event Marketing

by Bob Rusk

LAS VEGAS Radio stations that are not generating big sales through event marketing opportunities are losing out on their piece of a \$5-billion pie.

As major companies continue to spend less money on traditional forms of advertising due in part to declining brand loyalty, stations must be more creative and aggressive than ever in order to tap into sponsors' growing event marketing budgets.

Roann Hale, Radio Advertising Bureau vice president, led a session at NAB '96 that focused on ways to earn more of these dollars.

"Event marketing is nothing new to anyone sitting in this room," she told the crowd. "Radio has been involved in events and event marketing for years. What is new (are) new strategies inside events through spot and non-spot revenues — going after non-traditional clients and non-traditional dollars that maybe we didn't know were available to us in the past."

These strategies are a major reason why event marketing has grown so dramatically. Ten years ago, it generated just \$1 billion.

"If manufacturers are going to reverse declining brand loyalty, they have to figure out a way to get back into the hearts and minds of consumers," Hale added. "If they can get back into the hearts and minds, they have a better chance of getting back into our pocketbooks. And that's the bottom line."

"If they can reach us at events in our local communities, we are more receptive

to hearing their messages — more receptive to sampling their products (and) seeing demonstrations," she continued. "Traditional advertising dollars are not working for them the way they did in the past."

Find a cause

With manufacturers spending more money on straight to the consumer promotions, event marketing is clearly a major source of income for radio stations. Stations all across the country are working with manufacturers and retailers on consumer event promotions.

Of the five areas of event sponsorship, the fastest growing is cause-related. These include organizations such as the American Cancer Society, the American Diabetes Association and Big Brothers/Big Sisters of America.

"If you are not working with any cause organization," Hale said, "one of the things that I suggest is to pick out five or six causes that are important to your station and the community you serve."

"Go and do needs analyses with those organizations just like you would with any other advertiser. What you are looking for are their objectives, what events or fundraisers they have planned throughout the year and what the opportunities are for your station to merchandise inside the events."

"It's very important for you to establish that if you're going to be a marketing partner to (a cause organization), there has to be an opportunity for you to merchandise the events."

Merchandising involves approaching

potential sponsors who could also profit from the event. If it is a walkathon, maybe sponsors could hand out product samples or store coupons. Having displays in booth space is another possibility.

"Some stations that do cause-related tie-ins hand out one-sheets that show how they are involved in the community," said Hale. The sheet also lists the cause organizations they are involved with. When they go out and talk to a retailer or manufacturer, they say, 'Here's who we are involved with in the community. Do you want to be involved with any of these organizations?'"

"This is a great way to show there is a sincere involvement with these cause organizations. If you really are partnering with these (organizations) and have merchandising opportunities available, you know what events they have going on throughout the year."

Cross-promote

Hale pointed out that air time — radio's traditional source of revenue — is just a small part of what stations can present to clients today.

"When you start selling events and working with advertisers, you become a promotion agency. You're talking about tying them in with cross-promotion partners and getting them involved in the community."

"You're talking about a much bigger picture than some spots on the radio station which sometimes are secondary, even tertiary."

Stations that are involved in event marketing and have merchandised these opportunities realize that there are times when they don't involve running spots on the air.

"For stations that are in sellout situations or are trying to bring any types of revenue, these are great opportunities to bring inventory to your station at a time when you might otherwise be maxed out," said Hale.

She stressed that selling events is not

about selling spots; it is about selling radio. It is about selling opportunities that will help manufacturers sell more merchandise — giving them new ways to reach consumers.

Sponsor in the spotlight

Before joining the RAB, Hale worked at KSCS(FM) in the Dallas/Fort Worth market, which sponsored a two-day country music fair featuring acts like Reba McEntire (before she was a superstar).

"We had Dodge pay to display trucks around the staging area," Hale said. "They got no on-air mention. They paid \$12,000 to set three trucks around the staging area for two days. This kind of opportunity has grown tremendously."

Hale added that a station does not need to sponsor its own event in order to profit from it.

"I always suggest that stations tie in with somebody else's event," explained Hale. "You won't have the insurance costs and have to do all the things to make an event pull off smoothly. There are a lot of ways to make money off of other people's events — (and) make it sound like it's your own."

The combination of marketing a cause-related event that brings in sponsors is expected to remain an important revenue source for radio stations.

"Clients want to build equity into an event," said Hale. "If we can figure out ways to merchandise opportunities that mean something to them, we have a great chance of becoming partners with those people in a meaningful relationship that will help these people do what they are trying to do — which is sell more products."

In addition to the radio station profiting from cause-related events, such events get the station more involved with the community.

"It's not that corporate consciousness or our consciousness has been totally replaced by the bottom line," said Hale. "but today radio stations, just like big business, have to figure out a way to merchandise opportunities."

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ROOTS OF RADIO

Comic Strip Comedy Animated Radio

by Richard W. O'Donnell

PORT RICHEY, Fla. Once upon a time, there were radio shows featuring comic strip characters all over the airwaves — especially during the late afternoon, when the kids were home waiting for supper.

There were almost as many of these comic strip programs in the old days as there are talk show hosts today. That will give you an idea of how popular they were.

Believe it or not

If you are a purist about such things, the first radio show ever based on a newspaper cartoon was Robert L. Ripley's "Believe It or Not." True, this was not your typical daily comic strip, but it did use the cartoon format, even though it was about oddball things that happened in real life.

Ripley's "Believe It or Not" came on the air in the spring of 1930, and survived until 1949, when the cartoonist passed away. Prior to Ripley's death, the show about the unusual was launched on TV, and probably would have enjoyed a long run, if he had lived.

What was the first radio show inspired by a conventional comic strip? Here's a clue:

"Who's the little chatterbox: the one with pretty auburn locks? Who can it be? It's Little Orphan Annie!"

Long before she showed up on Broadway with the hit musical "Annie," Daddy Warbucks' little girl was on radio. She debuted back in 1931, and remained on until 1943, when her sponsor, Ovaltine, switched to Captain Midnight.

"Little Orphan Annie" was a strip developed by cartoonist Harold Gray, and it was an adventure show. Annie, Sandy, her dog, and their faithful friend, Punjab the Giant, were always off somewhere tracking down villains. Actress Shirley Bell was Annie and her best friend was Joe Cornassel, who was played, for a while, by singer Mel Tormé.

Annie was always giving special gifts to her young listeners who sent in the right amount of labels from the Ovaltine jars. There was a dandy mug, a super ring and of course, the secret code, if you joined "the club." Announcer Pierre Andre had a ball sending out secret code messages at the end of the show, once or twice a week.

Ham Fisher's "Joe Palooka," the gentle soul who became a heavyweight champion, was another early radio show. Palooka came on in 1931, and lasted for a while, but never really caught on. Who played Joe? It was Alan Reed. And Knobby Walsh, his manager, was Frank Readick.

"Popeye" premiered on NBC in 1935. Created by Segar, the two-fisted sailor with a fondness for spinach was already a star in the movie cartoons, and had a ready audience waiting for him.

Popeye had a voice of gravel, and he was impersonated by Detman Poppen. Wimpy, Olive, Sweetpea and all of his newspaper buddies were on hand. Ironically, the tough guy had to ignore spinach for a while. His sponsor was Wheatena, and whenever extra strength was needed, he gulped down a bowl of breakfast cereal.

It was during the late afternoon and early evening that several comic strip dramas, most of them in the 15-minute format, hit the peak of their popularity.

"Superman" was probably the most

famous. He arrived on the air from the planet Krypton in 1940, and soon was fighting Nazis. Originally a comic book hero, the man of steel went first to radio, then onward to the newspapers and movies, and TV, of course.

Clayton Collyer played the lead. He had two voices. His voice came across as a sissy when he was Clark Kent on the Mutual show. He became deep and powerful when he was Superman.

Ironically, "Batman," a comic book crusader, also tried radio, but failed to win an audience. The guy in the black outfit and his young friend, Robin, have been successful on both television and in the movies.



Blondie (Penny Singleton) has a surprise for Dagwood (Arthur Lake) who has become a radio crooner. Marjorie Weaver is the smiling girl.

Other strip favorites on radio during the late afternoon included "Terry and the Pirates," "Buck Rogers," "Don Winslow of the Navy," "Hop Harrigan," "Jane Arden," "Mandrake the Magician," "Smiling Jack" and "Dick Tracy," who gave away almost as many things as "Little Orphan Annie," if you sent in enough of the sponsor's labels.

During World War II, these radio heroes, for the most part, fought foreign spies and enemy armies, as well as the

usual assortment of gangsters, thugs and evil geniuses. They always won.

Some shows were on for a half-hour. "Mark Train" was one. "Red Ryder" another. Later, when the late afternoon shows lost out to television, many of them were changed to 30 minutes and played later in the evening.

Blondie

"Blondie," Chic Young's comic strip that is still around, had a long life on radio in the situation comedy format. Penny Singleton was Blondie and Arthur Lake was the bumbling Dagwood, her husband. The show was on CBS on Monday nights starting in 1938, and survived for several years. Singleton left the series toward the end. Ann Rutherford was playing the role when the program left the air in 1950. By then it was on ABC.



Radio's Superman: Clayton "Bud" Collyer Shown with actress Janis Carter

Lake, a great comedic talent, was the key to the success of the radio version. Veteran radio actor Hanley Stafford

played Mr. Dithers, the boss who was always firing Dagwood.

"Archie Andrews" started out in the comic books and built up a tremendous following in a hurry. Originally on Mutual daily for 15 minutes, it eventually ended up on Saturday morning with half-hour shows. Archie could be called "the poor man's Henry Aldrich." He lasted on radio from 1943 to 1953. Bob Montana's comic book characters — they later hit the daily newspapers — were a delight. The show deserved prime time, but had a steady audience on Saturday and it never went on nights.

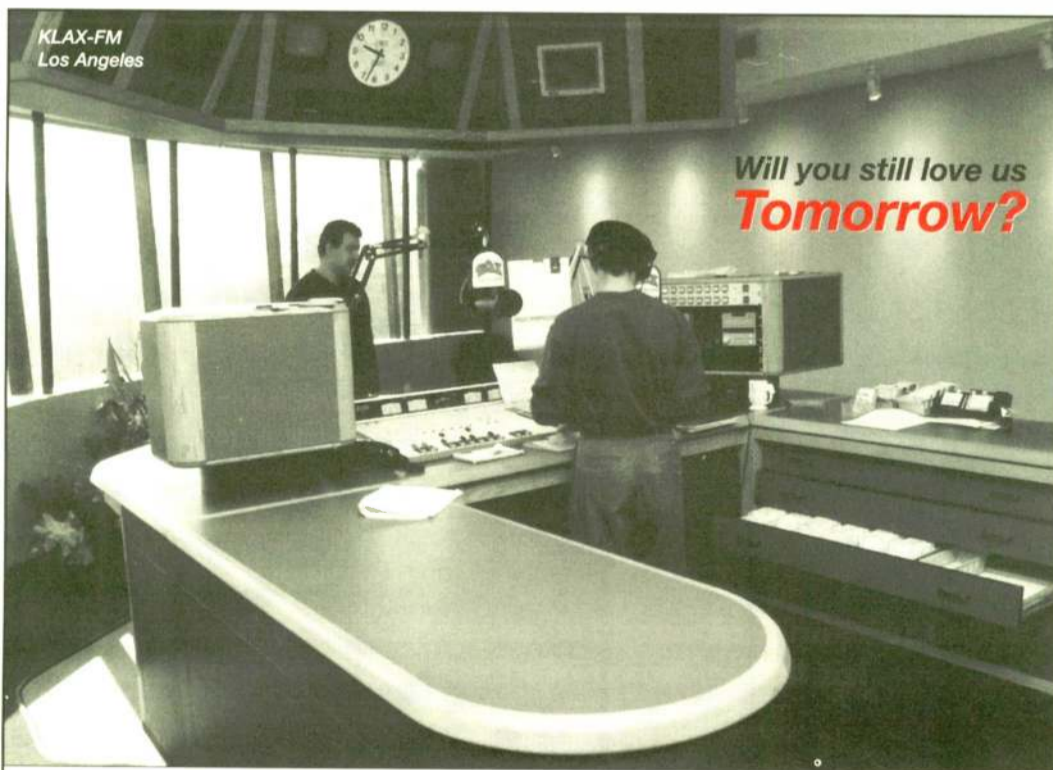
Archie was played by Bob Hastings, and his sidekick Jughead was Harlan Stone. Listening to an old recording of the show reminds you of how the younger generation was changed over the years.

"Major Hoople," who resided in "Our Boarding House," a strip created by Gene Ahern, also enjoyed some success on radio. His show came on in 1942, and lasted for a few years on NBC. Arthur Q. Bryan, who was all over the airwaves in those days, played the Major.

"Sad Sack," the cartoon strip that originated in military publications and later made it to the newspapers, had a short career as a summer radio replacement in 1946. Herb Vigran played the lead.

Another all-time comic strip great, "Bringing Up Father," did not last long on radio. It survived on NBC for only one season. That was in 1942. George McManus' Maggie and Jiggs were the central characters and it was expected they would have a long radio life. They did not. Those corned beef and cabbage dinners Maggie served to hubby Jiggs in the daily newspapers just weren't as funny on radio.

Mark Smith, a veteran Broadway actor, played the cigar smoking Jiggs. Guess who played his nagging wife, Maggie? It was Agnes Moorehead, rated by many as radio's greatest actress.



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MANAGER'S NOTEBOOK

Take Time to Analyze Big Picture

by Sue Jones

BURKE, Va. Close your door, sit down and lean back in your chair, put your feet on the desk and create the perfect radio station in your mind.

Think about what you would do if you could start from scratch, no facility or staff, and money was no object. Before you think I've lost it, humor me for a couple of paragraphs.

Step back

It is easy to get so entangled in the daily operational problems that you do not take a step back and look at the whole organization for what it is and what it could become.

When you create a vision of the best station based on your knowledge and experience, it becomes a yardstick for measuring your current operation and helps define where you want to go with it. It also gives you a chance to speculate where the industry may grow over the next five to 10 years. Think about how those changes will affect your station.

As your thoughts materialize, you might envision a station with technology and equipment so advanced that it never fails or needs maintenance. Think of a station that needs less than five staff members to operate 24 hours a day, 365 days a year, and they are all topnotch professionals with no personal problems. In this dream world, the number of listeners continually increases and is matched by the revenue that climbs monthly.

I am asking you to visualize the future, to see beyond today's set of problems.

Radio is one of the most rapidly changing industries. It has to be responsive to fickle listeners, keep pace with space-age technology, provide immediate bottom-

line value to advertisers and make a profit while doing all of those things.

To effectively juggle it all, leadership rather than management is needed.

Take a look at what the management experts say. Peter Drucker, management guru of the 20th century, distinguishes between leadership and management this way:

"Management is doing things right; leadership is doing the right things."

A smart leader is continually reviewing the radio industry and others as well.

"Management is efficiency in climbing the ladder of success; leadership determines whether the ladder is leaning against the right wall," according to Steven Covey, author of "The Seven Habits of Highly Effective People."

Without thinking about the current problems outside your office door, survey the whole picture of your station as it is today and how it might look in the future. What changes would be needed to bring it more closely in line with the dream-world station? No one can actually see the future, but you can make some educated predictions of future industry shifts or changes in the market and predict how that will affect your operation.

Important questions

With this perspective in mind, your mind's eye may see that your studio equipment and transmitter are aging. They will probably be OK for the next two to three years with some minor repairs and routine maintenance.

But you know that digital technology has arrived for the radio industry. How

will that impact your operation? Will you have to replace all of your studio equipment and transmitter? Can any of it be interchangeable? Will your current engineering staff be able to install and maintain a new type of technology with its current training and experience levels? Will additional training be necessary?

A radio system similar to cable television will have dramatic changes to sales also. How will you refocus the sales staff? Will they need training, too?

The next step is actual digital radio transmission. How fast will the public embrace digital broadcasting? What comparative yardsticks do you have to measure it against? Think of the public's acceptance of cable television, compact discs, and VCRs. The public has accepted cable television along with standard broadcasting.

Cable has not replaced the networks. However, the compact disc did replace the vinyl LP as a better medium. In the VCR environment, VHS replaced Beta. Perhaps it would be useful to consider the differences and the reasons why the market responded to these new technologies.

Do you want to be on the cutting edge of digital broadcasting and lead the way for others? Perhaps you can use it to expand your radio holdings or scope.

Do you want to sell your station before the new technology becomes common? If so, what do you need to do now to get the biggest return on your efforts and investment?

The analysis and insight will help you formulate the vision of where you want to take your station in the next five to 10 years. You need to define your strategy for the direction you want to go over the

next 10 years. This type of strategic thinking is outside the scope of daily tactical management.

If your department heads are adequately trained in sound management principles and techniques, they should be able to manage the daily operations of the station. As general manager/owner, you need to focus your attention on which wall to lean your ladder against and define the end goal.

Defining the end goal may take several months or longer. A smart leader is continually reviewing the radio industry and others as well. He or she is talking with colleagues, other industry leaders and public officials to form the information "database" that will help mold the future end goal.

Convey the plan

When you have defined your end objective, you must convey it to your department heads. Once they understand it and buy into it, making it happen will become a management exercise.

The importance of stepping away from the management role and taking the time to learn about new technology, evaluate the impact it had on other similar industries, and define your station's direction is critical to your survival and success.

Your department heads could be the best in the industry, but successful management cannot compensate for failure in leadership. Five years from now, your department heads could still be the best managers in the country, but if they are managing a station using antiquated equipment and the market has shifted to a whole new focus, your station will rapidly fall behind or fail.

If you need examples as proof of this logic, look at IBM and the computer industry or the American auto industry dealing with Japanese imports.

□ □ □

Sue Jones is a principal in Bisset Communications, a communications management firm located in Washington. She can be reached at (703) 503-4999.

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The Concert Position

► continued from page 75

stands either wearing or holding up your call letters. This gives you nice visibility in the arena, but it's not as strong as the first three benefits because few people are affected.

5) Free shows. This is the killer. Listeners will remember you for a long time when they attend your free show. Because of the effort involved, few stations pull this off regularly. Believe it or not, it's not always an expense issue.

Concerts can be liquidated entirely by sponsors, and frequently, record companies when pressured will help with free acts for contemporary music stations. There's no question that this requires concentrated effort, but it can be done.

Visibility at the show is important. In order to really own a show, most of the concert goers must see or hear you there. This doesn't happen anymore by just parking the station van at the entrance. When people leave one of your core artist concerts, they should know that your station cares about this artist.

Most of the time you won't be able to get stage announcements or hang banners inside. For about \$2,500, you can purchase a light projection system. It's small and easy to set up outside. Any slide you place in the unit can be projected on the side of a building.

Bring all of your station vehicles and don't park them. Drive them slowly around the lots with music playing loud enough to attract attention. Beach balls smuggled inside with your call letters are cute and inexpensive. Toss them into the audience and let them do the work. For outdoor shows, give away or sell cardboard seats that can hold your call letters and a sponsor logo. Hand out lots of commemorative bumper stickers. They're more likely to end up on cars.

Let's not forget the backstage broadcast before the show and the after-show special for people driving home. Keep your artist interviews short and unusual. Try letting a band interview itself. Finally, it's great to have a discount price on that band's compact discs with a local record chain for a day or two before and after the show. Again, have listeners write their own coupon with your call letters.

It takes a lot of activity to make a lasting impression.

See you at the show. I'll be the one trying to bribe the soundman into running a tape of the radio station.

□ □ □

Mark Lapidus is the vice president of marketing at Liberty Broadcasting. Reach him at e-mail: libertyhq@aol.com or FAX: (301) 899-3014.

Stop Me if You Have Heard This One

by Peter Hunn

LAS VEGAS Be one of the first to find a seat at an NAB seminar session, and you will no doubt hear other early birds swapping radio tales. A fast watch at this past show gave me the opportunity to add a classic to my roster.

Seems an over-worked local daytimer owner was miffed recently on the occasion of a very important supermarket remote broadcast. A kid assigned to board operator duty that day sauntered through the studio door quite drowsy and really late. His mother had dropped him off at the end of the driveway.

"You were supposed to be here 15 minutes

ago," the broadcaster strongly stated. "Listen, I've written down detailed instructions for today's remote. Just be waiting for my cues on the Marti receiver."

"Oh, OK boss," the cub announcer yawned, while his employer raced to the station van.

Fortunately, sounding a bit out of breath was the station's only negative symptom as the network news feed ended and the crucial remote began. And this was a major event with a good crowd, exclusivity, and the station's audio piped clearly into the downtown sound system.

"You know folks, I rushed out of the studio so darn fast," the owner admitted, "that I forgot to take a copy of our latest local

weather forecast. Of course, Harold, back at station master control will now let us know exactly how nice this day is going to be!"

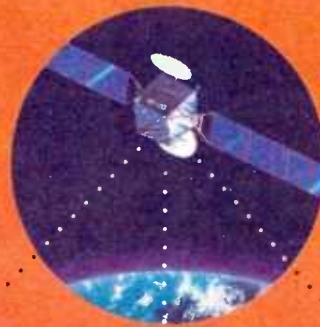
There was a fumbling of papers, then silence ... broken by the kid's recovery, "Uh, I can't find the paper the weather is on, so I don't know what to say ..."

Oh no, the boss realized, knowing he couldn't switch off what was probably coming.

"... but on the way in, my mom always listens to FM 101 (the cross-town rival) and they said it's gonna be real sunny today with a hi of ... uh ... 65 or 75 or something."

It was still early enough for the distinct sound of surprised laughter to echo down the street into the poor broadcaster's shaking head.

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Management Techniques Reviewed at NAB

by Whitney Pinion

LAS VEGAS "There are no new techniques," said Bob Fox, chairman and CEO of KVEN(AM)-KHAY(FM), Ventura, Calif. "It's how we implement the methods that have existed for 2,000 years."

Fox spoke during the NAB '96 radio management session, "Management Techniques for Success." The session may not have produced any breakthroughs for those attending, but the panel of seasoned radio professionals offered a number of variations on old ideas.

Establishing open communication with station staff, for instance, is a concept preached more often than it is practiced.

One person reaping the rewards of "open" or "open book" management is Gary Grossman, president and general manager of KRKT-AM-FM in Albany, Ore. The goal of this type of management is to generate a feeling of ownership among staff members.

"Problems and solutions are shared so no one person carries the burden. Victories are celebrated by all, and a true feeling of trust is developed," explained Grossman.

Define your vision

At the core of open book management is vision defined as a realistic, attractive assessment of the future of the station shared and understood by all employees. Although a station's vision and mission are not the same, Grossman recommended writing a mission statement in order to define vision.

Another way to define a station's vision,

Grossman said, is to establish a set of standards and to continually review and raise them. Also, make sure your employees know these standards and uphold them. "It is the only way to get a true team approach," said Grossman.

Raising these standards is crucial because what worked yesterday may not be sufficient for tomorrow. Altering standards does not mean compromising them, Grossman said, especially in terms of hiring. Only hire people who measure up to the standards, not those who need to be molded or shaped.

Grossman talked about "situational leadership." Staff should be able to rely on a "comfortable consistency" among managers or department heads, but not every employee should be dealt with in the same manner.

"We like to believe everyone has peak performance potential; you just need to know where people are coming from and meet them there," Grossman said.

Ultimately, Grossman said, open management eliminates hassles, such as the "us vs. them" battles, alleviating the stress of day-to-day business and creating a sense of fun and celebration in shared success.

Curt Brown, vice president and general manager of KTTS-AM-FM in Springfield, Mo., emphasized the necessity of clear, open communication among all station employees in order to strengthen working relationships as well as employee loyalty to the station.

Brown recommended periodic "communication meetings" to encourage intradepartmental discussion. These meetings entail splitting staff into two or three

evenly numbered groups with a balanced mix between departments.

Employees should receive invitations to these meetings, specifying time and location. Brown emphasized that no department heads should participate, as their presence may inhibit or stifle frank discussion.

The meetings should be divided into a number of sessions, each lasting no longer than an hour and a half. The general manager, who is, of course, invited to attend, should pose a question for discussion at the beginning of each session. Questions might be: If you were general manager for a day, what would you do to improve station ratings? Or, if you were a manager at a competing station, how would you attack us?

Talk honestly

No holds barred, Brown said. Employees should be allowed to talk honestly about anything that has to do with station operations.

Detailed notes taken by a secretary at the meetings become the source of discussion at an all-day department heads retreat. Ideally, this retreat should be held in a low-key, relaxed place away from the station with food, drinks and no ringing telephones.

Comments from the meetings should be divided by department and reviewed individually with the best of them written on a chalkboard for consideration. Some may be as simple as changing brands of coffee in the coffee machine.

All changes implemented must fit within the annual budget or be postponed until the following year. The key, Brown said, is to

post a list of upcoming changes for all employees to see and to follow through on those changes in a timely fashion.

Attention to detail

Fox had no specific tools or tactics for improving management style, but he did offer some general guidelines.

"There are no terrific techniques," said Fox. "Do what works for you." Radio is both an art form and a product-oriented business, he said, and you should always pay attention to your product. That means paying attention to detail and making sure that what needs to get done is getting done.

Find out what goes on inside your station by looking around and casually talking to your employees. Keep in touch with your audience as well, Fox said.

"We have a responsibility to our employees, our community and our clients," he said.

Fox encouraged managers to teach employees how to make their own decisions. "To grow," he said, "you have to let others grow."

Susan Hoffman, vice president and general manager of San Diego stations KSDO(AM) and KKBH(FM), suggested that managers help employees grow by providing inspiration, by being an example to employees and by challenging them to be great.

Hoffman echoed Grossman when she said that effective leadership requires vision and direction, and hiring employees who work to the expectations and standards of the station only strengthens the organization.

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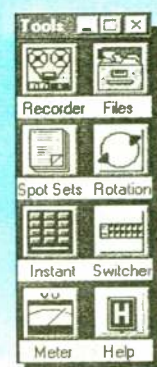
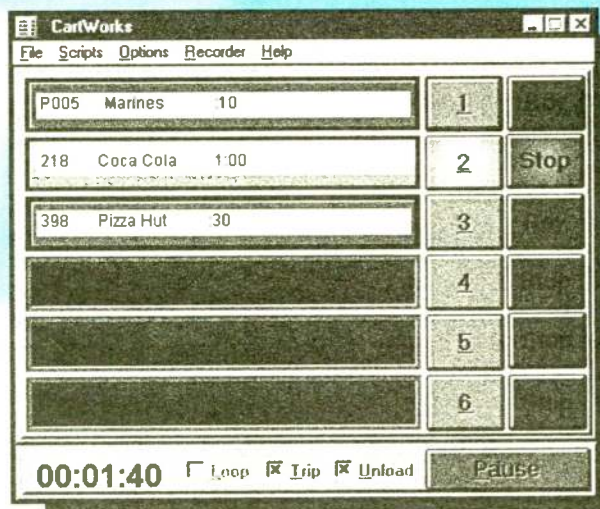
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View Frequency Domain With Spectrum Analyzer

by Jim Somich

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The traditional way of observing electrical signals is to view them in the time domain using an oscilloscope.

The time domain is used to recover relative timing and phase information that is needed to characterize electric circuit behavior. However, not all circuits can be uniquely characterized from just time domain information.

View electrical signals

Circuit elements such as amplifiers, oscillators, mixers, modulators, detectors and filters are best characterized by their frequency response information. This frequency information is best obtained by viewing electrical signals in the frequency domain.

To display the frequency domain requires a device that can discriminate between frequencies while measuring the power level at each. One instrument that displays the frequency domain is the spectrum analyzer. It graphically displays frequency or power as a function of frequency on a CRT (cathode ray tube).

Frequency information is best obtained by viewing electrical signals in the frequency domain.

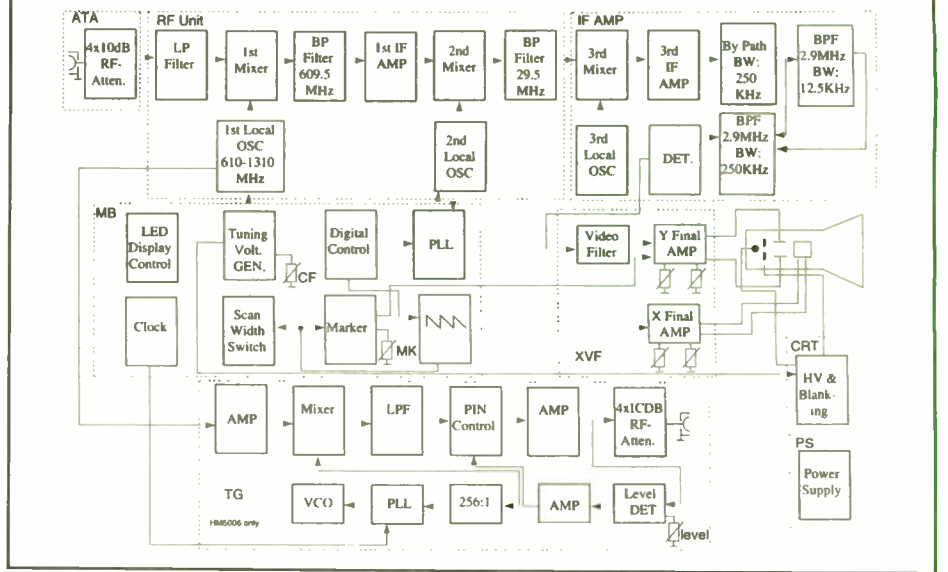
oscillator, residual FM of a source and frequency drift during warm-up can be measured using the calibrated scans on the spectrum analyzer.

The swept frequency response of a filter or amplifier are examples of swept frequency measurements possible with a spectrum analyzer. These measurements are simplified by using a tracking generator.

There are two basic types of spectrum analyzers: swept tuned and real-time analyzers.

continued on page 82 ▶

Figure 1



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View Frequency Domain

► continued from page 81

The swept-tuned analyzers are tuned by electrically sweeping them over their frequency range. Therefore, the frequency components of a spectrum are sampled sequentially in time. This enables periodic and random signals to be displayed, but makes it impossible to display transient responses.

Real-time analyzers, on the other hand, simultaneously display the amplitude of all signals in the frequency range of the

analyzer; hence the name real-time. This preserves the time dependency between signals, which permits phase information to be displayed. Real-time analyzers are capable of displaying transient responses as well as periodic and random signals.

The swept-tuned analyzers are usually of the TRF (tuned radio frequency) or superheterodyne type. A TRF analyzer consists of a bandpass filter whose center frequency

is tunable over a desired frequency range; a detector to produce vertical deflection on a CRT; and a horizontal scan generator used to synchronize the tuned frequency to the CRT horizontal deflection.

It is a simple, inexpensive analyzer with wide frequency coverage, but lacking resolution and sensitivity. Because TRF analyzers have a swept filter, they are limited in sweep width depending on the frequency range (usually one decade or less). The

resolution is determined by the filter bandwidth, and, because tunable filters usually do not have constant bandwidth, is dependent on frequency.

The most common type of spectrum analyzer differs from the TRF spectrum analyzers in that the spectrum is swept through a fixed bandpass filter instead of the filter being swept through the spectrum.

The analyzer is basically a narrowband receiver that is electronically tuned in frequency by applying a saw-tooth voltage to the frequency control element of a voltage-tuned local oscillator. This same saw-tooth voltage is

simultaneously applied to the horizontal deflection plates of the CRT. The output from the receiver is synchronously applied to the vertical deflection plates of the CRT and a plot of amplitude versus frequency is displayed.

Varying voltage

The analyzer is tuned through its frequency range by varying the voltage on the LO (local oscillator). The LO frequency



is mixed with the input signal to produce an IF (intermediate frequency), that can be detected and displayed. When the frequency difference between the input signal and the LO frequency is equal to the IF frequency, then there is a response on the analyzer.

The advantages of the superheterodyne technique are considerable. It obtains high sensitivity through the use of IF amplifiers and many decades in frequency can be tuned. Also, the resolution can be varied by changing the bandwidth of the IF filters.

However, the superheterodyne analyzer is not real-time, and sweep rates must be consistent with the IF filter time constant.

To accurately display the frequency and amplitude of a signal on a spectrum analyzer, the analyzer itself must be properly calibrated. A spectrum analyzer properly designed for accurate frequency and amplitude measurements has to satisfy many requirements:

1. Wide tuning range
2. Wide frequency display range
3. Stability
4. Resolution
5. Flat frequency response
6. High sensitivity
7. Low internal distortion
8. Linear and logarithmic display modes (voltage and db)

A typical spectrum analyzer is block-diagrammed in Figure 1. Next month we will continue with spectrum analyzers and their applications in broadcasting.

□ □ □

Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. He can be reached by e-mail at jimsomich@aol.com

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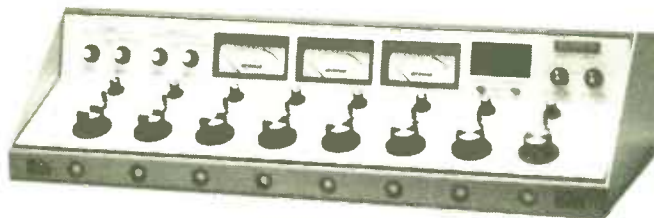
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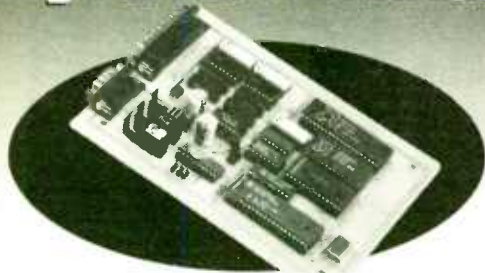
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Survey Instrument Passes Test

by John Bisset

SPRINGFIELD, Va. In the first installment of this series, we reviewed some of the benefits of the microprocessor-based 8718 Electromagnetic Radiation Survey Meter. This meter is designed to be used with a variety of new and existing measurement probes that comprise the 8700 series family.

Field tests

For our field tests, a shaped probe was selected that compensates for the various exposure levels based on frequency. The



Figure 1

shaped probe provides an exposure readout based on Percent of Standard. The shaped probe is useful in complex, mul-

tisignal environments, because exposure limits vary according to the frequency of the emitter.

In "antenna farm" environments, where TV, AM, FM and other communications antenna are located, the shaped probe can provide a very accurate determination of the level of exposure, without having to turn all the transmitters off and measure individual frequencies or groups of frequencies.

Before measurement can begin, the probe and the meter must be zeroed together. The shielded storage case provides a convenient chamber to insure the instruments are not exposed to radiated fields. On our first try at zeroing, we read a message saying the probe could not be zeroed. We checked connections, then found that the meter had been set for Fiber Optic input. After accessing the menu system, we toggled to the CABLE selection.

Setup is easily performed using the screen prompts. When measuring an emitter, the measurement screen provides a readout of percent of standard as well as a bar graph that shows the approximate signal intensity. The bar graph was particularly helpful in determining the loca-

tion of hot spots.

For example, in our field tests a metal doorknob on a wooden coupling unit door showed a much higher reading, causing potential over-exposure due to reradiation from the primary emitter inside. This phenomenon has been documented aboard ships, where a hand rail or other metal is excited by a nearby emitter.

Move around

As seen in Figure 1, the probe can be easily moved about, checking any structure for the highest levels of radiation. For AM measurements, however, NARDA recommends placing the probe on a nonmetallic stand, because the human body can act as an antenna below 10 MHz and introduce errors. A wooden ladder is suggested, and we found the ladder most useful. Not only is there room to mount both the meter and probe, but the varying height of the ladder steps permits aiming the probe in more directions.

As we measured some higher power AM stations, it was interesting to note that the fences sometimes actually contributed to higher readings — so much for fence safety! In fact, one section of fence seemed particularly hot — unusual, because it is accepted that most fences act as a shield around the emitter. Further investigation found the grounding wires located at the bottom of the chain link panel had been broken off, allowing the panel to "float" and absorb energy.

Although the bar graph is helpful to decipher RFR levels, the 8718 can be programmed to sound an audio alarm at a specific value. In fact, there are two alarms built into the instrument, which make measurement simpler. The second alarm is a variable tone alarm that changes with the field strength. The fixed alarm can be used to indicate that a specific threshold has been exceeded, and the variable tone ramps up as you approach that threshold. This changing tone corresponds to the bar graph signal, further simplifying measurement.

Some of the measurements we took with the 8718 were surprising. The FM antenna mounted on top of a short pole atop a mountain, which we thought

would blanket the surrounding area with RFR, produced exposure limits of 10 to 15 percent of standard. An older auxiliary FM antenna, side mounted perhaps 50 feet up on a tower was another story. There were spots on the ground where excessive exposure levels were measured. The same was true for a transmitter building that housed not only FM broadcast, but also two way transmitters.

After a short time working with the 8718, you start to point the probe at everything — even the microwave oven in the snack area. It is amazing what radiates energy!

As one surveys an area, the built-in data log with time and date stamp, as well as a reference number was the most useful. As you can see in the example shown in Figure 2, NARDA's Windows-based software permits downloading data right from the survey instrument into your computer. The result is a chart that lists data points, as well as a graph of the results.

If the points are recorded by a rigger climbing a tower, the graph of Figure 3 is typical as the rigger climbs closer to the emitter. In this plot, the points were logged every six seconds. The 8718 can

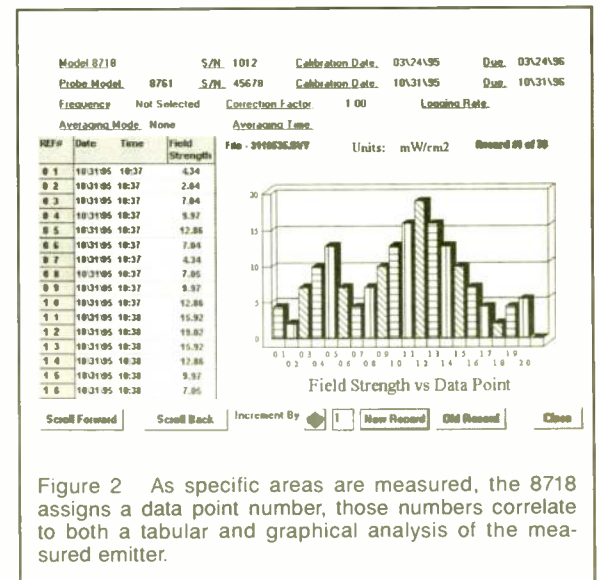


Figure 2 As specific areas are measured, the 8718 assigns a data point number, those numbers correlate to both a tabular and graphical analysis of the measured emitter.

store up to 3,000 measurements using its internal memory — more than enough to adequately map an area.

Not only is the 8718 a powerful instrument with respect to its measurement capability, but when teamed with a computer, the measured data is conveniently tabulated and graphically presented in a professional manner.

Although the instrument is not likely to be budgeted for individual station use, given the broad frequency spectrum that a shaped probe and the 8718 can cover, it certainly makes sense for group ownership purchase. You might be surprised at what can be uncovered doing a "Due Diligence" inspection with the Narda 8718.

For more information from Loral Microwave-Narda, contact the company in New York at 516-231-1700; or circle Reader Service 212.

John Bisset is a principal with Multiphase, a broadcast engineering services company based in Washington, D.C. He can be reached by fax at (703) 764-0751 or on line at wrwbench@aol.com

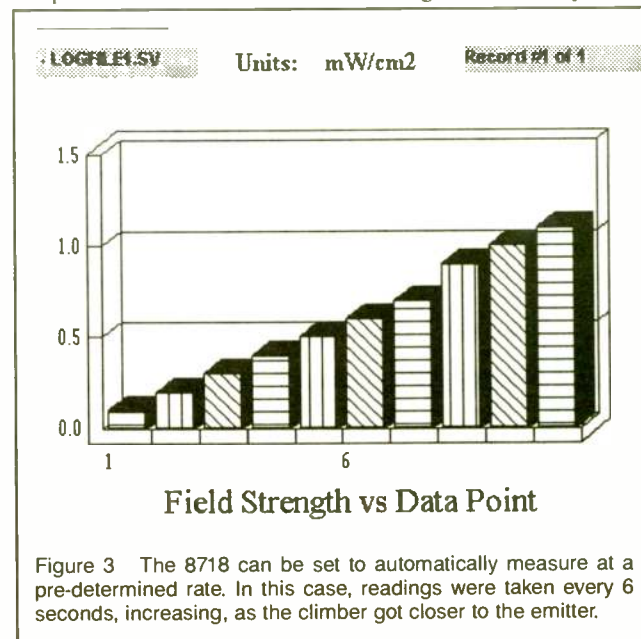
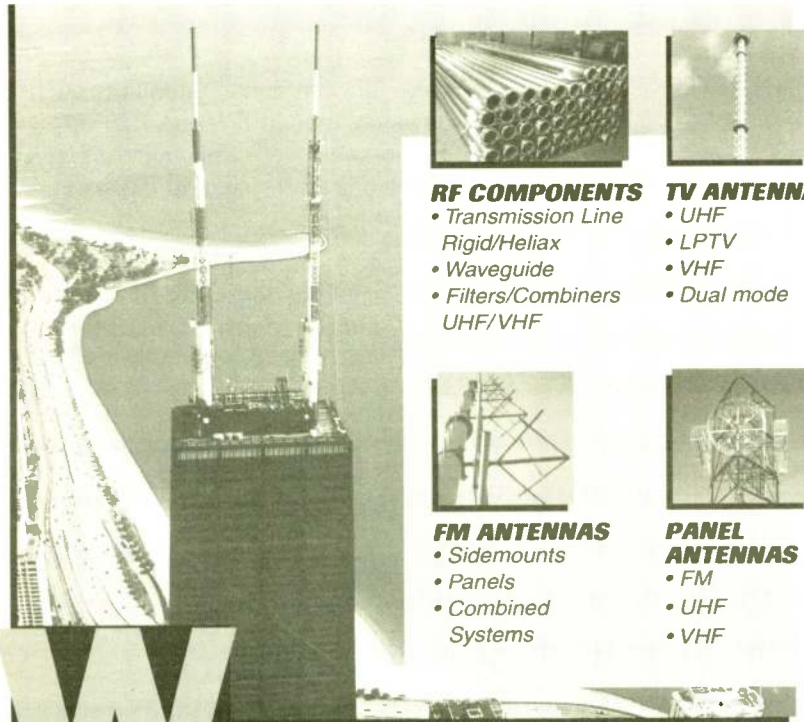


Figure 3 The 8718 can be set to automatically measure at a pre-determined rate. In this case, readings were taken every 6 seconds, increasing, as the climber got closer to the emitter.



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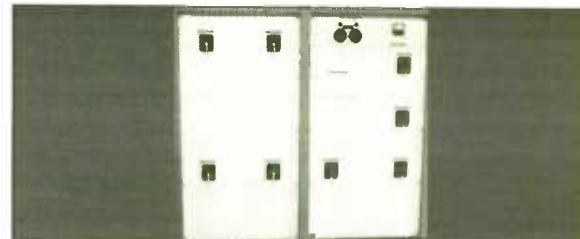


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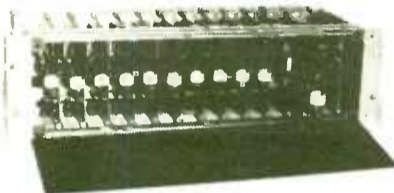
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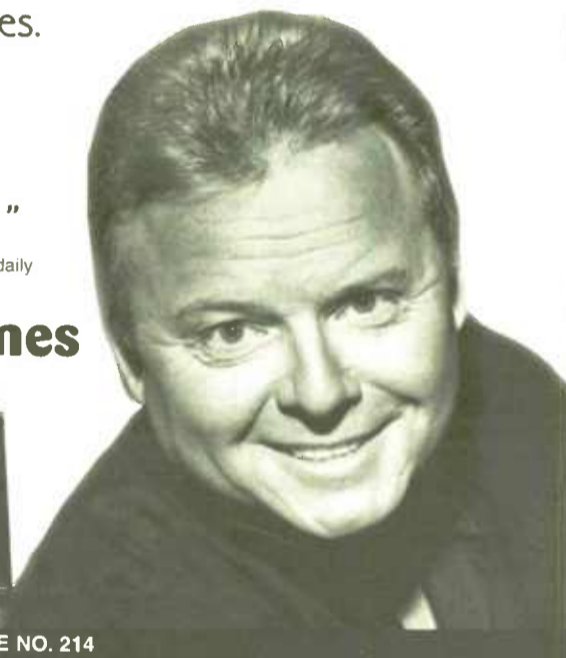
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USER REPORT

Symetrix Keeps Foul Mouths off Air

by Erik Disen
Director, Engineering
and Facilities
KRLD(AM)-KTCK(AM)

DALLAS Remember when digital delay units became a commercial reality in the late '70s? The first were simple to operate; there were few knobs and buttons which non-technical people had to master. However, the catch-up was very primitive. They sounded OK ... when in full delay. A good time to build delay was during the hourly network news, only the network newsmen sounded like he was on drugs.

KRLD(AM) was using one of these Brand "X" digital delays successfully in 1994 when disaster struck in the form of a stout lightning bolt. The Brand "X" digital delay never worked right again. Because the problem was intermittent, not even the factory could fix it.

Aging gracefully

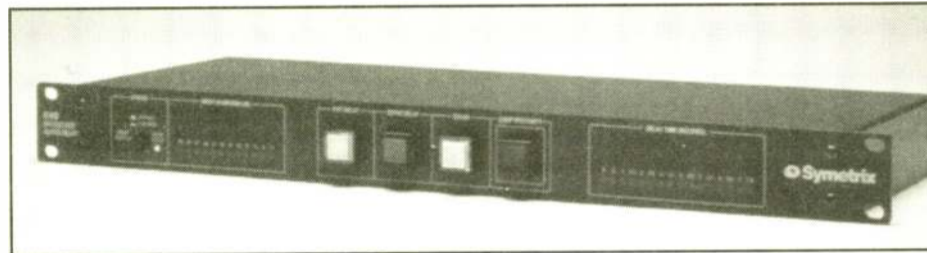
It was during this time that I happened to be talking to Walt Lowery at Symetrix about an audio processor. During the conversation, he mentioned the new Symetrix 610 Broadcast Audio Delay. I tested it on KRLD, liked it, and kept the 610. The Brand "X" unit now ages gracefully, destined for the dumpster.

The Symetrix 610 is in a handy form factor, being one rack unit tall. In a crowded control room, it is nice to get back rack space.

The audio I/O are XLR connectors, which I like because they allow quick

removal/reinstallation of the equipment. If you ever have to take the unit out, you can just plug the XLRs together and restore your audio path. The control I/O is a DB-25 connector, hard to wire, but easy to buy.

Setting the unit up is simple. You select your nominal operating level, either +4 or +8 dB. I used the +8 setting to allow for poor level riding.



The Symetrix 610 Broadcast Audio Delay is in daily use at KRLD.

The next thing to do is select the time increase/decrease algorithm. You accomplish this by manipulating the four big buttons on the front panel. First, you push all four buttons for about five seconds. When they start to flash you next push the button that corresponds to the desired operation mode.

Drug-free announcers

For KRLD, the default setting supplied from the factory took too long to build delay, so we changed options. We now use the shortest time: four minutes (remember the net news). Symetrix warned that the shortest time might cause unnatural pitch shifting during catchup, but we do not find

it objectionable. The Symetrix 610 does this better than its digital delay predecessors. The network announcers now sound drug-free.

Actually, the secret of the ease of operation of the 610 is the four big buttons - Exit Delay, Start Delay, Cough and Dump Profanity. Operators only have to be given a cursory training on how to use the sys-

tem, which tells me that the 610 is very intuitive to use.

The Symetrix 610 has two unique features that KRLD does not use; we haven't trained ourselves to take advantage of them yet. These are the 1/2-dump and cough functions.

The 1/2-dump mode can be selected to dump only half of the audio stored in memory. This would be desirable if a station had numerous profanities that needed to be edited. If you dump the entire memory when you push the Dump button, you have no protection until the unit catches up. With the 1/2-dump, you would at least have half of

the delay left to catch the next profanity.

The cough feature is interesting. It allows the talk show host to cough, talk to the producer, or make any other brief objectionable noise while maintaining a seamless, polite program output. The Symetrix 610 plays from memory while the interruption takes place and then re-stretches the audio afterwards.

More like tube sound

I like the 610 audio quality. As we are all aware, digital equipment does not overload gracefully. Previous digital delay units displayed a brittle, shattering quality if the board operator failed to ride levels properly. The Symetrix 610 degrades when overloaded about as well as any digital equipment I have heard. It is more like a tube sound.

Unfortunately, KRLD's Symetrix 610 experienced a failure during its infant mortality phase. The failure allowed some low-level, pre-delay audio to sneak through to the output. The double audio was fairly far down, but it was definitely there and quite annoying. One phone call to Walt Lowery at Symetrix had a replacement 610 in our hands overnight.

The Symetrix 610 Broadcast Audio Delay is in daily use at KRLD. It delays AM News Talk with Rick Roberts, a program that discusses newsworthy topics. Rick puts the delay to the test and the 610 performs well. I recommend it to any talk station that needs a full-featured, high-quality digital delay at a moderate price.

For more information from Symetrix, contact the company in Washington State at 206-787-3222; or circle Reader Service 7.

USER REPORT

Processor from Philips Cleans up Music Library

by Paul Stenstrom
General Manager
KGVL(AM)

GREENVILLE, Texas KGVL(AM) was founded 50 years ago as a country station in this small town outside of Dallas. Twenty years ago, we added an FM station.

We are in a small unrated market, 40 miles from the seventh largest market in the country. Our competition includes four strong FM country stations booming in from Dallas giving away cars, cash, and who knows what else. We also compete with a local satellite-fed, low-budget country station. To survive, we have to be local, we have to be different, and we have to sound as good or better than the Dallas stations.

Cutting-edge country

Our FM niche is in an alternative country custom format — a "cutting-edge" country that is slick, aggressive, and appeals to a relatively young crowd. To make our FM successful, we limit avails and push some high rates.

This approach makes our 1000-watt AM station vitally important to our overall success. We must have a lower-rate alternative

to our FM and we have to get our small bread-and-butter accounts the exposure and advertising results they expect. We cannot afford for our AM to be a "throw-



Paul Stenstrom and Jim Patrick work on the Philips Sound Enhancer.

away" as so many are.

A couple of years ago, we decided to give our AM a new custom format that would really stand out, yet would sound good on AM radio. We took a classic country format — primarily '70s and '80s music —

continued on page 91 ►

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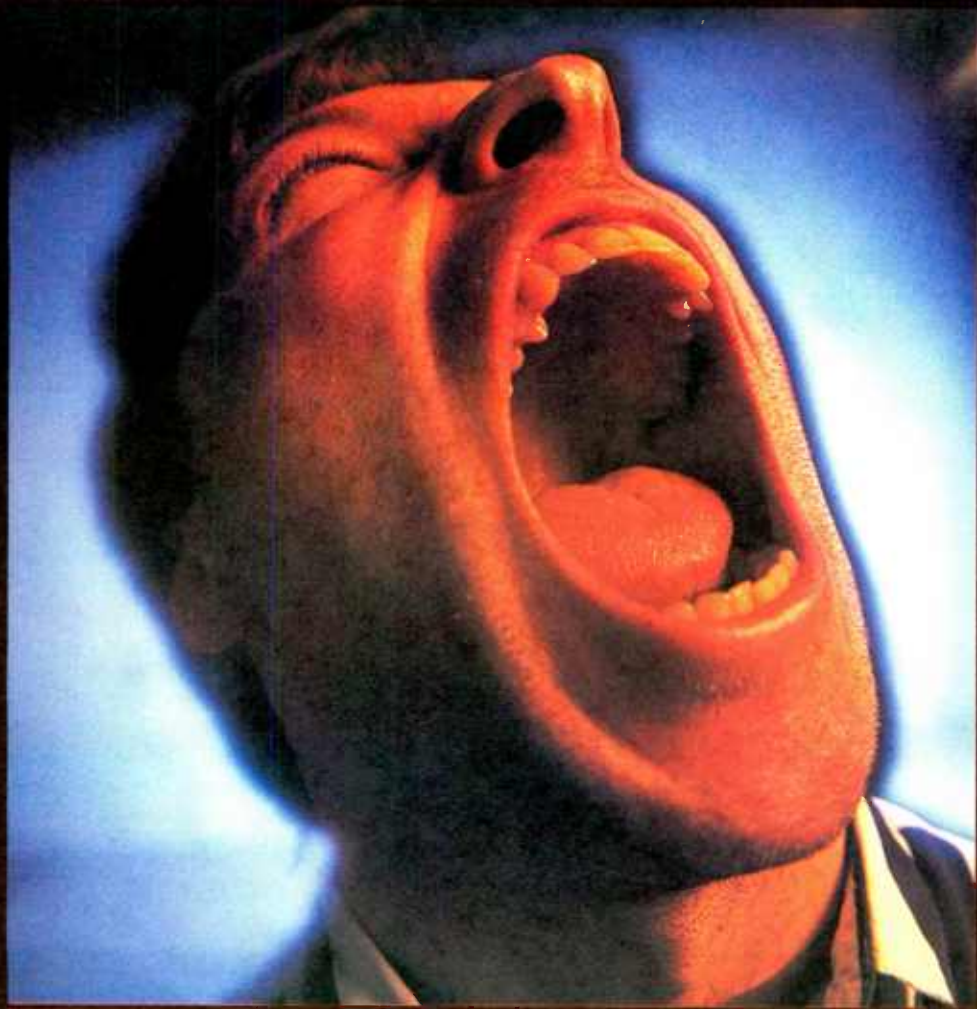
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USER REPORT

NTI EQ³ Not just Another Equalizer

by George Bisso
Chief Engineer
Infinity Broadcasting

SEATTLE During the past couple of years there have been many high-profile technical reports written about the Night Technologies International EQ³ Equalizer. I am going to give a less technical, more personal perspective on how I have used this remarkable piece of sound gear to improve the clarity and richness of our station's sound over the air.

When I first heard about the NTI EQ³, recalling all of the negative senti-

ments of traditional equalization, I said, "OK, here we go again. Another phase-shifting, distortion-generating equalizer box is on the market." Boy, was I wrong.

I knew there must be something inside the box besides air when I lifted the EQ³ out of its shipping crate. No lightweight, one-rack-space piece of gear here — the equipment weighs in at 13 pounds. I immediately sensed the quality of the product as I turned the stepping potentiometers and examined the craftsmanship of the box overall.

I next went looking for the users manual

— you know, the big book on how to turn it on, preset the controls, get it in the ballpark for my format, etc. I was pleasantly surprised that there are no thick manuals shipped with the EQ³ — you do not need one. The only information that is shipped with the EQ³ is a simple set of instructions that explain what the controls do and how to use them to accomplish what you want.

Also, when I went looking for the On/Off switch, I could not find one. The EQ³ has none. You do not need one and you will not want to turn this box off once you start using it. End of story.

I first installed the EQ³ in my already crowded equipment rack where I could patch it in and around different pieces of equipment. My hope was that there would actually be some audible improvement in the sound we broadcast across the air. Here in the Seattle area there is a lot of competition among radio stations, and I am always looking for that audio edge over the other stations in town.

The moment I switched the system on with the EQ³ installed, our audio signal jumped out of the radio; and I thought I already had a good-sounding station. The vocals were clearer, there was more breadth to the sound, and the signal seemed to carry farther.

The EQ³ performs like no other equalizer I have ever worked with. The EQ³ is a six-band equalizer with separate channel controls for each of the six bands and, yes, it is a full, true stereo equalizer with total channel-independent electronics and filters.

Each band is 2.5 octaves wide and has a dual-control stepping potentiometer that allows for coarse and fine adjustments to boost or cut in 3 dB or 1/4 dB increments with a maximum adjustment of ± 15 dB. The headroom of the EQ³ is +25 dB. It comes with balanced XLR input and unbalanced XLR and 1/4-inch phone output connectors.

After I turned the EQ³ on and heard the great sound, I played more with the controls. I found that I could boost individual bands to the maximum without fear of distortion because there is no audible phase shift. Try that with other equalizers. With a little tuning, I was able to make my processors stand up and put out that sweet-spot sound.

There is more. The EQ³ has a unique audio band as the sixth band within its electronics. The band is called the AirBand. It is a boost-only shelf that begins at 6 kHz, levels at 10 kHz and extends to 330 kHz. Using this band-pass, I was able to turn down the brilliance and high controls on my processor and turn up the AirBand to get a nice, clean, high-end sound. This totally eliminated the high-end splatter, non-clean sound I have always wanted to get rid of. I was able to fine-tune my system through the EQ³ to get the sound I wanted.

I tried the EQ³ with many different audio processors, both AM and FM, from less powerful signal stacks to high-end stacks of digital processing, STL and digital exciters. I tried it on analog and digital format recorders, and every time when I had a clean audio signal as an input source, I got superior results out. The EQ³ helped put back some of

the sound that my processing and STL equipment lost.

I set the EQ³ up in the production room and my production director told me he did not want to part with it. I told him he would have to buy his own. What it did for carts and microphones would take up too much space to talk about here. Just get your hands on one and you will understand what I am talking about.

I have done a lot of testing for many companies over the years and the EQ³ has me so excited I cannot sit down. I send back most equipment, but this I am keeping. I want to go everywhere and help get the EQ³ installed. The EQ³ has a bright future and it is starting to show up in broadcasting stations around the world.

For more information from Night Technologies, contact the company in Utah at 801-375-9288; or circle Reader Service 50.

APOGEE

Stereo D/A Converter Ideal For Portable Applications

SANTA MONICA, Calif. The Apogee DA1000E-20 is a stereo D/A converter with full 20-bit resolution, designed to provide a professional reference standard for accurate, uncolored monitoring of digital audio sources. Its applications include studio monitoring systems, CD mastering, audio production and CD reproduction. Thanks to its 12 VDC operation, the unit is ideal for portable, remote and location work, particularly in conjunction with its companion A/D unit, the AD-1000.

The DA1000E-20 offers several standard interfaces, including AES/EBU, S/PDIF, optical, SDIF and SDIF II. The digital/analog converters themselves are 8x oversampling 20-bit devices configured to eliminate the usual large transitions around zero, providing effective low-level performance.

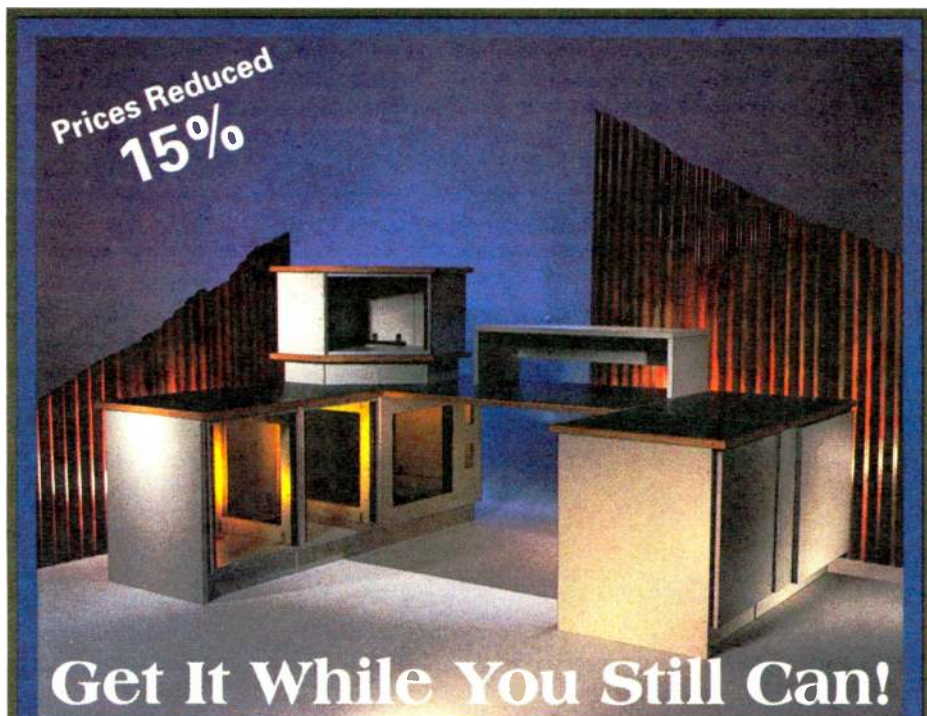
The converter also features Apogee's filter technology and the patented low jitter clock. This clock references to external sources and regenerates the clock, providing an electronic flywheel effect that greatly reduces jitter.

Balanced and unbalanced pro and consumer levels are available at the rear-panel XLR connectors via an internal gold pin matrix. Power-up relay protection is provided to prevent thumps in the output during power cycling. Normal and reverse polarity and muting can be selected from the front panel. Emphasis status is also indicated on the front panel, and can be manually overridden.

A 1 kHz test oscillator assists with system alignment, providing various reference headroom settings as well as 0 dB digital full scale.

Sample rate is measured and indicated on the front panel. The power switch offers continuous on and "auto" that powers up the unit when it sees a digital input signal.

For more information from Apogee, contact the company in California at 310-915-1000; or circle Reader Service 25.



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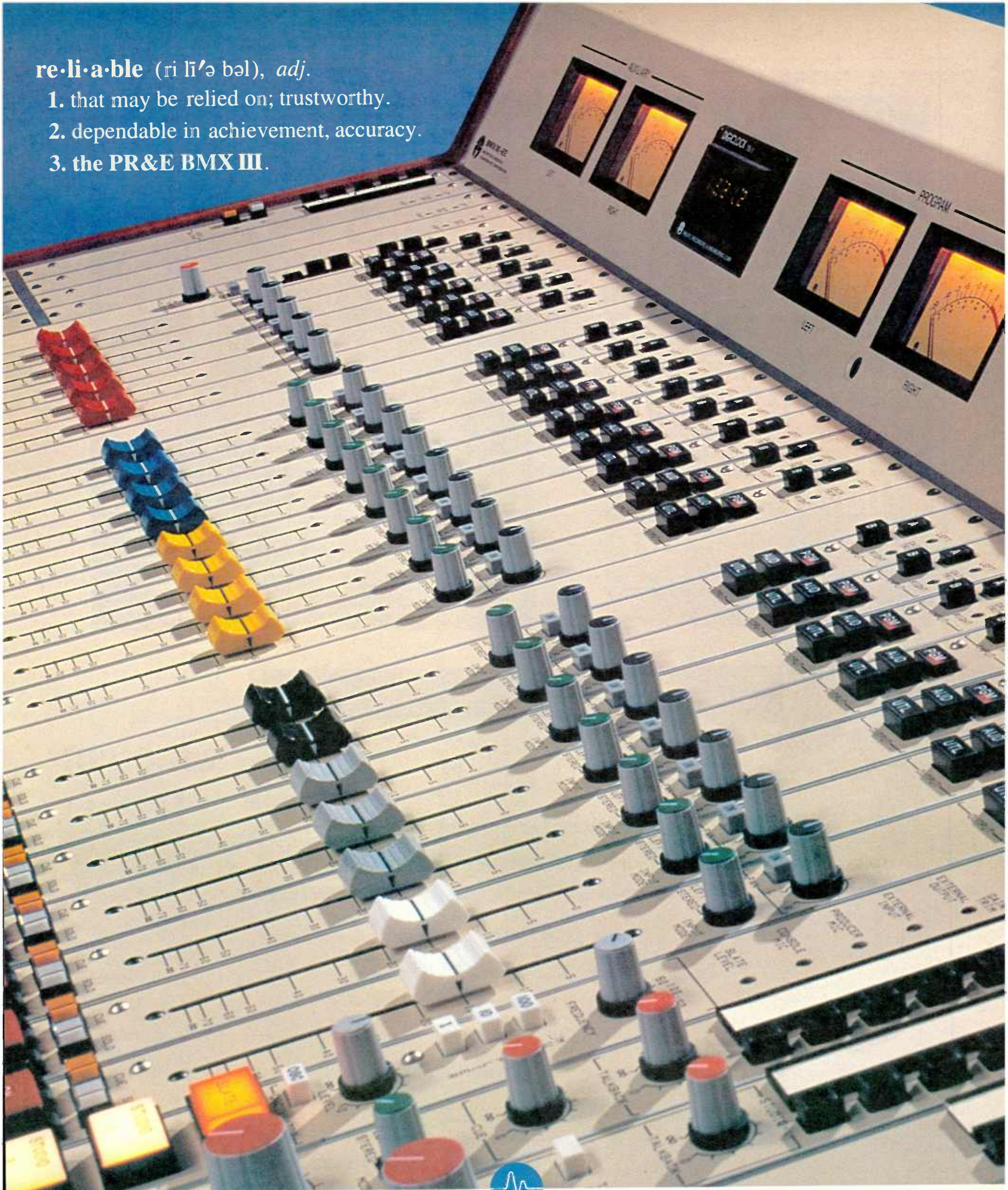
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USER REPORT

Ensoniq Delivers Diverse Palette

by Alan R. Peterson

WASHINGTON Malverne, Pa.-based Ensoniq Corp. manufactures two outstanding digital audio processors: the DP/4+ and the DP/2. Both are enormously powerful devices that offer production directors a very diverse sonic palette.

It is clear from the model number that the DP/2 is the simpler baby brother of the Ensoniq effect line. But this in no way diminishes the amount of power it has.

The tradeoff is in the labyrinth of commands one must wade through to harness this power.

Kudos must be given to Ensoniq for the depth of control given to all parameters of operation. Even on a simple compound effect (flanger + reverb), there are no less than 16 different parameters you may tweak to achieve a successful effect. Even some you would never think of.

Never mind

For example, how about six adjustments to the flanger alone? Never mind simple Speed and Width adjustments; Ensoniq also gives you Notch Depth and Flange Center to boot.

Same goes for a Large Room reverb. Any other box gives you Mix, Decay and — if you have been good — Predelay. The DP/2 allows for Decay Definition, provides adjustable delay times for the first two reflections and offers three Position Balancers that simulate the placement of virtual mics in space to create room depth.

Ensoniq is not done. You can also detune the reverb over time, simulating the breakup of resonant modes in a large room. This makes the reverberation less "predictable" sounding and much more alive than the motionless diffusion found on very inexpensive boxes.

The DP/2 is filled with many outstanding effects. This box gives you rotating ("Leslie") speaker simulators, a tuneable rumble filter, a vocal eliminator and a very nice vocoder.

In addition to the MIDI implementation found on almost every box made today, some effects on the DP/2 utilize the decades-old technology of voltage control. I enjoyed this immensely.

For example, the VCF-Distortion program makes use of a 0-5VDC input to alter the qualities of a vintage-sounding voltage controlled filter (VCF). This control can be as simple as a spare pot and a battery wired together. This sort of instant, linear-feeling control over a sound is quite refreshing in a retro sort of way.

Philips Cleans Library

► continued from page 86

and expanded it to include music from the '30s through the '60s.

By going back to the music of Bill Monroe, Jimmy Rodgers, Bob Wills, Gene Autry, Hank Sr. and The Sons of the Pioneers, we hit on a unique sound that had a large appreciative audience.

When we began our format change, however, we quickly discovered we had a problem. The large music library we wanted did not exist on CD and none of the major syndicators had the music we were looking for. As a result, we decided to build a library from scratch.

We knew our library would take an enormous amount of research and work and that it would require the best archiving system we could find. So in 1995, we rebuilt our studios including completely rewiring our phones and electric service.

Bells and whistles

We then installed a state-of-the-art computer system with a Novell network including seven work stations, digital editing, a 36GB (and growing) hard drive, and all the bells and whistles.

Locating the music for our AM library proved difficult. Most of the best stuff is not available on CDs and probably never will be. The real treasures are on 78s, 45s and cassettes. We searched stores specializing in these old recordings and even asked our listeners to search their own record libraries to help us.

Ultimately, we gathered a great library from these and other sources.

But one major potentially fatal problem remained. Virtually every recording we located was marred with noise that made it totally unusable for broadcasting. The old computer adage "garbage in, garbage out" really applies when referring to computer storage and retrieval of rare, classic recordings.

We could do some noise clean-up with our computer. Huge cracks or occasional pops are easy to notch out of a recording with digital editing. But the condition of these old recordings would have taken a monumental amount of time for our computer to smooth it all out.

Clean cuts

Even if we did this, simple EQ by itself would distort the music beyond the bounds of good taste. We desperately needed a way to clean up the cuts and make them airable without compromising the original sound.

About that time, we heard about the Philips Sound Enhancer and called around

to locate one. We actually wound up buying it without even hearing a demo. There was no economically-feasible alternative on the market. It was our only possibility.

Since the Sound Enhancer was originally designed with consumers in mind, its complex functions are easy to learn and use. We just brought it in, hooked it up, and ran it. We could not have been more pleased with the results.

The unit allows us to quickly custom-configure the settings according to the specific problems we find on any given cut. Because the Sound Enhancer is a real-time processor, production is fast and efficient. The hiss and most of the continuous, annoying cracking is easily wiped away. In addition, we can use the unit to create or enhance stereo effects and to add the extreme highs and lows that the original recording never captured.

As each cut is processed and added to our library, we input the name, artist, tempo, time, etc. We also include interesting comments about the selection, the artist, etc. This gives us the ability to call up a selection in a variety of ways depending on our needs at that moment. In addition, the announcer can introduce the cut using information from the "comments" in our computer. Our new system and library have proven so successful, we now plan to put our FM music on computer, too.

Good quality

Currently, we have cleaned up and archived over 2,200 classic cuts — enough to keep our AM operating 24 hours a day. Eventually we will have 5,000-plus AM cuts on our hard drive. At that point we intend to explore the possibilities of syndicating the library to other stations — the quality is good.

The response to our classic country format has been great. Our "down home" AM audience loves this old music as much as we do. From a marketing standpoint, the new format is just what we needed to stand out from our competitors. We're getting calls from excited listeners more than 75 miles away, something that has never happened before.

The Sound Enhancer is an incredible box. It does all it is supposed to do without a hitch, and for a very low investment. It is a key part of our station operation and is the one tool that is indispensable for our music archiving.

For more information from Philips, contact Mackenzie Laboratories in California at 909-394-9007; or circle Reader Service 232.

Ensoniq did not skimp on the MIDI menu. Enormous control and the ability to easily dump and store program data via the MIDI jacks puts the DP/2 high up on the pile of processors available today.

For power-mad production rats, the DP/2 has 300 memory locations for editing and storing one's creations. This is in addition to the 300 ROM presets Ensoniq has already written for you.

Roadblocks

All of this power comes with a migraine. The DP/2's design means accessing, editing and storing a program that requires some mean button-pushing while the 209-page reference manual is close by. This is not an easy box to figure out fast and the common cry of "it's not jock-friendly" will go up in many camps.

While there are many processors that let you simply dial up a close approximation of the sound you want, the DP/2 and big brother DP/4+ are not such devices. These are not meant to be "quickie boxes," but serious tools for serious production.

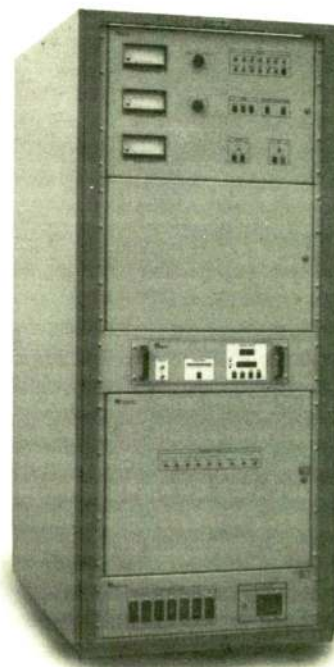
If you are the type of production person who cannot live without your Nonlinear HF Damping and can work those Config and Edit buttons like a Nintendo game, take a good look at the Ensoniq DP/2.

Watch for an in-depth review of the DP/4+ in a future edition of RW's Studio Sessions.

For more information from Ensoniq, contact the company in Pennsylvania at 800-553-5151; or circle Reader Service 204.

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SPECIAL REPORT

Composite Processing Remains Hot

by Eric Small
President
Modulation Sciences, Inc.

SOMERSET, N.J. Few technical issues ever evoked the controversy that composite clipping did 10 years ago. The need for composite clipping had its origins in the pursuit of competitive loudness by FM stations. After the introduction onto the market of overshoot-compensated combined audio processors and stereo generators, clippers were in use at virtually every commercial FM station.

The use of composite clippers stirred the emotions of normally sane broadcast engineers in a way I have never seen before. Debates with fervor normally reserved for discussions of religion, sex and politics took place wherever engineers gathered. Raging letters to the editor were written (just ask RW).

Tool of Satan

Several respected engineers cast themselves in an odd light in their attempts to paint composite clipping as the very tool of Satan. I considered all of the hoopla lots of fun, especially from the point of view of one who was stirring the coals.

Composite clippers, as well as other forms of "tight" peak modulation controllers, are silly and by any real technical measure, unnecessary. Now that may be strange coming from a manufacturer of such devices, but it is true. I am reminded of the reaction of an engineer who had moved from academic research of digital technologies to working in the radio market. Upon first hearing clipped audio, he found it incredible that radio stations would purposely "do that" to their audio.

The only reason for the existence of composite clipping and other forms of tight modulation control is the existence of even sillier and more ambiguous FCC Rules governing peak modulation. But because these rules exist and broadcasters must play by them, composite clippers are still a necessary item at most FM stations.

Drawing on a bit of history, it is clear that FM signal processing had three main eras: the better limiter; overshoot compensation and composite processing.

Better limiters began in the early 60s when FM was still merely a money-losing joke. The Fairchild Conax, a high-frequency, high-level peak controller intended for disc recording was an early entrant into the market. But the high point of the era was the CBS FM Volumax, which was designed explicitly for radio and held a monopoly on the market for more than a decade.

Related drawbacks

FM limiters had two related drawbacks. First, they never seemed to control overmodulation very tightly. And, when pressed to deliver competitive loudness, they rolled off the high-end frequency response so much that many FMs sounded more like AM.

The reign of the Volumax ended when Orban and I developed the Optimod FM integrated processor and stereo generator. We introduced the industry to an integrated approach with overshoot-compensated filters, which delivered a level of modulation control unheard of. This meant the high frequencies did not have to be sacrificed to achieve loudness on the dial.

The first composite clippers came on the scene at about this time. They provided nearly perfect overshoot control at a fraction of the cost of the integrated processor/stereo generator and without many of the disagreeable artifacts of audio processing. But there were drawbacks. They would modulate the pilot and thus foul up the stereo perspective; they could generate a particularly grating type of distortion and they tended to trash any SCA subcarriers.

Unambiguous indication

Then Modulation Sciences introduced a composite processor that protected the

pilot and provided an unambiguous indication of when the distortion point was being reached. It protected the stereo pilot from modulation by not clipping the pilot.


We accomplished this by taking a sample of the composite, filtering out the pilot, clipping the signal without the pilot, saving the energy above the clip point and feeding it back into the composite, out-of-phase. This meant that everything above 100 percent is canceled except the pilot, which rides through unscathed.

While most engineers may still equate composite processing with squeezing the

last decibel from heavily processed contemporary music formats, many engineers find the MSI CP803 Composite Processor a valuable problem solver that offers solutions not normally associated with composite processing. These include limiting composite STL overmodulation; wide dynamic range processing for fine arts formats; transient protection in digital air chains and final overmodulation protection for unattended operation.

Composite STLs were a wonderful invention and they offer tremendous flexibility in setting up and operating an FM station. However, they have some failure modes that can cause modulation exceeding 150 percent, and it may not be caused by the hardware. Lightning, co-channel interference or weather-related propagation disturbances can all cause problems.

continued on page 94 ▶




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USER REPORT

Aphex Upgrades VOA Transmissions

by Pat Chapple
Deputy Chief, Network
Control Center
VOA

WASHINGTON Here at VOA in the Patrick Henry Building, we have gone through the same type of downsizing as many major corporations. As the number of studio engineers declined, it became evident that we really could not handle all the various incoming and outgoing audio and video formats.

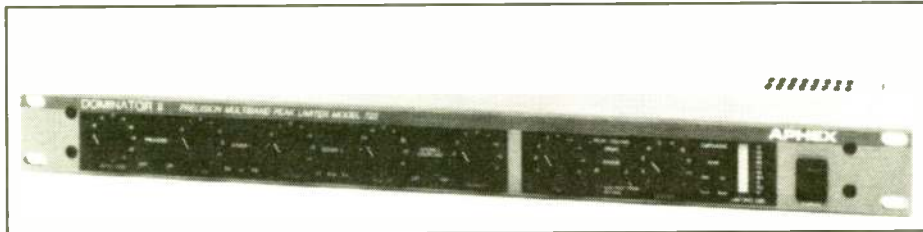
Audio levels fluctuated when broadcasts moved from live microphone to tape to other formats. With our staff down to 11,

it was impossible to make all the necessary line level adjustments.

Some of the studios here were so old that much of the wiring consisted of old telephone lines, and jumping from one broadcast format to another was just too radical. Phase problems were constant and annoying. Engineers had difficulty maintaining consistency in the audio and signal levels feeding the long-linked chain in the VOA network. Moving

The Aphex Compellor works by utilizing three "brains": the Dynamic Verification Gate (DVG), the Dynamic Release Computer (DRC) and the Frequency Discriminate Leveler. This circuitry controls the attach and release characteristics of the leveler and the compressor based upon the texture of the input. This means that the Compellor needs to be set only once, regardless of input changes.

The VOA engineer decides how much



The Aphex Dominator II has performed flawlessly at VOA.

between incompatible broadcasting formats degraded quality.

During our recent upgrading, Candy Clark of Broadcaster's General Store put us in touch with Marvin Caesar, president of Aphex Systems, to test some of its signal processing equipment and see exactly how it would effect our transmissions.

VOA broadcast material originates all over the world and is then transmitted to VOA. News items are received and translated in more than 47 languages and broadcast to the VOA global network in real time. In addition to 38 broadcast studios, VOA production facilities also house three complete video networks.

Audio is then transmitted over 17 full duplex links, 1,300 satellite dishes, seven SCPC direct stereo broadcasts to Central Latin America and Africa, and seven future compressed digital networks. Our links reach into China and other Asian countries through Russia and Europe via Inter-Sputnik Corazon and Utel-Sat systems. Operating 24 hours a day, seven days a week, any equipment we install is carefully tested and evaluated.

We tested the Aphex Compellor, a compressor leveler limiter; and the Aphex Dominator, a multiband precision peak processor. Within a short time, it became apparent that this equipment provided greater clarity and intelligibility to the million of VOA listeners, plus it sustained the quality and consistency of audio levels and signal transmissions. In some instances, there was a notable increase in bandwidth.

No quality loss

VOA purchased 40 Compellors and 40 Single Channel Dominators with the 9000 modified mainframe. Engineers gained the flexibility to move between formats without any loss of audio quality. Signal levels remained constant. Phasing problems ceased outright, quality increased and only the most minor adjustments maintained audio and signal levels.

For VOA, maintaining transmission dependability and quality is a valuable asset. Failure to send continual broadcasts into foreign countries can result in VOA frequencies being used by other sources. VOA considers its airways a possession, which it continually protects.

The VOA fiber link also realized benefits from the Aphex equipment. Four fiber networks feeding into gateway stations in Greenville, N.C., and Delano, Calif., experienced greatly increased bandwidth.

the lowest level signal will be brought up and the proportion of leveling to compression, then trims the output for unity gain. The result sounds as if the engineer is riding faders extremely well.

Automatic correction

Level correction occurs automatically. The Dominator II provides peak protection with zero overshoot. Once the peak is set, there can be no higher amplitude in the output.

The Dominator II features a 104 dB dynamic range and servo-balanced transformerless inputs and outputs terminated to XLR-type jacks. In addition to providing peak protection, the Dominator II produces at least 3-6 dB greater loudness with higher sound quality.

If we bypass using the Aphex equipment, we immediately get calls saying the programming is flat and does not sound right. In addition, Aphex equipment has performed flawlessly for more than 18 months.

For more information from Aphex Systems, contact the company in California at (818) 767-2929; or circle Reader Service 100.

Composite Is Still Hot

► continued from page 93

Although most composite STLs include a carrier-operated squelch designed to prevent open channel noise from modulating the transmitter, they often do not operate when the interruption is very brief or when the signal is noisy but does not disappear completely.

Long-term interference

Lightning is a transient problem, but it can cause the STL receiver to unlock, which can result in a blast of high-deviation noise lasting several seconds. Other kinds of interference and weather-related noise can last for hours. Often the signal fades in and out in a way that the squelch cannot resolve.

The CP803, which is completely transparent below its threshold, is unique in that it can offer absolute protection against serious overmodulation when using a composite STL.

Even without a composite STL, there are many failure conditions that can cause serious overmodulation. A CP803 serves as inexpensive insurance against all failures in

ORBAN

New, Low-cost Digital OPTIMOD-FM from Orban

SAN LEANDRO, Calif.

Designed specifically for stations on a tight budget, the new Orban OPTIMOD-FM 2200 Digital Audio Processor and Stereo Generator offers much of the pioneering technology in Orban's flagship OPTIMOD-8200 at a significantly lower cost.

The 2200 accomplishes all audio processing and stereo encoding in the digital domain to provide easy set-up, flexible programming options, precision calibration and exceptional stability. Orban's proprietary two-band processing and high-frequency enhancement create a perceptively louder and brighter sound with a proven track record for capturing and holding listeners. The eight factory presets have programmable parameters for bass EQ, HF enhancement, gating, AGC and release time to allow creation of a "signature sound."

A protection mode effectively controls peak modulation to maintain legal limits without diminishing perceived loudness. Digital stereo encoding — based on circuits in the Orban 8200 — produces a stable composite output that stays clean and drift-free with no need for periodic adjustment.

The OPTIMOD-FM 2200 also includes remote control, alignment tone generator and multi-function LED meters for set-up and monitoring. Analog inputs and outputs are standard, with AES/EBU digital I/O available optionally.

For more information from Orban, contact Amy Huson in California at (510) 351-3500; or circle Reader Service 161.

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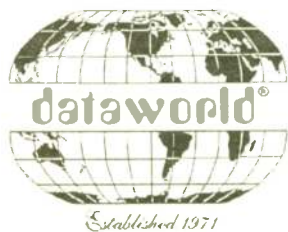
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Displays station contours for all broadcast facility records contained in Mediaxpert™. State & county boundaries, place name labels are displayed.

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Potential and measured audience data is contained in this module. 12+ Audience demographic estimates for specific dayparts are supplied by The Arbitron Company.

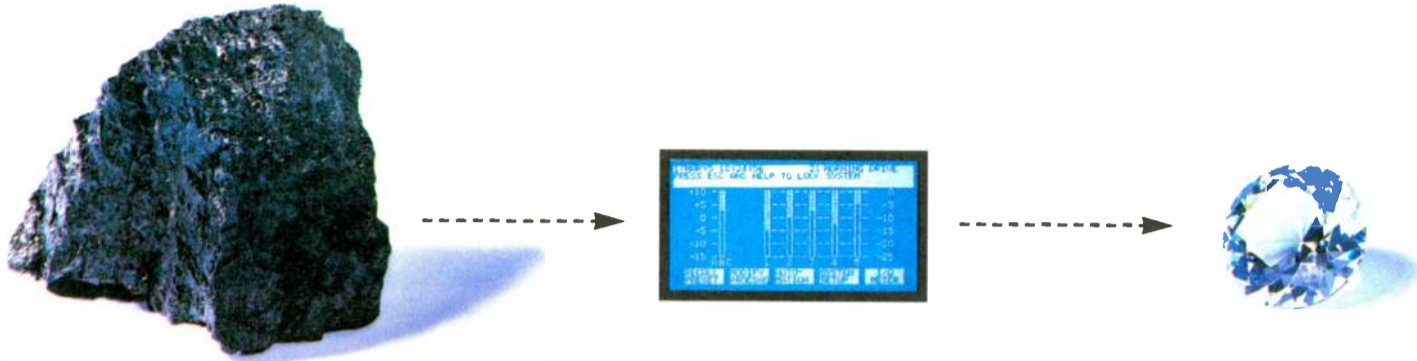
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OPTIMOD-FM 8200 Processor

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TECHNOLOGY UPDATES

BENCHMARK

New Improvements Introduced to A to D Conversion

SYRACUSE, N.Y. The AD2004B introduces new improvements to 20-bit audio A to D conversion. Analog pre-processing significantly reduces system distortion products while a custom phase-lock loop IC virtually eliminates jitter-



induced sidebands under all operating conditions.

Extremely low jitter is absolutely essential for quality A to D conversion. There is no place in the digital audio chain where jitter is more devastating. Phase modulation effects of sample clock jitter at the A to D are permanent and can never be removed. Even jitter below 15 pSec will produce measurable sidebands in a 20-bit conversion of a clean 10 kHz tone.

Though on the market only four weeks, ABC-TV has ordered 21 pieces. WBEB-FM in Philadelphia ordered three converters to use with a new digital console. The San Francisco Symphony used chamber music listening tests to compare its current 20-bit converter with the new AD2004B. The Symphony ordered an AD2004, noting the clearly audible difference between the two converters.

For more information from Benchmark, call Rory Rall in New York at 800-262-4675; or circle Reader Service 31.

ALESIS

The Alesis NanoVerb 18-bit Digital Effects Processor

LOS ANGELES The NanoVerb is the latest effects unit from Alesis, a leader in digital signal processing and recording products. NanoVerb offers 16 effects programs, including hall, room and plate reverb, delay, chorus, flange, rotary speaker simulation and multi-effects.

The NanoVerb uses 18-bit A/D and D/A converters for superb sonic performance (20 Hz - 20 kHz frequency response; >90 dB S/N ratio), and users can interface to NanoVerb via stereo inputs and outputs.

NanoVerb's compact size (5.5 inches wide by 1.75 inches high by 4.5 inches deep) allows three of them to be mounted in a single standard rack space to dedicate each unit to a separate sound source.

NanoVerb is applicable wherever high-quality effects are utilized, from creating on-air promo spots to overall special sound effects for voiceovers to the creation of multimedia presentations.

The NanoVerb offers a front-panel Adjust knob that provides control over a single parameter on each program, such as reverb decay, chorus rate or delay time. Other controls include input level, output level, effects mix and program select.

A rear-panel Bypass jack allows users to turn effects on or off with a standard momentary footswitch. NanoVerb is the most affordable Alesis signal processor ever made.

For more information from Alesis, contact Jeff Klopmeyer in California at 310-841-2272; fax: 310-836-9192; e-mail: alecorp@alesis1.usa.com; or circle Reader Service 153.

MICROCON

Improving Sound with Composite Processing

BROADVIEW HEIGHTS, Ohio Third-generation composite processing can improve your sound and increase dial dominance. The FM FlexiMod from Microcon Systems enhances any processing chain, including those with first-generation digital processors.

Audio is not data. The FlexiMod improves the sound of digital systems by restoring harmonics destroyed in the digital conversion. Digital clipping sounds grungier than analog. The FlexiMod processing module is based on 10 years of field experience on stations of all sizes and formats and with all types of processing chains.



Clipping can be reduced or eliminated altogether without sacrificing dominance. Low frequencies will be clarified by the FlexiMod's psychoacoustic model. High frequencies will shimmer with clean detail.

Thirty-day demos of the FM FlexiMod are available. For more information from MicroCon Systems, contact Jim Somich in Ohio at 216-546-0967; or circle Reader Service 108.

BSS

Full-function, Four-band Parametric Equalizer

NORTHRIDGE, Calif. The BSS FCS-916 is a full-function, four-band parametric equalizer and microphone preamplifier. Typical broadcast applications include: Radio and TV talent microphones, audio cart and video tape audio sweetening, live performance microphone preamplification and equalization.

A thoroughly-shielded, high-quality input section with a high-performance discrete circuitry microphone pre-amplifier and phantom power facility, combine to make the FCS-916 appropriate for both broadcast taping and location sound applications.

Other features of the one-rack-unit-high FCS-916 include a total of six filters with independent in/out switching, two sweepable high/low pass filters plus four fully-parametric EQ filters.

Each parametric band is designed to provide the optimum combination of frequency range and control resolution (with $\times 10$ and $\div 10$ frequency multipliers), maximizing the coverage without the compromises associated with fixed 20 Hz-20 kHz units. Each band also features independent in/out switching as well as a master in/out switch for the entire EQ. Additional facilities include the choice of bell or shelving options for the high and low pass filter bands.



With the FCS-916, BSS has created a truly dynamic tool that is particularly suited to applications where very precise spectral component removal is required. The FCS-916 has a narrow notch filter mode (-30dB) on each parametric band, ideal for noise or interference elimination and broadcast post-production applications.

For more information from BSS, contact the company in California at 818-830-8728; or circle Reader Service 131.

LEXICON

PCM 80 Well-suited for Broadcast/Production Work

WALTHAM, Mass. The Lexicon PCM 80 Digital Effects Processor maintains Lexicon's highest standards for sonic clarity. Its extraordinary processing power yields the finest digital effects and processed reverb available in its price category.

The PCM 80, a true stereo effects unit, features digital and balanced analog interfaces, high-performance 18-bit conversion and 24-bit internal digital bus. Digital and analog inputs can be mixed together, making it especially well-suited for broadcast/production work.

The PCM 80 has found wide acceptance in the radio and broadcast industry and features a comprehensive array of 400 preset sounds ranging from unique, complex digital effects to beautiful lush reverbs.



Dynamic Patching goes far beyond simple modulation effects, creating modulation sweeps which move in time with music or special spatial effects which enhance the broadcast material.

Another unique feature is Time Switch. Like an LFO, Time Switch modulates effect parameters making it possible to create the "Max Headroom" stutter effect among several other time-related, triggered events.

The PCM 80 dynamic spatialization processors is a radical new concept. Two independent spatial processors allow effects to be placed beyond the conventional stereo soundfield.

A front panel PC Card slot expands the processor's functionality with new algorithms and presets. A continuing series of effects cards is being introduced. Recently released cards are: Pitch FX featuring 100 new presets and six new algorithms including time compression (Varispeed), Dual FX featuring 200 new presets and 25 new algorithms, and Scott Martin Gershbin Post FX featuring 100 presets designed specifically for spot and post production requirements.

For more information from Lexicon, contact the company in Massachusetts at (617) 736-0300; fax: (617) 891-0340; e-mail: 71333.434@compuserve.com; or circle Reader Service 104.

Broadcast Equipment Exchange

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

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Bogen GA6A (6), new in sealed boxes, \$50/ea or all for \$250 +shpg. E Davison, 217-793-0400.

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Hafler Pro 1200 60 watt power amplifier \$225.00/ea. 1 available. Call 1-800-622-0022.

Yamaha A-700 integrated power amp, 100 W/chan, exc cond, \$125. R Cobb, Solid State Recording, 1044 Lightfoot Rd, Winaina FL 33598. 813-634-1940.

ANTENNAS/TOWERS/CABLES

Want To Sell

Phelps Dodge 2 bay FM antenna, 107.1 MHz, 1-5/8 EIA input, \$500; 10 kW dummy load, gd for AM & FM, \$800; 3-port coax relays, 1-5/8 EIA flanges on ends, \$250; 7/8 EIA flanged cable approx 4' long, \$50 ea; 7/8 EIA flanged 90's, \$25 ea; Scala HDCA-10 antenna 92 MHz, \$100, all plus freight & pack. D Gilliam, KJZZ, 1435 S Dobson Rd, Mesa AZ 85202. 602-710-0803. GILLIAM@RIO.MARICOPA.EDU

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Andrew 1-5/8" 200' w/connectors, \$1100; 100', \$500; med pwr rototiller 2 bay, 97.7, \$1400. Ron, KPIK, 1206 N Main, Beebe AR 72012. 501-882-1015.

EF Johnson 145-102-13 AM antenna changeover switch, \$135. P Willey, WBTN, Historic Rte 7, Bennington VT 05421. 413-663-3419.

Andrew LDF7, 200' w/hangers, no connectors, \$1000; Scala CA5-FM (4), 5 element yagi, rear mount, 9.0 dB gain, \$200 ea; Scala PD4, 4-way power divider, \$100. D Magnuson, 423-525-6358.

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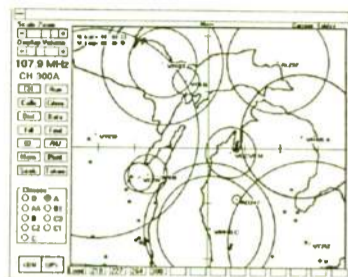
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Radio Systems RS-6 console \$2950.00/ea. 2 available. Call 1-800-622-0022.

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Ramsa WR-8816 16 chnl, 4 group, 2 output recording/mixing, ea chnl has 3 band EQ, insert point & direct output, mint cond, \$1800/B.O. M Lesko, Upstate Sound, 136 Beverly Rd, Syracuse NY 13207. 315-474-8985.

Sony MX-20 8x4 chnl mixer/line mixing board, \$175. D Meyer, 805-962-8273.

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Mackie 1604, \$725; Tascam 512, \$950; Tascam 520, \$1750; Allen & Heath SYNCON 28x24, \$8000; Ramsa 820, \$2200. W Gunn, 619-320-0728.

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Inovonics 230 8 band peak limiter, AM or FM selectable. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

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Sennheiser MKE2-60 mini lavalier microphone \$175.00/ea. 1 available. Call 1-800-622-0022.

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Bird 4384 portable RF DIR wattmeter. \$475.99/ea. Call 1-800-622-0022.

CCS CDQ-2000E; Adtran DSUIIAR (4); Straight Wire Audio PH-2B phone pre-amp; Aphex stereo Compellor, BO, D Irwin, KJAZ, POB 1450, Alameda CA 94501. 415-616-5768.

Cellabs Datajack cellular data adapter \$90.00/ea. 2 available. Call 1-800-622-0022.

Circuit Research Labs DX3 stereo noise reducer \$275.00/ea. 1 available. Call 1-800-622-0022.

Comrex LXT/R one line encoder/decoder \$625.00/ea. 1 available. Call 1-800-622-0022.

Cutting Edge VIP1 voice processor \$1550.00/ea. 1 available. Call 1-800-622-0022.

Digital Audio TE-01 The EdTior \$150.00/ea. 2 available. Call 1-800-622-0022.

Dynatech DAT2.OHD dat drive. \$1095.00/ea. Call 1-800-622-0022.

Fidelipac DCR1040 record module \$1500.00/ea. 1 available. Call 1-800-622-0022.

Gentner #TP teleprocessor \$295.00/ea. 1 available. Call 1-800-622-0022.

Gentner VPIFB-BO versapatch I/FB-BO \$350.00/ea. 1 available. Call 1-800-622-0022.

Gentner DH-I digital hybrid \$695.00/ea. 1 available. Call 1-800-622-0022.

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Henry SYNCHRO synchrostart \$75.00/ea. 1 available. Call 1-800-622-0022.

HHB 1PRO portable dat recorder \$850.00/ea. 1 available. Call 1-800-622-0022.

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JBL 4412AL studio monitor (left) \$350.00/ea. 1 available. Call 1-800-622-0022.

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Valley Audio 401 mic processor \$375.00/ea. 1 available. Call 1-800-622-0022.

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Wegener 1601 main frame; Wegener 1605-12 pwr supply; Wegener 1606-51 block rcvr; Wegener 1622A demod; Wegener 1645 audio decoder; Wegener 1646 audio decoder, all in excel cond, w/manuals, sold as set, \$900. T Peloubet, WGRY, Grayling MI. 517-631-5583.

Lyrec tape timers (3), \$300 ea; (7) Seike/Spotmaster tape timers, \$175 ea; (5) Spotmaster TP1B cart winders w/timer, \$225 ea; (5) Spotmaster TP1B cart winders, no timer, \$50 ea. Mel Crosby, 408-363-1646.

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McMartin TBM 3700 monitor, fair cond, w/manual, \$200; McMartin TBM 2200A stereo monitor, fair cond, w/manual, \$200; McMartin TBM 2000B SCA monitor, gd cond, w/manual, \$200; McMartin 2500C RF amp, gd cond, w/manual, \$300, or all for \$750. T Peloubet, WGRY, Grayling MI. 517-631-5583.

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ITC ESL IV splice finders (2); ITC Omega mono play (3); ITC Omega mono R/P; BE 2100PS stereo play (3); BE 2100RPS stereo R/P; BE 2100RP mono R/P (3); ATC mono, R/P (1) & (2) play; IGM mono (3) R/P & (3) play; Tapeaster 700P mono play (9); Tapeaster 700RP mono R/P (3); Allied A-Line wood cart rack; Lazy Susan cart racks (2); ITC Scotchcart (1000); Fidelipac (1000). R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

Otari MX 5050 BQII 4 chnl R/P R-R, 9 yrs old, \$995/BO. J Travis, WCIK, POB 506, Bath NY 14810. 607-776-4151.

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MRL short test tapes 2", \$229. W Gunn, 619-320-0728.

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Harris MW 5 xmrtr. 1410 freq, flood damaged, must sell, BO, KBNP, 811 SW Front St #430, Portland OR 97204. 503-223-6769.

Harris BT 52H twin 25 kW highband VHF xmtrs, excel cond. \$30,000 J Proctor, KVCT TV, 980 FM 1746, Woodville TX 75979. 409-429-3679.

LPB 60 W AM on 1460, like new. \$1500, on air less than 30 min, replaced by larger xmrtr. R Swan, WROY, POB 400, Carmi IL 62821. 618-382-4161.

McMartin 5 kW 3 phase FM w 8000 exciter, all current models recently refurbished by PE, vgc, pick up in Arkansas, \$10,000/BO. Ron, KPIK, 1206 N Main, Beebe AR 72012. 501-882-1015.

BE 1984 FM30 30 kW xmrtr, 40,000 hrs w/exciter, BO. G Liebisch, Curtic Media Group, 919-876-0674.

Harris MW-5A, 5 kW AM in vgc, tuned to 1470 kHz, \$15K. G Arroyo, WONO, 407-260-6100.

LPB AM60P, like new, used 40 mins as 3rd AM backup, \$1500. R Swan, WROY, POB 400, Carmi IL 62821. 618-382-4161.

RCA BTF20E1, 20 kW PA w/Television Technology Model X 30 W exciter, removed from service 9/95; Cutler-Hammer 3 phase isolation transformer, 75 KVA 3 phase 240 V to 3 phase 208 V. R Lankton, WCVU-FM, 941-639-1188.

Wilkinson 25 k on air 99.9 MHz, incl filter, good shape, \$20,000 or B/O. Dwight or Mike, Jan-Di Broadcasting, 970-242-5665.

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3CX10,000H3	6550B
3CX15,000A3	6550C
3CX15,000A7	6AS7G
3CX15,000H3	6BM8
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4CX250BC	833A
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4CX400A	TH5-4
4CX800A	TH5-6
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TRAFFIC/ACCOUNTING COORDINATOR: New Green Bay FM station interviewing for experienced traffic, billing, payroll person. Candidate must have experience with some formal accounting background and experience with some formal accounting background and experience to set up new traffic and scheduling system. Training on system provided in-house by Computer Concepts. Station will use networked Computer Concepts Traffic/billing system. Resume in confidence to temporary construction address: Jack Le Duc, President, 909 Kepler Drive, Green Bay WI 54311. EOE.

CHIEF ENGINEER: needed for Wilmington-Jacksonville, North Carolina duop. Candidate must be experienced in transmitter and studio maintenance. FCC General Class License preferred. Please forward resume to: Ms. Timmons, PO Box U, Salisbury, Md. 21802 or FAX 410-742-2329. EOE

Assistant Engineer with PC and RF experience wanted for SFX stations in Greenville, SC market. Send resume and salary requirements to: Chief Engineer, SFX Broadcasting, PO Box 100, Greenville, SC 29602. E.O.E.M/F/H/V/.

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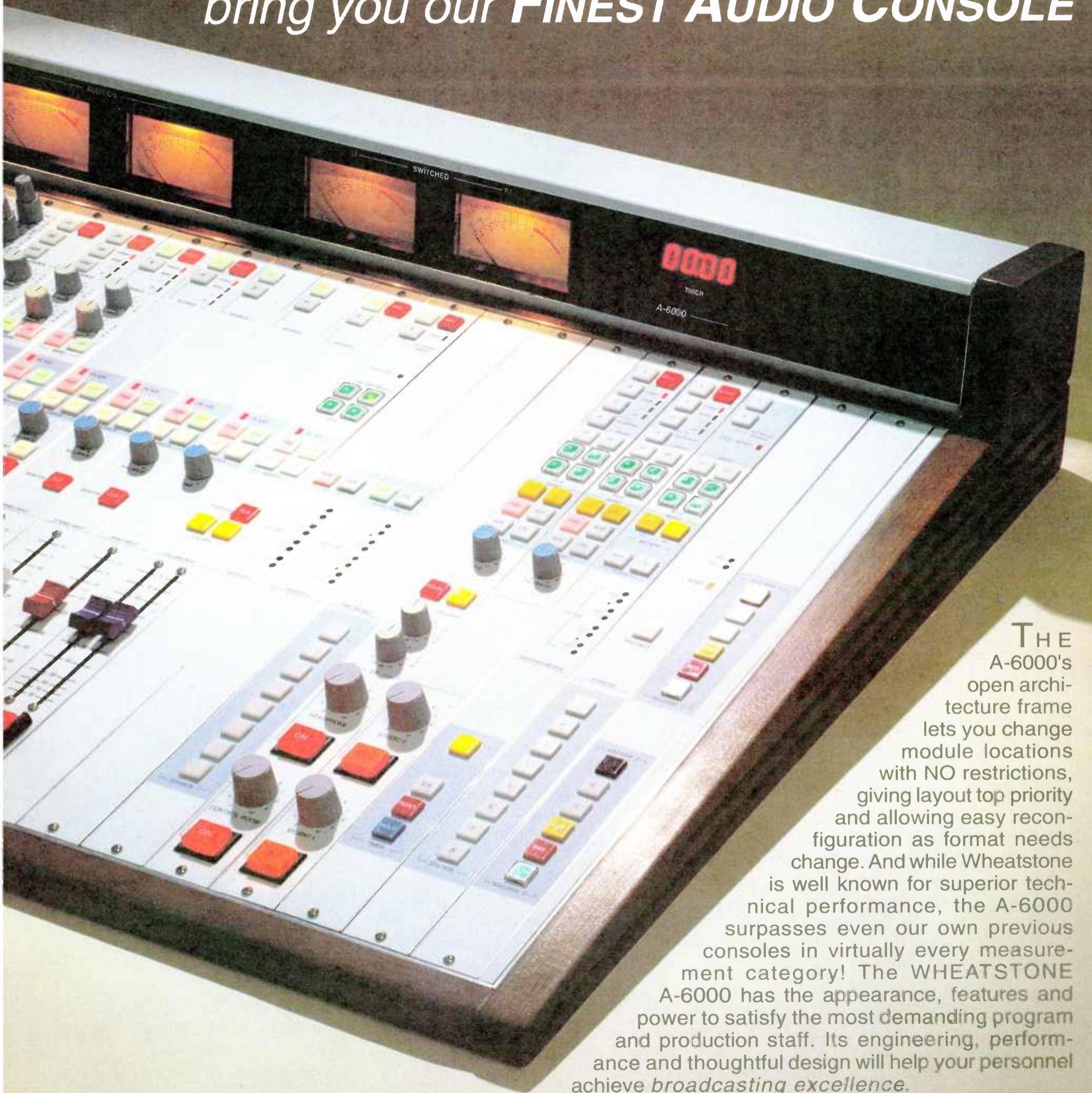
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