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Radio World®

Workbench

Workbench
See Page 69

Vol 21, No 10 | Radio's Best Read Newspaper | May 14, 1997

DARS Hits the Streets — in a Few Years

by Matt Spangler

WASHINGTON "Sold! to CD Radio for $83 million and AMRC for $89 million."

No, it didn't quite happen like that, but after 26 rounds of bidding as part of a Federal Communications Commission auction last month, Satellite CD Radio and American Mobile Radio Corp. did pay $83 million and $89 million, respectively, for two 12.5 MHz slices of S-band spectrum at 2320-2345 MHz. This will enable the companies to provide new satellite digital audio radio services (DARS) to compete with existing terrestrial broadcasters. The service promises to provide seamless, nationwide, CD-quality programming.

In other words, you get into your car in Wilmington, N.C., turn on 2320 X and drive clear out to Barstow, Calif., all the while listening to your favorite tunes, continuous, commercial-free and in digital sound.

At least, that's the plan.

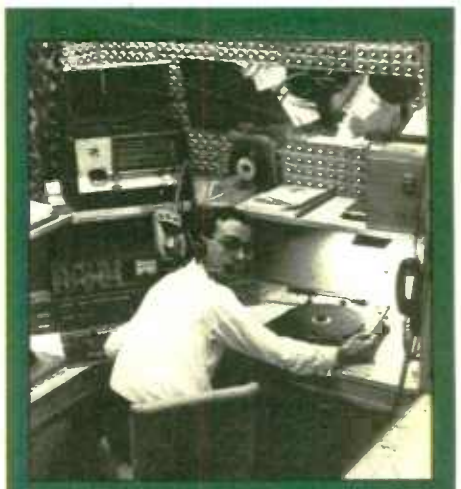
CD Radio hopes to roll out 30 channels of music and 20 of news by mid-1999. The music channels will be commercial-free, but available on a subscription basis, ranging from $5-10 per month, depending on how it is initially received by the public. The non-music channels — all-news, all-talk, all-sports — will be included as part of the service, but if a feed from BBC, CNN or another programming provider is received, some commercials may be included.

David Margolese, president of CD Radio, said that DARS will cater to niche markets, like classical, reggae, blues and jazz, that aren't available in many underserved markets. FCC Commissioner Rachelle Chong praised the technology for being able to provide this service: "In my view, this is the most exciting aspect of DARS — its potential to serve listener groups with diverse interests who may not be large enough in a traditional broadcast community to support specialized programming by local broadcasters."

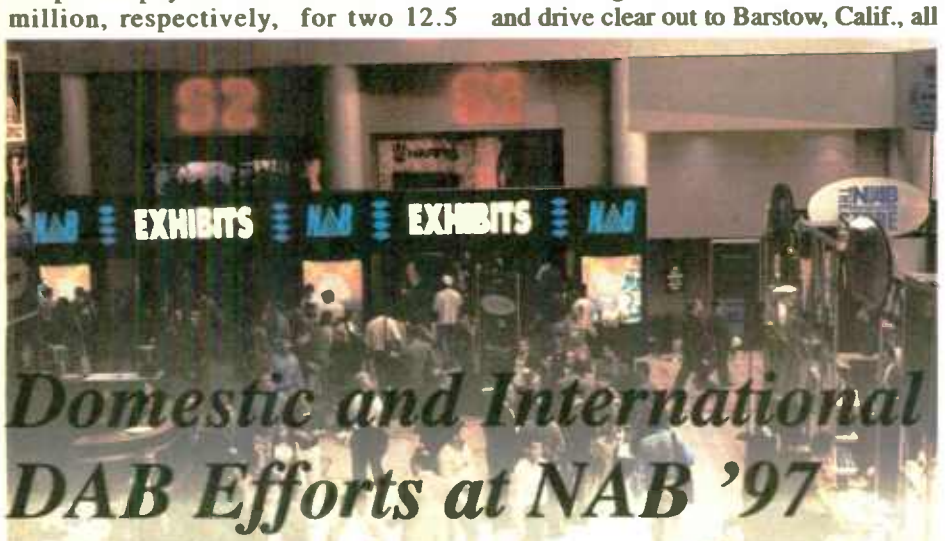
Loral Space & Communications will build three satellites for CD Radio, and Arianespace will launch them.

At press time, AMRC did not have an exact timetable for when the service would be launched; Lon Levin, president of the company, said he hoped it would be ready in two-to-three years. (He said that timetable and expenses would be released to the FCC as part of a revised application due May 16.)

See DARS, page 6 ▶



Bill Clough of UPI got his start in radio *very* close to home — in the garage. Page 96.



Domestic and International DAB Efforts at NAB '97

by Matt Spangler

LAS VEGAS They may have been packing the house for the digital television sessions at the Broadcast Engineering Conference at NAB '97, but a sizable crowd was on hand for the audio side of the spectrum as well. With 45 million radios expected to be digital by the year 2003, broadcasters are definitely listening.

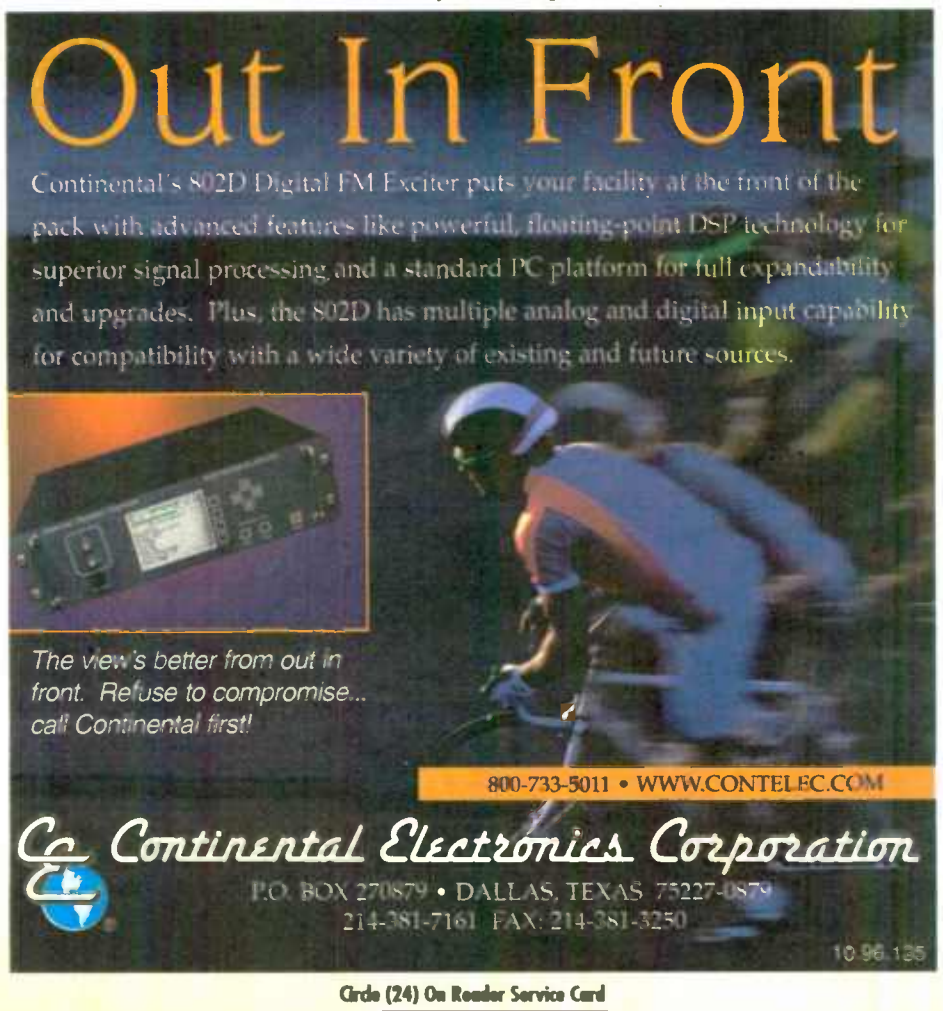
There was a distinct difference between the U.S. and international presenters at the "Digital Sound Broadcasting" sessions: the domestic papers were aimed at trying to resolve the long-standing debate over what standard should be adopted here, while their international brethren discussed what they already are implementing.

The methods and conclusions of the digital audio broadcasting (DAB) field testing, which wrapped up in San Francisco last fall, were discussed in some detail. DAB is designed to eliminate multipath, giving consumers seamless, CD-quality sound. The Federal Communications Commission entrusted the Consumer Electronics Group (now called the Consumer Electronics Manufacturers Association), a division of the Electronics Industries

See DAB, page 12 ▶

Radio World Cool Stuff Award NAB 1997

'Cool Stuff' Winners Inside!



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NEWSWATCH

Gannett to Exit Radio

ARLINGTON, Va. Gannett Broadcasting is getting out of the radio business.

The media conglomerate sold its stations to Evergreen Media for $340 million last month. The stations were WGCI-AM-FM, Chicago, KHKS(FM), Denton, Texas and KKBQ-FM, Pasadena, Texas.

Chancellor Media, which announced its merger with Evergreen in February, will now rank first in market share in four of the nation's top-10 radio markets, and first or second in eight of the top 10 markets.

In a separate announcement Evergreen said it will sell WPNT-FM and WLUP-FM in Chicago to Bonneville International Corp. in order to bring Evergreen into compliance with the ownership caps established by the Telecommunications Act of 1996.

In addition to being the publisher of USA TODAY and USA WEEKEND, Gannett now consists of 91 daily newspapers, 16 television stations, cable operations

See NEWSWATCH, page 2 ▶

World Radio History

NEWSWATCH

▶ NEWSWATCH, continued from page 1

in five states and alarm security services.

The transaction is still subject to approval by the Federal Communications Commission, but is expected to close in the fourth quarter of this year.

Republicans Fail to Back Chong as FCC Nominee

WASHINGTON Senate Majority Leader Trent Lott (R-Miss.) submitted recommendations to fill two Republican slots at the Federal Communications Commission last month. One name not on the list: Rachelle Chong.

Her term expires June 30, and in the words of Sen. John McCain (R-Ariz.), chairman of the Commerce Committee, the Republicans want "some new blood" in there. Thus, they have recommended two relative unknowns in the telecommunications world to the White House: Harold Furchtgott-Roth, chief economist for the House Committee on Commerce, and Michael Powell, chief of staff for the U.S. Department of Justice Antitrust Division.

"Mr. Furchtgott-Roth and Mr. Powell bring the expertise the FCC so badly needs at this time," Lott said in a press release.

The President makes the official nominations for commission seats, but traditionally forwards the recommendations of the opposition party.

Furchtgott-Roth has been with the committee since 1985. In that time he worked on the Telecommunications Act of 1996, and has pursued an aggressive deregulatory agenda. Before coming to the committee, he was a senior economist with Economists Inc., specializing in, among other things, telecommunications regulation. He also recently published the book "Cable Rate Regulation."

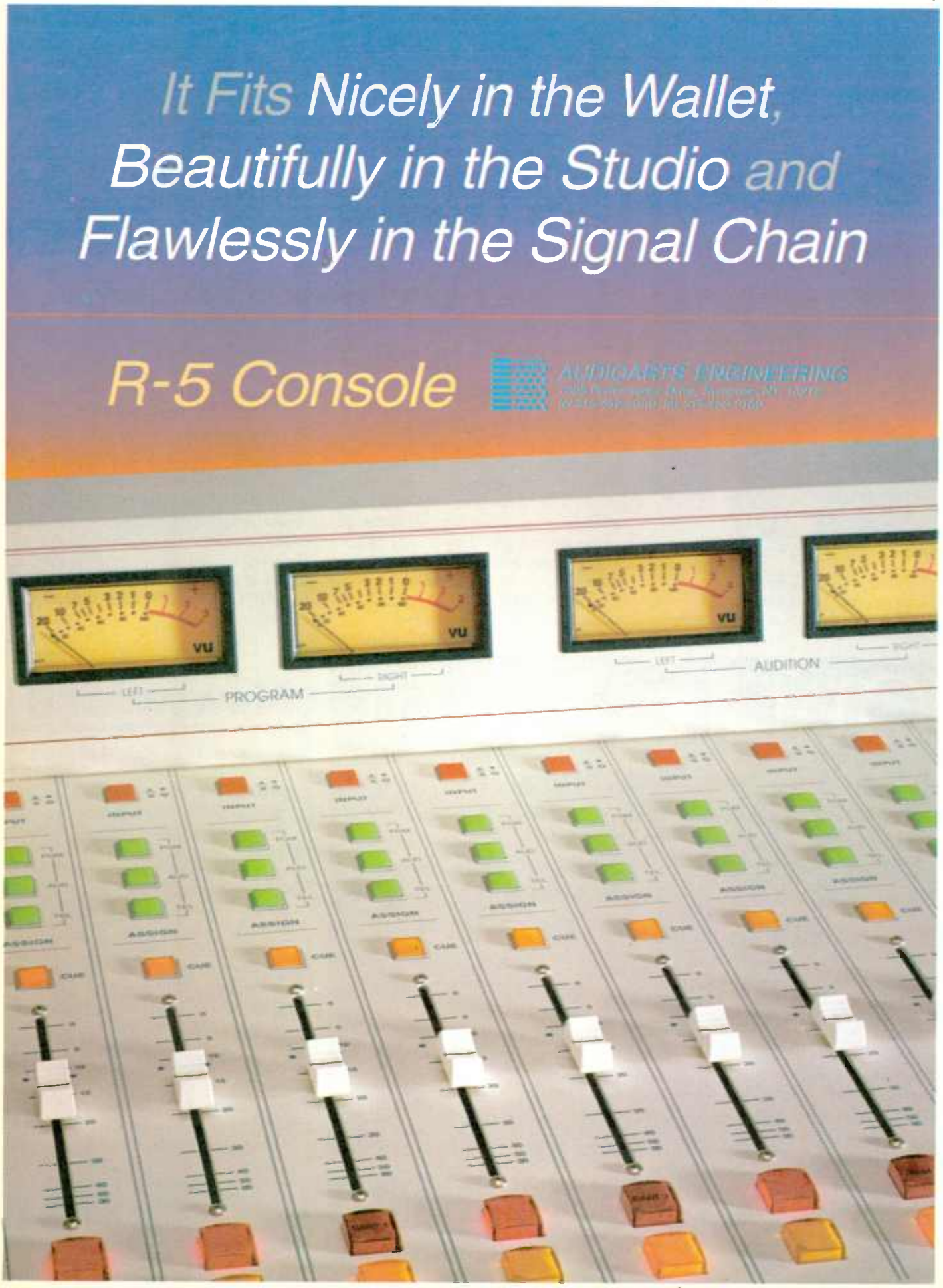
Powell, the son of retired Gen. Colin Powell, has been with DOJ since Dec. 1996. Before that, he was an associate at the Washington law firm of Olmeveney & Myers, where he practiced, among other areas, telecommunications law.

Asked at a press conference about how he felt about Powell as a nominee, McCain said, "He is a fine, outstanding, principled, knowledgeable telecom lawyer ... I don't care about his position on telecom issues, because they change monthly."

Sen. Conrad Burns (R-Mont.) said that the Commerce Committee hopes to begin hearings on all the nominees, which will likely include FCC General Counsel William Kennard as the Democratic contender, by mid-May, and to wrap up the hearings by the end of June.

Meanwhile, several prominent Asian-American organizations, including the Organization of Chinese Americans, the Congressional Asian Pacific American Caucus Institute and the National Asian Pacific American Bar Association, have called upon President Clinton to renominate Chong to another term. "The APA (Asian Pacific American) community has

See NEWSWATCH, page 3 ▶



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World Radio History

FCC Tries to Close Pirate Equipment Shops

by Matt Spangler

WASHINGTON Are pirate radio equipment manufacturers allowed by the Federal Communications Commission to terrorize our airwaves? One "legitimate" equipment manufacturer says yes.

John Devecka, sales manager of LPB Inc., cited companies that manufacture transmitters that he alleged could "in no way possible meet FCC regulations." The FCC requires transmitters have a fixed antenna, non-standard RF connector and a field strength of 250 µV at 3 m or less, which is typically accomplished with about 20 mW.

Devecka said companies that target pirate broadcasters will claim to sell 20 W and 100 W linear amplifiers for export, only to broadcasters who claim to be using the equipment for "experimental" purposes. "... they say, 'Send us a letter saying that you're taking it out of the country, and we'll send you anything you want.'"

Log on, find out

Log on to the website of L.D. Brewer, which is referred to on the newsgroup *alt.radio.pirate* as "Your One Stop Pirate Shop," and you will get the following message: "Custom Built Transmitters: we will custom configure your station for you from any combination of the listed equipment, build it into your choice of enclosure, and add custom features as you desire." (The site is located at *www.ldbrewer.com*)

Beverly Baker, chief of the FCC's Compliance and Information Bureau, which deals with the pirate radio problem, said at a panel session at NAB '97 that the Internet makes it easy to distribute information about how to set up a station illegally.

> **I turn away (pirate broadcasters) all the time.**
>
> — John Devecka, LPB Inc.

Devecka said that if LPB decided to stop complying with FCC regulations, the company could double its annual sales in five minutes. "I turn away (pirate broadcasters) all the time, probably a dozen a week," he said. As a manufacturer that targets low-power broadcasters, he is understandably concerned.

He said that he has brought his concerns to "dozens of different people" at the FCC, and they are looking the other way. Of Baker, Devecka said: "I don't know what she's going to do about it; I know she's not enforcing it."

Baker denied this. "We deal with the sale of non-type accepted equipment all the time," she said.

Devecka cited one example in which a company in Boca Raton, Fla. was using an expired certification ID number "on a device that couldn't possibly meet certification," yet informed the FCC it was the old device. Devecka was told that the Office of Engineering and Technology alerted CIB to this, but nothing was done about it.

Baker said problems might occur as a result of how the statute that gives CIB its enforcement powers is worded. As it stands now, manufacturers can sell equipment that does not necessarily meet type acceptance as a kit — the statute is not clear on that.

"We don't have language in our statute that allows us to go after people who are not themselves violating the law, but who are aiding and abetting others," Baker said.

Devecka said this sort of "nonenforcement" can be attributed to a reduction in FCC field personnel. "Since they cut back all of their field offices, all of the engineers who didn't want to move were fired, and they were replaced by lawyers, not engineers."

Allen Myers, president of Chapter 209 of the National Treasury Employees Union — the FCC union — said this isn't entirely true. All of the 14 monitoring stations save one were closed, but their employees were not fired if they were willing to relocate to other branches, like

See PIRATE, page 11 ▶

Lights Turned Out

The licenses of the following silent stations automatically expired on Feb. 9, 1997, pursuant to Section 312(g) of the Telecommunications Act of 1996:

Call Letters	Community of License	Frequency
AM		
KAIN	Vidalia, La.	1040
KCLS	Flagstaff, Ariz.	690
KDEW	Dewitt, Ark.	1470
KFAS	Casa Grande, Ariz.	1260
KHAT	Lincoln, Neb.	1530
KTYN	Minot, N.D.	1430
WAYB	Waynesboro, Va.	1490
WHIA	Dawson, Ga.	990
WHRF	Bel Air, Md.	1520
WHSY	Hattiesburg, Miss.	1230
WLVN	Brantley, Ala.	1080
WMFL	Monticello, Fla.	1090
WRHX	Herndon, Va.	1440
WSRR	Washington, N.J.	1580
WTOX	Lincoln, Maine	1450
WTSS	Scranton, Pa.	1320
WUWU	Cordele, Ga.	1490
FM Commercial		
KHUG	Rocky Ford, Colo.	95.9
WAZE	Dawson, Ga.	92.1
FM Noncommercial		
KBDY	St. Louis, Mo.	89.9

NEWSWATCH

▶ NEWSWATCH, continued from page 2

been greatly disappointed that this Administration has either ignored or was unwilling to appoint an APA to a cabinet level, or even sub-cabinet, post," said OCA President Michael Lin.

DISCUS Asks Clinton to Mediate on Booze Ads

WASHINGTON Federal Communications Commission Chairman Reed E. Hundt had harsh words for liquor distillers at the National Association of Broadcasters show last month.

Just before the show, Fred Meister, president of the Distilled Spirits Council of the United States, wrote to President Clinton, asking him to bring together beer, wine and liquor companies to develop a code for alcohol advertising for broadcasters within 90 days.

"Your tasking for the group," the letter read, "would be for them to develop a unified code that sets the same responsible standards for all forms of beverage alcohol (beer, wine and spirits) advertising and also would be the guidelines for broadcasters."

Hundt took DISCUS to task at NAB, saying "it's sad" for the distillers to divert the negative press focused on them to beer and wine companies.

Meister had written: "The fact is that there can be no sensible or effective analysis of the issue of youth, alcohol and advertising if beer and wine are not part of that process."

Hundt did agree that a code should be developed, but by broadcasters themselves. At a press conference, NAB President Edward O. Fritts attacked Hundt for this idea, calling it "a solution in search of a problem."

A number of entities, including the NAB, members of Congress and fellow commissioners, have questioned whether the FCC has jurisdiction to regulate liquor advertising. Hundt issued a statement just after DISCUS released its letter to the President, saying: "There's absolutely no question that the FCC has jurisdiction to investigate whether airing hard liquor advertising ... is consistent with broadcasters' public interest obligations."

Clinton had not responded to DISCUS at press time.

Stations Honored for Public Interest Journalism

CINCINNATI Two radio stations took home 1996 National Journalism Awards from the Scripps Howard Foundation. They were recognized for their human interest stories.

KNAU(FM), a public station in Flagstaff, Ariz., won the small market radio broadcast journalism award. The station produced an hour-long documentary and five subsequent reports exploring racial tensions in Arizona's Indian country.

The large market radio broadcast journalism award went to WCBS(AM), New York, which provided instant and wall-to-wall coverage of the TWA Flight 800 explosion.

Both stations received $2,000 in cash and a Jack R. Howard plaque.

"The journalists we're honoring practice journalism in the right way," said William R. Burleigh, president and CEO of The E.W. Scripps Company.

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World Radio History

Radio Loses Some, Gains Some

WASHINGTON If you read page 1 before you read this, you know that Gannett is exiting the radio business. Too bad. They created and ran a terrific group of stations that gave us some of the top names in radio. For example, WGCI-AM-FM Chicago, home to the now-nationally syndicated Tom Joyner.

The group sold for $340 million to Evergreen Media. And of course, Evergreen has done some pretty interesting stuff in radio. You just hate to see a good one go.

Although ... Out of the business of running radio stations, but not out of radio. I was pleasantly surprised to discover that Gannett is planning to keep its limited partnership in USA Digital Radio, the consortium developing IBOC DAB for the United States.

And speaking of state-of-the-art radio, the Washington SBE Chapter meeting last month was held at the transmitter site for WWRC(AM) here in town. If you ever want to see AM radio engineering/design done right, this is the facility to visit. And rather than go on and on about it right now, I am promising you a full-blown story on the facility with lots of pictures. Very soon in an upcoming issue of **RW**.

I also wanted to publicly thank Bradley Broadcast Sales and Art Reed for buying the whole group dinner that night. In addition to the incredible station visit, we ate dinner at the famous Lido's Pizza of Hyattsville, Md. If any of you out there went to school at the University of Maryland or anywhere in the vicinity, you know what a real treat that was.

But the real thanks is meant because a show of support of the SBE (particularly at the local level) is a show of support of the broadcast industry. Plain and simple. And I know it is much appreciated and needed.

Westwood One Chairman Norm Pattiz and NBC's Tom Brokaw

★★★

Tim Schwieger was named president of Broadcast Supply Worldwide (or BSW). Tim will direct all aspects of the day-to-day operation and financial management of the multimillion dollar company. He had been serving as the company vice president of marketing, and he has been with BSW for 15 years.

He joined BSW as one of two sales reps. Within a year he was promoted to sales manager and one year later became vice president of sales and marketing.

Congratulations Tim. Best of luck. It is always nice to see good things happen to nice people and Tim is certainly one of the good guys in our business.

★★★

In another one of those odd little stories that have been made possible by today's de-regulated industry, NBC Nightly News Anchor Tom Brokaw just signed a deal with Westwood One. Pictured left with Westwood One Chairman Norm Pattiz (l), Brokaw stated "I'm delighted to be associated with Westwood One." Brokaw will write and host "The Tom Brokaw Report," a daily 90-second feature produced exclusively for radio covering topics from politics to human interest stories.

What makes this fascinating is that Westwood One was purchased, a couple of years back, by Infinity Broadcasting which in turn was just absorbed by Westinghouse and is now part of the big CBS Corp. family. So, Tom Brokaw is being distributed on the radio by the same people who bring you Charles Osgood and Dan Rather. In other words, the competition. I'm having a hard time keeping track of who goes where these days.

NBC Radio's Peter Maer and President Clinton

★★★

President Clinton was also on Westwood One recently, commemorating the 50th anniversary of the end of Major League Baseball's color barrier. Pictured below, President Clinton told Westwood One NBC Radio News Correspondent Peter Maer: "We never finished the job started by Jackie Robinson."

In an exclusive on-on-one interview held in the Oval Office, Clinton said that "Americans don't have enough true friends across racial lines," and a challenge for the future is to find ways to "appreciate what is different about us."

The interview aired on the NBC Radio Network.

★★★

Lastly, but perhaps most importantly, I wanted to mention that NAB Senior Vice President of Public Affairs Walt Wurfel is leaving the NAB. Walt has been with NAB for the last 11 years, and has helped forge many of the important broadcast regulation and events of the last decade.

Not only that: he is a terrific friend of broadcasters as he is a radio station owner himself. I am sure that every trade press reporter will agree with me when I say he will be sorely missed. Walt is a class act all the way and as a former newspaper man, understands the term "editorial integrity."

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World Radio History

READERS FORUM

If you have comments for Radio World, call us at (800)336-3045 or send a letter to Readers Forum (Radio World, P.O. Box 1214, Falls Church, VA 22041 or e-mail 74103.2435@compuserve.com or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

Ease up on the jocks

Dear **RW**,

I am sick and tired of people in this industry complaining about the new EAS. I am a jock at the LPI station here (yes, a *jock*), and I see that some "fine-tuning" can be done to EAS, but hey, we're all in uncharted waters here. For those in the industry who are angry that the FCC has "forced" this on stations, wake up! You have had *years* to prepare for an EBS replacement! Even a "dumb jock" like me knows that.

Which leads to my point.

Over the years in this publication, various articles have referred to all jocks as "incompetent," "destructive" or "couldn't get a remote on the air without a handle" stereotypes. I have always taken personal offense to such comments. If I wrote an article with the line "... and we wouldn't have been off the air in morning drive if the weekend part-time contract engineer had vacuumed the air filters on the transmitter," I would be scaled within an inch of my life on this very page!

I realize that somewhere is the worst (technically competent) jock. Somewhere is the worst doctor, and — *surprise!* — somewhere is the worst *radio engineer*! If you have jocks who enjoy starting carts with a ball pen, then perhaps it's time for you to darken the door of management and programming, and come up with a code of expected competency for the staff, a code with teeth.

For those who are concerned about jocks generating header codes for EAS alerts, perhaps you should either train them better or just move into the radio station and have your mail forwarded there so those "dumb jocks" can't screw things up. This "dumb jock" holds W8BQ, a valid Extra Class ham license. For those of you who haven't been out of the shop for awhile, they don't just give those things away.

It is my hope that the writers and editors of this publication will show a bit more respect for jocks in the future.

Phillip A. Kelly, W8BQ
WHIO(AM)/WHKO(FM)
Dayton, Ohio

Grades of UTP

Dear **RW**,

I read with great interest "A Computer Network Case Study" (Feb. 19) by Lynn Meadows. She mentions how the network designers changed from coax to twisted pairs, but she doesn't mention that these are twisted pairs *for data*, most commonly called UTP, unshielded twisted pairs.

She also doesn't mention that UTP comes in different quality grades, called Categories. There is Category 3 and 5, each of which would work well on the Windows-based network proposed. (There used to be Category 4, but very few manufacturers produce it anymore.) You can go farther with Cat 5 than Cat 3. The industry standard for Cat 5 (TIA/EIA 568A) says you can go 328 feet (100 meters). That's probably why the designers said that twisted pairs could go 300 feet per run.

However, there are even better UTP designs, such as Belden Data Twist 350, which can go farther still. And there is a new "super" UTP from Belden called Media Twist, which is probably the best UTP ever made and can go even farther. Each grade costs more and allows you to go farther. How far depends on a number of factors, primarily the data rate and the bandwidth required.

If your readers are putting in their own networks, they should be aware of the wire they are putting in and how far it can go. Thanks for the interesting article and your always thought-provoking newspaper.

Stephen H. Lampen
Technology Development Manager
Belden Wire & Cable Co.
Richmond, Ind.

Cool Stuff, Cool Show

The desert dust of NAB '97 has settled. What did it tell us about the state of radio?

First, the industry is vibrant. More than 100,000 attendees came to Las Vegas this year, a record.

Certainly, many came for the TV and multimedia exhibits and seminars, and in fact, some people in our business will tell you, "The spring NAB is a TV convention."

Make no mistake; this is a huge show for radio. That's why manufacturers consistently time the release of new products for the spring. That's why regulators, lawmakers, owners and managers make the annual trek to Sin City. Corporate engineers were highly visible on the radio/audio floor. Exhibitors rolled out digital consoles, new transmitters, uncompressed STLs and Internet tools. No other convention gets this vote of confidence from the gear people.

Second, consolidation is making itself felt beyond the ownership suite. Equipment dealers reported brisk sales during the past six months, as groups began to learn how to operate large combo facilities and network sites together. Suppliers also feel the pressure to consolidate or update their offerings. As reported last issue, Harris Corp. will acquire Northeast Broadcast Lab Inc. and work to beef up its radio systems business. Broadcast Electronics invested in the high-end STL business by buying Dolby's digital STL product line.

Expect some radio suppliers to respond to the strong pull of new business in DTV and multimedia. Expect others to take advantage of this strategy, and position themselves as serving radio, and only radio.

Third, this convention reinforces that the National Association of Broadcasters is the ultimate trade association and lobbying force. Few trade organizations can put together this much marketing muscle, or attract as many influential, technically-savvy attendees, from its own industry *and* from outside.

Fourth, radio faces quite a few challenges. They include uncertainty over the future of DAB in the United States, creating interesting programming in the post-Telecom era, new competition from satellite-delivered audio, and questions raised by the Internet.

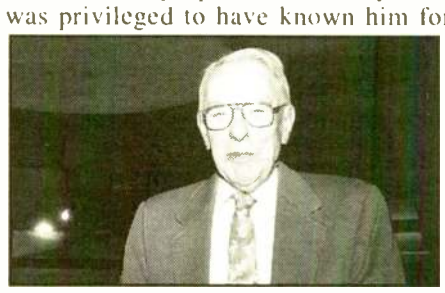
Last, the NAB show remains the place to see the cool stuff. Once again **RW** is proud to offer our own list of Cool Stuff we saw. Find these products throughout the pages of this issue, and let us know what you think. —**RW**

'Granny' Klink W3AFV SK

Dear **RW**,

The April 16 issue of **RW** had an article on the passing of WTOP engineering consultant Granville "Granny" Klink. I'd like to add some personal thoughts.

I didn't know Granny as long or as well as most of the people in the industry, but I was privileged to have known him for almost 17 years. He was a true gentleman, and my idea of the consummate engineer. He seldom had a negative opinion about someone or something. On the few occasions he did, it was almost always directed at an action and not the personality.



'Granny' Klink

Granny was also a ham radio operator. He had his call, W3AFV, for more than 60 years. He was active in CW, and his desk at the WTOP transmitter has a semi-automatic key and practice oscillator.

At age 84 he could send, in my estimation, at a rate in excess of 20 words per minute. And he probably copied even faster. Even for one who barely reads code, hearing him practice was one of the most pleasant sounds I'll ever experience.

I have an avid interest in broadcasting history, and I interviewed Granny in 1990. Over the years he related many things that I now kick myself for not getting down on tape, such as the time he spent the greater part of a Christmas day in the late 1940s working on technical problems at the top of what was then the WTOP(FM) tower in Arlington, Va., now the site of WAVA(FM). And his recollection that WTOP, as WJSV and located in the Earle Building, used the studios of the U.S. Recording Company (the former WMAL facilities at 712 Eleventh St., N.W.) to originate CBS programs when the station studios were in use.

There's so much more to Granny Klink; we who knew him could write volumes and never remember everything. To his immediate family, his friends and his WTOP family, my deepest sympathy.

To Granny, 'til later, rest in peace. OM.
Granny Klink W3AFV SK
Bob Paine KA3ZCI AR

Robert W. Paine
Chesapeake Beach, Md.

New Fiji FM

Dear **RW**,

May I add a P.S. to Neil Sanderson's "Pacific Missionaries Thrive" (March 19)?

As of last November, the Fiji Islands have a new FM station — Radio Light 106. (I'm of the opinion it is 106.1 or 105.9, but that is the way they advertise it.) The station is owned and operated by Evangelical Bible Missions out of Summerfield, Fla.

In addition, as of March 1996, Harvest Baptist Church on the island of Guam is broadcasting over its new FM station — KHMH, Harvest Family Radio, 88.1.

Just thought some of your readers might be interested in this information.

Dave Freelan
Sounds of Joy
Greentown, Ind.

— Note —

The photo of Simon Geller in the April 2 issue was by David Spink and provided courtesy of the Gloucester Daily Times.

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Next Issue of Radio World
May 28, 1997

World Radio History

GUEST COMMENTARY

Stand-alones, Stand Up!

by Bryan Smeathers

CENTRAL CITY, Ky. There has been some confusion over the Feb. 19 story, "Small Market Next for DOJ?," written by Matt Spangler, and over our application for an FM transmitter in Central City, Ky.

WMTA(AM) at 1380 kHz was not and is not planning to re-broadcast its signal over the FM translator; current FCC rules disallow that. WMTA was not the applicant for the translator. A separate company (Muhlenberg On The Air Inc.), which has the same ownership as WMTA, is the applicant for the FM translator.

Productive

The confusion originated by the story was, however, very productive. I have received calls from AM owners and managers all over the country, who related their concerns over the impact on small market operators of the rapid consolidation resulting from the Telecom Act of '96. It is clearly evident that the Telecom Act is slanted to the big-money major corporations against the "mom and pop" stations, AM and FM, throughout the country.

Several of these stations have communicated a need for a new national association, for AM broadcasters only, to fill the void left by the NAB and most of the state associations whose primary concentration is on the "big stations." This is an idea worthy of further discussion and pursuit.

Why not indeed?

As for the confusion about an AM station retransmitting on an FM translator: That too is an excellent idea. Why shouldn't AMs, placed at a greater disadvantage by the implementation of the Telecom Act, and more specifically the stand-alone AMs, be permitted to simulcast on an FM translator, properly allocated and licensed to their community? Sure, the range won't be as great as that of a regular FM station, but it will improve service to the community of license and provide a more competitive position for the AM station. In many markets where AM stand-alones exist, spectrum is not available for a full-power FM. The AMs have no chance of gaining an FM.

Have we forgotten our radio roots? This industry was founded on small-market AM radio. AM radio still provides a terrific service but is now at a greater disadvantage than ever, especially the stand-alones. Why shouldn't the FCC make some special revisions for the stand-alones by changing the rules to allow the stand-alone AMs the opportunity to add FM translators to simulcast their signal where available?

There has been and continues to be substantial deregulation, which benefits the big-money broadcasters. Isn't it about time to do something for the "mom and pop" broadcasters?

Any small-market AMs, and more specifically the stand-alones, are encouraged to e-mail their comments to me at *wmta1380@broadcast.net* or write to me at P.O. Box 973, Central City, KY 42330. Also send your comments to **RW**.

■■■

Bryan Smeathers is president and general manager of WMTA AM 1380 Inc. You can visit the station website at http://biz-comm.com/wmta

Mixed Feelings About DARS

▶ DARS, continued from page 1

AMRC is a subsidiary of American Mobile Satellite Corp., which provides mobile communications throughout much of the United States and its possessions.

Margolese said that the company will not focus on competing with AMRC.

"Our competition is our opportunity, and to the extent that there's another operator out there, that's only going to assist in expanding the awareness in the marketplace, as far as we're concerned. We're not gonna squabble over a portion of whatever they've got."

Primosphere, one of the other proponents of the service that lost out in the auctions, had been set up expressly to provide DARS. The company will now be dissolved. The other major proponent, Digital Satellite Broadcasting Corp., could not be reached for comment.

Serve the servants

CD Radio formed a strategic alliance with WorldSpace Inc., which is developing a digital audio satellite system that will beam programming into underdeveloped countries. WorldSpace, which has a 20-percent interest in AMRC, plans on launching a network of three satellites beginning in mid-1998.

"This is the ideal strategic relationship for AMRC to gain access to proven technology already in development and accelerate market entry in the U.S.," said AMRC President Lon Levin. The alliance also matches the ideal of the U.S. DARS service, which is designed to reach traditionally underserved rural areas.

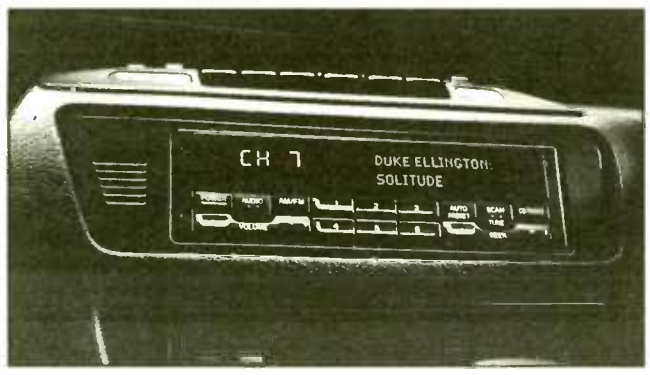
Gary Shapiro, president of the Consumer Electronics Manufacturers Association, told National Public Radio's "All Things Considered" that he thought that the service might only work in rural areas. "What has to be determined is how much you lose when you're driving," he told **RW**. "If you're driving in Kansas, you probably don't lose that much. If you're driving in Washington, D.C. ... you're going to lose something."

The S-band spectrum suffers from multipath in areas with an abundance of trees or buildings, he said. The results of testing of digital audio broadcasting (DAB) systems by the Consumer Electronics Group arm of CEMA concluded that the Eureka-147 L-band system is the best performer. L-band spectrum, however, is used by the Department of Defense in the United States.

The FCC has released a further notice of proposed rule-making asking for public comment on how the commission should authorize the use of terrestrial repeaters by DARS providers. Comments were due May 2, and reply comments are due May 23.

Stirred, not shaken

The National Association of Broadcasters has long been opposed to DARS because, in its view, it poses a threat to the localism of terrestrial broadcasters. The association also believes that calling DARS a satellite service is dubious, because it would require the use of thousands of terrestrial repeaters as translators in order to provide seamless service (see **RW**, Feb. 5).



CD Radio's DARS receiver

Shapiro shares this view. "I think they'll face some challenges unless they use thousands of repeaters," he told NPR.

At the NAB show last month, radio broadcasters weren't exactly shaken by the news that they may soon be competing with satellite-delivered audio services, but they acknowledged that DARS could mean trouble for them. Radio transmitter manufacturers also saw the service as a potential threat to the growth of their business.

Jeff Detweiler, sales manager for transmitter manufacturer QEI, called DARS "a concern" since it could cut into demand for terrestrial transmitters. He was hopeful that an in-band, on-channel (IBOC) DAB system would be ready soon, to level the playing field.

At the show USA Digital Radio had an exhibit on its IBOC system, which the company hopes to begin field testing later this year. USADR President Bernee D. L. Strom doubts that DARS will be ready ahead of IBOC. "We've already proven our system works in a mobile environment," she said. "They haven't proven mobility."

A sales manager for another major transmitter manufacturer didn't want his name or company mentioned, but he expected broadcasters to pressure the FCC into keeping DARS in check. "There are far too many broadcasters out there to allow this system to overrun the current system," he said.

Public Radio News Service Put on Block

by Matt Spangler

BOSTON Monitor Radio is for sale.

The Christian Science Church announced last month that it will sell Monitor Radio, the second largest provider of news broadcasts to the public radio system, after National Public Radio.

Sue Schardt, manager of marketing and development for Monitor Radio, said it had become costly to balance the radio service with other church activities.

"We've been providing this as a service to public radio for 13 years, at a rate of about $8 million a year," she said. "After a lot of thinking and reviewing, it's just clear that that's too much of an expenditure ... We have 'The Christian Science Monitor' newspaper and a variety of other activities that we need to support."

MONITOR RADIO

The church is in negotiations with a number of buyers, including Public Radio International, the U.S. distributor of Monitor Radio. The Monitor Radio name will be retained by the church.

"We plan to remain a constructive force in radio news and are currently exploring new programming opportunities," said Monitor Radio Editor David Cook. "Any future radio efforts will be on a more modest scale and will have to give promise of being self-supporting."

"The Christian Science Monitor" began producing the programming in July 1984. The three editions of the service — Early, Mid-day and Daily — are carried on more than 200 public radio stations and are heard by 1.1 million listeners per week.

The New York investment banking firm of Veronis, Suhler and Associates will handle the sale, which is expected to be completed by July 1. The sale price has not been disclosed publicly.

The church's Herald Broadcasting Syndicate also plans to sell its two shortwave stations, WSHB, Cypress Creek, S.C. and KHBI, on the island of Saipan. When Monitor Radio is sold, religious programming, which is currently broadcast on the shortwave stations along with the news, will be broadcast until the shortwave stations are leased or sold.

National Public Radio will offer a one-hour program of domestic, international and business news at 5 a.m. EST to fill the void left by Monitor Radio's Early Edition.

"Our stations told us they need air-quality programming in the early morning," said NPR President and CEO Delano Lewis. The programming will begin June 30.

World Radio History

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World Radio History

Latest on RFR and FAA Regulation

by John Bisset

LAS VEGAS As an engineer, one of the highlights of any trade show conference is a briefing on changes in technical legislation. At a NAB '97 panel session, engineers were updated on developments in RFR and FAA regulation.

Jim Hatfield, of the engineering consulting firm Hatfield and Dawson, reminded engineers of the new Federal Communications Commission RF exposure guidelines that were adopted last August, and which are scheduled to be implemented this September. Of concern to AM broadcasters is that the ANSI standard is more permissive for AM than the National Council on Radiation and Protection report, which was adopted by the FCC.

This report refers to two sets of exposure guidelines — occupational and for the general public. Safety guidelines for the general public are five times stricter than for the workplace.

Robert Cleveland of the FCC explained that the docket is not closed out yet. He encouraged clicking on the RF safety icon on the FCC Web site for more information.

He also said that the FCC has made a change in exclusion policy. The commission is examining the prospect of a more uniform policy, based on power and distance criteria. Also for the first time, cellular, PCS and amateur operators have been included in making safety determinations.

A new bulletin is being prepared for the broadcast industry. However, its title will be different. Because of the misinterpretation of the term RF "Radiation" by the general public, the term "Electromagnetic Field" will be used. The new bulletin will include charts, graphs and exposure limits for broadcast facilities.

Signs, signs, signs

During the roundtable portion of the session, Cleveland and Hatfield were joined by Bill Hammett of Hammett and Edison, an independent engineering consulting firm, Keith Larson of the FCC and Chris Imlay, a communications attorney.

Safety guidelines for the general public are five times stricter than for the workplace.

Imlay asked panelists about the practicality of warning signs, and whether they actually protect the public. What can be done, for example, in mountain settings, where antennas are located near camping locations, hiking trails or picnic groves? How broadcasters who do not comply would be liable also seems unclear.

One of the more interesting concepts was suggested by Karl Lahm, a former consulting engineer now employed by Voice of America. He talked about a set of standards he encountered in Germany that set a limit for heart pacemaker EMI, as well as hearing aid interference.

The FCC has evaluated these issues, but no standards have been proposed at this point.

Another important question was, if a broadcaster has to file a license renewal between now and September 1, to which standard does the broadcaster certify? The answer is unclear, but it was pointed out that when the present RFR standard came into effect, it was not applied retroactively.

With the commission tower registration program well under way, the FAA/FCC panel discussion was timely. According to panelist Keith Larson of the FCC, over 15,000 towers have been registered with the Gettysburg office. He was joined by John Allen, an aerospace consultant, professional consulting engineers John F. X. Browne and Donald Everist, and Steve Rohring and Jerry Sandors of the FAA.

There was some concern among those present that the FAA was using its airspace model as a tool to deny facilities.

Radio consultant Jack Mullaney asked that existing facilities be given priority over other applications. He also explained that, depending on which region of the FAA you dealt with, you get dramatic differences in interpretation of EMI standards.

It was suggested that if an existing facility has a non-conforming tower lighting system, that this system be described as "existing lighting." In this way, the FCC will not issue standard lighting restrictions, which would place the operation at odds with the license.

To help expedite applications, it was suggested that if a determination of hazard is made by an FAA region for an existing station tower, that an appeal be filed with the FAA in Washington. If a station is simply correcting coordinates, a cover letter explaining this should accompany the registration form.

Broadcasting Enters The Internet Age

by James Careless

LAS VEGAS The Internet is going to push the growth of consumer media products through the roof, and broadcasters are ideally suited to cash in.

That was the message Rick Ducey, senior vice president of the National Association of Broadcasters' Research & Information Group, drove home to delegates during his keynote address at the Broadcast Engineering Conference at NAB '97.

"The Internet is no longer the province of geeks," Ducey said. "Of the 229 million people over the age of 16 in the U.S. and Canada, about a quarter are using the Internet, and 17 percent of those are on the World Wide Web. About three-quarters of World Wide Web users search for information about products and services. That comes to about 5.6 million people who have searched and bought something on line."

Consumer passion for the Internet continues to grow, Ducey said, which means that consumer purchases are going to substantially boost consumer media revenues.

"In 1990, 44 percent of the spending on consumer media was from advertisers," he noted, a percentage that is expected to drop to 41 percent by the year 2000.

Yet, "at the same time, overall spending on consumer media, which includes advertising, plus end-user and institutional spending, is expected to jump from $193 billion in 1990 to $353 billion by the year 2000, or an increase of 83 percent." The money will come in the form of new products, such as WebTVs and home PCs, and new services that exploit the 'net's interactivity. Surveying the possibilities, Ducey added, "Internet Age broadcasters have all the necessary qualifications to be an important part of this marketplace."

The (gilded) Internet Age

By "Internet Age," Rick Ducey was referring to what he sees as the "Third Age" of consumer media products, the first having been the "Newspaper Age," which began 150 years ago, and the second being the "Broadcast Age," which started with radio. Said Ducey, "As broadcasters become digital, our companies will automatically become 'Internet Age' companies."

Because of this, "we'll have essentially

See INTERNET, page 12 ▶

NAB Inducts Legendary Wally Phillips of WGN

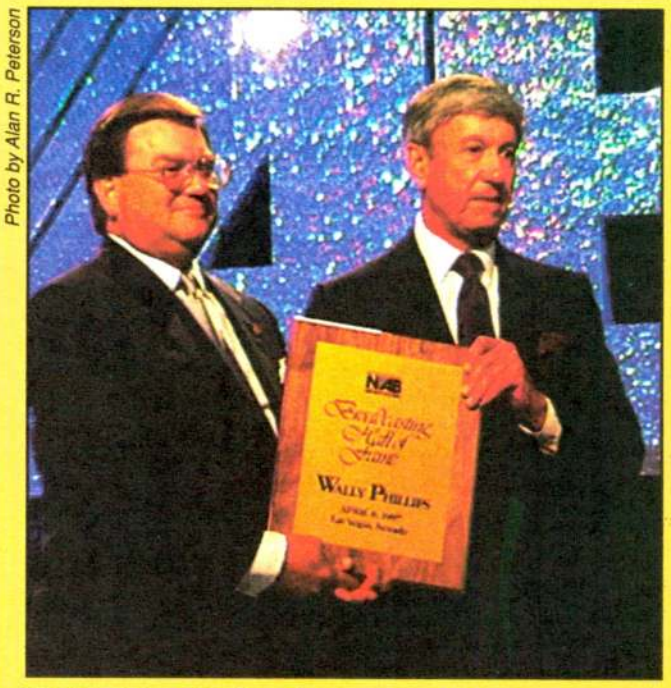
by James Careless

LAS VEGAS Without once mentioning underwear or private parts, legendary Chicago morning man Wally Phillips was inducted into the Broadcasting Hall of Fame at NAB '97.

In his heyday at WGN(AM), Phillips attracted 1.5 million people — half of the entire radio audience in Chicago — to his weekday broadcasts.

"For over 40 years, our honoree has followed his own built-in programming rule," NAB President Eddie Fritts told delegates, "and that is radio is a people-to-people medium. That belief allowed him to create one of the most successful morning programs in all of radio, in one of this country's most competitive markets, Chicago."

Photo by Alan R. Peterson



NAB President Eddie Fritts presents Wally Phillips with Hall of Fame plaque.

Fritts then added, "Comedian Jonathan Winters once said, 'I have never been able to figure out exactly what it is Wally Phillips does, but whatever it is, he does it very well.'"

Praise for Phillips also came from Dick Orkin, advertising specialist and owner of Dick Orkin's Radio. Orkin knows Phillips well, having competed against him in Chicago.

"Avails on his program virtually sold themselves," Orkin recalled, who eventually had to dress up as "Chickenman" in a bid to win back listeners. "My program director reminded me of that over and over again."

Summing up what he termed the "mystery" of Phillips' success, Orkin asked, "Wally, how in the world did do you do it all those years? I mean, without even once even discussing underwear or private parts?"

Orkin noted Phillips' success as an example for broadcasters to follow.

The highlights of Phillips' career were touched on by another NAB Hall of Famer, Paul Harvey, in a prerecorded presentation delivered in his inimitable "The Rest of the Story" narration style.

Afterwards, Phillips himself came to the podium to accept the honor. Looking around the assembled heads of American radio, he quipped, "I feel like Madonna in the Chicago Bulls locker room after the press has gone. I don't know where to start."

World Radio History

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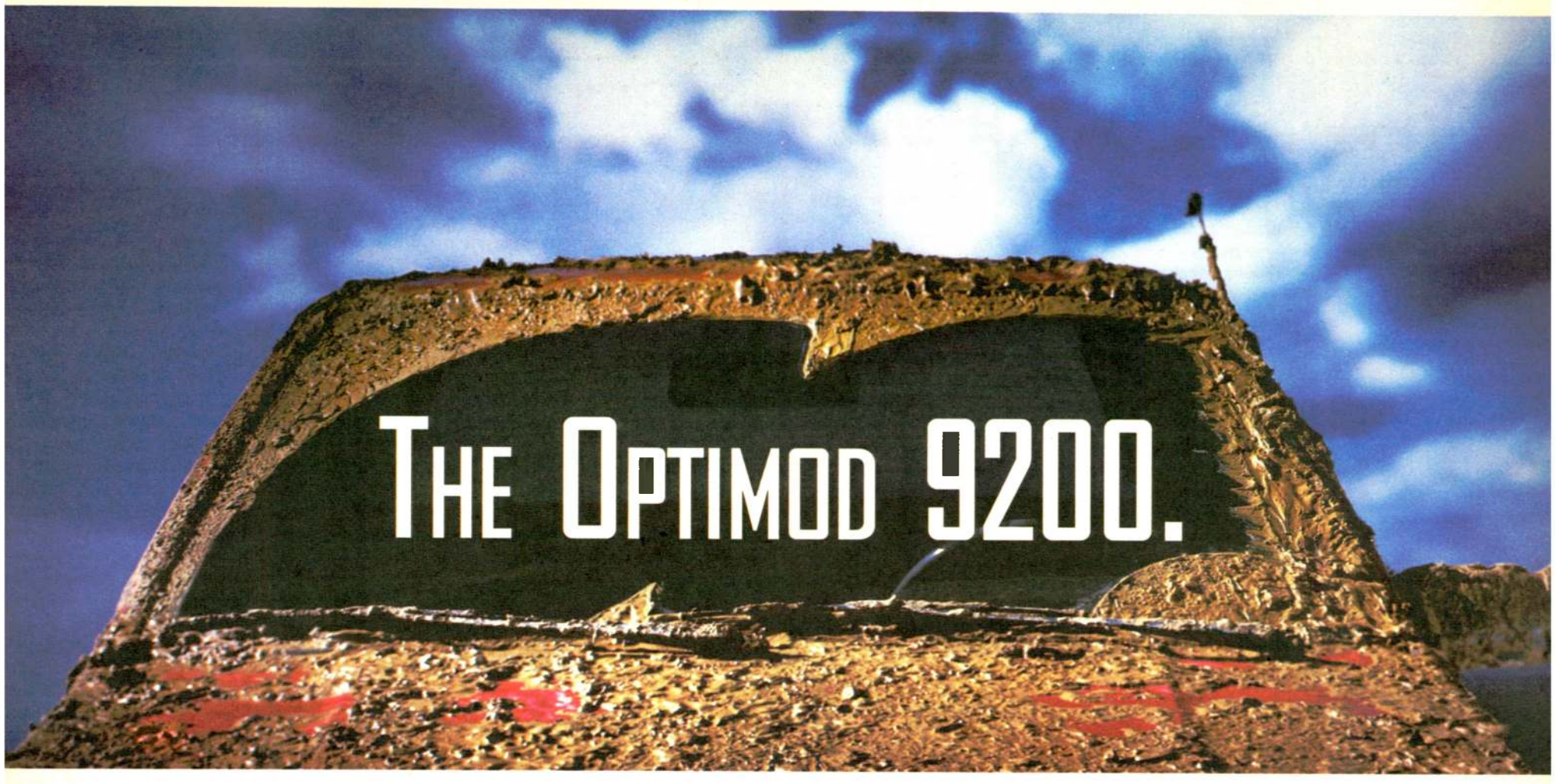

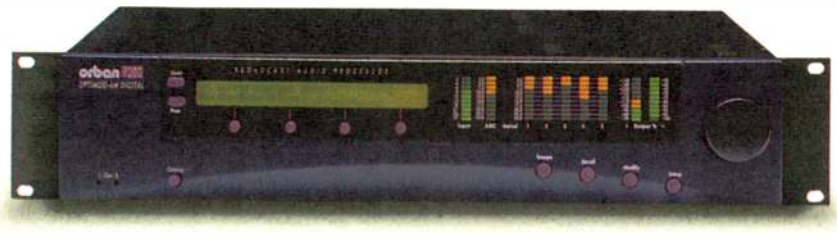

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World Radio History

FCC vs. Pirate Equipment

▶ PIRATE, continued from page 3

the Wireless Telecommunications Bureau and the Common Carrier Bureau. These employees were mostly the watchstanding personnel, who were manning the commission high-frequency direction finding network.

Baker said that downsizing the monitoring stations made the process more efficient.

"We're doing the same activity; in fact we have a system that works better than the previous one did, and where we previously needed about 110 employees just for that system, we now can operate it with seven or eight," she said.

Last warning ...

Still, is the monitoring of illegal equipment working? "There may be an element of truth that some enforcement is not being done because in some areas of the country they don't have an office there anymore," said Richard Smith, chief of OET, which processes applications for type acceptance and approval of radio equipment. The Miami field office of CIB, which would have handled the Boca Raton case, was in fact one of those that was shut down. The lack of personnel, and the fact that they must cover the entire country, complicates matters.

CIB is charged with taking the recommendations of OET — that a product doesn't meet its specifications — and alerting a company in writing to this effect. Smith said that when CIB gets backed up, OET may issue its own letter to the manufacturer.

"We might write them a letter as sort of both a warning and an inquiry that says, 'We have reports that you are marketing this device under a certain number, and according to our records this is for a particular type device that may not be the one you are marketing, and we need clarification and, by the way, there are penalties if you are doing this.'"

Smith also said that if OET continues to get complaints about the manufacturing of a particular product, it will follow up with CIB. Normally, he said, the process is quite effective. "If some illegal activity is shut down, usually then, shortly thereafter, your complaints cease."

This photo, from the L.D. Brewer web site, allegedly shows an FCC agent examining the transmitter of Tampa, Fla. pirate station 102.1 FM.

Korea Aims to Be Digital By 2001

SEOUL, South Korea Over the coming five years, South Korean FM radio and television broadcasting will begin to convert to digital broadcasting, the Ministry of Information and Communication announced recently.

For FM broadcasting, the ministry is planning to adopt the Eureka-147 DAB system, but a separate plan will be adopted for AM and shortwave broadcasting after observing international trends. The ministry has not specified when such a plan will be announced.

During the transition period from analog to digital, Korean radio and TV stations will air programs in both analog and digital modes.

According to Hyong Taegun, deputy director of the Department of Communications Policy in the Ministry of Post and Telecommunications, radio and TV stations will begin trial digital broadcasts of some of their programs in the year 2000. The trial broadcasts will last for one year.

The conversion will proceed gradually from 2001 to 2010 in order to give broadcasters and the public enough time to adopt to the new system.

Digital broadcasting is expected to be a big boost for the South Korean electronics industry.

—by Magda Kowalczuk

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World Radio History

Jordan Says CBS Prepared For New Challenges

by Chris Joaquim

LAS VEGAS CBS Corp. is ready to take on the challenges posed by recent dramatic changes within the broadcast industry, according to Michael H. Jordan, chairman and CEO of Westinghouse Electric Corp. He delivered the opening keynote address at NAB '97.

Jordan spoke of a number of issues facing the industry, including public interest responsibilities, the digital revolution and market-share erosion.

He suggested that over-the-air broadcasters reaffirm their commitment to public interest issues.

"This has been a noisy and sometimes contentious year in the public policy arena," he added. "Whenever there is a dramatic change, there is naturally contention and debate over issues and events. Let us be sure that no one interprets that healthy debate to be a retreat from our public service role."

Looking toward the future, Jordan said, "Just around the bend is another revolution — the replacement of the economic rules of engagement that have shaped the media industry to the current day."

Jordan predicted the total cost structure in the industry would rise at a rate of 10 to 15 percent annually, and said that he doesn't expect revenues to match this pace.

He said he believes the implications of this cost/revenue gap would be increases in investment risks and failures of new ventures, continuing consolidation trends and the evolution of the media buying system, which allocates revenues from brands to specific advertising vehicles.

Jordan attributed the drive towards greater consolidation to the "horizontal and vertical integration opportunities" available. By horizontal, he was referring to cross-promotion opportunities, such as the simulcast of "60 Minutes" on many of CBS' news radio stations.

He also spoke of Westinghouse's efforts to develop a successful in-band, on-channel (IBOC) digital audio broadcasting (DAB) system with USA Digital Radio. "We're pleased to see that USA Digital Radio has made tremendous progress toward creating a robust system that will require limited investment by the industry," he said.

In closing, he said, "These will be challenging times for our industry. Some will fail ... most will survive on the strength of their assets and brands ... A few will flourish by adapting to the changing imperatives that I have been discussing. We at Westinghouse — soon to be the CBS Corp. — intend to be in that last category, and to flourish."

Radio Still Exploring Internet Activities

▶ INTERNET, continued from page 8

two basic business lines," he added. "We will have the traditional "Broadcast Age" business of providing programs in real time. However, using the same kinds of content, we can manage our media assets and distribution platforms to also diversify very successfully into Internet Age economics. We can do data broadcasting, multiple program feeds, broadcast multiple data types, offer software services or provide multiple camera angles, provide program statistics and other customized views of our media assets."

Of course, with something as new as the Internet, it is difficult for broadcasters to know which business propositions to back and which to avoid. Still, said Ducey, "based on 150 years of consumer media, there are some clear guidelines of what it takes to be successful." To achieve this, any new form of consumer media has to be "economical, structured, easy, compelling and synergistic."

Being "economical" means giving consumers a product whose value justifies its price. Said Ducey, "People don't mind spending money if they think they're getting their money's worth. Consumer media must deliver a perceived value that equals or exceeds the price, or the outcome is failure. Exciting new technologies have to perform in a marketplace."

"Structure" means organizing content in ways consumers both like and are familiar with: for instance, it is no accident that TV news programs still follow the divisions of news, sports, weather and entertainment established by mass production newspapers more than a century ago.

"Easy" is just what it implies: for consumers to embrace new technologies, they've got to be easy to use, Ducey said. "Whatever we can do to help connect people to the media content and the experiences they value, the more likely we'll achieve success. That's a great challenge to be solved in the next generation of consumer media. People need to know what to expect, and where to find things that are interesting to them."

"Compelling" means providing high-quality, entertaining and informative content that consumers want to experience. Noting the success of conventional radio and television in delivering such products, which consumers receive free in exchange for sitting through commercials, he said, "broadcasting is a proven killer application."

Finally, Ducey explained "synergistic" by saying "Consumers like to get something for nothing. They like to add value to things they already own. Things that work together well add value synergistically."

But will people pay for it?

As for the impact of the Internet on advertising revenues? Ducey counseled delegates not to worry. "Audiences will still gather around content, and advertisers will still pay to access those audiences," he said. "Audiences will also pay for the ability to create customized news."

"Advertisers will also value the ability to reach highly select target segments of consumers," Ducey added. "And that's a good thing, because all this stuff is going to be expensive, and we need all the money for the system that we can get."

At the end of his remarks, Rick Ducey reiterated his argument loudly and clearly.

"Consumers are going to like the Internet Age," he said, "and there's plenty of opportunity for all of us in this room to benefit from this, and run some pretty successful businesses."

Europe Launches DAB

▶ DAB, continued from page 1

Association, with recommending a standard. Five years ago, CEG initiated the DAR (digital audio radio) evaluation program.

The field tests were conducted by Hammett and Edison, an independent engineering consulting firm out of San Francisco. Presenters Stan Salek and Daniel Mansergh rehashed the testing methods. They admitted that the field testing could have stood some improvement; among the suggestions were more adequate room for equipment, a climate control system, adequate AC power capacity, more tower space and a more reliable test vehicle (an uproar of laughter commenced at a slide of the test RV being towed.) In addition, the indoor data acquired in the Presidio was not included in the report because of a corruption problem in the computers used.

Bob Culver, chairman of Working Group A of the CEG DAR Subcommittee, organized and assimilated the field test data. He said that the subcommittee has asked the DAB proponents to do their own analyses of the results, but thus far none has expressed any interest.

AT&T's Ed Chen said that the company's labs did obtain some data from the subcommittee and performed some limited analyses. AT&T/Lucent is a proponent of an IBAC (in-band, adjacent-channel) DAB solution. He said that their IBAC system could use some modification to increase its sensitivity, but unless a broadcaster willing to test the system is found, the effort may have to be abandoned.

Brian Kroeger, chief scientist at Westinghouse Wireless Solutions, claimed that USADR has asked the subcommittee to provide the company with data for analysis, but thus far it has received none. Westinghouse is assisting USADR in working out the flaws in its IBOC (in-band, on-channel) system. Kroeger said that USADR plans to field test a prototype later this year. As to the criticism the system has received for allegedly causing multipath to its host analog signal, Kroeger said that two independent sidebands and an analog signal backup are designed to combat this problem.

High-speed FM subcarriers have also been undergoing testing. David Murotake of Sanders said it has tested the FM Digital on WCRB(FM) in Boston, revealing some multipath, but no interference to the host analog signal.

DAB marches on

While U.S. broadcasters try to agree on a standard, across the border, in Canada, and on the other side of the Atlantic, DAB systems are already being put in place.

In Ottawa, the third site tested in Canada, the Canadian Radio-television Commission (CRC) is nearing the end of testing of the L-band (1452 - 1492 MHz) system from the Eureka-147 consortium. Attendees were shown a video demonstration that compared the field strength of an FM signal vs. the Eureka-147 system. The difference in multipath was strongest when the field vehicle was driven past trees or buildings.

Last October in France, the International Consortium for AM Broadcasting, which consists of broadcast and network operators, and receiver, transmitter and chip manufacturers, created the "Digital Radio Mondiale." This consortium will formulate an international AM digital standard. Three systems are currently under development: Thomcast's Skywave 2000, the VOA/JPL digital shortwave system and Deutsche Telekom's digital music wave system. The VOA/JPL system has already been tested, and the final field tests for its prototype are expected in 1997-98.

The WorldSpace system is designed to provide satellite programming to underserved, developing nations. By 1998, the company plans on having three satellites — CaribStar, AfriStar and AsiaStar — broadcasting to Asia, Africa and South and Latin America. (It expects to launch its first satellite in June 1998.) The most unique paradigm of the WorldSpace system is that it will enable listeners to access the satellite anywhere programming originates.

On the receiving end, WorldSpace's Werner Saalfrank reported that four radio manufacturers have been selected to produce WorldSpace receivers. He had harsh words for Eureka-147, which he said wouldn't work because so many manufacturers could not possibly agree on everything. WorldDAB's Franc Kozamerik responded by pointing out that Eureka-147 has been recommended by the International Telecommunications Union and is already in regular and pilot operation.

Thomas Lauterbach, of Eureka-147/Bosch, said that the second generation of DAB receivers is scheduled to come out this year. An expansion of the receiver's display, which broadcasts still pictures and HTML information, is expected in 1999: a mobile audio visual terminal, which will include a video phone.

Finally, across the Pacific, Japan plans on introducing a DAB system by the year 2000. The Telecommunications Technology Council's Radio Committee is currently evaluating the Eureka-147 and BST (Band Segment Transmission) systems.

World Radio History

FCC Regulatory Issue Roundup

by Matt Spangler

LAS VEGAS Four of the Federal Communications Commission's top officials were on hand at NAB '97 to address the most important legal concerns of the day.

FCC Chief Counsel Julius Genachowski, General Counsel William Kennard, Roy Stewart, chief of the Mass Media Bureau and Beverly Baker, chief of the Compliance and Information Bureau, fielded questions from attendees and moderator Jeff Baumann, executive vice president and general counsel of NAB.

James Quello

Retiring Commissioner James Quello gave the opening remarks, quipping that he was opening the floor immediately to "questions and accusations."

Casinos, inspection, auctions

Referring to several recent federal appeals cases that challenge the FCC's ban on casino advertising — which is no longer enforced in Nevada — Kennard

... (Casino advertising) is an issue that will most likely be resolved by the Supreme Court.

— William Kennard
FCC General Counsel

said this is an issue that will most likely be resolved by the Supreme Court.

Baker discussed the commission's "alternative inspection program," whereby ex-FCC officials, station owners and engineers will inspect a station for a fee; unless a complaint is received, this inspection would be valid for two years. She said the FCC is actively working with state broadcasting associations and other organizations to establish such programs.

Sen. John McCain (R-Ariz.) recently asked the FCC to freeze its comparative hearings for analog licenses while he works on spectrum auction legislation. Kennard said that the FCC has been required by the D.C. Circuit Court of Appeals to resume these hearings if legislation is not enacted by Aug. 7.

Main studio rule, pirates

On the "main studio" rule, which says that a station's license must be within its city grade contour, Stewart said that he will probably recommend to the commission that stations should be accessible to the communities they service and that a station's public files should also be accessible.

Baker outlined several methods the FCC has for dealing with pirate broadcasters. One is to issue a forfeiture of operation to the broadcaster — $11,000 per unlicensed operation — the commission can use "in rim" proceedings to seize any equipment used for an illegal activity. Temporary or permanent injunctions against the broadcaster can also be obtained.

In the latter case, however, the FCC can run into legal hurdles. She cited a recent case in San Francisco, in which a judge that Kennard described as "sympathetic" to the First Amendment rights of a pirate broadcaster has not ruled on a permanent injunction for a year.

Competition analyses

Finally, Kennard was asked a question that has been on the minds of radio group owners for some time now: How does the FCC interact with the Department of Justice in their respective competition analyses as part of their reviews of station consolidation? Assistant Attorney General Joel I. Klein has said that the department has not asked the FCC to hold up its reviews pending the results of the DOJ analyses.

Kennard said that, in this post-Telecommunications Act of 1996 deregulatory era, the FCC is still trying to sort out its procedures in this area, but it is certainly interested in the DOJ analyses.

Cross-ownership Comments at FCC

by Jacqueline Conciatore

WASHINGTON Review of cross-ownership comments and reply comments are on schedule at the Federal Communications Commission.

The FCC received comments and reply comments on its cross-ownership policies in March, and it has put all the review proceedings on the same track, according to FCC attorney Roger Holberg.

The commission is currently reviewing comments pertaining to a possible easing of its broadcast ownership regulations, including rules on newspaper-radio cross-ownership, one-to-a-market and attribution of ownership.

No set timetable

It is uncertain when the commission will finalize any policy changes, but it will take at least a month or two, Holberg said.

In the comments it filed, the National Association of Broadcasters came out in favor of easing ownership rules, citing a "breathtaking transformation" of the local media marketplace resulting from the Telecommunications Act of 1996.

Initial comments on the daily newspaper cross-ownership waiver policy were pro and con, Holberg said, but six reply comments fell heavily in favor of liberalizing waiver standards. Opposition came from a coalition of minority, women and other advocacy organizations. The group asked that if there were to be an easing, that it be coupled with specific public interest requirements, including incubator programs for female- and minority-owned broadcasters.

Liberalizing policy

The 20-year-old restriction on newspaper-radio cross-ownership seeks to promote local diversity of viewpoint and economic competition. In its call for comments on liberalizing the policy by which it grants waivers to the rule, the commission said there could be circumstances in which cross-ownership in a single market would serve diversity — if the only prospective buyer of a newspaper were a radio station, for example.

Under current rules, the FCC will grant waivers only when an owner is unable to sell a station at market value, a market can't sustain separate ownership of the entities or there exists other circumstances that would put the ban at odds with its intent. To date, the FCC has granted only two permanent waivers of the cross-ownership restriction, both involving TV stations. The commission has granted temporary waivers to give owners time to divest of a property and come into compliance.

Holberg says some filing comments urged the Commission to use its review of the radio-newspaper rule as a springboard for re-examining the TV-newspaper rule.

The NAB has also come out in favor of eliminating television-radio cross-ownership restrictions, or the one-to-a-market rule. It also supports a proposal to raise the benchmarks for attribution of holders of voting stock and of certain classes of passive investors. This would allow companies to increase investments in broadcast outlets without being classified as owners. It has opposed subjecting Local Marketing Agreements (LMAs) to ownership rules.

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SBE Board Tackles Change, Future

by Alan R. Peterson

LAS VEGAS Electronic communication, frequency coordination and industry relations drew the most debate during the Society of Broadcast Engineers Board of Directors meeting held at NAB '97.

Certification

Reporting for the Certification Committee, David Carr provided information on new certification programs, including software for maintaining new categories of questions for testing.

"It was declared in Phoenix that computer-based study guides were dead. I am glad to see we now have a viable platform," said SBE President Terry Baun.

Carr reminded the group that 1997 is the first year for two new SBE classifications: Certified Engineer, Audio (CEA) and Certified Engineer, Video (CEV).

The first testing for CEV certification occurred during the show.

The suggestion was made to create and make available a CD-ROM of engineering shareware as a means of continuing education towards certification. With more technological changes expected in the next five years, it seemed to board member Jim Bernier that posting such information on the SBE website would prove more flexible.

Laughs on-line

Bernier delivered his report from the Electronics Communication Committee, drawing a laugh when he told the room, "You won't find any paper in your folder — we do it electronically."

Bernier reported on the status of the SBE website and BBS service. On the website, information on EAS and the employment page remain the heaviest-hit pages, while 75 percent of the calls to the national BBS line are for jobs.

"And," Bernier told the room, "I can tell you who here has been looking through it," drawing more laughs from the assembled engineers.

More than 55,000 visitors have accessed the SBE website since it was launched.

Coordination

Board member Rick Edwards incited considerable debate with his report from the Frequency Coordination Committee.

Among the points raised in his report was the suggestion the SBE provide a means of sending electronic data to the FCC for frequency coordination. This launched a discussion on fees already in place by the commission and whether this would make the SBE little more than a software developer for the federal government.

It was also suggested that if an outside concern other than the SBE were to take on the task of frequency coordination, the society would lose all control over it.

Board member Andy Butler eventually proposed the formation of a group to examine the feasibility of a pilot program to gather information on the topic. The proposal was voted on and passed.

The Industry Relations Committee report was delivered by board member Butler. He informed the group that all future articles written by SBE officials were now being published in **RW**.

The question was raised as to whether it was in the best interests of the SBE to "take up the flag" in product debates. The dispute centered around component life claims of a manufacturer vs. premature failure in actual use, and if it is the place of the SBE to be a standard-bearer in such matters.

The board was unanimous in deciding that the SBE should not be involved.

Greenberg scholarship

The Trustees of the Ennes Educational Foundation announced the creation of the Robert Greenberg Memorial Scholarship to recognize the contributions Greenberg made to broadcast engineering.

Greenberg, who died unexpectedly March 20, at the age of 42, was a longtime employee of the Federal Communications Commission and a member and supporter of SBE. Most recently, he was senior supervisory engineer (FM) in the Audio Services Division of the Mass Media Bureau.

The scholarship will be awarded to an individual pursuing a career in broadcast engineering; the first will be awarded in July.

Applications can be obtained from the Ennes Foundation Trust, 8445 Keystone Crossing, Suite 140, Indianapolis, Ind. 46240, or by calling (317) 253-1640.

Donations to the fund are fully tax-deductible and can be forwarded to the SBE address. One-hundred percent of the contributions go to the funding of the scholarship.

Making Sense of EEO Requirements

by Matt Spangler

LAS VEGAS The Federal Communications Commission has been in the news a lot lately for fining stations for EEO (equal employment opportunity) violations. What the FCC requires, and what stations can do to comply with its requirements, was discussed in a panel session at NAB '97.

Renee Licht, deputy chief of the FCC Mass Media Bureau, said that the FCC has initiated a proceeding designed to reduce the recordkeeping burden on broadcasters, giving credit to stations who participate in state job fairs and raising the EEO threshold. A report and order is expected this summer.

Currently, stations are required to demonstrate to the commission that they have instituted a minority hiring program and to update the commission regularly on the progress of that program. Licht said that for about 97 percent of stations, the program is all they are required to do.

About 3 percent of stations are sent a letter of inquiry asking for further information on the program. This ranges from, according to Washington attorney David Oxenford, what minority recruitment sources were used in hiring (the NAACP is an example), how many referrals were received for each job opening posted, who was interviewed of those applicants and, ultimately, who was hired for each position.

Licht stressed that as long as stations keep adequate and thorough records of referrals, sources and the like, there should be no problems. Only a handful of stations are sanctioned. She also called good recordkeeping "a matter of good business."

There is a difference between the missions of the FCC and the Equal Employment Opportunity Commission, according to Washington attorney David Grant. The FCC mandate is to ensure that there is diversity in the workplaces that it is licensing, while the EEOC provides relief to individuals who have suffered from discrimination.

This can come in the way of lots of money. The 1991 Civil Rights Act gave employees the right to bring acts of discrimination to jury trials and to receive compensation. Grant cited one case in which a plaintiff was award a few thousand dollars in back pay, and $300,000 in punitive damages. He said that this is a disturbing development, that "the specter of jury trials is a scary proposition."

The question of what percentage of a pool of applicants should be minorities naturally arose during the discussion. Licht said that only an "adequate" number of applicants is required. The FCC does not use a formula; it instead relies on the station to use its judgment, based on the population of the area it serves. Oxenford concurred, saying that the commission's goal is not quotas, but rather "good-faith efforts." Licht also said that a pool of minority applicants used for one position opening can be used for future openings.

Then, one could reasonably ask, what is an applicant? Again, Licht said this is up to the station, meaning whoever feels is qualified for a position, not just anyone who submits a resume. She said that one thing that stations have done is send follow-up forms to applicants, asking them to volunteer information on gender, race and so forth. This information should be filed separately, though, so as to not influence those arranging interviews.

One point of controversy was a comment by Oxenford that stations should consider recruiting through referral sources even if the position will probably be filled through promotion within. A member of the audience called this "a disingenuous representation."

Oxenford later said that, in most cases, promotions should not be thought of as openings.

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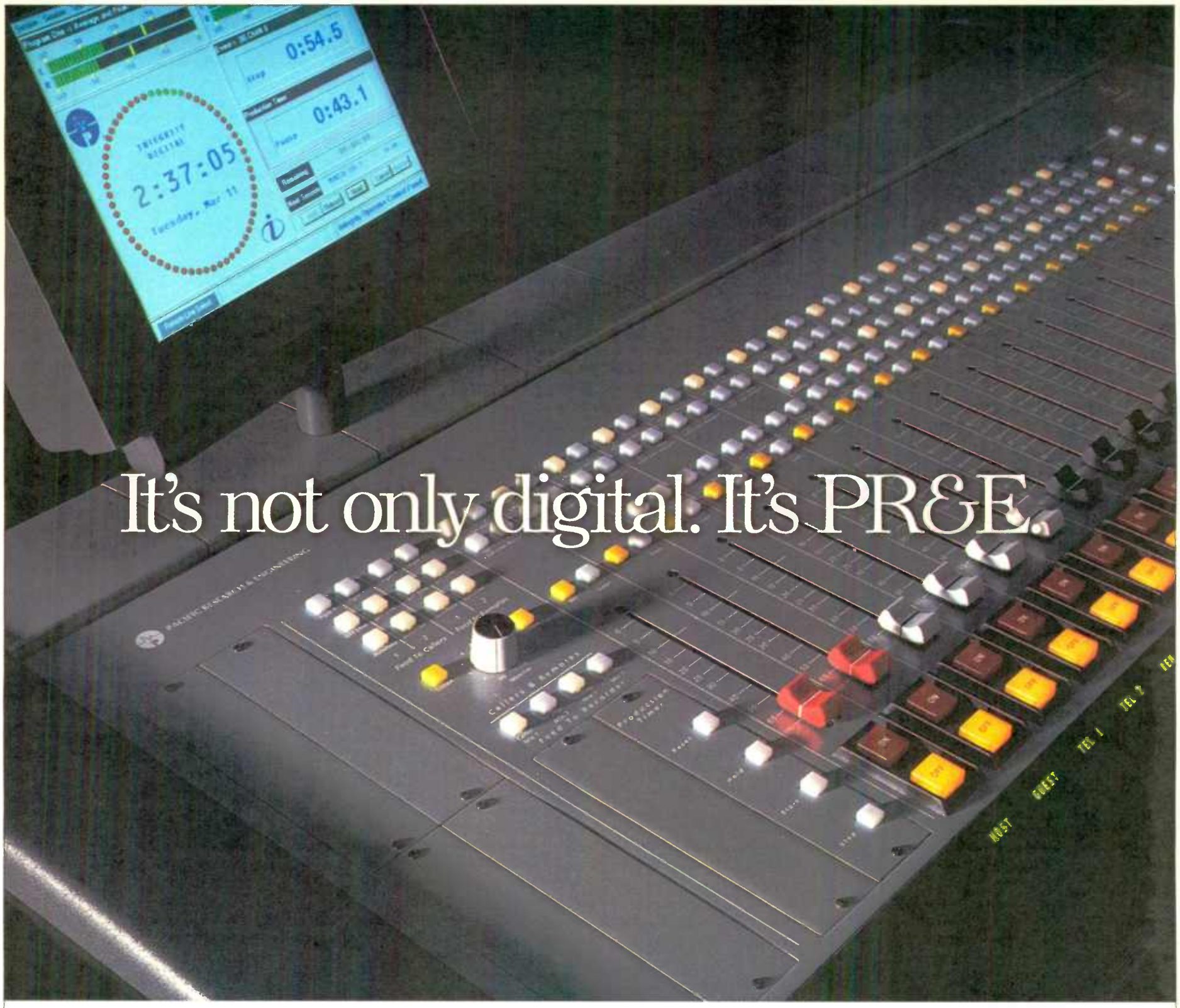

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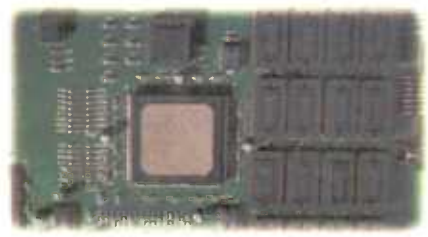

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Despite Bugs, EAS Makes Progress

FCC Willing to Work With Stations Experiencing Difficulties With System Implementation, Upgrades

by Bob Rusk

LAS VEGAS Just three months into implementation of the Emergency Alert System (EAS), the system is working remarkably well, despite some bugs that need to be worked out. That, at least, is the impression of the Federal Communications Commission and Society of Broadcast Engineers.

"The engineering community thinks it's a good system and is working hard to develop it and make it effective," said Leonard Charles, SBE board member and chairman of the organization's EAS committee.

However, he added, "our members have identified a few ways in which it could work better."

For example, he pointed out that there is a "genuine concern regarding the 15-minute relay time for the required monthly test. (The members) wish it could be a little longer."

To that end, Charles said the SBE will lobby the FCC for a rule change. The SBE also is waiting for the FCC to approve additional event codes that cover non-weather situations, something that the commission is working on with NOAA (National Oceanic and Atmospheric Administration) and FEMA (Federal Emergency Management Agency). He spoke during SBE meetings at the NAB '97 convention.

SBE president Terry Baun stressed that EAS is "very complex."

"The strength of the system," he said, "is also its weakness. It is so versatile, which makes it difficult to administer — especially in the beginning. I'm confident it will work well. We just have to understand that we're still in a shakedown period."

Specifically, Baun said that training station board operators in EAS procedures is one of the biggest challenges.

Baun, a contract engineer, has installed EAS at several stations in Wisconsin. He said his experience with the system has been excellent.

"We'll have our fourth required monthly test this month," he said. "The previous tests have had some glitches, but all of them worked."

Equipment sales

Harris Corp., which sells the Sage version of EAS, continued to take orders for the equipment at NAB '97.

"We're taking a surprising number of orders," said Jim Woods, director of studio products product line at Harris. "There are still stations that are just beginning to get (EAS) implemented. We're also seeing EAS business from stations that bought a basic package, but have decided to add options such as a receiver unit or control unit."

Woods said some companies that initially were going to use one unit for multiple stations have decided to buy separate units for each station. In addition,

We see EAS as a business that will continue for the next couple of years.

— Jim Woods
Harris Corp.

Harris has developed software packages aimed at the public safety market, as well as hardware products that came from customer suggestions.

"We see EAS as a business that will continue for the next couple of years," said Woods. Woods noted that EAS is now a part of our industry, not a one-shot deal.

Burk Technology, one of the other companies that sells EAS equipment, is showing its RX-4 receiver system and LX-4 audio switch.

Deadline extension

While the deadline for installation of EAS equipment was Jan. 1, the FCC granted stations an extension if an order was placed before that time, but equipment had not been delivered.

"We considered that a good faith effort," said Frank Lucia, FCC director of emergency communications. "To date, that policy has not changed."

Lucia said there was one case where a station had the equipment in place, but "was having trouble receiving the assignment it was supposed to monitor." The problem was taken care of when an FCC inspector visited the station.

"We have received 40 state EAS plans, either in draft or final form," said Lucia. "Many of those have been approved by the commission. Those are important because they tell a broadcaster what the monitoring assignments are for EAS. If there is no state plan, at least one of the assignments would be the old EBS assignment."

Lucia said to the best of his knowledge, no stations have been cited for EAS-related infractions.

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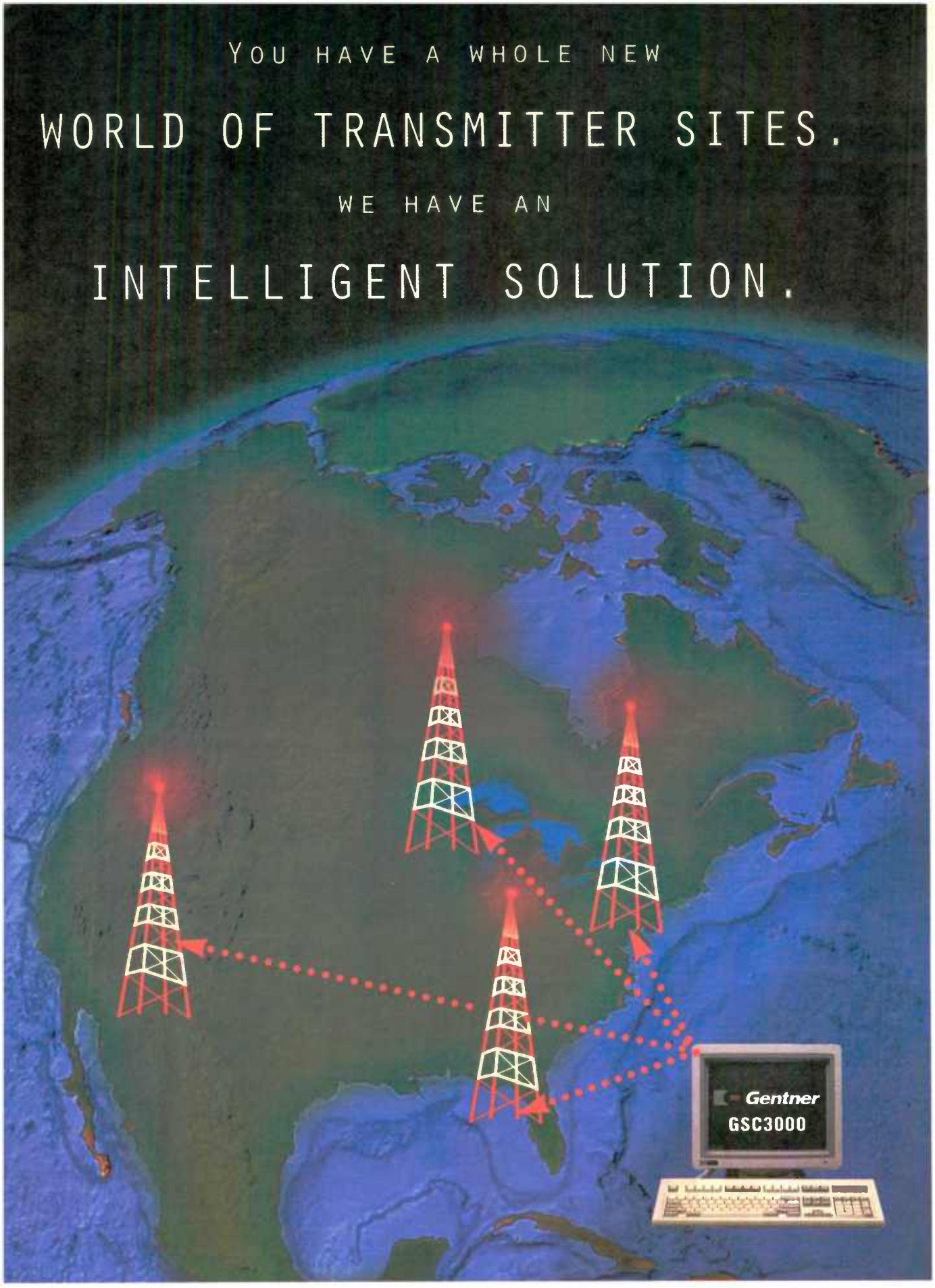

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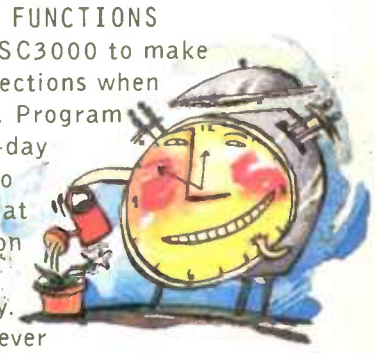

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Designers Find Plenty to Ponder

Thomas R. McGinley

NAB '97 and the 51st annual Broadcast Engineering Conference featured a day-long showcase of topics focusing on new designs and inventions intended to improve the technical art of radio broadcast transmission. A fertile field of fresh ideas was planted for working engineers with each paper. CBS Radio Engineer Glynn Walden moderated the morning session, which lead off with a novel new AM antenna design.

The 'umbrella' antenna

Consultant Clarence Beverage of Communications Technologies and educator Al Christman presented a completely new concept of AM antenna radiation. Dubbed the "umbrella" antenna, their invention uses the elevated ground radial model, but excites the elevated radials, leaving the tower grounded to induce the return currents. Think of it as an "outside-in" or backwards radiator.

The design goal was to be able to use an existing multi-use grounded tower without a ground system as an AM antenna. The model candidate was a 320-foot Rohn SSV self-supporting tower at 1550 kHz. This represented a half-wavelength-tall tower, although shorter towers of at least a quarter-wavelength would work. The NEC model, using either three- or six-driven quarter-wave elevated radials, attached quarter-wave above ground, predicted such a design would be comparable to the radiation efficiency of a conventional series-fed quarter-wave design with buried radials.

Beverage built a 70:1 scale model of the design at 107 MHz and confirmed that the efficiency was actually 0.5 dB greater than the reference quarter-wave standard antenna. He noted that the vertical radiation is a bit different, showing slightly elevated values over the reference antenna in the 60-to-90 degree angles. The FCC has indicated it will accept a 301 application using this design, but would require a field proof to confirm ground wave efficiency. For nighttime operation, the vertical characteristics would have to be carefully evaluated and controlled to prevent possible skywave interference.

Beverage also offered an update on the use of elevated ground radials along with guidelines for their proper installation. Six licensed stations now employ them. All radials should be copper or aluminum weld wire, 90 degrees long, and attached to support posts at least 5 meters above ground. A minimum of four wires should be used, but more than six is unnecessary. In DA arrays, radials cannot connect at their ends.

Modulation analysis

Harris Corp. presented the results of a comprehensive evaluation of the "Performance of Modern AM Modulation Methods Into Various Antennas." Pioneer AM RF designer Hilmer Swanson and Harris Engineer John DeLay reviewed the four modern methods of AM modulation: digital amplitude, PDM (pulse-duration), pulse-step and pulse series. Four different load configurations were tested: resistive dummy load, LC BandPass network into dummy load, a +45 Tee network into BP network into dummy load, and a -45 Tee network into BP network into dummy load.

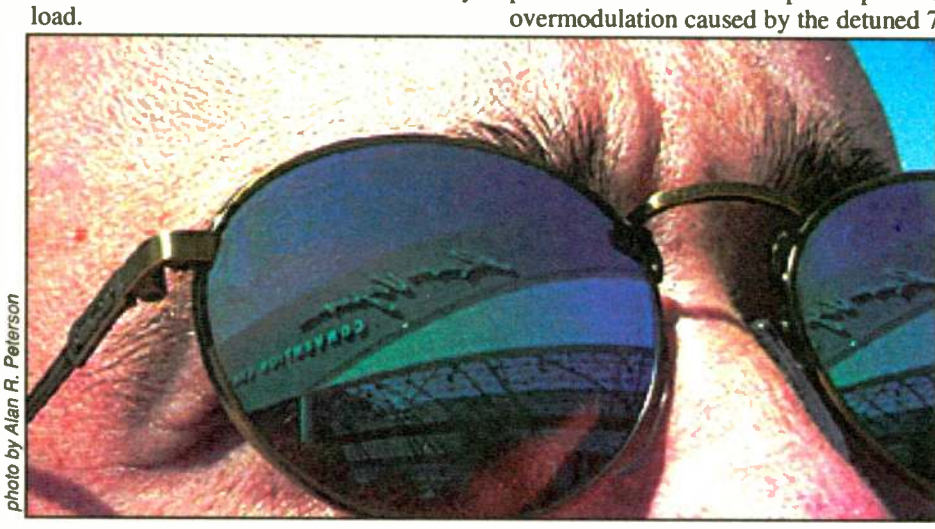

photo by Alan R. Peterson

NAB attendees had plenty to reflect on in Las Vegas this year.

The test transmitters were a Harris DX-10 and a Harris Gates 2 PDM transmitter. THD (total harmonic distortion), frequency response, TIM (transient intermodulation distortion) and square wave overshoot performance were all evaluated. The simulated antennas presented a VSWR of 1.4:1 at +/-10 kHz from the transmitter carriers.

Working into the dummy load alone with 95-percent modulation, the distortion and response measurements compared favorably for both transmitters; however, the PDM model exhibited minus 21 percent 400-Hz squarewave overshoot, while the DX-10 showed virtually no overshoot. With the simulated antennas, high frequency distortion of the PDM unit increased rapidly to almost 3 percent at 12 kHz due to pre-emphasized overmodulation caused by the detuned 70 kHz PDM filter. Overshoot of the PDM was double that of the DX digital design. TIM performance under these conditions measured 0.3 percent for the DX-10, but increased to 2.8 percent for the Gates 2 PDM transmitter.

The test data fully supported the conclusion that the DX digital modulation design is more forgiving to non-symmetrical antenna loads, and is superior even when performing into balanced or wide loads. When DAB is finally adopted, it is felt that antennas will need to be broadbanded because the BER (bit error rate) increases at higher frequencies. It was also noted that transmitters will need to pass DC for proper DAB operation.

No sidelobes

Ali Mahnad, formerly of Jampro Antennas, now with Microtek Engineering, discussed "Sidelobe-free Antenna Arrays: A New Breed of FM Broadcast Antennas." Mahnad cited the evolution of antennas designed to suppress downward radiation, a reality prompted by ANSI RF radiation limits and new FCC licensing requirements. Increasing antenna heights and the use of half-wavelength spaced elements limits radiation straight down, but does not always sufficiently limit sidelobe radiation at other angles below the horizon.

These sidelobe components cause their own problems, most notably increased multipath distortion known as "source-induced multipath," especially prevalent in areas close to the antenna site. Mahnad identified the source of unwanted side-lobes by analyzing a "phase profile" of a typical FM antenna. As with any multi-element antenna, space-phasing and current phasing must combine properly to form nulls in the desired directions. By carefully manipulating the element spacing and feeder design, sidelobes can be eliminated with only a slight reduction in forward gain, according to Mahnad. He introduced his "Ultra-tracker" FM antenna as a new model antenna that incorporates this design.

Better performance

A radically clever and eloquent idea developed to improve FM stereo noise

See DESIGN, page 22 ▶

Satellite Buffet Is Full for Radio

Bob Rusk

The latest advances in satellite technology were a headline attraction at NAB '97. From audio branding that stamps your signal with a watermark, to satellite distribution of commercials, there was something to fill virtually every need.

GE American Communications promoted its analog and digital services for both C-band and Ku-band applications. The company's newest satellite, GE-3, is scheduled to launch in the fourth quarter of 1997 — with the coverage to take in the continental United States, Hawaii and the Caribbean.

Avcom of Virginia Inc. exhibited the PTR-25 LCD portable test receiver, a battery-operated satellite receiver with built-in color LCD monitor, Squawker system and relative signal strength meter in a single package. The receiver incorporates a microprocessor that controls functions such as tuning, frequency and digital frequency lock (DFL).

The big news at the National Public Radio booth was an announcement that **NPR Satellite Services** is helping launch the Christian Broadcasting Corp. with ComStream digital equipment and a transportable uplink. Christian Broadcasting is relying on NPR's non-preemptible channel to avoid getting bumped.

Scientific-Atlantic, one of the industry leaders, presented its full line of products, including earth stations, receivers and B-MAC encryption systems.

Advent Communications of England offered the latest in its NewSwift satellite antenna system. NewsSwift can be deployed by one operator, resulting in quick and easy satellite acquisition — regardless of location or conditions.

It can be deployed as a flyaway, or roof-mounted on a vehicle. The compact design allows for the antenna to be carried in small helicopters, business jets and scheduled airlines.

LNR Communications showcased its compact SNG (satellite news gathering) Safari flyaway antenna that can be set up in 30 minutes by only one person. Touted as the "smallest, lightest SNG flyaway on the market," it is also rugged and stable.

Over at the **Dawn Satellite** booth, there was a lot of talk about LNBs. Dawn's C-band LNB incorporates the latest HEMT technology and the Ku-band LNB was designed specifically as an economical solution to demanding digital applications.

StarGuide Digital Networks, a provider of digital satellite multimedia broadcast technology and **MUSICAM Express**, provider of digital delivery services, announced an agreement with Bloomberg radio news. The deal calls for real-time distribution of Bloomberg's radio programming via state-of-the-art digital technology. By utilizing satellite uplink services from MUSICAM Express, news will be quickly distributed over GE Satcom C-5.

Starguide also displayed its SGII digital multimedia satellite receiver. Features include: multi-channel, multi-carrier operation and simultaneous audio, video and data input.

Vyvx Advertising Distribution Services, the nation's largest distributor of audio and video commercials, announced at NAB '97 that it will convert its satellite network to the digital format. This deployment of digital technology is a major step in building a

See SATELLITE, page 21 ▶

World Radio History

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World Radio History

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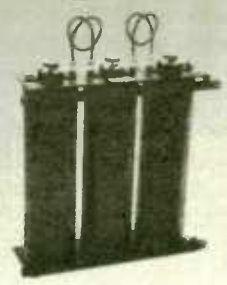

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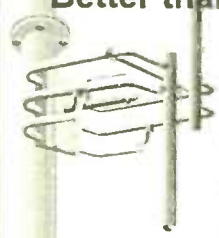

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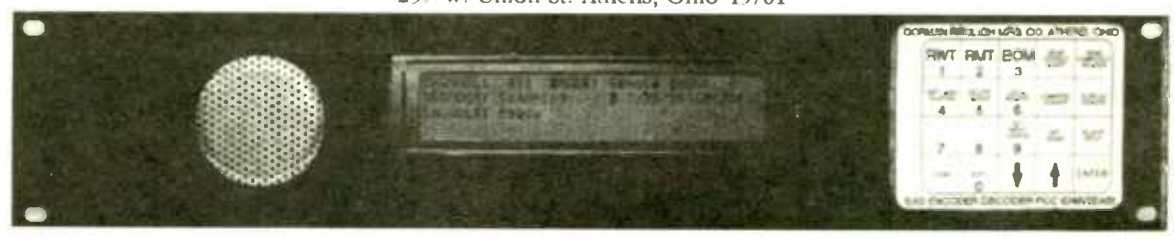

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World Radio History

Satellite Delivery Advances

▶ SATELLITE, continued from page 18

comprehensive, state-of-the-art, store-and-forward network.

Meanwhile, Vyvx and **Digital Courier International** have agreed to integrate the DCI Electronic Distributor Interface with the Vyvx electronic order entry system to distribute radio spot advertising in the United States via ISDN telephone lines.

International Datacasting introduced advancements in its multimedia broadcasting software and additions to its data broadcast software and data broadcast line. Echoweb software enhances the functionality of the company's existing EchoCom and Echocom Plus packages.

Internet services

NSN Network Services, which was acquired by radio station group owner Jacor Communications during NAB '97, was offering its InSAT satellite Internet systems and services. InSAT offers connectivity across most of the planet, regardless of local phone line capacity.

InSAT terminals are fully integrated VSAT satellite earth stations that have been tested for performance, reliability and economy. InSAT servers use Sparc technology as a base for ISP or individual company use.

TDF, a subsidiary of Groupe France Telecom, presented its AudioBranding, which brands any type of audio content, including commercials and songs. It is read by decoder and various computer applications. Touted as imperceptible to listeners, AudioBranding lets broadcasters conceal coded information. It can be used for such applications as: identification of a station and programming received by a listener (listener polling) and stamping of content by copyright.

Another international exhibitor, **Deutsche Telekom**, was on hand to promote digital audio broadcasting. In order to push ahead with the launch of DAB in Germany, Deutsche Telekom has worked extensively on the development of this system since its inception more than a decade ago.

The **Inband Corp.** was offering I-DACS (inband downlink automation control system), a satellite downlink automation control system that is designed for all segments of the radio and television broadcast industries. I-DACS runs on inexpensive and readily available PC hardware employing a familiar Microsoft Windows Graphical User Interface (GUI). Antenna positioning, receiver setup, matrix, switch routing and output device setup can be automatically controlled by the computer.

On display from **Wegener Communications** was the DVR496, which allows a radio network to put multiple audio (signals) on one carrier. The addressable feature set applies to this product. The audio channel can be selected within the carrier.

One of the most impressive displays at NAB '97 was the new S-15 mobile digital satellite uplink system from the **Broadcast Division of Harris Corp.** The system includes a 1.2-meter Ku-band antenna built onto a four-wheel-drive sport utility chassis.

Digigram President Phillipe Girard-Buttoz (r) and Vice President of U.S. Development Neil Glassman display their NAB 1997 Cool Stuff Award as well as the winning product: the PCXpocket.

The first Type II PC card intended for professional sound recording and editing on a laptop computer, the PCXpocket adds a full digital audio workstation to the capabilities of the laptop computer. Easy transmission of audio segments is possible with a modem or ISDN terminal card.

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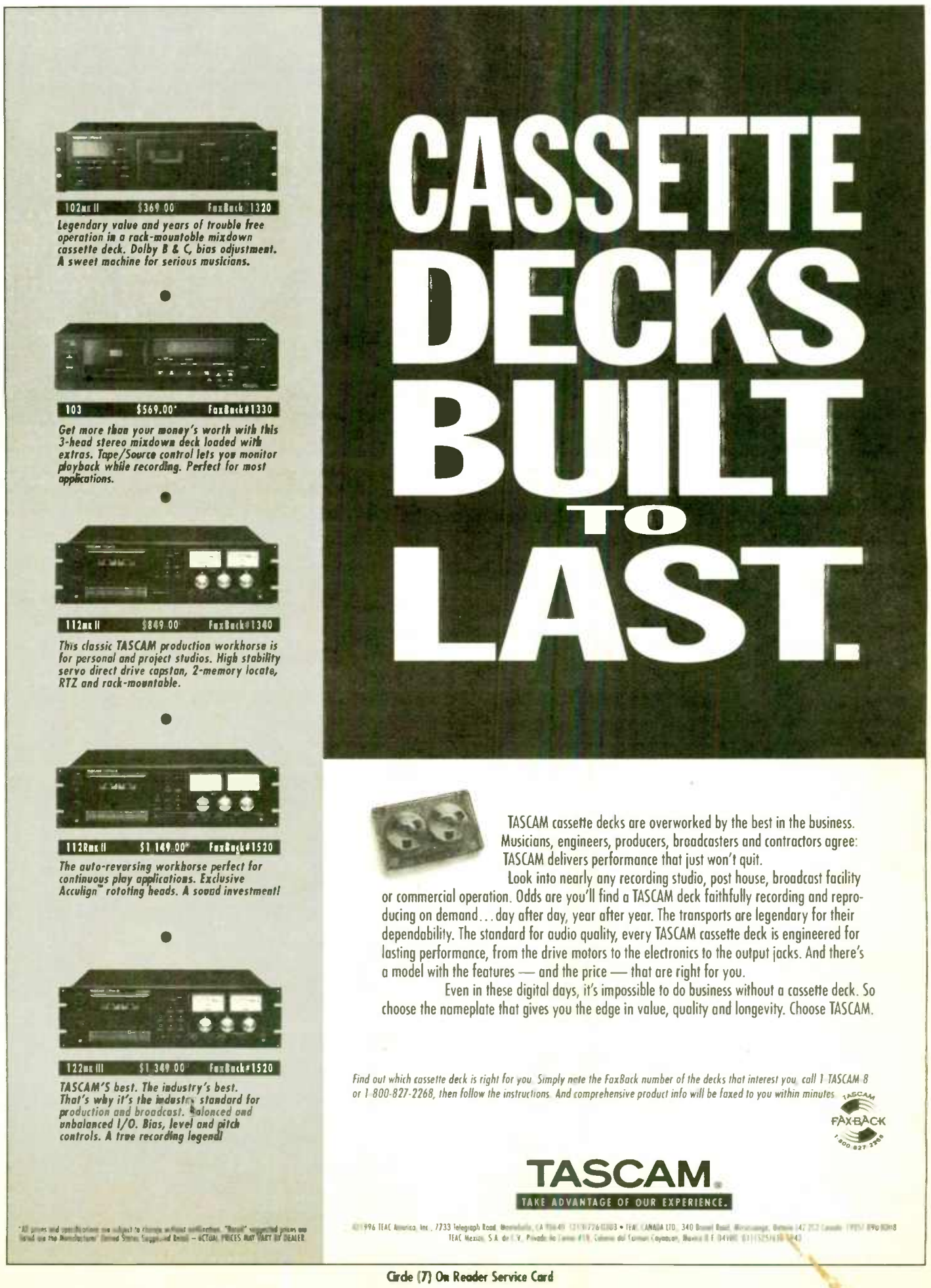
For more information, contact Digigram at (703) 875-9100 or **circle Reader Service 146.**



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World Radio History

Plenty of Tech Talk at NAB '97

▶ DESIGN, continued from page 18

performance and multipath reduction in receivers was unveiled by Bill Gillman, former director of engineering for Gentner Communications. He is now a consultant working on special projects. His paper, titled "A New Method of Generating the FM Stereo Composite Signal Yields Improved Performance," outlined a proposal to convert the present double-sideband suppressed 38 kHz stereo subcarrier to single-sideband, modulating only the lower sideband.

Gillman cited the "23 dB stereo multiplex noise penalty" and traced its source to the FM detector noise response characteristics increasing with frequency. Pre-emphasis/de-emphasis overcomes the problem for mono reception to 15 kHz but cannot fully cope with the bandwidth requirements of the stereo subcarrier extending to 53 kHz.

The genius of using only SSB, thereby limiting the upper frequency to 38 kHz, is that all modern receiver product detector chips are fully compatible and can decode it with full fidelity. An immediate 4 dB of SNR improvement comes free. While that may not sound significant compared to 23 dB, it is the equivalent of turning up the transmitter power by 4 dB. Gillman asked how many station general managers would not like to have their 50 kW licensed power raised to 125 kW for almost nothing. Because this scheme uses reduced composite bandwidth, crosstalk to all SCAs is reduced, along with multipath distortion.

Gillman discussed the design requirements needed to take full advantage of the new SSB signal, including a 38 kHz quadrature pilot, injected at 2-to-3 percent to turn on new receiver decoders. In the stereo generator, a new design, crafted after the little-known "Weaver SSB generator," would be implemented using DSP to ensure a perfect SSB signal source. Gillman noted that his analysis still resided at the computer model level, but that real hardware should be easy to implement and will be soon. In the meantime, he is looking for acceptance and support by receiver and stereo generator/processor manufacturers.

Record crowds came to NAB in 1997. Here: The Sands Expo Center.

Immunity

"Improving Immunity to RF Intermodulation in FM Transmitters" was the subject of a paper presented by Broadcast Electronic RF Engineer Mukunda Shrestha. With the proliferation of combined transmitting sites for many FM stations, effective suppression of unwanted intermodulation products is vitally important. Undesired products usually cause interference to some other station or service and are often caused by narrow-band tube-type transmitters. Shresta described the intermod suppression properties of the BE line of FMSS solid state transmitters. Typical mixing losses greater than 25 dB are achieved in these units, while flat output bandwidth is maintained in excess of 1 MHz.

Much of the intermodulation immunity is provided by the 90-degree hybrid combiners used in the combining architecture of the power MOSFETs. The unwanted intermodulation products cannot pass through the hybrids and are burned off in the reject loads. The use of expensive external bandpass filters is usually not required.

Stay on

"Staying on the Air During Antenna Service," presented by Colorado-based consulting engineer Tim Cutforth, offered a useful list of options to maintain operations with useful power during required antenna maintenance, construction or repair. Cutforth cited the severe limitations imposed by ANSI requirements to protect workers, especially for AM tower work. Almost any power level exceeds induced body current levels. While an RF protective suit may achieve legality, most climbers will not wear them. Most of the time, such work must be done during daylight hours, as tower work in darkness carries significantly increased risks.

Obtaining the use of an emergency antenna off-site is ideal, but not easily achieved, unless arrangements can be worked out with a sister group station. Diplexing filter hardware will increase the costs, but may be worth it. Using a non-energized tower in a DA array as a non-directional radiator is the easiest alternative. A simple L network can be easily constructed and added with a contactor or switch to enable a quick switchover, minimizing downtime.

For an emergency FM backup antenna, most stations have an older antenna in storage, no longer used. Even one or two bays can serve as a very adequate radiator at low power, especially on mountaintop sites. Again, obtaining an off-site location is the most ideal, when tower space is available. Within the multistation market groups, back-up sites at a sister station main site are usually easy to acquire and are becoming common. Separate STL and remote control requirements do make this option more expensive, however.

Cutforth showed slides of a number of examples of back-up antenna installations in the Denver area. He reiterated the importance of having a viable alternate antenna. Once you have experienced an extended outage without one, their value grows immensely.

RW will print summaries of several papers presented during NAB in upcoming issues.

■■■

Thomas R. McGinley is chief engineer of WPGC-AM-FM in the Washington market, as well as technical advisor to RW. Contact him care of RW.

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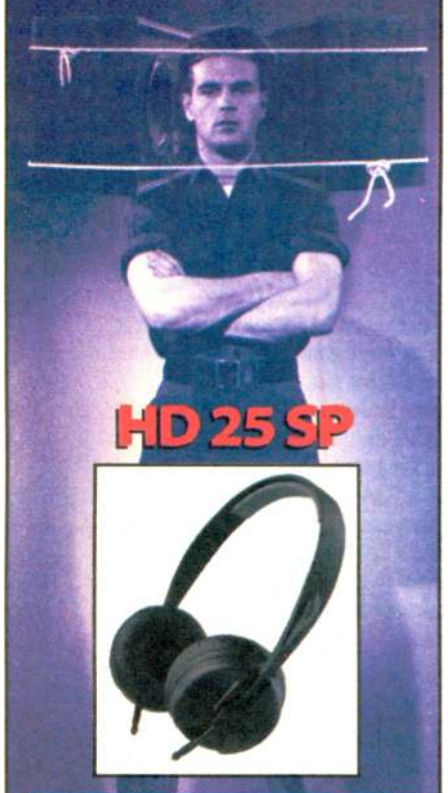

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World Radio History

Digital Consoles Dominate

Alan R. Peterson

Only a short time ago, the idea of a digital console seemed a distant dream. Then, forward-thinking companies took the leap and began releasing highly functional mixers with powerful features.

Some companies like Euphonix went for the high-end user, while Yamaha concentrated on creating popular affordable consoles. Harris used an earlier NAB show to introduce the DRC1000 digital mixer.

Last year, Radio Computing Systems (RCS) began importing the Klotz digital console from Germany, known now as the VADIS D.C. From those beginnings, this year's NAB convention showed the culmination of this evolution with a wide range of digital consoles for both production and live broadcast.

Digital's the answer

Some are all-digital, while many are analog under digital control. Either way, the direction has been set for the future of audio consoles.

The success experienced by **Yamaha** with the 02R digital console led to the new 03D production mixer, with 26 inputs, internal effects processing, four-band parametric EQ and built-in automation and snapshot capabilities.

With a futuristic look right out of a 'Jetsons' episode, the Numix digital console from Logitek drew attention with its modular wraparound layout.

Yamaha also announced a new ROM software upgrade for the 02R mixer to fit the needs of post-production users.

Korg USA unveiled the new Soundtracs DPC-II digital console, a medium-high end production and post-production console. The system shown at NAB was a 64-channel surface with a 96-input rack. Displays along the console show settings, processing and master snapshot automation positions.

Mackie Designs came to Vegas with the Digital 8-Bus, a 48x8x2x12 digitally-controlled console for music and production work. Eight-channel digital cards are optionally available for direct digital audio transfer.

From England, **Calrec Audio** brought the X Series of digitally-assignable broadcast consoles and the T Series of digitally-controlled production boards.

Futuristic features

Also from the U.K. came the **AMS Neve** Libra Live digital console for live broadcast production. Dynamic automation and console recall features provide ease of use in live broadcast environments.

See DIGITAL, page 26 ▶

Radio World Cool Stuff Award NAB 1997

Grant Evans from **Whirlwind** demonstrates how big hits can come in small packages. He's holding the NAB 1997 Cool Stuff Award-winning Qbox. This is an all-in-one audio line tester that combines a microphone, speaker, test-tone generator, outputs for standard headphones, and voltage presence monitoring for phantom or intercom power. The Speaker selector toggles between the source selections — allowing the operator to confirm mic or line level signals from the console.

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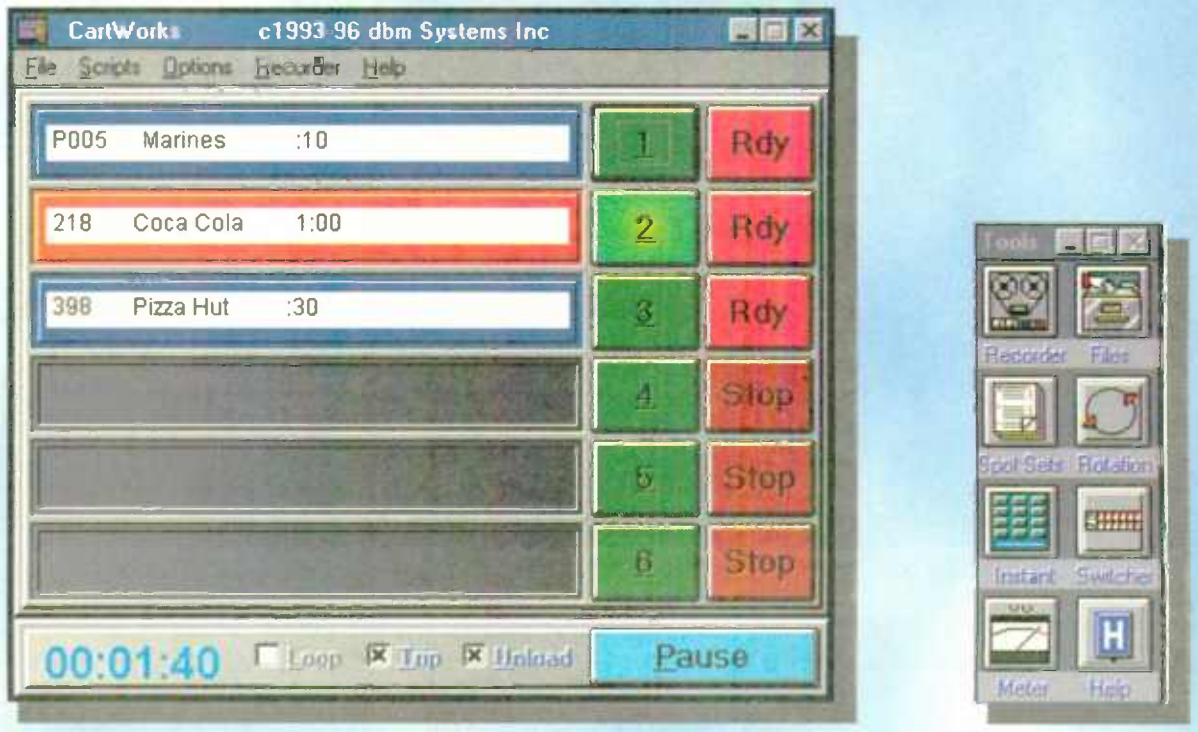

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World Radio History

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Broadcast Electronics' high power FM transmitters are uniquely suited to the complexity of the master antenna system atop the Empire State building, reaching audiences throughout the New York metropolitan area. "Broadcast Electronics understands broadcasting is a twenty-four hour a day business and many equipment and software providers don't offer the level of support that's required. Broadcast Electronics has built its reputation by supplying that necessary support," says Chief Engineer Bob Tarsio.

WLTW and WAXQ chose Broadcast Electronics' AudioVAULT® digital studio system over all the others for several reasons. "We picked Broadcast Electronics' AudioVAULT because of its straight forward user interface, system flexibility, and the reputation of Broadcast Electronics," says Bob Tarsio.

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World Radio History

Studio Gear Holds Facilities Together

Edwin Bukont

If you remove the turntables, cart machines and open reels from most studio furniture, what is left are some big holes that will not support the keyboards, monitors and mice that populate contemporary studio systems.

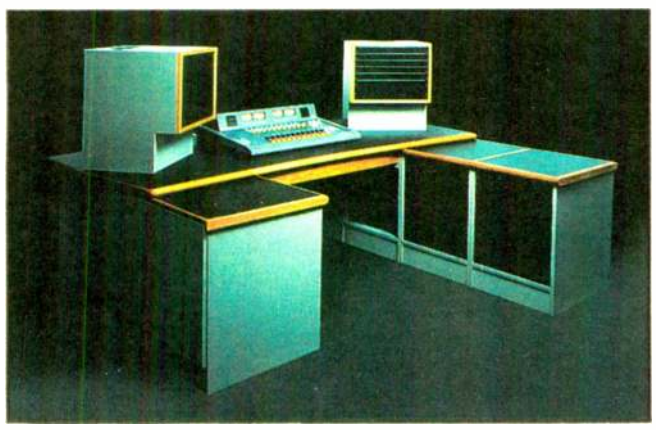
A new concern to furniture design today is a studio that will have functionally and an ergonomically useful life in the near future. Some manufacturers, such as **Pacific Research and Engineering (PR&E)** offer both furniture and equipment that address those concerns.

In production rooms, especially those without a typical audio console, the contemporary "workstation" furniture found in video and data processing applications may be more appropriate and often cost less.

When designing a new facility, there are concerns of monitor, keyboard, mouse and central processor/drive unit (CPU) location.

The location of the CPU system is important because it generates heat and noise. Most popular computer peripherals (keyboard, mouse, monitor) can be operated in the studio with the CPU in another room using extension devices.

Two companies offer both PC- and Macintosh-compatible products in the Extender: Companion and Commander lines from **Cybex Systems** and the Ex-Tend-It devices from **Gefen Systems**. The comfort level of the user is important because there are ADA and OSHA concerns about handicapped access and the prevention of repetitive motion stress injuries (such as carpal tunnel syndrome) for which traditional furniture may not be suitable.



PR&E QuikBilt Console

Furniture

PR&E now offers three lines of furniture including QuikBilt, an "off-the-shelf" modular system that can be shipped by UPS; the PrimeLine series, offering a wide array of "standard" components that look built-to-spec and which incorporate the experience of its renowned Custom built series.

Complete on-site services for all studio furniture needs and problems, from concept through design to construction and installation, are offered by Pennsylvania-based **Studio Technology**. At the opposite corner of the U.S. is **Mager Systems**, based in Phoenix, that offers design fabrication and installation of furniture with its signature "curved" look.

Wheatstone displayed the many configurations it offers, both consoles and furnishing that feature the Refined series, a modular product line complete with cable and interconnect management options.

Arrakis displayed the Radius and DeskStar lines that provide a wide array of modular units to support console and hard drive-centered studio equipment offered by it, and others, with pre-wiring interconnect and cable management solutions also available.

Nigel B. Furniture is well-known for its innovative and easy-to-transport A/V workstation furniture. Assembly and takedown is a breeze.

If you have unique needs or seem to rearrange your space on an almost daily basis, get the extensive Nigel B. catalog.

More traditional needs and a wide variety of finishes are accommodated by the console and rack products offered by **Winsted Video Support Systems**. Products include media storage, A/V carts, workstations, dubbing and edit stations.

If your needs call for metal enclosures to provide shielding from external magnetic or electrical fields, **AMCO** introduced a new line of rack and console cabinets to meet almost any need.

Strong attention is given to ergonomic concerns and reducing workstation clutter in the Duo, Arc, Crescent and Custom lines offered by **Solutions Custom Furnishing**.

In particular, the adjustable monitor stand in the Duo series looks promising.

A pedestal and monitor stand was introduced by **E-Z Up Inc.**, to help keep monitors and broadcast equipment off the ground. The company also had its established line of tables and shelters on display.

If your new digital studios feature a hard drive-based system at "center stage" and puts the traditional console to the side, UK-based **Sonifex Limited** offers studio furniture and equipment packages designed specifically for that layout. Everything is provided and designed around the workstation, not the console. You provide and install the appropriate hard drive audio system.

If you are investing in digital technology, there are some technical concerns that must be considered.

Wires, adapters, etc.

After everything is in place, it becomes necessary to deliver power to it all. Even wall warts — sometimes known as AC adapters — can be made easier to mount by the various surge-protected power strip options from **Rack Innovations**. These power strips support 12 VAC BNC lights (yes, inside the rack), can be ganged together and feature mounting arrangements designed for racks.

Easily overlooked are the interconnections between systems. Leading manufacturers of connectors, cable and wire were all present at the show.

Belden displayed new products for digital audio, digital video, digital microphones, multimedia and RF needs. Of particular interest to **RW** readers is the new "AudioFlat" cable.

E-Z Up Instant Table

This cable, designed for short runs within racks or equipment, works specifically with insulation displacement connectors (IDC). Installation time can be reduced without compromising signal integrity in either analog or digital situations.

Calling it QCPII, **ADC** introduced the next generation of its respected wire termination system. Improvements include a 1x8 block of connectors (rather than individual connectors), a non-polarized punch tool and a modified wiring channel.

Clark Wire & Cable strings studios together with Bittree Patching Systems specifically designed for broadcast, production and post production applications. Custom cable assemblies, a complete line of digital cables and triax cables are available.

If you are using AES/EBU audio over 75-ohm coax, you may have been dissatisfied with traditional video patchbay options. **Canare** introduced a 75-ohm dual video jack designed specifically for the needs of serial digital audio and video.

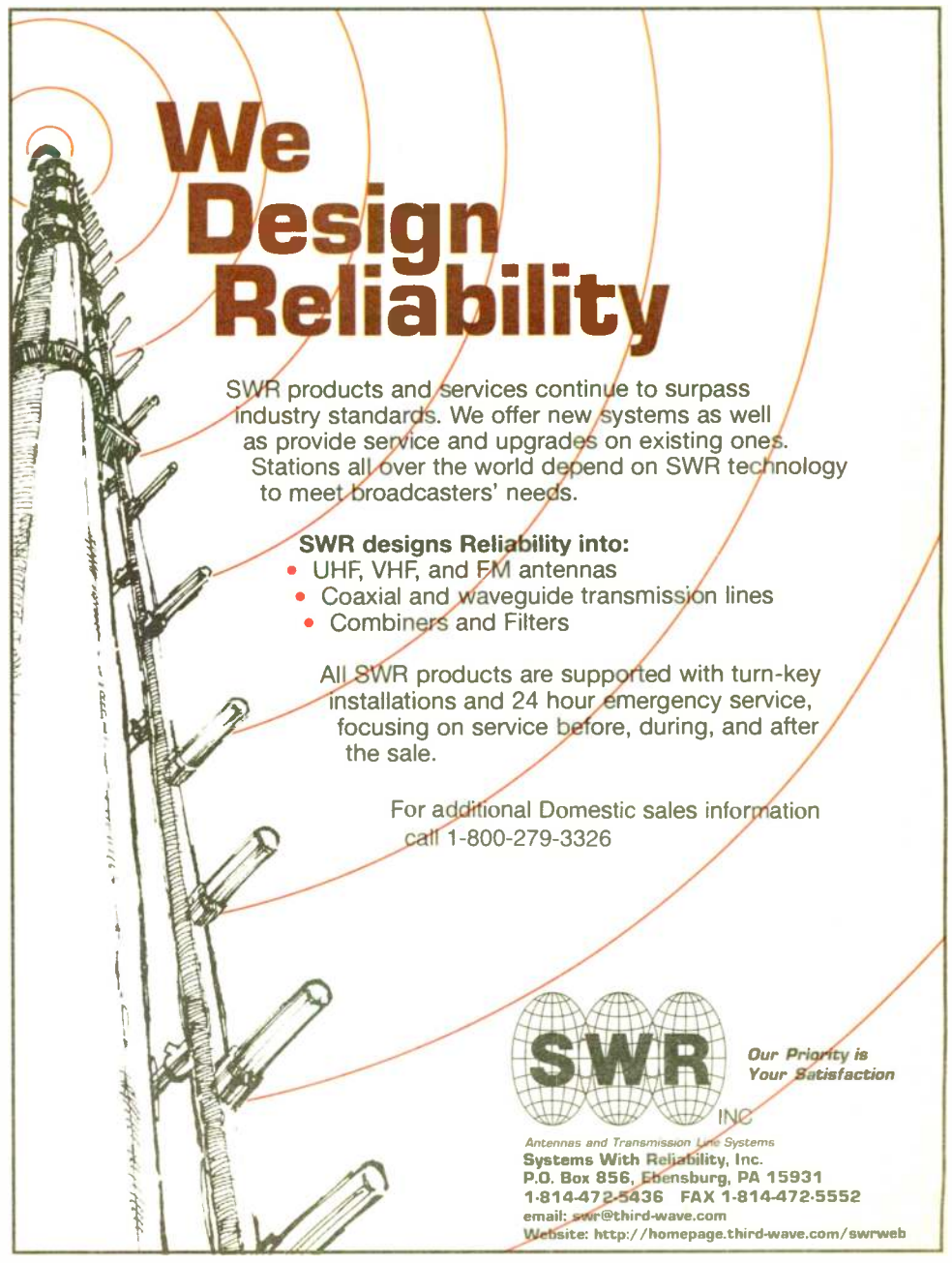
Gepco introduced new wire and cable configurations designed to handle the special challenges of preserving digital signal integrity over long cable runs typical of sport and remote production.

New products include 7537 SuperTrunk serial digital cable (AES compatible) twisted pair multipair, 7538 miniature serial digital coax and a multiple fiber-optical cable for single- or dual-mode applications. Most multipair cables now have both a color code and jack numbering.

Products and tools for the termination of audio, video and data wiring are offered by **MilesTek** offering a unique patchbay termination featuring "110" style punch blocks mounted to standard rack panels.

A rather extensive array of cable identification products, sockets, plugs, cables specialty audio cables and custom connector housing were offered by **Deltron/DGS**.

See GEAR, page 58 ▶



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World Radio History

Digital Forges Ahead at NAB

▶ DIGITAL, continued from page 23

Signal flow through the Libra Live emulates Neve analog consoles.

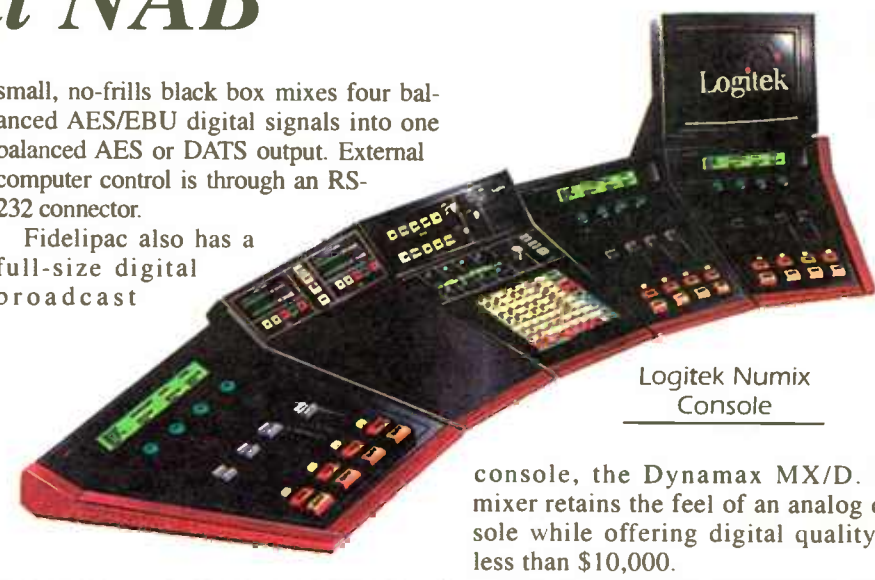
With a futuristic look right out of a "Jetsons" episode, the Numix digital console from **Logitek** drew attention with its modular wraparound layout, event screen and 4x40 LCD source/destination displays. The equally impressive ROC-10 digital console retained the look of a conventional broadcast console, but had the powerful Serial Sound audio engine running things behind the scenes.

A first look at the TASCAM digital mixer was tempting to many.

Auditronics brought the "NuStar" digital console to the NAB show. Called "the most usable and affordable digital console," the NuStar features a separate modular control surface and a rack-mount DSP electronics unit, which performs the actual processing on the audio.

Perhaps one of the tiniest all-digital mixers at NAB was the **Graham-Patten** DMR4X1, developed for **Fidelipac**. The small, no-frills black box mixes four balanced AES/EBU digital signals into one balanced AES or DATS output. External computer control is through an RS-232 connector.

Fidelipac also has a full-size digital broadcast console, the Dynamax MX/D. The mixer retains the feel of an analog console while offering digital quality for less than $10,000.



Logitek Numix Console

The long-expected Integrity digital console from **Pacific Research and Engineering (PR&E)** was shown at NAB. The 16-channel console combines classic Pacific feel with computer control of board configuration, DSP voice processing and full backup redundancy. New console ergonomics include a flat-screen panel display in place of a meter overbridge.

Higher-end console

From the other end of the country came the **Wheatstone** D-500 digital console, able to accept both digital and analog signals. Configuration and function are similar to the analog Wheatstone line, but this higher-end console is ready for radio's digital future.

Yamaha 02R Console

Harris Corp. returned to the convention floor with the DRC1000 digital radio console. Six powerful SHARC DSPs drive the console's digital circuitry, and the board is available with five-band EQ, compression and AGC as standard features.

AMS Neve Libra Live

A first look at the **TASCAM** digital mixer was tempting to many. While not yet priced for market, the new mixer has 40 mono inputs and 6 stereo inputs, assignable to any of eight busses. Internal dynamic processors include compression, gating and expansion. A "control pod" includes 20 soft rotary encoders and 32 soft switch controllers assignable to any function.

Euphonix demonstrated the high-end CS3000 console with an all-new control surface and "Total Automation" with motorized faders. The Hyper-Surround option can create mixes in any surround sound format.

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If you're looking to bring your mixing to the next level, make sure to pick up a Shure FP33 portable stereo mixer.

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World Radio History

Analog Consoles Still in Demand

Edwin Bukont

In the new analog console arena, many familiar names were missing from the floor. Most of those names did have new digital console offerings.

Many well-known models are still in production, but the emphasis is definitely on digital products. To date, Logitek is the only company to cancel its analog offerings.

Bridge to integration

Arrakis Systems provides a bridge to digital integration with an input module for connecting its DL4 audio workstation to its 12000 and 22000 series analog consoles. The five-position wide module allows for three faders at the console that are controlled via RS-232 ports. The keypad and a backlit LCD screen enable the operator to assign events on the DL4 to the console faders to create digital premixes.

Continuing the introduction of its versatile PRO-950 console, **Harrison by GLW** featured extensive input switching and output bus assignments.

Martinsound, the parent corporation of **Neotek**, promised new offerings later in 1997, but it is currently completing the construction of a new manufacturing facility in California. The Neotek Élan and Élite consoles were on exhibit this year.

Pacific Research & Engineering (PR&E) is among the few venerable makers of broadcast consoles to introduce a new analog product at NAB.

PR&E introduced the AirWave, part of a low-cost product line, targeted toward the budgets of the small- and medium-market broadcasters. The modular welded-steel mainframe can sit on a desktop.

Of course, AirWave includes the typical console features, with two stereo busses and one mono bus, A/B inputs with assignable logic, clock and time, dual remote line selector and a wealth of monitoring functions.

However, features not expected in a console in this price range include five high-performance preamps, co-host and guest headphone systems, a telephone module and balanced patch points — a necessity in large consolidated facilities.

Radio Systems consoles were on display at the **Broadcasters General Store, Bradley Broadcast and Harris Corp.** stands.

Three mainframe sizes

Ward-Beck of Scarborough, Ontario, will begin offering its Renaissance series of traditional analog consoles in the U.S. market this year. Available in three mainframe sizes from eight to 24 inputs, the consoles feature a wide array of standard and optional modules offering a multitude of busses, automation/live assist functions, a desktop version and electronic switching throughout.

Audioarts R-5 Console

Italian manufacturer **AEV** brought the Excalibur modular console, which features a 16- or 26-input mainframe. All I/O are balanced and include four independent stereo outputs and two independent mono outputs.

Auditronics had on display its 2500, 210, 801/851, 310 and 900 series audio consoles, as well as the 1900 series mix/minus system.

Fidelipac Corp. exhibited its MX Series analog on-air console.

Autogram Corp. showed its well established RTV-20, AC-8A, PM1032, MM8A, MM12A, Autoclock 100 audio consoles. Also on the show floor was the 7000 Series linear fader broadcast audio console line from **LPB**. The Signature III rotary fader audio consoles were also shown by the company.

Among the many production consoles shown by **Mackie Designs** were the SR Series large format mixing consoles, the LM-3204 line mixer and the LM-3204E expander.

Solid State Logic displayed its Axiom range of top-of-the-line consoles, as well as the SL 9000 J Series board.

From **Denon** came the SMX-2000 Digi-scratch mixer. This repeat performer from last year's show features a high-quality sampler triggered by a CD-sized "scratch wheel" to manipulate audio. The three-channel mixer includes two-band EQ, selectable line/mic/phono inputs and field-replaceable faders.

Wheatstone's newest product — offered under the **Audioarts** line — is the R-5 on-air console. Targeted at college and small-market stations, the R-5 is an inexpensive, simple-to-install desktop console. Features include two stereo busses with full-metering, four microphone preamps, full function tape remotes, A/B channel inputs, electronic switching, timer, extensive monitoring and Audioarts exclusive "Simple Phone" mix-minus feature.

A-300, A-6000 and D-500 on-air consoles and the SP-4 eight-track production mixer were shown by Wheatstone.

Yamaha introduced the MX12/4, a compact portable mixer with digital reverb and stereo EQ on the output. Eight of the 12 inputs feature both XLR and TRS connectors for balanced inputs and a +48V phantom power option. All channels have three-band EQ, monitor and effect sends and peak indicators. This is one for the road, packaged in an all-steel chassis with an optional rack-mounting kit.

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World Radio History

Digital Consolidation at NAB '97

Alan R. Peterson

As mature a technology as digital recording and editing has become, there was still room for several surprises at the NAB convention in Las Vegas last month.

Among them were new offerings or upgrades from Alesis and Orban, and the debut of an all-in-one station from Sonic Solutions. On many products, track count went way up, while the prices of other products stayed level or even dipped. Whereas eight tracks were considered plenty only five years ago, systems now boast 16 or even 24 in a single unit.

Orban managed to keep a shroud of secrecy on its new Audicy workstation until its Las Vegas debut. The Audicy is an outgrowth of the company's experience with the legendary DSE7000 workstation. It features a newly-contoured work surface, built-in Orban EQ, Lexicon digital reverb and real-time mixing of 10 channels. A total of 24 tracks can be assigned to the mixer channels.

(Editor's note: Look for Ty Ford's test drive of the Orban Audicy on page 70 of this issue of RW.)

Alesis, meanwhile, took its ADAT platform to a new level with the debut of the Meridian digital recorder. Maintaining much of the tape-based design philosophy of the ADAT line, the Meridian moved up to 20-bit encoding, added a jog wheel, an analog "ninth track" and SMPTE time code sync.

As part of its Audio Wizard for Windows radio management package, **Prophet Systems** is including the Wizard Multitrack Digital Editor, a four-stereo-track recorder/editor with full edit, cut/paste/copy and squeeze features, with audio output directly to the console for a "hands-on" mix experience rather than a virtual mix with a mouse.

Alesis, meanwhile, took its ADAT platform to a new level with the debut of the Meridian digital recorder.

Audio Wizard also includes "Quick Editor," a one-track cut-and-paste editor for airing phone playbacks and contest segments.

Arrakis returned to the convention hall with the Trak*Star eight-track workstation as part of its extensive product line.

The **Roland** DM-800 and VS-880 workstations continued to draw broadcasters looking for inexpensive, highly efficient editing equipment. The VS-880-S1 System Expansion offers dynamic automated mixing functions, 10 new effects algorithms and enhanced disk space.

MediaTouch is including MediaEDIT as part of its on-air package. This is a basic, two-track cut-and-paste editor capable of recording and editing MPEG Layer II and Dolby AC-2 compressed audio. Scrub and loop features are included.

Fostex came to Vegas with two rack-mount recorders: the D-90 eight-track hard disk recorder/editor with analog I/O and ADAT digital interface, and the D-160 with 16 tracks on a 2.55 GB removable drive. Both feature detachable front remote panels and the ability to sync to other "D" units for more tracks.

Speaking of 16-track machines, **Akai** used the show to exhibit the DR16 digital hard disk recorder/editor with internal 16 channel programmable mixer automation, two effect sends and 16-bit linear digital audio.

Fostex D-160 16-Track Recorder

Sonic Solutions released Sonic On-Air for radio. This package includes the Journalist Editor for fast production of news and simpler commercial spots, and the Broadcast Producer multichannel editor for producing complex magazine-style features.

Sonic Solutions also used the show to announce the release of the company's first 96 kHz multitrack recorder: the SonicStudio version 5.3, which provides four channels of 24-bit high-density digital audio. Clarity and definition is markedly increased.

AMS Neve brought out version 2.0 of the AudioFile system. Multiple SCSI devices can be attached to a single interface card, and support for Iomega Jaz drives is included. Loop editing, stereo/mono splitting and combining and new project management archiving are all enhanced features of version 2.0.

SADiE also announced 96 kHz capability at the NAB convention. The company has chosen 24-bit converters made by Data Conversion Systems to complement the new high-resolution editing features of the SADiE3 software.

Sound Forge 4.0 from **Sonic Foundry** is now available with a number of powerful updates and plug-ins, including support for RealAudio and for Microsoft's new ActiveX audio architecture. Also available but still unpriced: an acoustics modeler plug-in to simulate room space and the CD Architect plug-in to write Redbook-standard CDs.

Otari passed along the "5050" designation to a new breed of digital MO recorder and announced a 48-track version of the RADAR digital system is now available for broadcast and production use. The system weighs only 80 pounds and is available for a fraction of what a comparable 48-track digital tape-based unit would cost.

See EDITORS, page 44 ▶

Radio World Cool Stuff Award NAB 1997

Ted Staros of Pacific Research & Engineering demonstrates why the long-expected Integrity digital console from **PR&E** won an NAB 1997 Cool Stuff Award.

The 16-channel console combines classic Pacific feel with computer control of board configuration, DSP voice processing and full backup redundancy. New console ergonomics include a flat-screen panel display in place of a meter overbridge.

Another digital console manufacturer told **RW** at the show, "Pacific's entry into digital consoles legitimized them for many people, and made things easier for the rest of us."

For more information, contact PR&E at (619) 438-3911; or circle ***Reader Service 145.***

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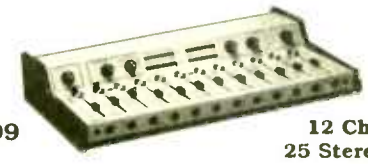

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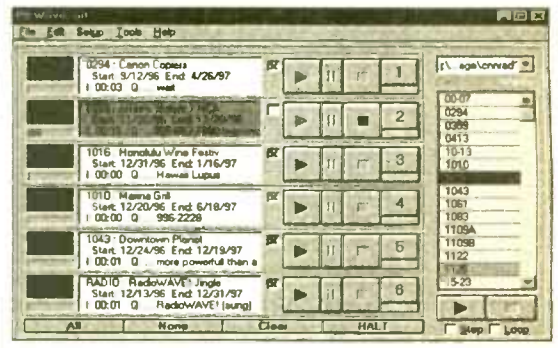

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World Radio History

Systems Go to Network Design

Val Davis

NAB '97 was everything we hoped it would be. It was huge — with over 100,000 in attendance — and in typical Las Vegas fashion, was a state-of-the-art showcase.

This year there were three definite trends to be observed in the automation/live assist field: Automation companies are moving their systems to the power and stability of the 32-bit platforms, Windows 95 and Windows NT.

Many companies are building networking capabilities into their systems to allow for transfer and use of audio from outside the system. And several companies have moved up to higher-quality audio cards.

The following companies exhibited at the show this year.

Enhancements incorporated in DigiCart/II Plus from **360 Systems** reflect the suggestions of hundreds of users, and some improvements that were not previously possible. These include internal hard disks offering up to 49 hours of storage, Iomega Zip compatibility that makes 16-bit linear recordings and a revised serial interface to many broadcast automation systems. The new DigiCart has the same powerful capabilities and operates essentially like the DigiCart/II.

AEV brought us Virtual Radio, a Windows 95- or NT-based system for live assist or fully-automated music on hard disk. The system is networked with a basic configuration of a Central Audio File server, the production workstation and the on-air workstation. It uses MPEG Layer II audio, expertly manipulated by Digigram audio cards. A music management package is also available, along with the AEV traffic system.

The DigiCenter from Audio Pro Technologies

The company also carries a full line of broadcast audio processing.

Arrakis Digilink II and III offer complete station solutions from live assist to full automation. The system is capable of unattended operation and satellite switching, and multiple units can be networked together for the transfer of audio, text and traffic logs. While the system is still DOS-based, it is nonetheless a powerful system capable of performing even the most difficult tasks.

Audio Pro Technologies told attendees about the DigiCenter, a digital audio managment system with more than 100 GB of online hard disk storage. Features include: optional digital audio I/O, varitime feature offering real-time adjustment and remote control logic I/O.

HOW THE FOSTEX DAT RECORDERS STACK UP.

Your smartest buy in a basic DAT recorder. A third sampling frequency (32kHz) offers up to 4 hours of extended play. AES/EBU and S/PDIF optical I/Os offer professional interface.

D 5

The most affordable timecode capable DAT recorder, bar none. Fully loaded with all options, nothing comes close to the D-15TCR. Chase functions are built in and instant start is available without pre-loading.

D15 NEW

Your best value in a studio timecode DAT recorder. It's the third generation machine from the company that first offered a timecode DAT recorder (the Fostex D-20). A workhorse professional DAT recorder.

D25

The pinnacle of sophistication in a timecode DAT recorder. Dedicated softkeys help you breeze thru menu settings and commands. Ease of routine maintenance has made it one of the most reliable DAT recorders in the industry.

D30

FOSTEX

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Support: 1-800 -9-FOSTEX e-mail; info@fostex.com http://www.fostex.com

Circle (11) On Reader Service Card

Enhancements

incorporated in DigiCart/II Plus from 360 Systems reflect the suggestions of hundreds of users.

The Audio Vault from **Broadcast Electronics** is a complete Windows-based automation system. While the AudioVault core system is still a Windows 3.1 16-bit application, it has begun to look to the 32-bit platform with the introduction of AV-Edit and AV-Schedule.

AV-Edit is a fully integrated on-screen waveform editor that allows direct cut-and-paste editing of AudioVault files. AV-Schedule is the latest in Audio Vault's software suite: AV-Schedule will import schedules from virtually any traffic or music software and integrate them into

360 Systems DigiCart/II Plus

the Audio Vault automation system.

Audio Vault also offers NewsBoss, a newsroom management system with wire reception, an on-air radio prompter and links between stories and actualities. Audio Vault uses proprietary audio cards with either linear or MPEG Layer II audio.

The **CartWorks** System is Windows 95-based. The system is an easy-to-operate, yet powerful, automation system. It uses apt-X audio compression that can be automatically converted to either SND or .WAV formats allowing for easy transfer of audio from virtually any other source.

This allows news actualities recorded on any laptop with a soundcard to be easily transferred into a station via modem and ready for airplay in minutes. The CartWorks system can be used for live assist or full automation, and can be

See SYSTEMS, page 57 ▶

World Radio History

Optimize Your CD Control With Denon

- Control Terminals RS-323C/422A, D-Sub 9 pin. D-Sub 25 pin
- Programmable Play Mode
- Pitch Control
- Auto Space
- Auto Cue
- Jog/Shuttle Wheel

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Professional audio applications require professional tools—particularly in demanding digital studio environments. The Denon DN-C680 CD player is engineered to provide the *ultimate* in flexibility and performance for broadcast and post production facilities. Offering a multitude of features, including programmable play mode, jog/shuttle wheel, auto edit, auto space and optional SMPTE kit, the DN-C680 provides the optimum solution for programmable CD playback.

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World Radio History

Radio World Cool Stuff Award NAB 1997

Daryl Buechting unveiled the new **Harris** CD LINK, NAB'97 Cool Stuff Award winner, an uncompressed digital 950 MHz STL.

This self-contained unit can accommodate a single AES/EBU input or two 15 kHz audio feeds. Two auxiliary data channels are available, one handling up to 4,800 baud, the other capable of up to 9,600 baud. Options include either two 6 kHz auxiliary audio channels or one 12 kHz channel. A DSP stereo generator is available in the receiver to provide a composite or direct digital feed to the exciter. All channels are available simultaneously at the receiver, providing flexibility for remote control, SCA, RBDS and other applications.

For more information, contact Harris at (217) 222-8200; or ***circle Reader Service 147.***

Mics Better Than Ever At NAB

John Bisset

Although there were a number of surprises in studio mics for broadcast purposes, a number of companies unveiled new or improved lavalier or button-type mics, as well as wireless systems.

The CK-77 from **AKG** is one of the new lavaliers. Billed as the world's smallest dual-diaphragm mic — at 0.55 inches long — this condenser mic reduces handling and clothing noise with its elements wired out-of-phase. The dual diaphragms increase surface area and provide greater sensitivity.

Tiny, but tough

AKG also demonstrated a new high-output omnidirectional dynamic ENG mic, the D-230. This "outdoors" mic has been designed to handle howling winds

EVI Audio RE500

with an integrated windscreen and shrug off the abuses of field remotes with a rugged all-metal body.

Longtime industry leader Electro-Voice was recently purchased, and the new company is now **EVI Audio**. Among its new products is the model 635L dynamic mic. Lengthened to allow ample room for a mic flag, the 635L is 3.5 inches longer than the original 635A.

The RE500 is a true condenser mic designed for hand-held operation. Based on the RE2000 design, this mic is not an electret. It can handle 148 dB SPL and has a 128 dB dynamic range. The mic features a smooth cardioid pickup pattern.

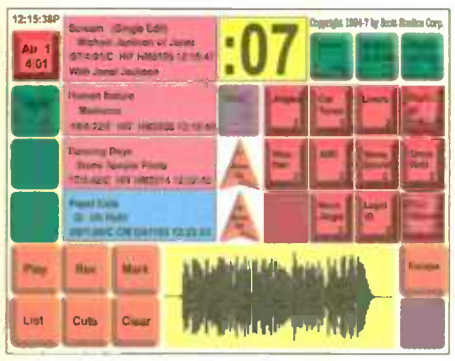
EVI Audio helped solve problems with lavalier mics by introducing the CO2 Pro. The miniature condenser mic was introduced last year. The "Pro" tools added this year are a variety of tie bars, tie tacks, mounts and clips.

VEGA, the wireless mic company, is also operating under the new EVI Audio umbrella. The company demonstrated its

See MICS, page 33 ▶

Scott Studios Acquires Electric Works Corp.

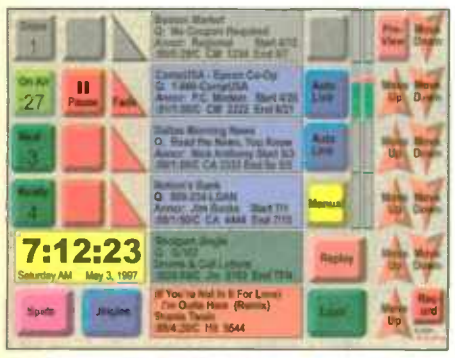
You Get More Digital Choices from Scott than from Any Two Other Companies!



The Scott System is radio's top-of-the-line digital studio for music on hard drive. Its touch screen is the *easiest* and most powerful for live jocks.

AXS® (pronounced ax'-sess) Pro is a live jock's dream, with more features than any other moderately priced digital system. Runs on Win95 and NT.

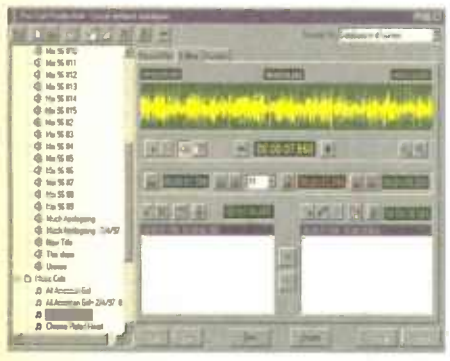
AXS® is radio's premier digital unit at an affordable price. It runs satellites, CD and hard drive, has Power Fill, substitutes satellite voices and sounds great!



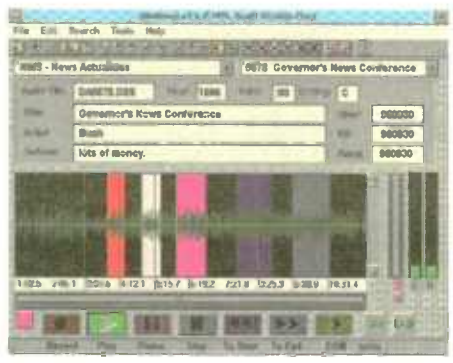
The Scott Spot Box hard drive digital has great audio quality like compact discs, but Spot Box looks and works like "carts"—at low "cart" machine prices.

The Scott Hot Box gives jocks 43 sets of 53 Hot Keys that instantly play sound effects, jingles and comedy. Priced less than "cart" decks.

Scott's Voice Trax in the jocks' lounge lets them pre-record a great show quickly. They hear song and spot starts and ends so their shows air smoothly.



Scott imports production from any WAV digital editor and includes "Laser Blade™"—the best 2-track editor with rotations, start/end dates and times.



WinNews lets any number of news workstations record and edit audio and text on one screen. Complete newscasts are easily sent to the air studio.

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World Radio History

▶ MICS, continued from page 32

new R-672 diversity wireless mic, a six channel wireless intercom system; and the RMT-14, a multichannel headphone monitoring system for IFB applications.

Sennheiser demonstrated its new MD425 supercardioid dynamic mic, which features excellent directionality as well as superior noise rejection. The mic is suited for live applications. Sennheiser also displayed two new high-fidelity wireless stereo headphone systems. Operating in the 900 MHz band, either headphone system provides long-range reception up to 250 feet.

The ENG-500/UT-500 From Telex

Ultimate in flexibility

For the performer, a new wireless in-ear system, the 3050 series, offers the ultimate in flexibility and audio quality. As for wireless microphone applications, the Sennheiser SKM3072-U UHF handheld transmitter utilizes phase-locked-loop technology to offer 32 switchable transmission frequencies.

Interference can be forgotten with that many combinations. The system's sonic quality is further enhanced through the use of the patented HiDyn Plus noise reduction system.

For digital recording, the MKH40-P48U3 meets the demands admirably. This condenser mic exhibits a cardioid pattern and, like other mics in this series, utilizes a tuned RF circuit as a part of the

For digital recording, the Sennheiser meets the demands admirably.

capsule. This makes the microphone highly immune to humidity while providing low noise performance.

Neumann displayed the AK 20 capsule, which was designed to be used with the Neumann KM 100 miniature microphone system. The AK 20 achieves a figure-8 pattern with a single 16mm diaphragm. Ideal for gooseneck mounting, this series should be considered for roundtable interview- type settings.

Neumann also displayed the new U87A, known for its "open" sound. The large diaphragm transducer is coupled to a low-noise FET preamp in the capsule. This results in a low level of self- noise. The off-axis response of the U-87 has been reported as quite hot, which can be good for inexperienced announcers. If the mic is to be used in small rooms and mounted near a reflective wall, a hollow sound due to phase cancellation can occur.

Several companies are offering low-end wireless mic systems. For stations on a budget, this product line is worth considering. **Telex** featured its new Pro-Star diversity VHF/UHF single frequency wireless mic systems.

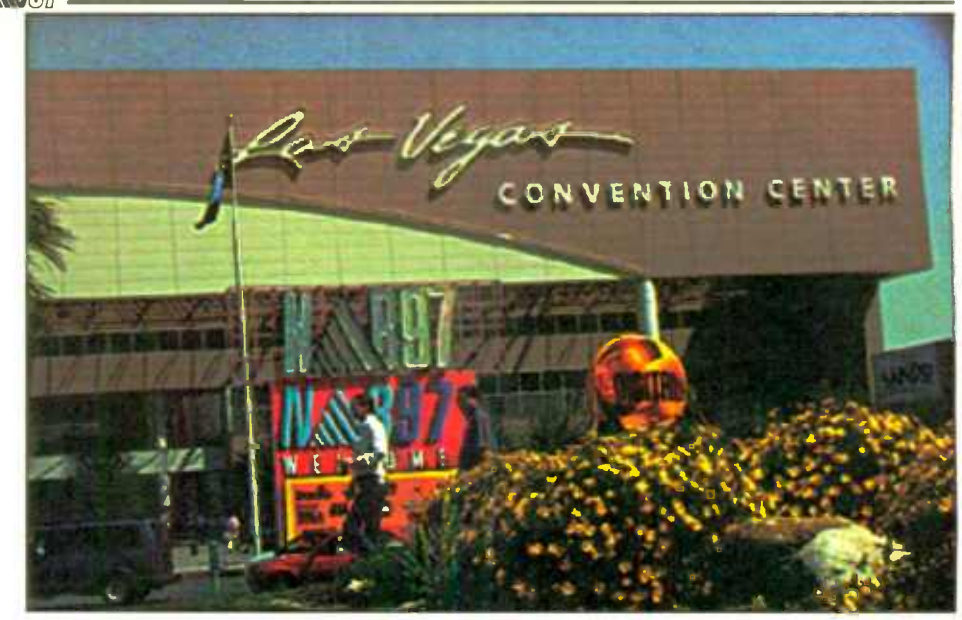
VHF version lists for $250, the UHF version has a list price of $450. The system comes with a lapel mic and a handheld is also available.

For broader applications, the ENG-500/UT-500 UHF Broadcast Wireless system is compact, ruggedly built, and offers crystal-controlled frequency agility.

Test gear

Looking to try before you buy? **Systems Wireless Ltd.** stocks a full line of wireless microphones and related

See MICS, page 42 ▶



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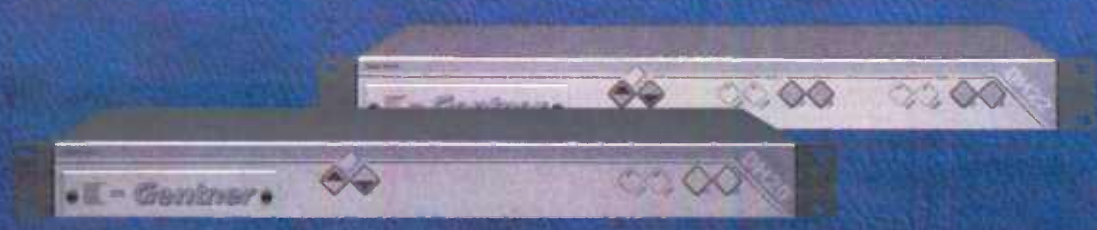

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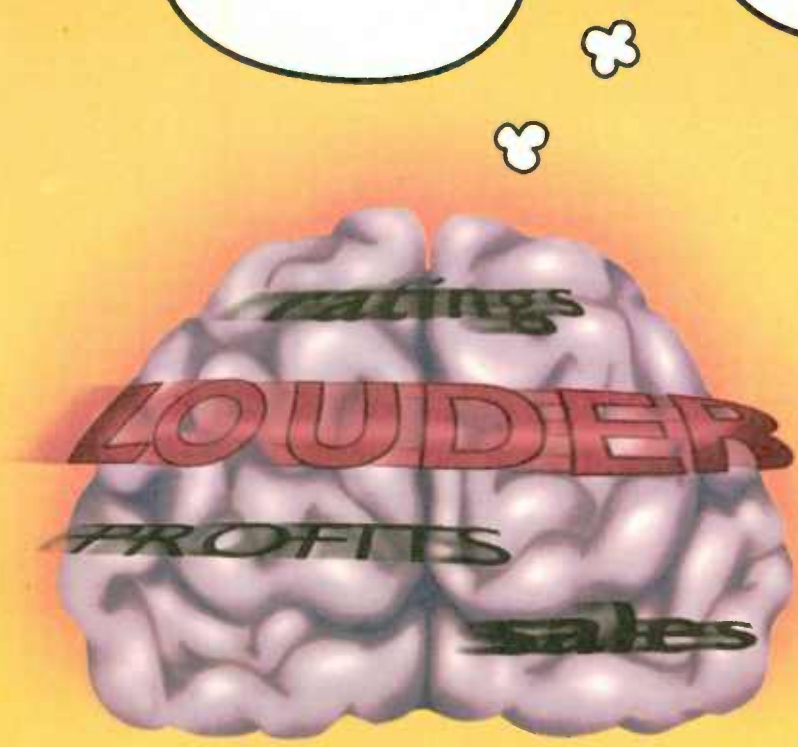
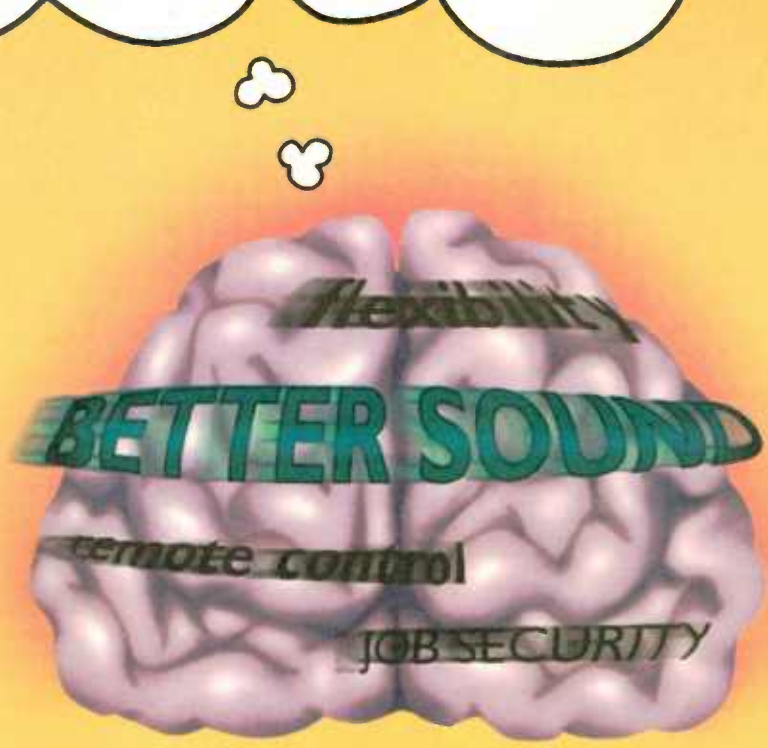
World Radio History

GREAT MINDS DO THINK ALIKE!

THE APHEX FM PRO



Station Manager



Engineer

Everyone imagines being louder than their competition without causing listener fatigue. It's no longer just a fantasy. With the new Aphex FM Pro, loudness doesn't come at the cost of mind numbing grunge and distortion anymore. It took the genius of four existing patents, combined with five new inventions, to create the most powerful, greatest sounding processor ever.

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World Radio History

Digital, Analog Source Gear Abounds

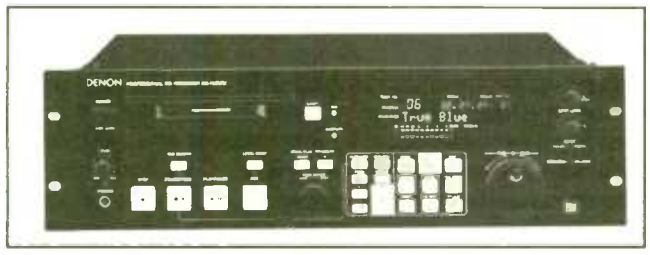
Though Analog Holds Its Own, Digital Rules As Radio Stations Implement New Media

John Gatski

Source equipment continued the evolution to mostly digital technology for radio broadcasters, although a number of analog devices are still marketed and used by hundreds of stations.

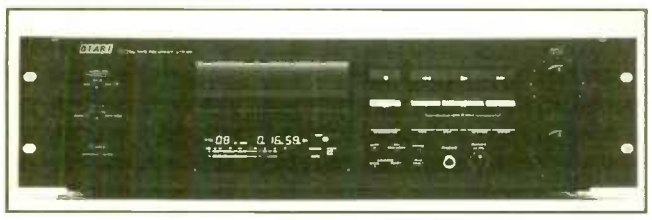
Sony MDS-B5 MD Recorder

At the 1997 NAB convention, **Denon** continued to demonstrate its dedication to source gear with the new DN-M1050R MiniDisc recorder and DN-C680 CD player.



Denon Professional MD Recorder

Other Denon products on display at the show included the company's established line of pro CD cart players; the DN-610F tape/CD combi-deck; numerous cassette and MiniDisc models; the DN-1406F CD jukebox; and DCM-30P and DCM-60P CD autochangers.



DTR-8S DAT Recorder From Otari

Harris Corp. showed the CD2001 CD cart machine, as well as the Orban AirTime Digital Delivery System, which provides ready access to audio and support information from a single database.

Keeping the faith in analog cart machines, **Audi-Cord** came to Vegas with the DL Series of play and play/record decks for on-air and production use.

Superscope/Marantz demonstrated its standalone CDR615 CD recorder, DM-350 combo CD/cassette deck, PMD370 five-disc CD autochanger and its series of portable analog cassette decks, multitrack cassette decks and other portable audio gear.

Fidelipac displayed its DCR Series of digital cart machines and the CTR Series of analog cart machines as well as other studio accessories.

Otari had its RADAR multitrack hard disk recorder/player, now configured at up to 48 tracks, on display. Other new gear included the DTR-8S DAT recorder and the 5050 magneto-optical two-track recorder.

DRS Ahead Technology was on hand, letting attendees know that it now carries the well-known line of **ITC** analog cart machines, including the Series 99B, DELTA Series, and Series 1 and 2 lines.

Sonifex highlighted the Sentinel+Index, a single data DAT drive and a single 2 GB hard disk and the Courier portable recorder, which records to a PCMCIA card with GI scrub wheel editing.

360 Systems introduced the DigiCart/II Plus, a digital hard disk recorder that features an internal 16- or 32-hour hard disk, a removable disk, editing and playlisting functions, instant access to cuts, comprehensive remote control, and digital I/O in AES/EBU, AES/SMPTE and IEC 958 Type II formats, as well as analog I/O.

MediaTouch introduced its new OpLOG V8.2 controller panel that will demonstrate the integration of digital audio with the Pioneer 5000 500-slot jukebox.

A pair of new DAT machines were on the **Fostex** stand. The D-15 features instant start, RAM scrubbing, cue-to-modulation and onboard parallel ports. The D-15 is available in three different configurations, based on application.

Fostex also showed its D-90, a removable hard disk recorder and the D-5, a mastering and archiving DAT recorder.

The updated portable PD-4 DAT includes SMPTE time code sync and a built-in 3x2 mixer with phantom power.

Sony exhibited the PCM-7040 digital audio recorder, MDS-B5 stereo MiniDisc cart recorder and the MDM-X4 MiniDisc multitrack recorder and PCMR-700 DAT recorder.

Antex Electronics Corp. introduced a four-channel PCI digital audio board that offers Windows 95 users studio-quality multitrack audio recording and playback with multiple device operation and advanced synchronization.

Italian manufacturer **Tiesseci** won an NAB'97 Cool Stuff Award for its TS35 Radio Automation Software or Radio Station in a Box. Designed for Windows 95 or Windows NT 4.0, the competitively priced software package is compatible with all Windows-compatible audio boards, and features cross-fades on a single stereo audio board and four stereo plays. The system uses proprietary cards, has additional add-on hardware controllers (mixers, etc.) and is network-based.

Pictured, Tiesseci Director Luca Zanetti was on hand at NAB to demonstrate the product.

For more information, contact Tiesseci at +39-332-289164; or circle Reader Service 149.

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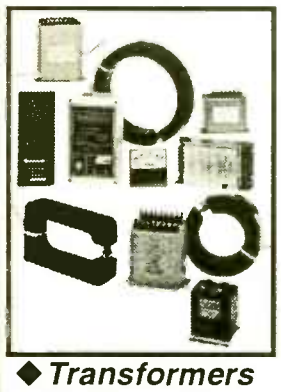

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RS-81S 8x1 SVHS Video Routing System
RS-81V 8x1 Video Routing System

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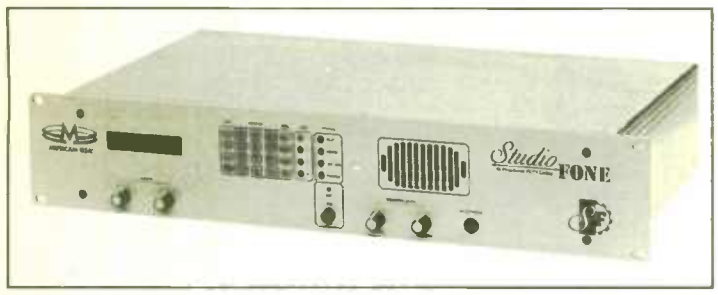
World Radio History

New POTS Codecs Make Big Noise at NAB

Lee Harris

For decades, broadcasters have been lusting for a device that would provide broadcast-quality audio over regular dial-up or POTS (plain old telephone service) phone lines. Like so many requests on the broadcasters' wish list, this too has now been granted.



MUSICAM USA StudioFone

At last, broadcasters can pull off professional sounding remote broadcasts from almost anywhere without the lead time and expense attendant to ISDN lines. Impressive examples of POTS codecs drew lots of attention at NAB'97 and the orders are piling up.

Got it right

Engineers knew it was only a matter of time until the proper compression algorithms would be worked out to permit high quality audio over regular phone lines.

MUSICAM USA introduced the FieldFone last year and had its improved FieldFone II on display in Las Vegas. Doreen Arleth from MUSICAM said the new model offers frequency response up to 10 kHz over a 33.6 kbps connection.

Customers who purchased the original FieldFone have received upgrades or new models.

Like competing units, the FieldFone II is fully bidirectional, allowing cues to be sent down the same line being used for the audio feed.

The 9.4 pound remote unit features microphone and line inputs, as well as separate send and return level controls. It can also send remote relay contact closures back to the staton to the companion StudioFone. These can be used to start recorders or interface with automation systems for unattended remote cut-ins.

As usual with broadcasting equipment, some operators are already putting the FieldFone to innovative uses.

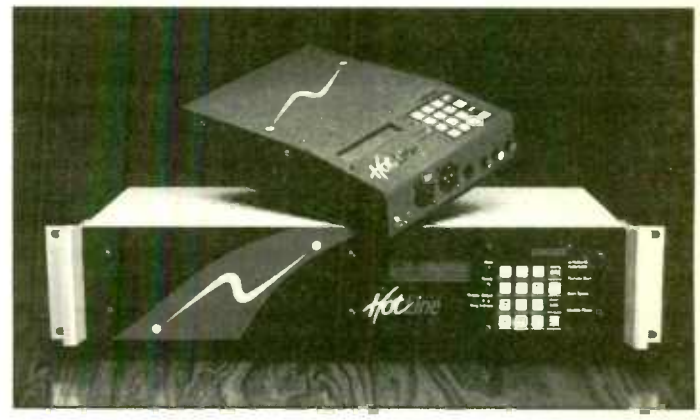
As usual with broadcasting equipment, some operators are already putting the FieldFone to innovative uses. MUSICAM's David Lin said a Korean broadcaster is using a FieldFone-StudioFone combo around the clock as a studio-transmitter-link.

Massachusetts-based **Comrex** has spent decades trying to squeeze decent audio out of POTS lines; first with its single line frequency extenders and then its dual and triple line extender units. Now with the HotLine POTS codec, Comrex has what broadcasters have wanted all along.

The HotLine delivers up to 10 kHz of full duplex audio on a standard dial-up line when connect speeds of 33.6 kbps are achieved.

The HotLine adjusts response to accommodate connect speeds all the way down to 12 kpbs, which will yield about 5 kHz.

The Comrex HotLine is extremely compact and lightweight, making it appealing for newsgathering applications.



The Comrex HotLine

Kris Bobo, vice-president of development, said CBS and ABC radio networks have purchased the units with the intentions of using them to cover the Helsinki summit.

Comrex reported shipping about 300 HotLines and companion studio units since January and the company expects this to continue to be a big seller.

The advent of broadcast quality audio via regular phone lines could have spelled big trouble for Texas-based **Marti Electronics**.

For years, a Marti RPU system was the only way to guarantee decent audio from a local remote broadcast. But in most cases, it is easier to dial a phone than to set up a line-of-sight RF link. Marti responded to the threat by coming out with a full-featured POTS codec of its own, the Smarti, that started shipping just in time for NAB'97.

Marti President, Jim Godfrey, said the Smarti was a necessary product line extension because POTS codecs were certain to cut into the company RPU sales; already experiencing a slowdown from frequency congestion in larger markets.

Greater flexibility

The Smarti delivers frequency response of up to 7.8 kHz on a 33.6 kbps connection.

It is designed to handle more complex audio mixing situations than its competitors, with four switchable mic/line inputs and two headphone outputs incorporated into a five-pound unit. Like the Musicam FieldFone II, the Smarti's software can be upgraded automatically via modem. Unlike its competitors, the Smarti does not offer a rack-mountable companion unit for the studio.

Most of these POTS codecs carry sticker prices in the range of $3,000 per unit, making them comparable in cost to ISDN codecs or RPU systems.

However, it is clear that these POTS systems will offer broadcasters much greater flexibility in setting up remotes.

Ideas, Solutions Offered For RDS/RBDS Customers

Don Elliot & Ann Schwab

Broadcasters seeking ways to transmit information and data more quickly and clearly found ideas and solutions in the Radio Broadcast Data System (RBDS) and Radio Data Service (RDS) products displayed at NAB '97.

Belar showcased an FM subcarrier monitor that digitizes the composite signal and performs operations digitally. Because of its unique software-based system, it can do things above and beyond analog-based monitors or units built to do a specific function.

The same unit can handle many different functions. Simply write the formula and algorithm and the software does all the work.

According to company President Arno Meyer, "There's nothing to tune, nothing to adjust — it just works. If you can design it, (the unit) will do it."

Digital DJ took to the convention floor with the Digital DJ Receiver, capable of receving alphanumeric information and graphics. The AM/FM radio includes the data receiver and screen. The device is addressable so users can receive real-time on-demand traffic, stock and weather reports as well as customized news and sports updates.

SCA Data Systems featured its recent product additions, the NT96R subcarrier data receiver with linear power supply and the NT96HD wide-range, high-efficiency switching supply subcarrier data receiver. Both feature transparent asynchronous and synchronous data transmission and built-in error detection and correction.

Both offer 9600 BPS throughput, with a maximum data rate of 12,000 asynch equivalent. They are fully compatible with the company's established 9600 data system, which provides one-way communication over a single SCA channel with a radius of greater than 30 miles.

Inovonics introduced its model 540 FM subcarrier monitor, which measures injection of RDS, SCA and high-speed data subcarriers, as well as displays SCA deviation/modulation. The product is designed to work with any modulation monitor.

Circuit Research Labs showed its SC-100 RBDS generator.

JNS Electronics featured its established Maestro product. "Digital transmission's a quantum leap for the broadcast industry," said namesake John Stannard, "and Maestro is designed to shift data in two-thirds less bandwidth than other current technology uses."

According to the company, the product is built to be transparent to data with no compression or filtering used in the transmission.

Circle (27) On Reader Service Card

World Radio History

Products & Services Showcase

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

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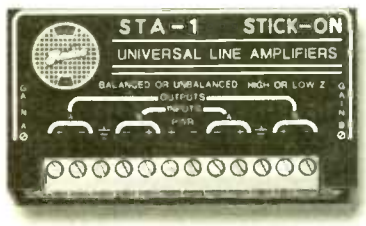

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World Radio History

Ringing in New Telco Products

Don Elliot,
Ann Schwab and
Alan R. Peterson

NAB attendees discovered new products to improve telephone-oriented broadcasting situations.

Telos unveiled its new Call Screener for Windows for talk show and multiple studio environments. The show producer or screener enters caller information for the show host onto the Windows screen. Criteria includes caller's name, city and additional comments.

A clever call screener was exhibited by **Radio Computing Systems (RCS)**. The TalkBack show manager displays color-coded caller history and features timers for on-hold and on-air. The system runs under Windows NT.

Gentner displayed its new DH20 and DH22 digital hybrids with special features including auto-answer, auto-disconnect, automatic mix-minus and call-progress detection. The DH22 has two digital hybrids in a standard single rackmount unit, enabling two callers to be conferenced on-air. The DH20 is a single-hybrid version of the DH22 and it replaces DH1A. The company introduced the SPH10 analog hybrid as an updated version of its earlier analog telephone hybrid unit.

Gentner also showcased the TSG12 multi-line on-air phone system and the GSC 3000 voice interface which simulates a caller's voice and responds to touch-tone commands.

Telos raised the bar with its new Zephyr Express codec and mixer, combining a full-featured codec, ISDN terminal adapter and an audio mixing/monitoring system in one unit. The Zephyr Express features an input audio limiter and the selectable Safe feature allows the unit to be locked into a single preferred configuration, protecting the ISDN setup and number to be dialed.

Other products in the Telos line included the 100 Delta digital hybrid and the ONE-x-Six talk show system.

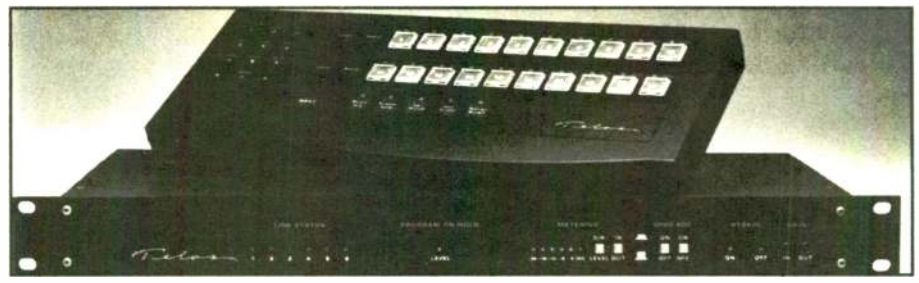
Comrex has been well-known for years with its line of frequency extenders and telephone couplers. The company returned this year with the Nexus ISDN codec and the Codec Buddy remote mixer. These units claim up to 15 kHz bidirectional audio with very low delay.

MUSICAM USA hit the floor with the Road Runner, a portable mono codec/mixer for ISDN feeds. The Road Runner is backed up by an additional analog audio send for delivery of voice-grade signal. ISDN performance can be as high as 20 Hz to 20 kHz on two "B" channels, with 92 dB dynamic range.

JK Audio featured its new universal product, Remote Mix 3. President Joe Klinger said, "It's a product that our customers designed for us." It combines two previously separate pieces of equipment — a phone line hybrid/mixer and universal handset interface — into one unit. The unit works with conventional phone lines, analog or digital PBX or ISDN lines and even cellular phones.

JK Audio also previewed a product that will become available later in May: the Telephone Handset Audio Tap-2, or "THAT-2."

The unit connects between the telephone and handset for quick access to audio in and out of the telephone. THAT-2 also has an A-B-C switch to accommodate carbon, electret or dynamic handset microphones.



Telos ONE-x-Six Talk Show System

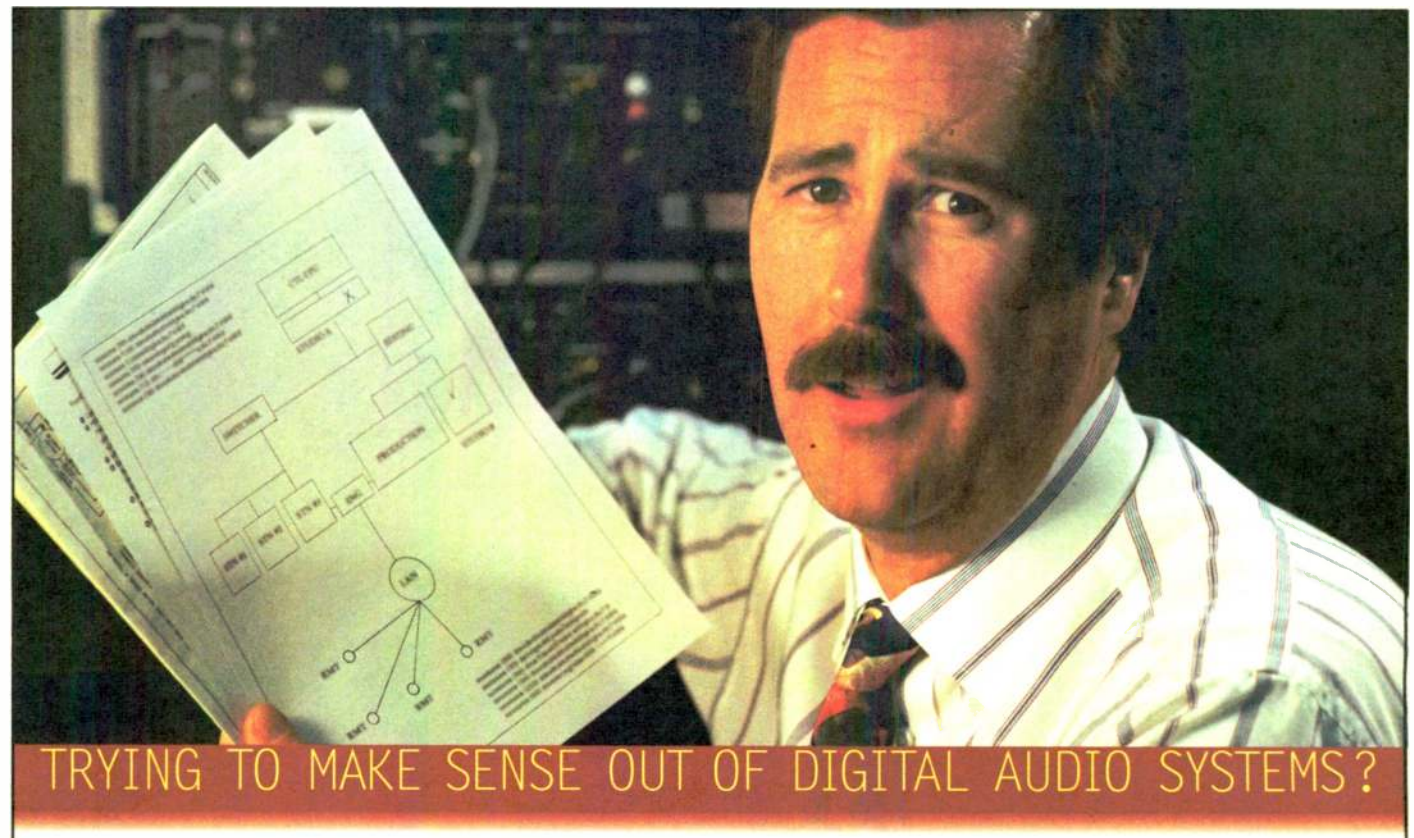
The unit will emulate the type of microphone in the handset and allow audio to be sent into many different types of analog and digital PBX and ISDN telephones.

Marti Electronics recently acquired the Cellcast remote broadcast studio, which combines a four-channel mixer and frequency extender with a built-in 3W cellular phone. This self-contained unit replaces three separate components at remote sites and, because of cellular technology, does not depend on hardwired lines to get a signal back to the studio.

RE America showed the RE 660/661 and 662/663 MPEG Layer II audio codecs. All offer direct access to ISDN. Features include: mono, dual-mono, stereo or joint-stereo operation, 300 to 9600 baud and optional AES/EBU and S/PDIF digital interfaces.

In the itty-bitty circuit department, **Radio Design Labs (RDL)**, makers of the "Stick-on" product lines for broadcast, came to the show with the ST-TC1 telephone system coupler and the TX-1W music-on-hold amplifier.

Blue-box manufacturer **Henry Engineering** introduced the Audio Online caller information system, with capacity for 16 callers and an interactive menu allowing callers to choose the subject most interesting to them. This joins the existing line of problem-solving blue boxes from Henry.



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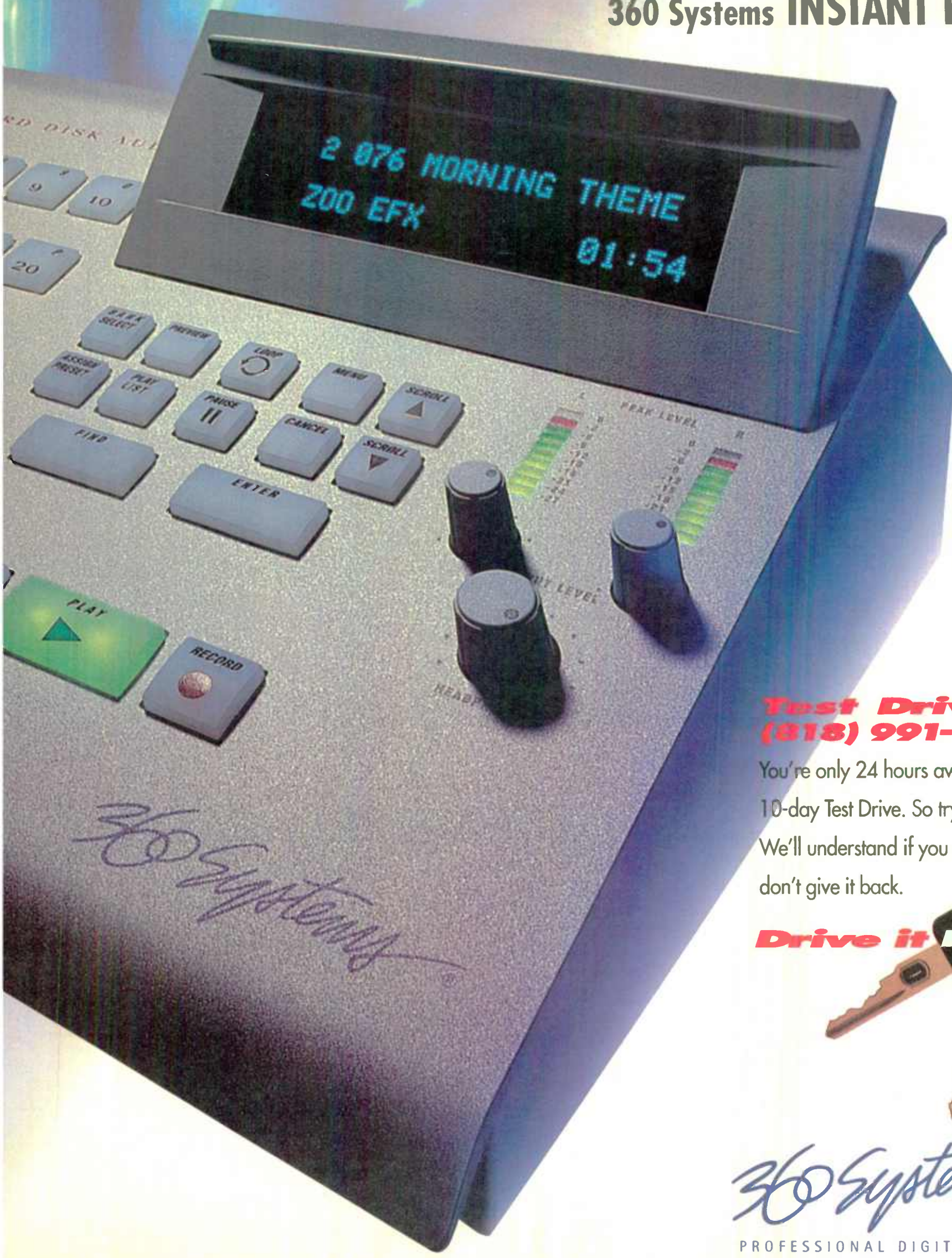

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World Radio History

Radio World Cool Stuff Award NAB 1997

"Stations are going to use it to create an on-air personality," said **Cutting Edge**'s Frank Foti. "So, I say, 'Why not give it personality?'"

He was, of course, refering to the NAB 1997 Cool Stuff Award-winning Omnia.fm digital processor from Cutting Edge. The digital processor comes with a stereo encoder that overcomes the harsh, metallic sound qualities inherent with previous DSP-based broadcast processors.

Pictured l to r: Telos Systems' Kevin Nosé, Foti and Telos Systems Jerry Fragapane.

*For more information, contact Cutting Edge at (216) 241-3343; or circle **Reader Service 152.***

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Mics For Every Radio Application

▶ MICS, continued from page 33

equipment for sale or rent. At the show, it was demonstrating the **Lectrosonics** model UCR 195 UHF band wireless receivers.

These quality products benefit from surface mount technology (SMT) and are compact and rugged. The **Micron Audio Products** TR-50 microphone was also demonstrated in the Systems Wireless Ltd. booth. This omnidirectional electret condenser lavalier is complete with a variety of clips and tie bar mounts.

One of the original players in the wireless mic field, **Nady** displayed a portable multi-channel UHF wireless system. The Nady 661 VR works with either handhelds or lavalier mics, and features up to 160 user-selectable channels. The system provides a clean, quiet natural sound. Should interference from other RF sources be a problem, it is eliminated by the Tone Squelch feature.

A related product was the Nady ENG-

One of the original players in the wireless mic field, Nady displayed a portable multi-channel UHF wireless system.

12. This portable, multi-channel UHF wireless system features a unique snap-on transmitter module, which converts any microphone into UHF wireless operation. With an extended operating range of up to 1,000 feet, the system boasts 120 dB dynamic range.

Entering the digital revolution in grand style, **beyerdynamic** introduced the MCD 100 digital cardioid condenser microphone. This studio-size mic has become the world's first digital mic. It has been designed with a 22-bit A/D converter built into the body of the mic behind the capsule. The standard digital output signal conforms with AES/EBU standards. Beginning production soon, this mic is an ideal complement to the new digital broadcast consoles.

Smaller than a matchstick

At the other end of the microphone spectrum is the world's smallest mic — beyerdynamic's MCE-7. This micro-lavalier is smaller than a wooden matchstick. It doesn't require an external windscreen and features a wide frequency response. The microphone's diaphragm runs vertical to the plane, to reduce popped-P's. The mic comes in beige and black as well.

For stereo ENG applications, the MCE-82 is a unique self-powered stereo X-Y condenser mic. The two capsules are set at 45 degrees for a 90-degree spread. The mic will run on either AA cells or a phantom supply, and has a built-in low-cut filter and a battery check switch.

See MICS, page 43 ▶

World Radio History

▶ MICS, continued from page 42

Professional Sound Corporation (PSC) demonstrated its MilliMic, a small lavalier about the size of a dime. This miniature mic features a high output, and a low inherent noise floor.

The AKG D-230 Omni Mic

Whirlwind also unveiled several mic-related products. The Medusa MINI-6 is a simple 6-channel drop snake. It is available in a variety of standard lengths up to 100 feet, with custom orders accepted.

The MD-1 is a portable mic-to-line driver. What distinguishes this little box is its built-in phantom supply and headphone amplifier. The input stage offers up to 60 dB of gain, and a mic/line input level switch. The output can be switch selected between the isolated gain stage and a straight loop-through.

The Q-Box, winner of **RW's** Cool Stuff Awards, is an indispensable audio line tester. For $150, you have a built-in microphone, speaker, test-tone generator, outputs for standard headphones or a 2K-ohm earpiece and voltage presence monitoring for phantom or intercom voltage.

The Q-Box is powered by a single 9V alkaline battery. Use the built-in mic to talk back up a line, let the internal speaker perform the function of a squawk box, or plug in a dynamic mic for a test. The source selector also permits switching between the internal mic and a 440 Hz tone that can be sent back to the console at +4, -20, or -50 dB levels.

Small offerings

Audio-Technica displayed a new handheld condenser microphone. The ATM89R is built with a special internal shock-mount that eliminates virtually all cable and handling noise. Its rugged design handles high SPLs with high sensitivity.

For interview applications, the AT891R Boundary Mic features a rugged, low-profile housing. This mic also includes a dip-switch programmable on-off switch. The switch can be programmed to momentarily turn on, momentarily turn off, or simply function in a press-on/press-off mode.

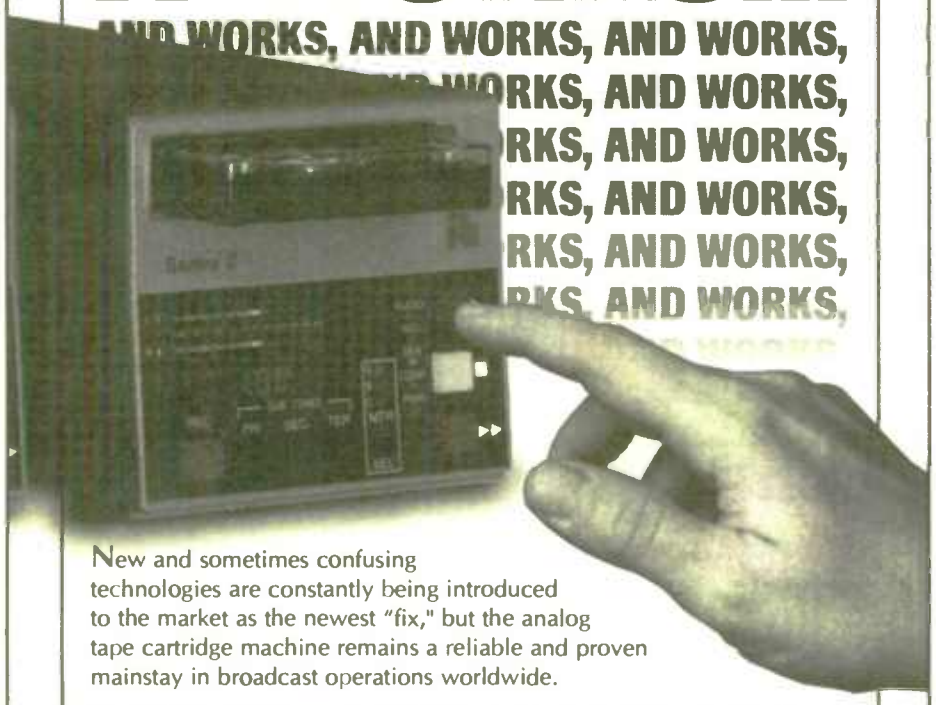
Audio-Technica also demonstrated two new, true diversity, low-cost UHF/VHF wireless mic systems. A total of 20 frequencies can be selected, and up to 10 systems can be used simultaneously. The handheld VHF system professional net price is only $309.95.

The broadcast mainstay microphones from **Shure** was on display this year, and although there were no new broadcast mics, an inexpensive digital feedback reducer caught our eye. The Shure DFR11EQ is the world's first truly affordable feedback reducer and PC-controlled graphic EQ. When feedback occurs, the system automatically senses the problem and activates one or more of its 10 notch filters to stop the problem. The system also comes with PC software that turns your computer into a one-third octave, constant Q graphic equalizer. All this in a half-rack box, not much bigger than a paperback novel.

Shure's other new product was a new in-ear monitoring system — a stereo, high fidelity IFB that can be run either wired or wireless.

Sony displayed two high-end condenser mics. The C-48 features a vibration-proof structure, and gold-coated diaphragm for improved stability. The C-800 is a vacuum tube condenser mic that will handle up to 150 dB SPL. It has a switchable uni/omni directional pattern.

IT WORKS...



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Circle (43) On Reader Service Card

World Radio History

Hot Diggity Digital Doings

▶ EDITORS, continued from page 28

Antex Electronics returned to the convention with the StudioCard for Windows, an audio board with four discrete inputs and outputs. The StudioCard is capable of simultaneous recording and monitoring of four channels and can mix unlimited virtual tracks to stereo, dual stereo or mono.

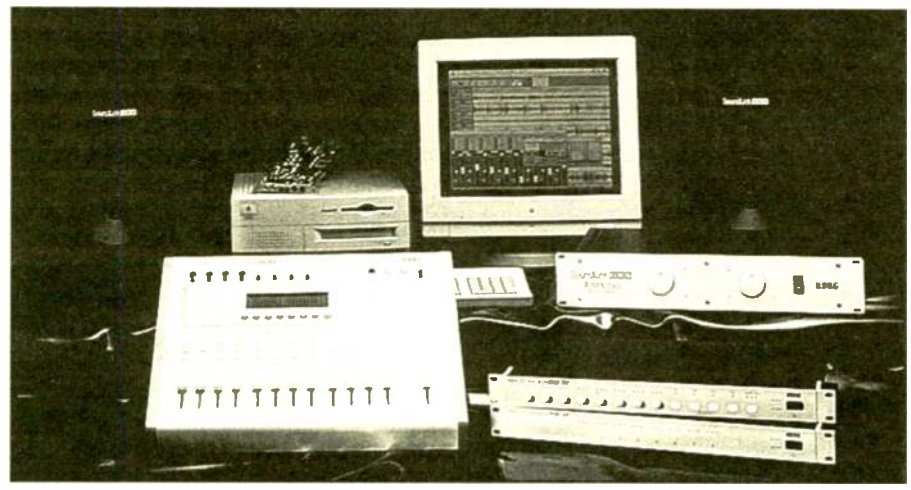
Korg USA used the show to announce the Korg SoundLink Digital Recording System (DRS), combining the DRS 168RC digital console, DRS 1212 audio interface card, Macromedia Deck II software and DRS 880 A/D-D/A converters.

Innovative Quality Software (IQS) has taken the Software Audio Workshop (SAW) to a new level with SAW Plus 32. The record/edit software package offers up to 24 stereo tracks, supports eight sound cards simultaneously and is designed for optimum performance with Windows 95 or Windows NT.

The price of the **Soundscape Digital Technology** basic core eight-track unit — the SSHDR1 — has been reduced in anticipation of the SSAC-1 accelerator card and new multichannel audio interfaces. The SSAC-1 is a plug-in DSP card which gives several times the processing power of the existing unit.

The Prophet Systems Audio Wizard

Two digital editors are included in **Broadcast Electronics** products. The AudioVAULT now includes AV-Edit, a 32-bit visual cut-and-paste editor which works across linear or compressed files. The BE NewsBoss also includes a new rudimentary cut-and-paste editor for news actualities. The editor cuts standard .WAV files and uses non-proprietary PC sound cards.



KORG SoundLink Digital Recording System

The astounding **Digigram** PCXpocket soundcard puts a full-fledged Digigram audio board onto a type II PC card for laptop computers. The company has teamed up with **Dalet Digital Media Systems** to create FreeEdit, a fully portable workstation for one to eight stereo tracks in a stock laptop computer. FreeEdit is based around the Sound Workstation included in the Dalet radio station package.

Digidesign has released Pro Tools 4.0 with new features such as send and mute automation, dynamic automation of almost all TDM plug-ins and a new narrow-mix view to increase the number of tracks visible on screen at any moment. New third-party plug-ins are becoming more available, including the D-Fi "downprocessor," designed to deliberately degrade audio quality in a creative manner.

TASCAM had plenty of digital offerings among the analog porta-studios the company made famous in past years.

The 564 MiniDisc multitrack recorder/editor was shown, along with the new DA-98 modular digital multitrack recorder. The DA-98 is built upon the DA-88 tape-based multitrack recorder and features confidence monitoring, a comprehensive LCD display and integrated internal patchbay.

Sony — the developer of MiniDisc technology — also exhibited a portable MD four-track production system, the MDM-X4, complete with internal mixer and high-quality digital sound.

CartWorks/dbm Systems came to Vegas with the CartWorks Plus Digital Editing System, a built-in recorder with Windows 95-based features and more power and speed than earlier versions.

Digital Audio Labs, makers of the CardD family of audio boards, was in the Sands Convention Center with the V8 multitrack workstation platform.

Transmitter and console maker **LPB** exhibited SALSA, the company's long-standing automation and live-assist system, which includes multitrack production capabilities.

The StudioFrame 16-track recorder/editor from **Computer Concepts Corp.** returned for another year on the exhibit floor. The digital production capabilities of the integrated radio suite from the Irish company **Radiomation** was only part of the company's entire package.

The software kit also offers built-in traffic, scheduling and live assist features.

Merging Technologies introduced the Pyramix Virtual Studio for the first time. This digital audio workstation runs under Windows 95 and Windows NT and includes multichannel editing, mixing and processing, as well as CD mastering. An audio interface unit, the AIU 8, was introduced at NAB.

Spectral Inc. continued to expand the versatility of products like StudioTracks XP post production software and Express radio broadcasting editing software. Spectral devices now include software for network audio transfer to the BE AudioVAULT and the ENCO DADpro on-air digital delivery system.

The Orban Audicy makes its NAB debut

Two companies exhibited multitrack products more appropriate to film and video production than radio, but interesting nonetheless. **TimeLine Vista** had the MMR-8 Modular Multitrack Recorder, while **Fairlight USA** had the MFX-3$_{plus}$ 24-track digital audio workstation, the veteran FAME audio mixer/editor and DaD, an enhanced digital audio dubber.

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World Radio History

Eyes Were On Monitors At NAB

Don Elliot and Ann Schwab

Many companies took advantage of NAB '97 to introduce new monitor, headphone and intercom products and to showcase established lines.

Telex introduced its PAM-100 production audio monitor. The unit provides extensive monitoring capabilities for broadcast situations simultaneously covering production intercom communications, on-air or any other user-defined sources.

In a single unit, the product combines two separate listen-only keypanels, each with eight assignable listen keys, each key having four-character alphanumeric display. Each keypanel has a separate listen level control for each listen key, a level control for its auxiliary input, and a master volume control to adjust the overall level.

For monitors, **Nady** displayed the EO3 wireless personal monitor system and the

Genelec 1039A Monitor

SEM 6000 (VHF) and 7000 (UHF) professional VHF wireless stereo in-ear monitor system.

Ward-Beck Systems unveiled its new Audio Bit Buddy (ABB-1), a portable digital audio monitor. It monitors a digital audio source and includes a headphone with its own VU meter, and sampling rate (error, status). The unit has a belt clip and the information is easily visible on the top of the unit when it is worn. As Michael Jordan, marketing/inside sales, said, "It's one of its kind — offering digital and analog, plus status information."

Genelec OY introduced the 1037B Active Monitoring System, a three-way system designed for medium-sized control rooms. The system features bass, midrange and treble controls to allow the system to be tailored specifically for the acoustic conditions of different control rooms.

For large broadcast facilities, Genelec offers the 1039A Active Monitoring System. It consists of two speaker enclosures and two 7U racks housing amplifiers, electronic crossovers and protection circuitry.

In addition, Genelec introduced the 1029A, a two-way, bi-amplified active close-field monitoring system, available at an affordable price point. The system includes a pair of Genelec 1029A powered speakers and a matching subwoofer (the 1091A), and will retail for less than $1,800.

Expanding and improving upon its DMS-1 Studio Monitor System, **JBL Professional** exhibited the DMS-1H, a

See MONITORS, page 48 ▶

Radio World Cool Stuff Award NAB 1997

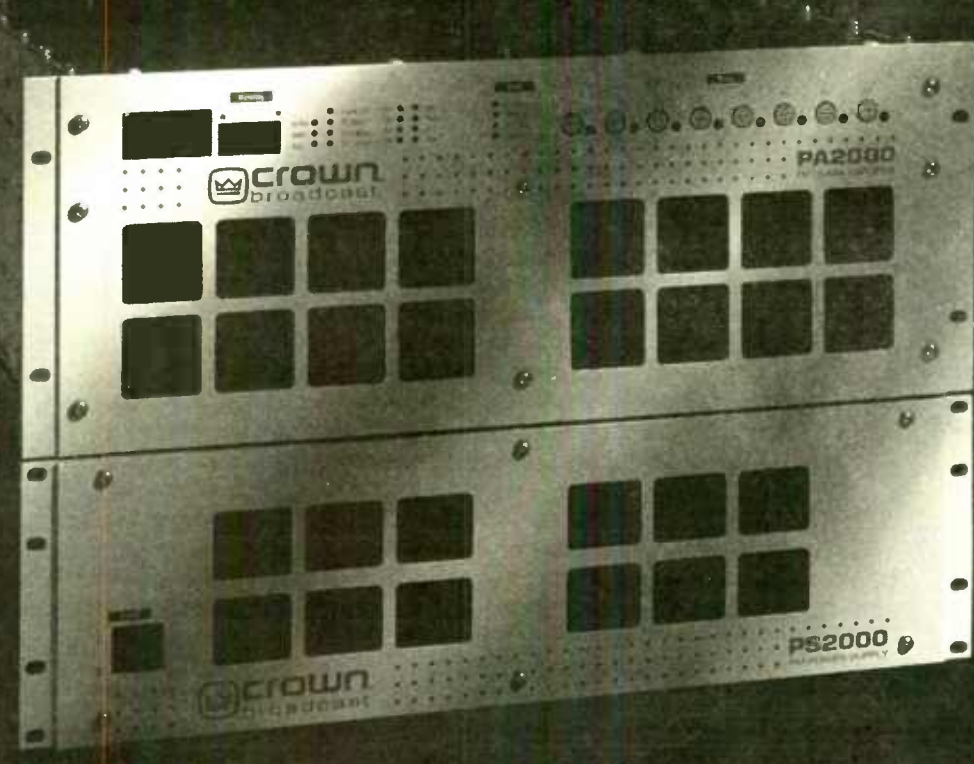
Another international winner of an NAB 1997 Cool Stuff Award is the BTM21 Modular Broadcasting Console from Buenos Aires-based **Tyros**.

Features include an MSC command system with unlimited uses, water resistant ABS molding console, neutral color range and proven ergonomic controls, switches and keys that are vacuum insulated for protection against dust, liquids, smoke and cigarette ashes and eight removable four-phase input modules. The unit also features adjustable VU meters.

Pictured l to r: Anibal Rodolfo Berneri, design engineer, Adolfo Metti, general manager and Erica Hahn, marketing manager.

*For more information, contact Tyros at +54-1-795-1668; or circle **Reader Service 169.***

Efficiency: *(e-fish'en-see) n.* 1. the most effective use of available resources; 2. great things in small packages; 3. Crown's new FM 2kW amplifier.



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Circle (30) On Reader Service Card

World Radio History

Checking Out the Music Libraries

Sharon Rae

Manufacturers traditionally bring out their biggest and best for the National Association of Broadcasters' Las Vegas show, and this year was no exception. From production libraries to weather services, companies unveiled their brightest new products at NAB '97.

OneMusic showed its NewProduction music library and introduced LiquidTrax, a FirstCom/OneMusic exclusive.

"What LiquidTrax does for the producer is it gives him the creative control back that he needs to score the music the way today's productions require," said Hal Jackson, executive producer for OneMusic Library. "We've unlocked the stereo mix ... The stereo submixes have a timing mark at the top of each one so that you can use the power of your digital audio workstation, line up all the timing marks for the stereo submixes and be able to mix the final score the way you need it for your production."

TM Century unveiled its Imagio audio imaging library. "What Imagio is all about is building the image of a radio station," said Ralph Riley, sales representative with TM Century.

"It's geared for those promos and those elements that just make the station stand out." This quarterly imaging service for radio is released around the same time as the Arbitron books.

"We also have the HitDisc series," said Tech Guerrero, manager of the Latin, Ethnic and Multicultural division of TM Century.

"The newest addition in the series is the L-Disk — the Latino Disk. It's red and split into three different formats: 'pop-balada,' which is like Latin international AC; dance, such as progressive Latin dance, like techno, jungle, drum and bass; and the third one is rock, which encompasses pop rock and alternative rock from Latin America."

TM Century also displayed Masterplan, a Spanish promotions and sales library.

Dain Blair is the president of **WHo DId THaT MUSiC LIBRARy?/Groove Addicts**, which showed off a number of new products at NAB '97, including Smooth Moves, a new NAC package, the new Hot Talk package and a CD library.

"Our music library is now over 400 music cues on 21 CDs," Blair said. "There are five more updates due this summer, so it's growing rapidly. We also debuted a package of six CDs for sweepers, stingers and stagers called MindBenders."

Talent behind the tracks is one area in which WHo DId THaT MUSiC LIBRARy? producers say they stand out.

"The composers who work for us are award-winning," said Blair. "We have Stuart Copeland of the Police for example ... (Our music library) is 70-percent recorded with acoustic instruments."

Hitpickin' good

Hank Landsberg, president of **Halland Broadcast Services Inc.**, introduced the company's new Hitpick software with the HitDrive custom music service.

"It comes on a floppy disk and lets the station look through our entire inventory of all the songs we have, then pick the songs they want," said Landsberg. "Then when they return that floppy disk to us, we can load those songs for them onto their hard drive in a matter of a few hours."

Match Production CD Sampler

The custom playlist includes an inventory of more than 4,000 tracks, and is available in oldies, '70s gold, AC, CHR, classic rock and country formats.

"What we are doing is getting more into providing custom music libraries pre-loaded on hard drive ... for stations that are using any of the numerous hard-drive automation systems out there," said Landsberg. "From what research I was able to do at the show, it seems as though there is finally a consensus among all the various hard-drive systems manufacturers regarding sample rate and compression scheme used for music recording on hard drive. It appears that most of the vendors have standardized on MPEG Layer II .WAV files at a sample rate of 32k ... We will be supporting that standard by having our HitDrive service available in that format."

Aircraft Production Music Libraries stressed the special features of its products.

"We created Speed Search to aid in usability," said Aircraft's Paul Greenberg. "Speed Search is a system where a customer can hold a CD, see the titles on the back cover and index through the 30-second edit right at the top of the CD. You don't have to go fishing around for the next cut. Also, with our Co-Pilot split tracks feature, we've separated the elements to help production guys be more

See MUSIC, page 47 ▶

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MUSICAM USA

Circle (31) On Reader Service Card

World Radio History

▶ MUSIC, continued from page 46

creative with their productions."

Match Production Music highlighted its Tunebuilder self-editing music software, which is customized to work with the 65-CD Match Production music library.

Sue Upton, administrative and finance manager for Match, said the TuneFinder CD-ROM audio catalog consists of short edits of its library.

"With our new search program, producers are able to search on any music style they are looking for ... By pushing their key words they'll get a list," said Upton of TuneFinder. The product contains a browser, finder and project manager as fully integrated components that form a complete database of library music.

"We've also just come out with three new CDs," Upton said. "One is a Latin CD ... It's very happy and up and going. We've got great rhythm-and-blues CDs just out, and also a jingle CD with lots of news themes on it."

Match also announced that it had been acquired by **BMG Music Publishing**.

"We'll be moving together with Killer Tracks," said Upton. "People will be able to get both our music and Killer Tracks music. Killer Tracks also represents a library owned by BMG called Atmosphere, and you'll be able to get everything from the one source."

CDs? We got CDs ...

Hagai Gefen, president of **Gefen Systems**, touted his company's new way of accessing CDs through a network. "We're calling on the central hard drive, and then letting the workstations all access the CDs at the same time," he said.

Gefen also showed off its new CD libraries. "We are one of the largest distributors of sound effects libraries," he said. "We are sort of a one-stop shop for sound effects, so we have a variety of CDs to offer, and every month or so we add a new library to our catalog."

Promusic highlighted its production music and sound effects library. The company released a handful of new CDs at the show.

"We've got 1,500 CDs at this time," said David Walters of Promusic. "About 10 new CDs a month is the average. We've got a lot of new releases coming out all the time, in every music style imaginable."

River City Sound's royalty-free buy-out music production library featured a new CD set at the show.

"We debuted volume seven of the Broadcast Series at NAB," said Bob Pierce, marketing director of River City Sound Productions. "The cost savings is huge. It's the difference between shooting a bullet and throwing it."

The Broadcast Series contains a variety of music, from sports, mellow, corporate/industrial to country, rock, hi-tech, atmospheric and urban. Each theme comes in a song-length version and is followed by 10-, 15-, 30-, and 60-second edits.

The company's Specialty Series is designed for the producer to customize his music library to fit exact musical requirements. Each disc is dedicated to a specific style of music, with such categories as weddings, nature, country, corporate/industrial, mellow moods, Christmas, sports and classical.

Network Music featured several new products, including the new Short Trax library. This product consists of 52 CDs with over 4,000 cuts.

"It's a new version of the Network Music library in 30- and 60-second and tag versions only," said Mark Anderson, an account executive with Network Music. "We have a lot of broadcasters that only need 30- and 60-second (cuts), so this is a completely new collection. It's all the same music that's in the full library, but only 30s and 60s."

Network Music also showed off a new version of its computer search program.

"It's called Track Finder," said Anderson. "The music library has over 1,500 cuts of music and the sound effects library has over 7,000 effects. The Track Finders from the music and sound effects libraries let you put one CD-ROM in a computer ... Put in a couple of descriptive words and it'll give you a list of all the tracks that match that search request."

Omnimusic exhibited more than 2,000 cuts of music and sound effects on 100-plus CDs.

"We come out with about 10 new CDs a year, so we are constantly updating," said Scott Mahaffey, an Omnimusic sales and customer service representative.

"We are very diverse," said Stephanie Lovick, Omnimusic's national sales director. "Another new addition to our library is called Omnitrak. It's our CD-ROM search program and it's a great tool to search through the entire library. It'll play about a five-second snippet of the beginning, the theme and the end of a piece of music to help you find what your are looking for."

Downloadable

Thomas Valentino, president of **Valentino Inc.**, said his company exhibited new additions to its music and sound effects libraries.

"Plus we have the downloadable aspect of our library on our Web page ...

See MUSIC, page 58 ▶

The Dynamax MX/D Digital Audio Console

- Conventional 8 Channel On Air Layout
- Selection of analog and digital input modules
- A&B input select switches with LED indicator
- LED lighted buss assignment switches for PGM, AUD, MONO and CUE
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World Radio History

Radio World Cool Stuff Award NAB 1997

Telos Systems President Steve Church (pictured) ensured that AudioActive serves the needs of radio stations. And for that, it earned an NAB 1997 Cool Stuff Award.

Full-time webcasting using AudioActive technology by Telos Systems was originated by WCLV(FM) in Cleveland in November 1996. The number of weekly hits increased from an average of 23,000 to 29,000, according to a station spokesman.

AudioActive technology uses Enhanced ISO/MPEG Layer 3 compression. Other stations already using AudioActive include Cleveland stations WCLV(FM), WMJI(FM) and WCSB(FM), as well as KSHE(FM) St. Louis and the Macintosh Music Network online concert series. AudioActive stations can also be heard with the Shockwave audio player. Macromedia, creator of Shockwave, agreed to make its system compatible with AudioActive.

*For more information, contact Telos at (216) 241-7225; or circle **Reader Service 153**.*

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A Look at Monitors

▶ MONITORS, continued from page 45

center-channel studio reference monitor for the music and audio-for-video surround mixing markets. The system will now ship to customers with the user's choice of either a JBL DSC280 Digital System Controller or a JBL SMC24 Analog System Controller.

Telex displayed the next generation of its popular Audiocom intercom product line: the SS2000 speaker, the portable SS2000P and the wall-mounted SS2000U speaker stations. Telex also brought the WM1000 and WM2000 headset stations, US2000A user station and the PS2000L power supply. The redesign includes

The Radiocom From Telex

mechanical and electrical upgrades, making the modules more rugged and easier to use. The new speaker stations have a balanced/unbalanced switch.

The company also showcased its new Radiocom BTR-600 two-channel encrypted digital and BTR-500 two-channel UHF wireless intercom systems.

R-Columbia Products showcased its new Palm Talker, a hands-free VOX-less wireless intercom. When installed into wireless intercom headphones, it can be used in lieu of a VOX (voice-actuated) accessory for virtually hands-free operation of radio transmitters without the background noise, clipped words and transmission wipe-outs usually associates with VOX-operated systems. As the name implies, the device fits into the user's palm.

The company also displayed its PRO V intercom system where users can be inside or outside, and separated by long or short distances. The system delivers clear, two-way communication over a "daisy-chained" line of multiple headset belt pack intercom stations or from the power supply to each separate station. Each belt pack station has a listening volume control and a digital electronic push-on, push-off switch. Headsets are available in single-ear, double-ear and ultra-lightweight styles.

The company also displayed Expand-a-Com, a new expandable talkback/intercom system. Any number of slave stations can be added to provide intercom abilities from 4-400 stations with from 1-40 channels.

Another new product on display was R-Columbia's five-channel wireless intercom, the TR-55/2.

Clear-Com Intercom Systems introduced the Matrix Plus 3 digital point-to-point intercom system. It features variable listen and input/output levels, 200 full-duplex ports in a single 9 RU frame and system linking. The system provides digital signal processing and each matrix card handles all processing and communications for its eight audio/data ports, communicating all information in real time among the other boards in the

See MONITORS, page 68 ▶

World Radio History

BROADCAST Communiqué

HARRIS CORPORATION, BROADCAST DIVISION | DIGITAL RADIO HIGHLIGHTS | NAB 1997

CONTENTS

2 **New Product Source: NAB '97 Radio Highlights**

CD2001, third-generation Harris CD Cart Machine, adds AES3 Digital Output to its list of benefits...
Harris DRC1000 — bringing the benefits of a digital audio console to radio...
Orban DSE 7000FX— best-selling workstation adds four times more DSP power...
Orban AirTime— more than a digital delivery system... a cure!...
Harris DIGIT CD digital FM exciter adds second-generation features
...Harris Platinum Z Transmitters— Finally! True digital modulation and solid state reliability at a price comparable to vacuum tube transmitters...
Harris A2D2A— inexpensive, high-quality A/D and D/A that works like a hog

4 **Why Would You Want An Uncompressed Digital Audio Air Chain and How Can You Go About Implementing One?**

A panel of Harris staff members with expertise on digital products from the radio studio through the antenna discuss the benefits of digital technology in general and the uncompressed digital audio air chain in particular. Harris staffers also share tips for implementing the digital chain.

6 **Harris Staffers To Present Six Papers At NAB 1997 Engineering Conference**

From examining and implementing new digital technologies to adjusting emergency services plans to meet new requirements, Harris staff members will address vital industry concerns.

6 **How And Why You Should Convert To An All-Digital Studio Path**

Harris VP and Radio Product Manager Geoff Mendenhall shares information and advantages of the AES3 digital path.

HARRIS

Harris CD LINK™ 950 MHz Aural STL Completes Uncompressed Digital Air Chain

Premiering at NAB 1997, Harris' CD LINK™, a 950MHz digital STL, overcomes the final technical hurdle in the totally uncompressed digital audio air-chain. This revolutionary STL transports *uncompressed* AES3 studio-standard digital audio over a standard 300kHz RF channel.

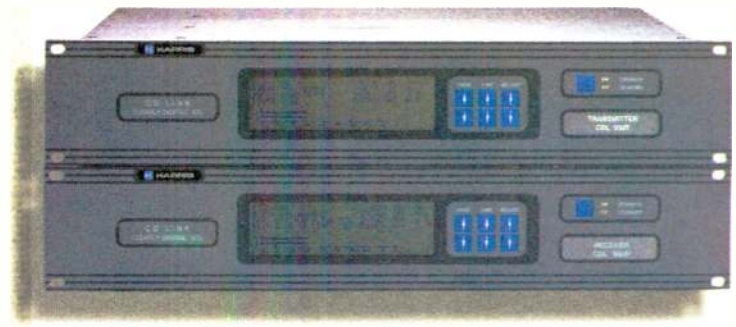
Until now, it has been common to have at least one component that uses lossy compression in the digital audio chain. Lossy compression is a bit reduction technique used to fit a digital signal into a specified bandwidth. This technique uses psychoacoustic digital compression algorithms that commonly eliminate 75% of a signal's digital audio content. Content that is eliminated becomes irretrievable.

When two or more components in an air-chain use lossy compression, cascading algorithms can occur, causing very noticeable distortions in audio quality. Until now, all 950MHz STLs have used lossy compression. CD LINK gives you all the sound your studio is capable of producing.

The CD LINK provides superior performance with a typical signal-to-noise ratio of 93dB and frequency response of +/-0.1dB. Beyond a robust signal with improved fade margins, CD LINK offers many other user benefits. A spectrum-efficient RF design allows CD LINK to transport one AES3 stereo signal and two data channels simultaneously. An analog stereo composite output as well as two 6kHz or one 12kHz auxiliary audio channels are available as options.

The CD LINK's transmitter and receiver are each housed in a single, 3-1/2" rack-mountable chassis which contains all digital and RF circuits. The unit, which is designed for ease of installation with an AES3 XLR or optical input connector, Type N RF output connector and a universal AC power supply, fits in the place of existing analog STLs.

For more information about the CD LINK and complete specifications, please send your written request to Harris via fax (217-222-0581) or e-mail (hbd@harris.com).



Harris CD LINK™ Benefits

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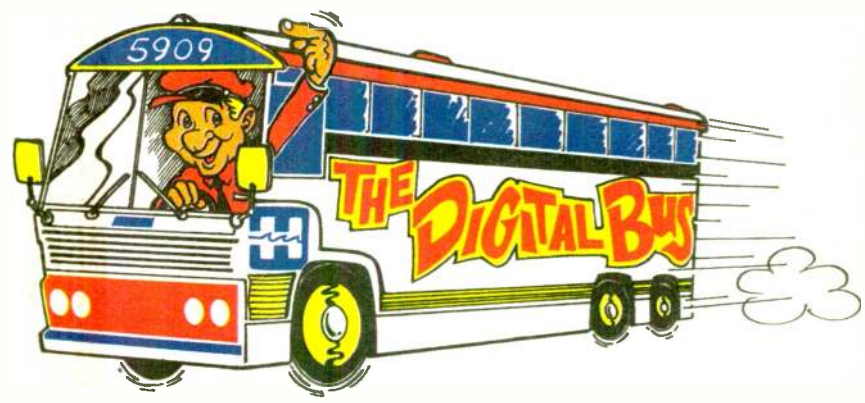
- Fits in standard 300kHz bandwidth.
- Delivers better audio.
- Has better fade margins.
- Provides higher-quality auxiliary audio than most other solutions (two 6kHz or one 12kHz audio channels for SCA use or for feeding an AM transmitter).
- Has extra data capacity in form of RS232 port (either two 4800 baud or one 9600 and one 4800 baud).
- At studio, accepts either analog or AES3 input. At transmitter end, can output *simultaneously* AES3, L and R analog. With optional DSP stereo generator, can output *simultaneously* composite baseband to a back-up analog exciter.*

*NOTE: Some people might want to buy CD LINK before DIGIT, Harris' digital FM exciter, because this feature allows them to have the processor back at the studio!



Radio Moves To The South Hall --Booth 5909

World Radio History

PRODUCT Showcase

Harris DRC1000 — Bringing the Benefits Of A Digital Audio Console To Radio

The Harris DRC1000 digital audio console delivers present and future "state of the art" capabilities in a secure and reliable user friendly design. The DRC1000 provides the high level of digital sonic quality you expect, while exceeding expectations in every feature. The power of this console is all made possible by utilizing 32 bit internal precision floating point DSP technology. Each Audio Processing Unit contains six (6) Sharc DSPs simultaneously sharing capabilities to offer "awesome" processing power.

The DRC1000 uses simple, easy to read on-screen graphics, LED source la-

bels, and lighted soft keys. Users find it simple to learn and easy to use. An internal security system allows for any of the adjustable configuration screens to be "Locked Out" from users. If you want your talent to only use the faders and start stop buttons, no problem. Do you have someone who wants microphones on the right side of the console during an air shift? Digital makes it easy! Why spend hours reconfiguring your hardware? With the DRC1000's powerful software, you can reconfigure your console to match your needs in just seconds.

Each Audio Processing Unit on the DRC1000 includes 11 stereo (22 mono) AES3 (AES/EBU) digital inputs. Inputs 1 through 8 (mono) can optionally be ordered analog and work at either mic or line level. Unlike most consoles, these inputs can be named and assigned to any of the 10 Penny and Giles 100 mm throw faders.

The APU has 7 stereo (14 mono) AES3 output busses. Output busses are simultaneously available in digital and analog. Two of the analog outputs utilize 20 bit digital to analog converters for highest quality. The remaining five analog busses utilize high quality 18 bit digital to analog converters. This input to output bus structure gives the flexibility to utilize the console the way you want. Matrix configurations can be stored and changed at any time. Output matrix changes this easy offer the flexibility you need without a routing switcher. Should an application require additional routing switchers, the DRC1000 can optionally control them via serial communications.

Various pieces of digital source equipment to be used may have different sample rates. The console, by design, brings all sources together into a single audio signal. As a major portion of the digital audio stream, sampling rates must also be blended together to create the output needed to match the remainder of your digital signal stream. The DRC1000 has automatic internal sample rate conversion for each input. This console will accept 32 kHz, 44.1 kHz, or 48 kHz in either AES3 or SPDIF. Simply engage the converter for any input that does not already match the desired output sample rate. The DRC1000 takes care of the rest. No need to buy a lot of additional equipment.

The DRC1000 offers a 5 band parametric equalizer as a standard feature. Filters include: low shelf, notch, bandpass, peak, and high shelf. You may use one or all five EQs simultaneously on any input. The console stores this information along with all of its other parameters in the user configuration. In this fashion, each user can have preferred equalization settings recalled when they use the console. Pan, compressor/limiter, and AGC are also included in the standard package. Options like reverb and pitch shift are also available.

No matter what the future holds for your operation, the DRC1000 will keep you in stride. It is designed to be expandable and to grow as you do. Today's digital products offer us new levels of efficiency never before thought possible. All of these capabilities in a reliable, yet easy to use package. Call TOLL-FREE 1-800-622-0022 today to see how the DRC1000 can improve your sound, your staff's capabilities, and your bottom line.

Harris A2D2A— An Inexpensive, High-Quality A/D And D/A Converter That Works Like A Hog

"This thing works like a hog!"

Maybe it is not the kind of quote that ends up in an advertisement, but it is how KKDA-AM/FM's Paul Strickland praises the Harris A2D2A digital converter. His Grand Prairie, Texas, station took delivery of the new A/D-D/A converter last November and he is convinced it was the right decision.

KKDA uses the A2D2A as part of a T1 STL line. The unit converts studio program audio into an uncompressed 44.1 kHz data stream, then feeds the digital signal into an Intraplex T1 digital interface. The signal is reconstructed at the transmitter site.

Other stations such as KEX-KKRZ, Portland, Ore., and WDVE-FM, Pittsburgh have also discovered the inexpensive, high-quality Harris device. Applications include standalone A/D conversion for workstations, DAT recorders and digital multitrack recorders.

The 20-bit A2D2A has standard XLR and quarter-inch analog connectors and supports both AES3/EBU and SPDIF formats. Three standard sample rates — 48, 44.1 and 32 kHz — are available and the unit can lock to an external AES3/EBU reference signal.

The front panel has been kept very simple, with two analog input controls, a stereo link button and four push buttons to select sample rate. Calibrated LED indicators track input level. One front-panel LED confirms a digital signal is present for conversion back to analog.

Input impedances are 20k ohm balanced, 10k ohm unbalanced. Signal-to-noise ratio is better than 95dBFS on the analog output. The A2D2A can perform simultaneous A/D and D/A conversions and factory specs claim 100 dB of a-weighted dynamic range in both signal paths. The 1 RU-high converter weighs under nine pounds and uses a line lump external power supply. The product is certified CE ready for European use as well. Domestically, the Harris A2D2A is priced at $599. To learn more, phone TOLL-FREE:1-800-622-0022.

(Reprinted with permission of Radio World)

Orban DSE 7000FX— Radio's Best-Selling Workstation Adds Four Times More DSP Power

Now, it's the DSE 7000*FX*! Orban has made significant gut-level changes to the best-selling workstation in radio. By going inside and adding four times the digital signal processing power, Orban's opened up all kinds of possibilities for the DSE. This new platform allows them to continually add more effects and capabilities while always keeping the ease of use that has made the DSE legendary.

Orban™ parametric equalization, Optimod™ compression, and Lexicon™ digital reverberation are now built into the DSE 7000FX. These are some of the best known names in audio processing. And although you might expect to pay thousands for such high-end studio effects, they all come standard in the DSE 7000FX.

With this new expandable platform, it'll be easy to add more and new capabilities to the DSE, all to make your job easier. As they're developed, these new DSE capabilities will come to you on a simple floppy disk, free of charge. So not only will your DSE stay current, so will your sound.

Equalization by Orban, compression by Optimod, reverb by Lexicon and the technology, the brains and resourcefulness of one of radio's most positively powerful companies... The DSE 7000FX is number one and pushing that envelope.

Once you try the DSE 7000FX, we're convinced you'll convert. That's why we'd like to offer you a demo* unit to try. Keep it for a week and see what happens. Play with it. Experiment. Fight over it. Just see if the DSE doesn't boost the speed of production and the creativity of spots. And see if you're ready to come on board with the best selling, best equipped digital workstation in radio. Phone TOLL-FREE 1-800-622-0022 for the full story.

*Subject to credit approval

Harris DIGIT® CD Digital FM Exciter Adds Requested Second-Generation Features

Harris' DIGIT® is the world's first digital FM exciter. True CD-quality sound is only one significant advantage that has made more than 950 DIGITs the choice of broadcasters worldwide and the industry-standard FM exciter since introduction in 1993.

Now in its second generation, DIGIT® CD builds on the proven benefits of DIGIT to provide even better performance and more features!

DIGIT CD offers superb performance by using Direct Digital Synthesis (DDS) to generate an on-air signal with true 16-bit digital audio quality. DIGIT is available with either an analog input module or a digital input module which allows direct connection to digital (AES3) program sources, with no loss of digital audio quality.

The digital input module includes a DSP-based stereo generator and a digital composite limiter (DCL). For AES3 digital audio input, DIGIT CD's stereo signal-to-noise ratio is 83dB. The DCL, an implementation of the WAVES L1 Ultramaximizer™ used by many digital recording studios, further enhances performance by using proprietary look-ahead circuitry to anticipate and eliminate overmodulation peaks before they occur.

DIGIT CD replaces the voltage controlled oscillator (VCO) traditionally used in analog exciters for program modulation with a 32-bit numerically controlled oscillator. VCO/PLL problems — for example, poor low-frequency separation and PLL unlock from audio transients — are eliminated. DIGIT CD is immune to subsonic transients that can cause faults in an analog exciter and force a station off the air. Drift-free circuits maintain DIGIT CD's original performance year after year, without operator adjustments.

For N+1 operation, DIGIT CD allows any assigned channel to be selected with no requirements for output tuning.

In addition to improved stereo signal-to-noise performance, DIGIT CD can be ordered for externally-controlled carrier frequency synchronization (GPS) capability for use in on-channel "booster" systems. DIGIT CD also includes a synchronous AM reduction circuit as a standard feature.

For more information about DIGIT CD, please fax your request to 217-222-0581 or e-mail hbd@harris.com.

World Radio History

PRODUCT Showcase

Orban AirTime™: More Than A Digital Delivery System... A Cure!

Designed for Radio and TV broadcast, AirTime (Orban's next-generation DDS) provides all the benefits of digital delivery and gives you a computer-based solution — a better solution — to manage audio, without forcing you to undergo a painful adjustment.

You can all work the same way as before, with some welcomed improvements. For example, audio and support information can be accessed from one convenient database. With the system's built-in network, your staff will no longer have to walk a cart from studio to studio or even initiate sending audio over a network. AirTime will handle the transfer automatically.

AirTime can benefit everyone in your station or studio who uses the technology, from on-air talent to traffic and administration, from interns to veteran staff.

A complete interface toolbox: AirTime includes cart machine emulators, sound slate key-pads, touch screens and traditional computer workstations for live assist and automation functions.

An old familiar face: Your on-air talent will have no trouble using our playback cart emulator, Sound Cube. It looks and works like an analog cart machine with large lighted START, STOP and RE-CUE buttons. So training is minimal.

Customized sound with the push of a button: With Sound Slate™, your on-air talent can instantly call up their own libraries of intros, liners or sound effects. To play a cut, on-air talent simply calls up his or her scene and pushes the appropriate button on the Sound Slate.

The power of Sound Screen: You can choose a touch screen option — Sound Screen™ — that lets you run your entire operation at the touch of a finger. It's well-suited for on-air applications, but it can also be powerful tool for administrative tasks.

For traditional control: We also offer Sound Station™ workstations: an on-air model to quickly and easily deliver sources; a production model to create, edit, record and name sources; and a traffic model to efficiently manage all audio sources (perfect for scheduling).

Whichever option you choose, you'll enjoy the benefits of working with the AirTime system.

Load up most delivery systems with work and they'll slow down as demand increases. That's true even for systems with the most powerful Pentium processors. AirTime is an exception. Our real-time operating system prioritizes all tasks on 32 hierarchy levels, giving critical jobs such as playing audio and database sorts primary attention. So, if the system is fully loaded running month-end traffic reports and cleaning up files, when a disc jockey or engineer hits PLAY, a cut will air instantly.

When you're ready to expand your operation, AirTime will grow with you. You can easily and cost-effectively add storage, channels, extensions and users without duplicating your entire system.

The right operating system can give a delivery system all the power and flexibility it needs to adapt to any environment. AirTime has that system: a true multi-user, multi-tasking, real-time operating system — QNX — that runs on a Pentium/PCI computer. QNX is based on UNIX, a proven, rugged operating system that can stand up to even the most demanding applications.

For more than 25 years, Orban has been the first name in broadcast solutions. As such, there's a commitment to making the digital evolution as smooth as possible for our customers, providing them with premier products and technical expertise to meet their changing needs. Give Harris a call TOLL-FREE at 1-800-622-0022 and hear more about what AirTime can do for you.

Harris Platinum Z Transmitters— Finally! True Digital Modulation And Solid State Reliability At A Price Comparable To Vacuum Tube Transmitters

If you've always thought you'd have to pay a premium price for solid state FM transmitters in the middle power ranges, think again.

Harris' latest generation of FM transmitters — CD Series Platinum Z — combines field-proven solid state technology and Harris' world-standard DIGIT CD digital FM exciter for the price of a vacuum tube transmitter.

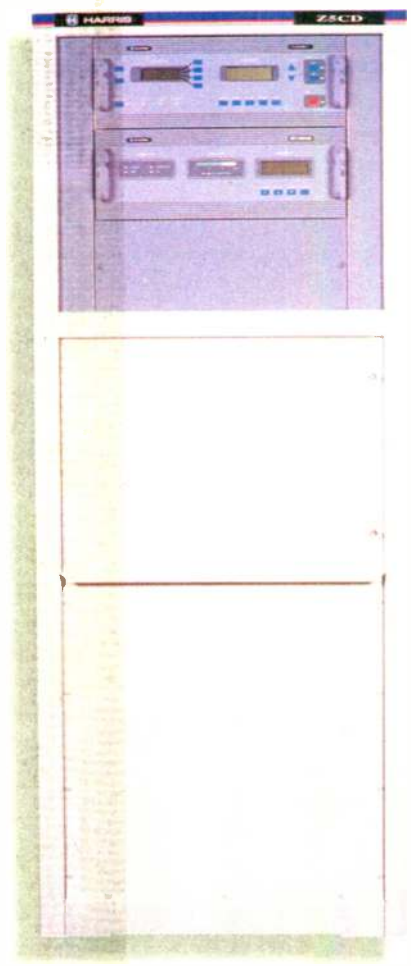
Making their debut at NAB 1996 at the 5kW level, Platinum Z CD Series transmitters now are available in 2kW and 10kW models as well and can be combined for higher power applications.

Platinum Z transmitters offer incomparable value. These ultra-reliable transmitters use the same devices that have achieved an MTBF in excess of 250,000 hours in hundreds of Platinum FM transmitters on the air worldwide. Multiple broadband 800W RF power amplifier modules operate in a parallel configuration to produce rated transmitter power.

With Platinum Z transmitters, Harris introduces a unique, patented combining system. The system — called Z-plane combining — delivers full power to the antenna even if a hot-pluggable power amplifier module is removed from the transmitter.

Reliability and on-air serviceability are further enhanced by extensive redundancy. Among redundant components are IPAs and power supplies (5kW and above). Dual exciters are optional, and Platinum Z transmitters include built-in exciter switching.

We invite you to learn how a Harris Platinum Z CD Series transmitter can give



you the CD-quality performance your listeners demand with unmatched reliability and cost effectiveness. For more information, please fax your request to 217-222-0581 or e-mail hbd@harris.com.

Don't Forget—

Catch A Ride on the Digital Bus In Booth 5909 of the South Hall!

CD2001, Third-Generation Harris CD Cart Machine, Adds AES3 Digital Output To Its List Of Benefits

The CD Cart Machine®, model CD2001 by Harris — now in its third generation — has become a market leader throughout the U.S. — the world's toughest, most competitive radio market.

Now, it's ready for the world.

Why? Because DJs rely on it to start fast and play flawlessly. Because Program Directors trust the autolock feature to prevent dead air. Because management knows that the CD Cart system is the best way to keep valuable music libraries safe from peanut butter, cowboy boots, finger prints, dust, chair rollers, high heel shoes and all the enemies of "perfect forever" compact disc performance. Because engineers know a well-designed, well-built and serviceable machine when they see one. AND because the CD Cart Machine is now AES3 digital out, too. The CD2001 features a digital output with world-standard, 3-pin AES3 as well as an analog stereo output.

Still other enhancements have been made: The servo adjustment is now automatic, and the 16-bit microprocessor is now on board. Surface mount technology is used, and the certified CE-ready unit is manufactured in an ISO 9001-registered factory. It adds up to an even more reliable unir!

Of course we've kept the features that have made previous generations of the Harris CD Cart Machine so popular:

- Autolock feature prevents dead air.
- Cue to music, ready to play.
- Recognizes syndicators' Index 3 subcodes.
- Large, bright flashing EOM (End Of Message) indicator can be programmed for 5 to 35 seconds of "early warning" time before track ends.
- Track number can be preselected with track keys or jog/shuttle wheel.
- Advanced linear tracking system cuts start lag time to under 200 msec.
- Runs cooler than any other CD cart machine for long life.
- Uses industry standard CD cartridges.
- Cartridge port door keeps dust and contamination away from laser.
- Broadcast-ready XLR outputs (stereo analog, plus AES/EBU) and remote interface.
- Heavy cast aluminum deck plate.
- Vertically mounted circuit boards with optional extender cards for fast servicing.
- Top cover and servo board remove easily for cleaning.
- Floating internal mechanism enhances shock resistance.
- Rolling shafts and ball bearings at all moving points for longevity.

For more information about the CD2001, please phone the Broadcast Center TOLL-FREE at 1-800-622-0022.

World Radio History

Why You Would Want An *Uncompressed* Digital Audio Air Chain And How You Can Implement One

Since the first digital radio product made its appearance nearly 17 years ago and the CD replaced the LP and tape as the quality standard, radio broadcasting has been edging toward an uncompressed digital audio air-chain. At NAB '97 with introduction of CD LINK™, a revolutionary 950MHz STL that transports uncompressed audio in a standard, 300kHz bandwidth, Harris will provide the last link in this chain. In this roundtable discussion, Harris participants discuss the benefits of CD LINK and the uncompressed air-chain, its evolution, and how broadcasters can begin implementation.

Roundtable participants include Geoff Mendenhall, VP - Radio Product Line Manager; Jim Woods, Studio Product Line Director; Daryl Buechting, FM Product Manager; Don Taylor, U.S. Radio Field Sales Manager; Dick Fry, FM Applications Engineer, and Rick Funk, Digital Studio Products Specialist.

Q. Why would a broadcaster want an uncompressed digital audio air chain?

Geoff Mendenhall: Better audio.

Rick Funk: Compressed audio, by its nature, is destructive. It's not really the compression so much as it is the bit reduction. Bits that are thrown out in a compression algorithm cannot be retrieved. We have accepted compression because the loss is done in such a way that it's not significantly perceived by the human ear. But broadcasting, through history, has been a more perfect science than that. We've always wanted to strive for the best audio quality, so it's natural to strive for uncompressed audio.

Geoff Mendenhall: Broadcasters want to deliver 100% of the audio content to their audience — not the 25% that remains after compression. Better audio means freedom from artifacts while delivering 100% of the information. It also means eliminating problems associated with cascading compression. The signal only gets worse as one compression scheme takes out some of the information then another compression scheme takes more information from what was left. There's a lot of concern about that.

Rick Funk: Technology to this point has not offered the possibility of transferring digital audio from Point A to Point B over a standard STL without compression. The person who has wanted uncompressed audio has had to go to T-1 links.

Don Taylor: One value of uncompressed digital audio is that it allows you to put the audio processor anywhere you want in the air chain.

Rick Funk: People have wanted to put their processors at the studio, where it is very accessible for adjusting the processing parameters.

Don Taylor: There's an added value to having the processor more accessible. If there's a failure, the engineer can get another signal on the air much more easily.

Q. What is the real significance of the CD LINK, broadcasting's first uncompressed digital audio STL?

Jim Woods: The CD LINK is the last link in the completely uncompressed chain. Now broadcasters can "engineer" their facilities to the level they feel they need to be at from a competitive standpoint. There are no longer any technical hurdles. There still are some economic issues in the studio — for example, do you want to store uncompressed digital audio, and how do you manage that? But that's an economic issue and, consequently, a business decision. The uncompressed digital STL was a technical hurdle.

Daryl Buechting: As an uncompressed digital STL, CD LINK allows you to avoid compression distortions.

Geoff Mendenhall: It's now possible to provide a transparent, distortionless path all the way to the digital exciter, which can then convert that data directly into an essentially perfect analog RF signal. Before DIGIT (Harris' digital FM exciter was introduced in 1993 and is on air at approximately 950 sites worldwide), there wasn't a strong need or desire to extend the digital source all the way out to the transmitter. Now that we have a digital exciter that can accept AES3 data directly, it makes it much more attractive to provide uncompressed AES3 data all the way out to the transmitter.

Q. What are the advantages of a digital STL?

Geoff Mendenhall: By shipping the audio out as data via STL, you have better fade margins. The product you deliver to your listeners with an analog STL cannot be any better than the signal-to-noise ratio of the STL link, and that can vary with fade and interference. With a digital STL, you either get perfect data or you get nothing, and you probably can operate at 20 to 30dB lower signal levels (or worse signal-to-noise ratio) and still get perfect audio through.

Also, you don't have to worry about hum pickup. In the case of composite STLs or other methods of transferring analog audio, you don't have to worry about affects on stereo separation because of phase shift in the transport medium. In the case of split STLs with L and R, you don't have to worry about channel matching levels, or matching preemphasis, or matching phase between L and R channels. All of those things are perfect.

Dick Fry: A lot of these benefits were provided by manufacturers of digital modems for analog STL equipment. There were data reduction losses, but there were still benefits of improved fade margin and better signal-to-noise ratios, so there was a market — even with an analog exciter.

Geoff Mendenhall: That's right. As a first step, people were willing to accept data reduction and know that 75% of their audio data would never make it on the air because they could enjoy the benefits of better fade margins and elimination of hum and level match. Now they can have all those advantages, plus they can have 100% of their audio.

Daryl Buechting: CD LINK drops in place of an existing 950MHz analog STL, so it's very easy to install. And it fits in the 300kHz bandwidth, the same as a composite stereo STL.

Q. Have we heard from broadcasters who have been waiting for an uncompressed STL before aggressively implementing their digital air chains?

Geoff Mendenhall: That's what we've been hearing. Let me give you a little of Harris' philosophy: Why are we doing this? It certainly wasn't that we wanted to attack anyone: it was purely that we needed this product to complete the uncompressed digital air chain and accelerate acceptance of DIGIT and our other digital product offerings. Acceptance of these things has been held back because there was a missing piece — the uncompressed link. None of our vendors or suppliers have been able to provide us this product, even though we've asked for it a number of times over the years. Finally we decided to do it ourselves, because it is important to the overall 100% uncompressed path.

Jim Woods: This product completes a chain that allows people to make value decisions about their audio chain. If cascading compression algorithms or pure audio are not of concern, this product may not be of interest. But if cascading algorithms and the other resulting issues are of concern, then this product provides another alternative.

Q. There are many advantages to going digital, aren't there?

Jim Woods: Yes. I think it allows for some very simple interconnects: it solves a lot of interface issues among various pieces of equipment and allows broadcasters to deliver the highest quality, most reliable audio.

Don Taylor: To piggyback, it is far easier to wire AES3 in a studio than it is to wire L and R analog pairs. You only have half the amount of wire. Plus, you don't have to worry about phase reversals, and you don't have to worry about one wire being longer than the other so that the left channel arrives at a different time than the right channel does. All of these issues just go away...

Dick Fry: Equalization... frequency response and degradation over long lengths of wire are eliminated by going to digital.

Jim Woods: In my mind, the benefit is better audio and simpler equipment interconnects. The digital chain provides high-quality audio with no signal degradation from the studio to the output of the transmitter.

Don Taylor: There's less risk as far as reliability and ease of installation are concerned. You take a less technical person, and that person will be far more successful with a digital installation [than an analog installation].

Geoff Mendenhall: That's because you don't have all the tweaks. With analog, you've got to adjust levels, you've got to avoid clipping, and you've got to get levels matched. There are consistency issues, too. A digital system gives you better audio and more consistency. The only thing you have to set is maybe two levels — on the audio processor output and on the DIGIT input — and those levels are for both channels simultaneously. It's more of a plug and play/works or doesn't work scenario.

Don Taylor: It's easier to troubleshoot...

Daryl Buechting: ...and AES3 test equipment *is* available...

Don Taylor: ...and there no longer is the need to figure out where the Left channel left us and where the Right channel left us because it's going to be a continuous stream until the point of failure.

Q. How should a broadcaster go about implementing the uncompressed digital air chain?

Geoff Mendenhall: I would start where the biggest benefits would be: I'd start at the transmitter and work backwards. There may already be digital audio sources at the studio, but still there's an analog console. However, if you replace your exciter with a digital exciter, you'll get an immediate improvement in audio. From there, go with a digital link back to the studio. At that point, you can drive that digital link with an audio processor that accepts analog audio from the studio and converts it to data. In case of the CD LINK, you have a choice of feeding analog audio or AES3 data into it. If you have analog audio from your audio processor at the studio, CD LINK will convert it to AES3 data and transport it all the way out to DIGIT in the AES3 mode. By buying just two pieces — DIGIT and CD LINK — you can make a major improvement to your broadcast air chain. Then when you get ready, you can upgrade the audio processing to fully digital and continue to work backward through the studio until you get to the source.

Daryl Buechting: Harris can package everything together.

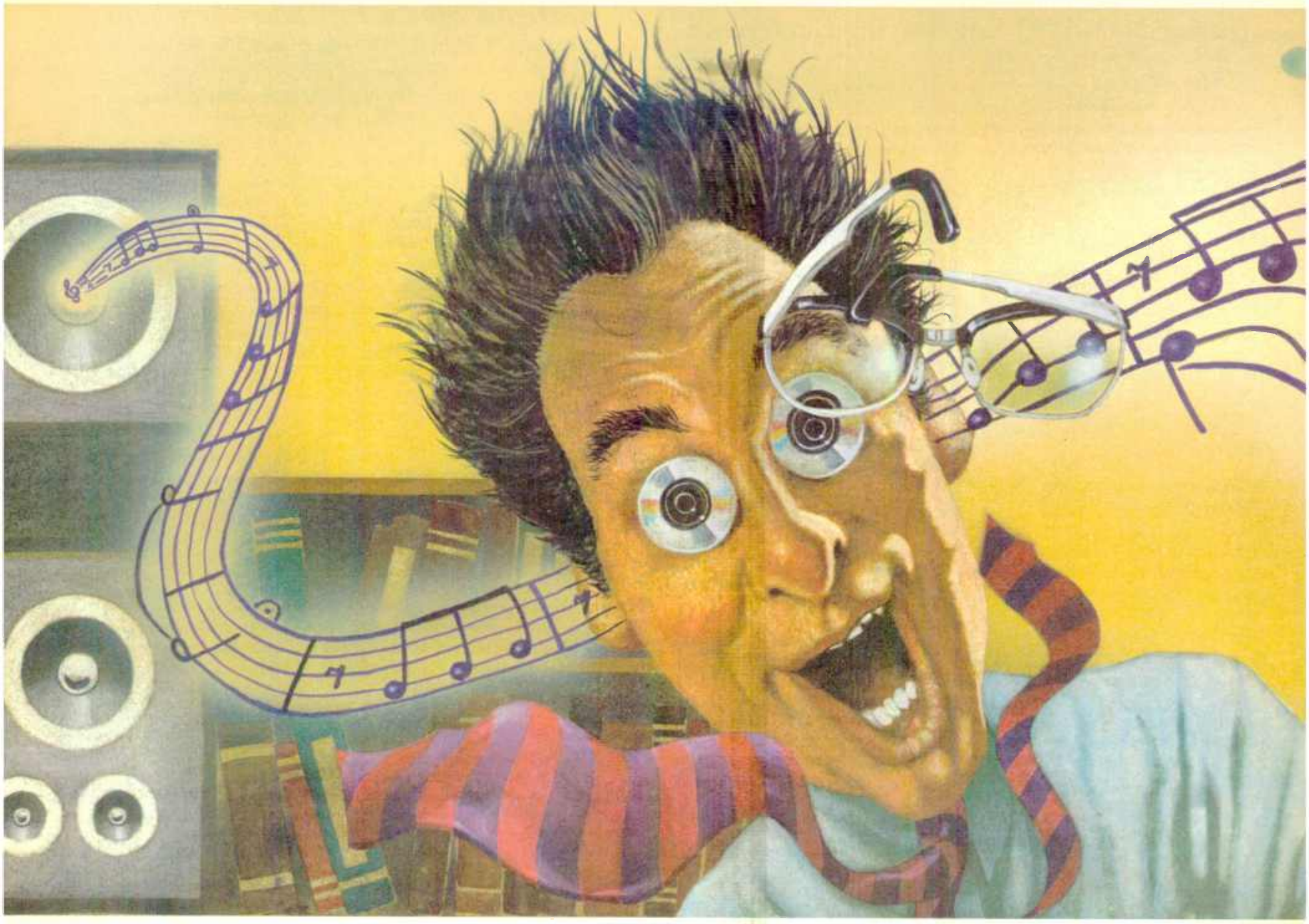
Jim Woods: We represent digital sources from CD players to DAT. We are delivering digital consoles and expect NAB 97 to be a watershed. We represent hard disk audio systems to fit different needs — a variety of solutions from Arrakis DIGILINK products to Enco DAD to Orban DDS. We have the unique ability to bundle the digital products together to meet the customers' specific requirements. We represent high-value solutions and can deliver a competitive package to meet our customers' requirements.

Geoff Mendenhall: Back to the question, "Have we heard many customers say they're waiting for an uncompressed broadcast solution?" The answer is yes. I hear it all the time. I hear it at trade shows. I hear it in phone calls — that there are many broadcasters who have NOT converted to compressed STLs because they have been waiting for this solution. I believe there is going to be a huge demand. By the time we're six months out from NAB, I believe the CD LINK should be the world standard.

HARRIS

World Radio History

UNCOMPRESSED DIGITAL STL



CD LINK™ STL
Full CD-quality sound that blows minds and blows away competition.

If you thought an *uncompressed* Studio-to-Transmitter Link was impossible in a 300 kHz bandwidth, think again. *Harris makes it economical and easy* for you to have an uncompressed bit-for-bit AES3 path that delivers rich, full, digital sound like your audience has never heard before from an FM broadcast station. Sound that can boost ratings, attract more advertisers, make your station more profitable, draw hotter talent, and start an upward success spiral that leaves your competitors singing the compressed digital blues.

We've made history by introducing CD LINK, the world's first UNCOMPRESSED 950 MHz digital STL.

Now the radio broadcast chain can be 100% digital, with CD-quality sound uncompromised by dueling algorithms and lossy compression schemes. Whether your present STL is analog or digital, a Harris CD LINK STL can provide AES3, left/right analog, composite stereo, one 12 kHz or two 6 kHz AUX audio channels, plus data and remote control channels.

CD LINK is another in a long line of firsts from Harris, designed to make you first in your markets. Contact Harris now for the information you need to make sound decisions.

CLEARLY DIGITAL

HARRIS CORPORATION
BROADCAST DIVISION

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FAX: +1 217 224-1439

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TEL: +1 217 222-8290
FAX: +1 217 224-2764

HARRIS

A new world of broadcast solutions

Radio-FM: DIGIT CD™- Digital FM Exciter • SuperCiter™ Analog FM Exciter • CD LINK™ Digital STL • Quest, Platinum and Platinum Z Solid State FM Transmitters • HT Single-tube FM Transmitters • FM Antennas **Radio-AM:** DX - Digital Solid State AM Transmitters • GATES® Solid State AM Transmitters **Radio-DAB:** DAB 2000 Transmitters **Studio Products:** Digital and Analog Studio Equipment **Systems:** Mobile and Fixed Studios and Satellite Systems

Circle (106) On Reader Service Card

World Radio History

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Harris Staffers To Present Six Papers During NAB 1997 Engineering Conference

Harris staff members will present six papers — five on understanding and implementing new digital technologies and one on planning for continued on-air operation in emergencies — during NAB 1997. Copies of any of Harris' papers are available by sending your written request via fax to 217-222-0581 or e-mail to hbd@harris.com. The line-up follows:

Designing and Building the Digital Studio Facility - A Nuts and Bolts Approach
by
Gary R. Hardwick,
Sales Specialist

Is the punch tool a thing of the past? What is required to upgrade an existing facility to incorporate digital technology? What are the key considerations in planning the digital studio for the next decade and beyond? This paper answers these questions — and more.

Performance of Modern AM Modulation Methods into Varied Antenna Conditions
by
John Delay,
AM Product Manager,
and
Hilmer I. Swanson,
Senior Staff Scientist
and winner of the National Association of Broadcasters 1990 Engineering Achievement Award

With the demands of today's broadcast formats and potential for future digital broadcasting in the AM band, it is more important than ever to understand different modulation techniques and their performance under varying antenna conditions. This paper compares the performance of digitally modulated transmitters and PDM transmitters under a variety of conditions.

Advances in Digitally Modulated RF Systems
by
Tim W. Dittmer,
Manager of Radio Engineering

This paper will examine several digital modulation techniques that are used to modulate RF carriers. Digital modems designed to upgrade analog RF systems will be compared to RF systems designed from the ground up to digitally modulate RF carriers. Additionally, systems using source compression algorithms for data reduction will be discussed and compared to uncompressed systems.

Planning Your Digital Television Transmission System
by
Robert J. Plonka
Principal Engineer

A fundamental requirement for planning a digital TV system is to determine the transmitter power rating as it relates to the FCC 6th NPRM allocations table. This paper discusses the peak to average power ratio in 8-VSB transmitter systems and its relationship to transmitter power ratings and linearity issues. Two other areas covered are 1) accommodating an adjacent DTV channel, and 2) frequency coordination.

Implementing Digital Television: WRAL Case Study
by
David C. Danielsons
Principal Engineer

This paper documents the installation and test of WRAL-HD in Raleigh, North Carolina, the first commercial DTV station on the air. Topics include transmitter installation and initial check-out, transmitter setup and performance with NTSC, IOT tuning for the 8-VSB ATSC signal, power calibration of the transmitter using a liquid cooled glycol system, and "on air" transmitter performance with the DTV signal.

Staying on the Air: Case Studies in Emergency Planning - Radio/TV,
by David C. Kobe,
Manager, Broadcast Technology Training Center

Transmitter hardware is evolving rapidly with changes that often involve breakthrough technologies. In fact, many stations are losing ground and lack a comprehensive plan to cover emergencies. This paper compares emergencies that have turned into disasters with emergencies that have been handled effectively. Are you prepared to meet the demands of digital and microprocessor technologies, solid state, and surface mount technologies? And what impact will future technologies have on your operation?

Don't Forget To Catch The Digital Bus to Harris Booth 5909 In The South Hall!

How And Why Should You Convert To An All-Digital Studio To Transmitter Path?

by Geoff Mendenhall, VP- Radio Product Line Manager

The acceptance of the AES/EBU serial digital audio data interface standard by all the major broadcast equipment manufacturers makes it possible to build an All Digital studio with an All Digital link to the transmitter using standard off-the-shelf equipment.

The AES3 (Audio Engineering Society/ European Broadcast Union) serial data standard is defined in AES3-1985, ANSI S4.40-1992 and AES3-1992 documents as the digital audio data format to be used as the interface standard for audio sources, mixing/control equipment, audio processing equipment, STL equipment, and transmitter inputs. The European Broadcasting Union has republished a standard which is identical to the AES3 standard, except for the use of transformer coupling. Some highlights of the AES3 data format are:

- The interface format can accommodate 16, 20 or 24-bits of digital audio information.
- The interface handles serial data transmission of two channels of digitized audio over a conventional shielded, twisted-pair wire, for distances up to 100 meters.
- The interface uses standard 3 pin, XLR-type connectors, carrying balanced, RS-422 compatible signals that are polarity independent. The input and output impedance for the interface is 110 ohms.
- The data is sent least significant bit (LSB) first, with alternating subframes for Channel 1 and Channel 2.
- The data is self-clocking, and does not require an additional CLOCK connection to synchronize the source and destination.
- Auxiliary data bits are available to transport system control information along with the audio data.

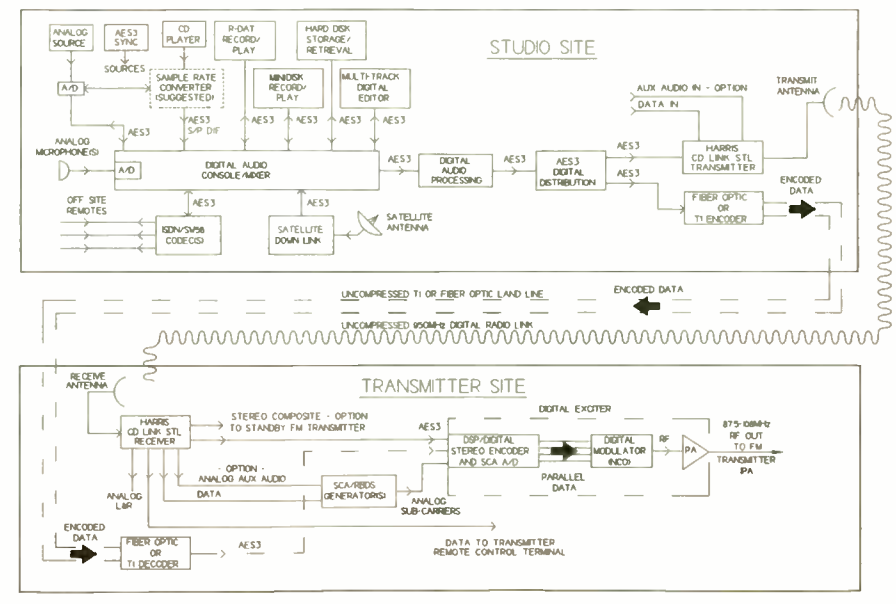
Standard AES3 transmit and receive chipsets support the three commonly used data rates of 48.0kHz, 44.1kHz, and 32.0kHz. Since the current FM stereo transmission standard limits the frequency response of the left and right channels to a maximum of 15kHz, a 32kHz data rate is often used.

The AES3 output from the studio console can be distributed to other locations including the transmitter site. Two common ways to deliver the AES3 data are either through a digital STL radio link or through a T1 digital telephone line. Digital STL's and Digital STL modems (used to upgrade analog STL's) are now available. Analog phone lines are being replaced by T1 digital phone lines capable of carrying high data rates. A new generation of digital audio processing equipment accepts a digital audio input, processes this data fully in the digital domain, and outputs this processed data without any analog to digital (A/D) or digital to analog (D/A) conversions. There are many advantages to using an All Digital path to your transmitter over discrete analog or baseband transmission. The advantages of an All Digital path include:

1. The elimination of all intervening A/D and D/A conversions and the distortions they introduce.
2. Full digital quality delivered to the "On-Air" signal without the noise and distortion build-up of an analog system.
3. Plug and Play - easy interfacing between equipment without worries about level adjustments or hum pickup.
4. Absolute frequency response and amplitude matching between stereo channels.
5. Absolute phase matching and differential phase stability between stereo channels.
6. Absolute stability and repeatability day-after-day, year-after-year without adjustments.
7. Resistance to interference
8. Greatly improved fade margin for radio links.
9. Half the cable population - one AES3 cable replaces two analog cables.
10. Ability to transport some auxiliary control data along with audio data on one cable.

Harris offers a full range of AES3 compatible equipment including the revolutionary CD LINK uncompressed STL and the industry leading DIGIT* CD digital FM exciter to make the transition to a full digital air chain easy.

THE ALL-DIGITAL UNCOMPRESSED PATH FROM SOURCE TO TRANSMITTER



World Radio History

The New Harris Uncompressed Digital STL

By: Andy Laird
Vice President, Engineering/Radio Group
Heritage Media Corporation

BACKGROUND

The improvements in CD players, audio console design, audio processors and digital FM exciters have, in my opinion, made the 950 MHz STL system the weak audio link in the broadcast audio chain. True lossless or non bit rate reduced digital systems are available for T-1 and at the 23 GHz bands. And these sound great! But my experiences at 23 GHz have been very disappointing from a reliability standpoint. T-1, on the other hand, is reasonably reliable but you have to pay for the circuit every month. Presently we use lossless T-1 equipment at seven of our stations where single hop 950 MHz systems are not possible and/or where a backhaul from the transmitter site is needed. These STLs truly sound better than any of our 950 MHz composite systems. They also sound better than the two 950 MHz systems we have operating with compressed digital encoders/decoders. Why is this?

The digital systems currently available for the 950 MHz band use bit rate reduction, most commonly four to one. This is presumably necessary to reduce the transmission bandwidth to fit into a 950 MHz STL channel. This is called perceptual coding. Perceptual coding works because of the inability of our hearing to notice certain details (they are masked) while other distracting audio events are taking place. The perceptual coder throws away the data that it thinks will be masked by our hearing. It's my opinion that typical broadcast audio processing unmasks the perceptual coding, making the bit rate reduction audible. Additionally, the stacking of different types of bit rate reduction used in distribution systems (such as satellite, ISDN and dial-up), with those used in floppy and hard disk storage systems, and then shoving all that through an additional round of bit rate reduced STL, creates even worse sound than can be imagined just by listening to each element on its own.

CONTACT

So, when Geoff Mendenhall of Harris Corporation called and asked if I would be interested in evaluating a new 950 MHz band STL, I was very interested. After signing a non-disclosure agreement, I found out that the system was uncompressed 16 bit linear digital using no bit rate reduction, the same as the T-1 systems we like so much. And on top of that, the transmission will fit within an existing 300 kHz 950 MHz channel and have two RS-232 ports in addition to auxiliary audio channels. Seemed like magic to me. I wanted to see it and hear it in operation. Subjective judgments of audio quality would be made, compared to our favorite T-1 system.

PLANNING

The Heritage FM station WAMG was convenient for this comparison. The main STL is a T-1 circuit using an Intraplex lossless digital system. The station plays "soft favorites" which include some newly recorded music. The main T-1 STL consists of an Intraplex encoder/decoder system. The Intraplex system provides L and R audio out into an Orban 8200 processor. The AES/EBU output of the 8200 is fed to the main transmitter's DIGIT® exciter.

THE TEST SET-UP

For the evaluation, we compared the audio quality of the uncompressed digital 950 MHz system operating closed loop into a dummy load with the "on air" T-1 system.

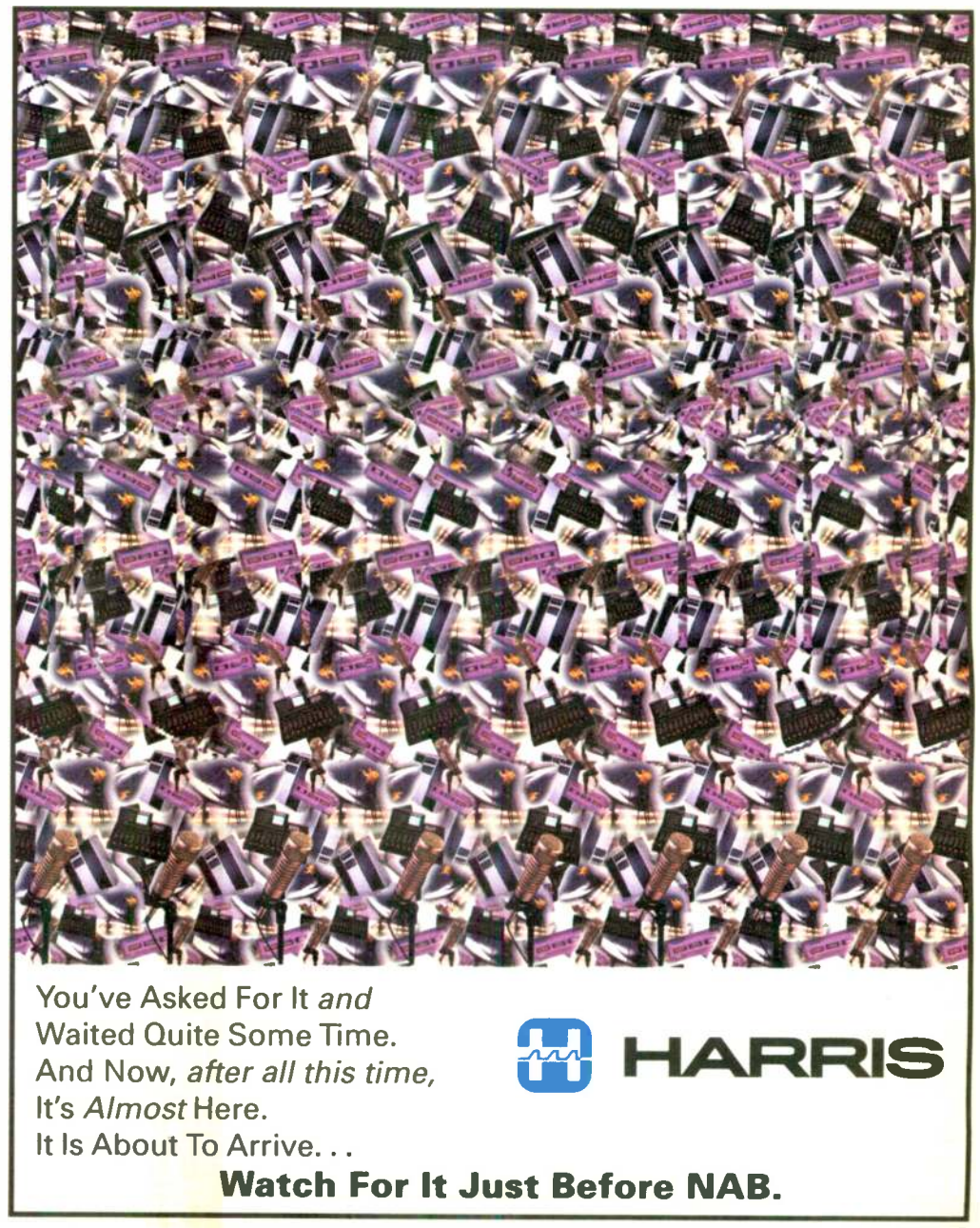
Occupied bandwidth: Terminating the output of the transmitter through a 20 watt 50 ohm attenuator, then through a precise step attenuator, the output was connected to a spectrum analyzer. The RF spectrum does not look like the "hay stack" that you would normally see from 950 MHz equipment. The energy distribution is very flat across the top and falls off almost vertically at the edges of the channel (300 kHz). It looks more like stacked hay bales as opposed to a hay stack. The cut off on either side of the 300 kHz is very sharp. The total occupied bandwidth of the digital STL fits into a standard 300 kHz, 950 MHz channel.

Fade margin: The attenuated output of the transmitter was removed from the spectrum analyzer and coupled into the receiver. We adjusted the step attenuator feeding the digital STL receiver to provide about the same 200 microvolt signal level being delivered to the backup analog STL. The output was then reduced with a precision step attenuator until just where the error correction circuitry began to operate. This was around 10 microvolts. As the signal level was reduced to 5 microvolts, the receiver muted. We measured about a 30 dB fade margin before receiver mute. The error correction circuit worked very smoothly with no clicks or pops down to the mute point of the receiver.

Operation and Diagnostics: The front panel LCD display provides a full array of operating parameters and membrane control buttons. In addition, several diagnostic tools are included to troubleshoot problems. The receiver also stores a history of error corrections.

CONCLUSIONS

We heard no difference between the T-1 system and the uncompressed digital STL system. Comparing music or voice revealed no sonic differences between the two systems. This did not surprise us since both the T-1 system and the new Harris digital STL transport data that is "bit for bit" identical at both ends of the link. Frankly, I was knocked out by the total performance of the system. There is no doubt that the system passes audio quality that Heritage stations have only been able to achieve through the use of non bit rate reduced T-1 systems. In addition to the audio, the system has the promise of greatly improving STL band congestion problems. The first adjacent channel rejection of the system will allow you to use two adjacent channels from the same transmit site to the same receive site with no interference. I think the future is looking very bright for Harris' new uncompressed 950 MHz STL.



World Radio History

DIGITAL FM TRANSMITTERS

Platinum Z Solid-state FM Transmitters. Full CD-quality sound that sends listeners to a new dimension without sending your budget down the tubes.

The phenomenal CD-quality sound provided by true digital FM generation is now a surprisingly affordable reality.

Harris introduces the CD Series™ Platinum Z™ transmitters. These fifth-generation FM solid-state transmitters are available in 2 to 20 kW models and feature the world-standard DIGIT CD™, digital FM exciter.

The big news for broadcasters is that Platinum Z provides the reliability of solid-state digital technology at a price comparable to conventional tube type transmitters. Platinum Z transmitters feature Z-axis design, utilizing all three dimensions...X, Y and Z axes. Platinum Z transmitters also use innovative Z-plane combining, which enables seamless transmission during maintenance and enhances redundancy. If you *remove a hot-pluggable RF module from a Platinum Z transmitter at any time, for any reason, the remaining modules will compensate to continue broadcasting at full power.* Incredible RF module MTBF of 250,000 hours further ensures the reliable performance of Platinum Z.

Platinum Z features:

- DIGIT CD exciter (digital or analog input)
- Hot-pluggable RF modules
- Redundant IPA system
- Redundant power supplies
- Broadband design (N+1 capable)
- Life support backup controller
- Dual-output power setting
- Built-in auto exciter switcher
- High overall efficiency

Digital CD-quality performance... solid-state reliability and redundancy...a price comparable to tube type transmitters...and backed by Harris 24 hour world-wide service! Is there any reason to consider a transmitter other than Platinum Z?

To discover for yourself how full CD-quality sound can take your listeners and your ratings to the new "Z" dimension *without* blowing a hole in your budget, contact Harris.

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Circle (39) On Reader Service Card

World Radio History

Powerful Automation at NAB

▶ SYSTEMS, continued from page 30

networked with Windows 95 to allow for unlimited expansion.

New products from **Computer Concepts** include NewsRoom, a wire and audio capture and editing system, and Visual Traffic, its new 32-bit Windows-based traffic system.

Its lineup also includes Maestro, a control room system that operates on top of the DCS audio engine, Voice Tracker, which allows the user to record voice tracks easily and quickly to create a live-sounding automated program, and StudioFrame, a complete digital recording studio with 8 to 24 tracks of digital audio.

Prophet Systems

told attendees about a new module to allow automatic transfer of audio cuts.

Dalet, makers of a well-known automation and live assist system used worldwide, introduced Team Radio, a software package for effective management of traffic and billing.

Dalet also offers Dalet News: full integration of text and audio for easy scheduling and airing of news; NetBack, a backup solution that alleviates the worry of server failure; Surfer8, a multitrack editor that allows simultaneous edit and record. and Dalet Web Publisher, a software module to create and maintain a truly active website.

Dalet is networked to allow easy transfer of audio from production to control or from outside sources to inside the studio.

Datacount introduced DARTS in single and multi-user version. It will encompasse all aspects of logging, traffic, co-op billing, accounts receivable, and sales and management reporting into one capable, cohesive package.

The **Enco** DAD Pro Digital Audio Delivery system will be true 32-bit by July. The system is available with RAID arrays for solid music storage. It records in Linear ADPCM if desired and is also available with the much-acclaimed Digigram audio card.

Enco also released DAD Jr., a two-track editor with store and forward capability.

The **LPB** Salsa is now Windows NT-based, which means 32-bit speed and power, linear audio, and a solid network solution. The system will run as a live-assist unit, satellite automation or music on hard-drive automation. Last year was the debut of Salsa, but this year the system is fully mature, with multiple station operation featuring full multitasking, networking and remote control capabilities.

A unique studio monitor line from Hayes Australia was also featured at the LPB booth. Its unique composite-board enclosure is made from 100-percent hemp.

MediaTouch is a Windows 95 system that uses Novell Networks to handle its automation/live assist audio transfers. The system delivers all the power necessary to automate a station with music on hard drive or CD bins. This system is feature-loaded and uses a touchscreen for easy operation. MediaTouch plans to announce an NT-based system in early 1998 with features like streaming audio!

While a new name in the automation field, **Orban** is not a new name to broadcasters. Orban offers Airtime, an automation system based on a form of UNIX. This brand is Q-Nix. What that means is power, speed and stability.

The system utilizes a network server and individual workstations and a server called an Audio Exchange that does nothing but manage audio. The control room units are touchscreen-based, working in conjunction with hardware-based cart replacement units.

Pristine Systems is appropriately named, because this system is *clean*. It handles everything from unattended operation and satellite switching to voice-tracked shows. The line includes RapidFire, a digital studio system that is designed for simplicity, power and appearance too. RapidFire is easy to learn and it rivals, and in some cases surpasses, systems costing ten times more. Other products worth asking about are the Pristine MMCS, Music Plus, Time Warp audio store and forward system, Audio Commander and Voicetraxx packages.

Prophet Systems Inc., which makes the popular AudioWizard for Windows digital automation system, introduced its Multilocation Audio Transfer Module, to allow automatic transfer of spots, songs and voice tracks from location to location. The company also told attendees about a new module to allow the creation of news stories and cuts for readback in the log.

Radiomation is a company in Ireland that produces one of the most powerful yet under-exposed automation systems. Radiomation is an integrated suite of software that includes complete automation, live assist, digital production, news, traffic, billing, receipts and sales management. The company has placed systems throughout Ireland, and at BBC facilities in the U.K.

The hot news from **Radio Computing Services (RCS)** is that Master Control is now NT-based. Master Control-NT does "Real Feel" Voice Tracking and integrates perfectly with Selector. The "Living Log" allows for easy last-minute log changes, and the new in-studio web browser runs under Windows NT.

Everyone has heard of the **Register Data Systems** "Phantom," a DOS-based automation system that provides solid performance in almost any application. Look for a 32-bit application under either Windows 95 or NT soon.

This year RDS introduced the Replicator, a network store and forward recorder, capable of recording two audio programs while playing back a third. It records and reproduces control closures with program content. The company also showed a new Windows 95/NT-based traffic and billing software package for radio or television.

Most broadcasters are aware of the **Scott Studios** touchscreen-based automation and live assist system. Scott just recently acquired **Electric Works (AXS)**. We may see a completely separate line available from Scott Studios very soon.

SMARTS Broadcast Systems made a leap forward by introducing The Right Touch, a Windows 95-based touch-control screen that allows for easy access to everything from sweepers and spots to news scripts, weather and live commercial copy. In addition, the Smartcaster line of automation systems provide great functionality in walkaway broadcasting systems. SMARTS also is delivering audio from one station to another with the SPIDER, an Internet-based audio distribution system for groups and networks.

From Italy, **Tiesseci** has a fully functional automation and live assist system that performs all the necessary functions to bring a station into the digital age. The system uses proprietary cards, has additional add-on hardware controllers (mixers, etc.) and is network-based.

Radio World Cool Stuff Award NAB 1997

Kudos and an NAB 1997 Cool Stuff Award from **RW** to **Orban** for recognizing that half of the radio business is AM radio business. Its Optimod-AM 9200 is a fully digital processor designed specifically to meet the demands of AM radio. Eight factory preset programs are provided for processing various music formats as well as news/talk and sports programming. Presets may be programmed for automatic switching synchronized with dayparts. The unit is remotely operable using a standard remote control or via modem using the provided Windows-based software. The digital processing structures include high- and low-pass filtering, gated AGC, receiver equalization, five-band limiter with distortion-canceling clippers, peak modulation clipper and a transmitter equalizer.

Pictured with the award-winning unit is Customer Service Manager Chris Holt.

For more information, contact Orban at (510) 351-3500; or circle ***Reader Service 167.***

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World Radio History

Gearing Up for Studio Products

▶ GEAR, continued from page 25

Neutrik USA introduced an "Easy Patch" method for terminating audio patchbays without solder or special punch tools. The jack normals may bechanged by PC board-style jumpers and the entire assembly is available on a slide-out chassis with rear support rails.

Audio Accessories introduced a new patchbay termination featuring Krone connections. The company continues to offer prewired patchbays in nearly every normalled configuration and breakout one could imagine.

Changing the layout of a patchbay can be accommodated with the **Telect** PRO-AV patch panel. This system uses a removable connector for each jack point, allowing easy change of the layout of your plant without rewiring or losing your investment in patchbays.

Console-maker **Autogram** makes audio distribution easy with Solution 20, a universal accessory system including the RC-1 relay card, DA-1 distribution card, SMA-10 monitor amplifier card and MPC-1 mic processor card.

Wohler introduced three standalone AES/EBU D/A converters: the DAC-2, DAC-4 and DAC-8.

The company also introduced AMP1-D and AMP2-VDSA digital self-powered speakers and an audio error alarm.

A/D-D/A converters and digital summing devices from **Graham-Patten Systems** keep the digital audio stream moving between studios.

Antex showcased its 2/SX-36 and SX-6 digital audio adapter series.

Hafler introduced its new amplifiers, the P1000 and P4000 diamond amplifiers. The P1000 is designed for broadcast studio monitoring, recording and many other uses. The P4000, designed for the studio market, is a 200 W per channel @ 8 ohm convention cooled amp.

For data transfer between SADiE and Octavia-equipped studios, the SASCIA real-time network from **SADiE** handles multiple channels of digital audio. The 155 Mbps link provides sufficient bandwidth for continuous replay of over 100 simultaneous audio channels.

Ward-Beck showcased its D2000 distribution amplifier series, while Benchmark Media Systems came to the show with the four-channel DAC 2004 20-bit converter, the AD 2004R 20-bit four-channel converter and the System 1000 line of audio DAs, mic preamps and switchers.

The MicroFrame Series and General Products Series of meters and preamps round out the **Benchmark** product line.

And to make sure that every timecheck is accurate, **ESE** showed its full line of analog and digital studio clocks.

New Radio Music Libraries

▶ MUSIC, continued from page 46

using Real Audio, and we are on the Liquid Audio system on their Web page," he said.

Manhattan Productions Music featured Tunefinder, a CD-ROM.

"What Tunefinder is all about is, it's a great music search program that allows users to type in a keyword ... then it shows you on the computer all the songs that match that criteria ... then you can play a 10-second sample on the computer," said Ron Goldberg, director of sales and marketing for Manhattan.

Manhattan also introduced Apple Trax, the company's newest music library.

"It's very hip ... cutting edge," said Goldberg. "It's for younger audiences ... it has alternative rock, hip hop, urban music ... all written in a way to enhance productions to make them more fun."

Weather giant **AccuWeather** featured its newest service for radio stations.

"One of the main things we've introduced is an Internet service for radio where (the station) can offer a local forecast and a variety of weather and other products on their Internet site," said Dr. Joel N. Myers, AccuWeather founder and president. "They can have the local radar updated regularly, satellite imagery, the local forecast and current conditions updated routinely ... We also offer a number of other things that are not weather, like gardening tips and lottery results."

Newsbreaks from Britain was new from **British Information Services**. This free service of one-minute news actuality reports for radio newscasts is fed cleanly via ISDN circuit from London with toll-free telephone access. It has also been launched on the Internet.

"We're using Real Audio software to give stations everywhere the option to either download it in real time or as a .WAV file," said BIS sales representative Mark Hopkinson.

"We market mostly to stations looking for international news coverage ... They can get sound bites from us and the latest news from Europe and the rest of the world."

Hopkinson said the company has also launched the product into Mexico.

S W E E T S P O T

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It rolls a microphone preamplifier, 20 bit A/D converter, de-esser, downward expander/gate, compressor/limiter and parametric EQ into a single rack space unit. Rotary knobs allow real-time parameter adjustments while eliminating multi-layer menus. An optional remote control allows selection of the first 11 presets and a bypass function without frantic dashes to the equipment rack.

With analog and digital outputs, the 628 is ideally suited to recording, live performance, and broadcasting applications. Analog outputs provide either line level (+4 dBu) or microphone level (-40 dBu) output. AES/EBU or S/PDIF digital outputs are switch selectable. The 628 operates at sample rates of 32 kHz, 44.1 khz or 48 kHz.

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World Radio History

Solid-state FM Gets Smaller

Michael LeClair

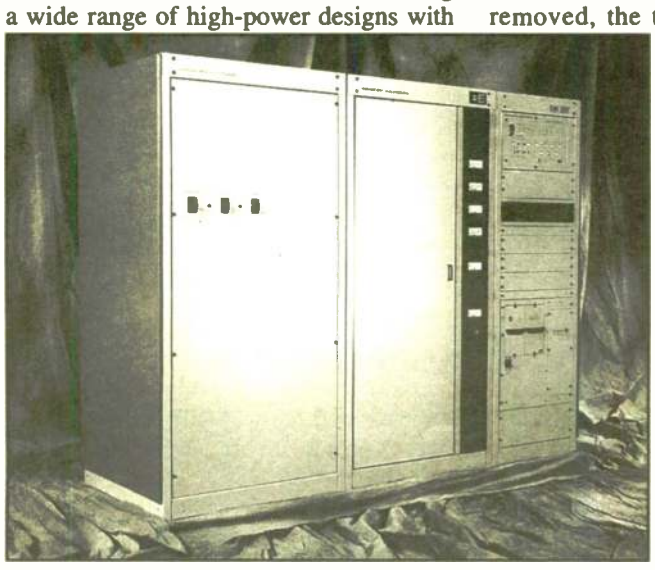
FM transmitter products were on display in force at the NAB in Las Vegas, with many manufacturers showing new items in all power ranges.

The trend in solid-state transmitters is smaller and more reliable. Many power amplifier designs use a modular approach for built-in redundancy, with some even offering multiple power supplies. Innovative new combiner designs now allow for uninterrupted operation while power amplifier modules are removed for service.

In addition, solid-state designs have become compact. Several manufacturers said an entire transmitter could be shipped via overnight delivery in the event of an emergency. The use of switching type power supplies is becoming more common as a means of reducing the weight and size of a transmitter.

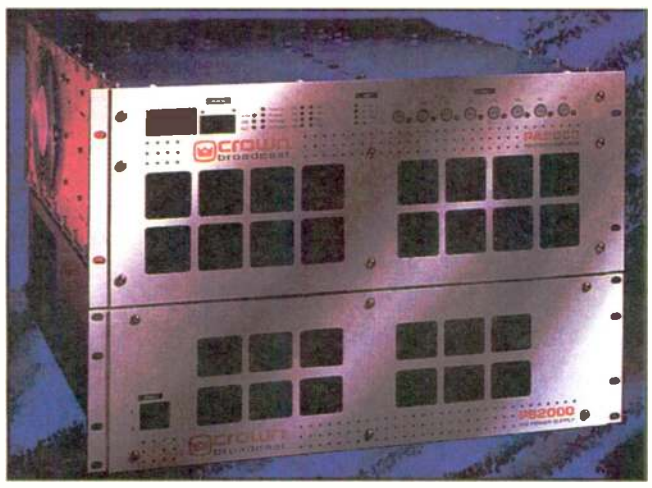
Tubes improved, too

Design improvements are not limited to the solid state area, however. Tube transmitter manufacturers were showing a wide range of high-power designs with new, full-featured controllers and digital exciters. While the amplifier cavity remains the same, all other aspects of the tube transmitter can be as advanced as their solid-state cousins. Tube designs remain an economical choice for high-power installations.



Broadcast Electronics FM35T

Of course, the progression toward digital techniques continues in transmitter design as well. Several manufacturers now offer a digitally generated FM stereo composite signal. Finally, digital exciters are becoming more widespread, allowing stations to create a digital airchain right up to the point of modulation.



Crown 2kW Amplifier

Broadcast Electronics demonstrated two new lines of FM transmitters: the low-power Predator series and the full-range T-series. The Predator is offered in 50, 150 and 250 W versions and features a digital exciter using a numerically controlled oscillator. This is a modular design and can be configured with built-in digital stereo generator and automatic gain control for a fully integrated low-power transmitter or translator.

The T-series transmitters are offered in a range from 10 to 30 kW and are an upgrade from the familiar B-series from Broadcast Electronics. James Carpenter, vice president of engineering, said, "We kept the best parts of the existing B-series, such as our reliable folded half-wave cavity, and coupled it with a completely new controller and solid state IPA."

The controller now allows monitoring of virtually all internal transmitter parameters and features a direct serial interface for remote monitoring of the transmitter via modem to a personal computer. Finally, filament voltage regulation is now standard on all T-series transmitters for extended tube life. Broadcast Electronics also offers a fully digital stereo generator and exciter to form a complete digital airchain.

Harris Corp. introduced two new models in its Platinum series, filling out a complete line of solid-state transmitters from 2 kW to 10 kW. All RF power modules are hot-pluggable, allowing repairs to be performed while the transmitter is on the air. Even with one module removed, the transmitter has adequate headroom and a stable stripline combiner allowing continued operation at full power.

"We've also installed an energy management system to improve the overall efficiency," said Tim Dittmer of Harris, "allowing us to match the efficiency of tubes while using a broadband amplifier design."

Based on the operating power and ambient temperature, this system can automatically adjust parameters such as cooling fan speed to reduce power consumption. The Platinum series is available with the Digit exciter from Harris.

A new 2 kW model was introduced this year by **Crown International**. The company now offers a full line of low-power solid state transmitters from 30 W up to 2 kW. These transmitters are modular and can be configured with internal stereo generator, automatic gain control and radio receiver as well. A switching-type power supply is used for low weight and reduced size, with an entire rack-mounted transmitter occupying as little as 15 rack units.

"By keeping the power supply and amplifier as separate modules, we made these transmitters portable," said Jim Blum of **Crown**. "We can FedEx 2 kW to anywhere in the U.S. within 24 hours."

Nautel premiered a 20 kW fully solid-state transmitter for those looking for high power without the need for tube replacements. The FM20 consists of two individual 10 kW transmitters driving a conventional combiner. The FM series also offers 4 kW and 7 kW models. All RF modules are hot-pluggable while the transmitter remains on the air and have enough excess power capability to permit full power operation with one module missing.

"All our FM transmitters come with our new NE-50 digital exciter as well," said President Dave Grace.

Continental Electronics featured new controller software for its solid-state transmitters. The software allows extensive monitoring of the internal operation of the transmitter for setup and diagnostic purposes. With an external personal computer or laptop, virtually every aspect of amplifier performance can be monitored for proper performance. Using a modem, this software could also be used as a functional remote control if needed.

Also on display at Continental was its new Embedded Diagnostic Unit, or EDU, for its high-power tube transmitters.

See FM, page 65 ▶

Radio World Cool Stuff Award NAB 1997

An NAB 1997 Cool Stuff Award went to **Lightwave Systems** from **RW** for the Fibox Audio Transmission System.

Long cable runs can cause losses and ground loops are difficult to find. The Fibox gets around both by using a fiber-optic cable and A/D conversion techniques to allow cable runs up to 2.5 miles. By multiplexing several units, one fiber can handle up to 12 channels.

For information, contact Lightwave Systems at (214) 741-5142 or circle Reader Service 156.

Circle (38) On Reader Service Card

World Radio History

EAS Products Still in Demand

Michael LeClair

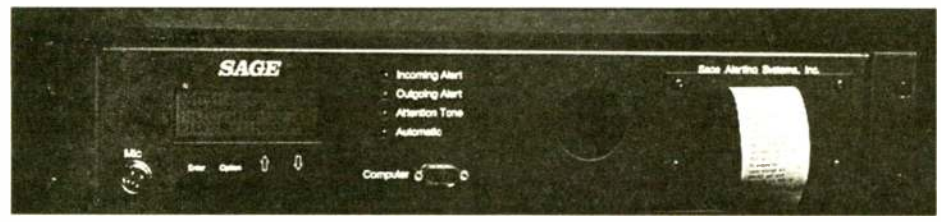
Most of the major EAS manufacturers displayed their products at the NAB this year, giving interested broadcasters a chance for hands-on evaluation.

Many stations already purchased EAS equipment to meet the January 1997 deadline, but there appear to be a large number that have held off. Not to name names, but one Las Vegas area radio station was heard running the old EBS tones and scripts after the convention had ended.

One EAS equipment manufacturer said he was still getting 10 orders a week in April, more than three months past the deadline.

The EAS System From Burk Technology

TFT 911 EAS



Sage ENDEC Emergency Alerting System

For those who have waited, the good news is that there are new features and software updates available on most units. Based on feedback from customers in the field, equipment manufacturers have been able to make their EAS equipment easier to use and install. New features have also been added to accommodate individual state plan requirements.

Most state plans have been released — at least in draft form — so stations can now purchase equipment with firm knowledge of what is required at their particular site.

Be prepared

Of course the bad news is, if you don't have anything yet, it will be hard to explain when the FCC knocks on the door and decides to make an example of your station.

For those who have already purchased their EAS equipment, it may be worthwhile to telephone the manufacturer to find out about new software updates — some are being offered for free.

TFT Inc. showed its model 911 EAS encoder/decoder and a full line of accessories. The 911 comes with a built-in printer, digital recorder and four monitor inputs in the standard system. Also available are a multimodule receiver (model 930A) that accommodates up to four receiver modules, a remote control status interface module (model 941A) and a program interrupt relay module (model 940A).

TFT also introduced software programs that add many features to the basic encoder.

For example, tests and activations can be logged to a personal computer instead of being sent to a printer. Sound files using the WAV format can be input into the encoder to allow standard messages to be pre-produced and imported for broadcast. Decoder activation of text-capable pagers is possible to alert emergency personnel.

These software programs are available as separate modules designed to run on a personal computer with a Windows 95 operating system.

Another EAS system with new software features at NAB was the Endec encoder from **Sage Alerting Systems Inc.** The Endec RMT simplifies the generation of EAS alerts, particularly for stations responsible for a variety of different counties and emergency situations. The Endec PRO is a program designed for emergency professionals at the front lines of the emergency reporting chain. PRO offers full flexibility in generating specific alerts by using a mouse-driven menu. All software is Windows 3.1- or Windows 95 compatible and requires the use of an external personal computer or laptop.

The RBOX accessory module was also introduced at the show for the Endec system. It adds five programmable relays and five control inputs to the basic system.

Newly approved

On display at the Continental booth was the newly FCC-approved **MTS** 3000D EAS system. It is a full-featured system with just about everything in the basic configuration. The basics include a front-panel floppy disk drive for software updates and three built-in receivers including one for the National Weather Service.

An internal log can store up to a year's worth of EAS activity, although a standard printer parallel port is available to drive a user-supplied printer. The high-fidelity digital audio recorder has a frequency response of 15 kHz and several hours of storage time.

The optional internal SVGA card is an interesting feature because it allows the use of a standard computer monitor for better visibility instead of an LCD display. Program interrupt relays and status I/Os are integral to the encoder.

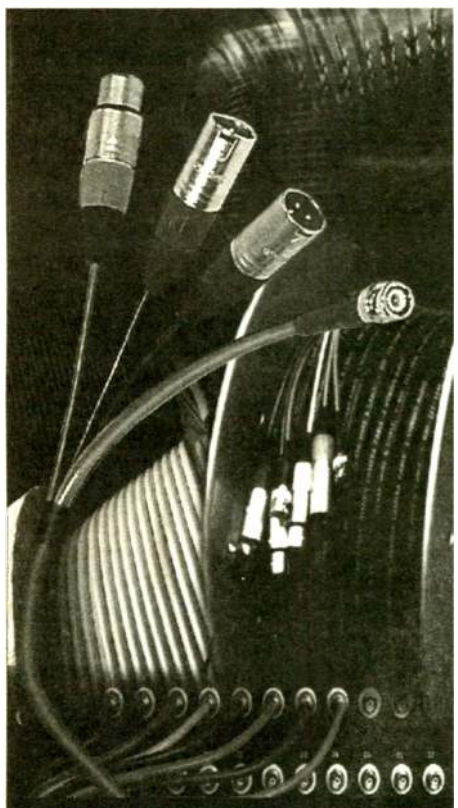
Burk Technology showed its model EAS equipment. The Burk system features a built-in printer, six monitor inputs and a high-fidelity digital recorder. The RX-4 receiver is available as an option and has four internal tuners: two FM, one AM and NOAA as the standard configuration. Four program interrupt relays are part of the accessory LX-4 module.

On display at the **Gorman-Redlich Mfg.** booth was the EAS1 system. The EAS1 includes a large four-line, 40-character LCD display for easy viewing and five internal programmable relays for interface with external equipment such as automation systems.

EAS print activity is output via a standard 25-pin parallel port to a user-supplied printer. A BNC coaxial output connector allows output directly to the composite input of an FM exciter.

The company said this feature is unique. Pre-programming of the encoder is available from Gorman-Redlich for a small fee.

See EAS, page 69 ▶



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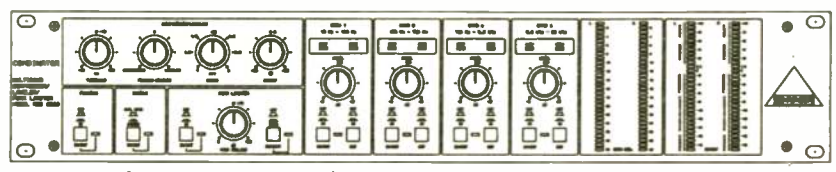

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World Radio History

New and Cool STLs, RPUs

W.C. Alexander

NAB '97 was an interesting place to be for those seeking new ways to get their audio feeds from studio to transmitter, or from remote location to studio. Several manufacturers had new and innovative products on display, while all studio-transmitter link (STL) and remote pickup unit (RPU) manufacturers continued to show their tried-and-true lines of gear.

In addition to its Smarti POTS codec, **Marti** also had its newly-acquired Cellcast unit on display. This unit features a Comrex/Gentner-compatible frequency extender, which works with its internal 3-watt cellphone or over a regular phone line. The Cellcast unit includes a built-in mixer and battery, offering go-anywhere, instant-setup remote capability.

As variations on its workhorse RPT-40 RPU transmitter and R-10 receiver, Marti showed frequency-synthesized versions to permit complete flexibility when operating in today's congested RPU bands.

Although Marti had none of the equipment on display, its sales people told convention attendees that it has just acquired Dolby's line of 950 MHz two- and four-channel digital STLs. This line of high-quality digital links will soon be available from Marti.

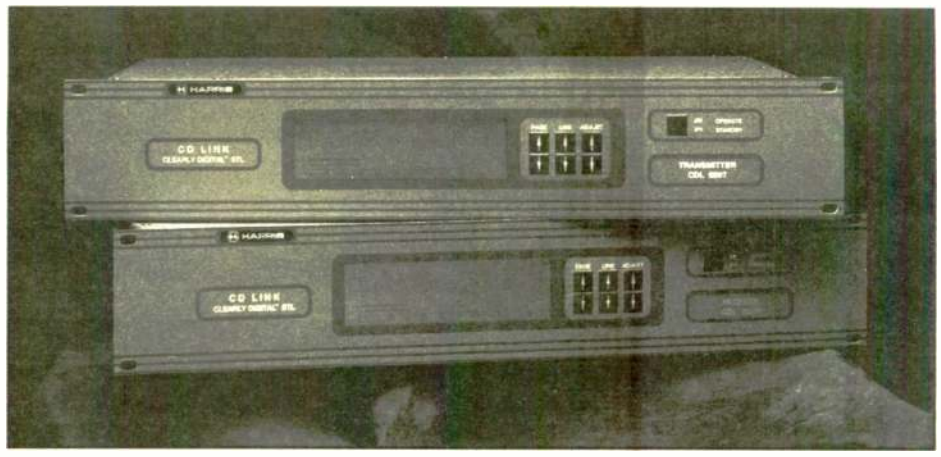
In the **QEI** booth, the CAT-Link T1 STL was on display. Although it has been in the field for several years, it is now available with AES/EBU input/outputs to facilitate full-digital operation.

For RPU applications, QEI showed QuickLink II, a two-channel digital spread-spectrum system that operates under Part 15 of the FCC Rules on 2.4 GHz. The QuickLink II features analog input/output and a built-in mic preamp. No FCC license is required to use this handy RPU, but line-of-sight is needed to make it work properly.

Moseley Associates featured its new Starlink line of STL systems. There are two versions of this new system — the SL9003T1 operates over a leased T1 line, while the SL9003Q has a 15 W 950 MHz transmitter and compatible receiver for over-the-air applications. The Starlink features AES/EBU and analog I/O and can carry four 15 kHz audio channels. Full metering and diagnostics are provided to ease setup and troubleshooting.

Also on display was Moseley's trusty PCL-6000 series of STL equipment, along with its DSP-6000 digital STL encoder/decoder units.

For RPU applications, Moseley showed its RPL-4000 synthesized remote program links. These units feature a built-in three-channel mixer for self-contained remote broadcasts.



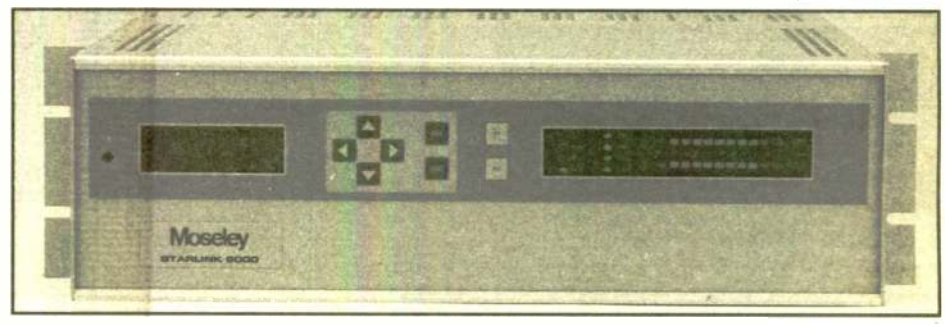
CD LINK: Uncompressed Digital STL From Harris

Intraplex had a complete digital T1 multiplexer set up in two racks in its booth, showing the capability of the system to transmit digital-quality audio in both directions. In addition to the audio, a telephone "ring-down" was connected to the system to demonstrate studio-to-transmitter communications. The Model 4200 "STL Plus" system is specially packaged for broadcasters and features bidirectional, linear and uncompressed audio transmission.

Broadcast Electronics made a splash at the show with its new PowerMizer 1 kW AM transmitter.

Energy-Onix came to the NAB show with its STL-1/STL-2 frequency-agile 950 MHz STL and Digital One digital STL encoder/decoder

At NAB '97, **Harris** unveiled its new CD LINK, an uncompressed digital 950 MHz STL. This self-contained unit can accommodate a single AES/EBU input or two 15 kHz audio feeds. Two auxiliary data channels are available, one handling up to 4,800 baud, the other capable of up to 9,600 baud. Options include either two 6 kHz auxiliary audio channels or one 12 kHz channel. A DSP stereo generator is available in the receiver to provide a composite or direct digital feed to the exciter. All channels are available simultaneously at the receiver, providing flexibility for remote control, SCA, RBDS and other applications.



The Moseley Starlink STL

TFT was prominent on the radio/audio floor, with its established 9100 series of 950 MHz STL equipment and DMM92 digital encoder/decoder.

Link Communications was on hand with its 800 MHz/1.6 GHz (950 MHz optional) STL system.

AEQ demonstrated a line of portable codecs, mixers and mixer/extenders.

New gear for an old friend

AM may be a "mature service" as defined by the FCC, but there were a great deal of new AM transmission system designs on the NAB '97 exhibit floor. It was no great surprise that expanded band and shared-site operation was the essence of much of the gear on display.

Broadcast Electronics made a splash at the show with its new PowerMizer 1 kW AM transmitter. This economical and revolutionary transmitter comes in two rack-mountable chassis (you provide the rack), occupying only 25 inches of space and weighing in at just a little more than 90 pounds. The price is also revolutionary, making this compact, efficient transmitter quite attractive. The design features class-E push-pull power amplifiers and 73 percent overall efficiency, as well as a built-in C-Quam stereo exciter.

Taking advantage of technologies developed for the PowerMizer, B.E. displayed the AM10A, a single-rack solid-state 10 kW transmitter, one of the least expensive on the market. It boasts 145 percent modulation, AM C-Quam stereo and B.E.'s exclusive class E power amplification.

Omnitronix introduced its OMNI-100K solid-state transmitter, with extensive antenna and power mains transient protection and modular design. The company also showed its full line of digital, solid-state AM transmitters and short-wave models.

Several years ago, **Potomac Instruments** came out with the 1900 series — a new design of directional antenna monitoring equipment. Potomac had this line on display in its booth, along with its SMR-11 AM monitor receiver, FIM-41 field strength meter and SD-31 synthesizer/detector. Potomac also manufactures remote control and other ancillary AM transmission equipment.

Delta Electronics had a wide array of AM transmission products on display in its booth. In addition to its complete TCT line of RF ammeters, Delta has come out with a digital RF ammeter. This unit works like the analog TCTs but does away with the limitations of analog-scale

See AM, page 69 ▶

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World Radio History

Monitoring Equipment Passes the Test

Harold Hallikainen

At NAB '97, I had the opportunity to visit with 27 companies manufacturing test and monitoring equipment that should prove useful in radio stations. As more stations convert to an all-digital signal path from CD all the way through the exciter, different sorts of test equipment are required. There are, however, still many places in the station where analog audio is present and requires monitoring. In addition, RF monitoring equipment should prove useful.

Levels and monitoring

From **Whirlwind** came the Q-box. This is an all-in-one audio line tester that combines a microphone, speaker, test-tone generator, outputs for standard headphones, and voltage presence monitoring for phantom or intercom power.

Audio Technologies Inc. showed its line of stereo bargraph meters. Each of these bridge a balanced audio line and can be configured for VU or PPM response. The new BGD200 monitors

BG-D200 Stereo Bargraph Meters From ATI

three stereo audio lines. It includes a red LED that flashes when there is a stereo phase reversal.

Dorrough Electronics showed its existing line of loudness meters and the company introduced a new balance meter for monitoring stereo audio. Dorrough has added features to a couple of audio level indicators and turned the combination into the Model 1200 stereo audio test set. Large LED meters indicate peak and average levels over a 100 dB range (with range switching). A function switch allows display of left and right or L+R and L-R.

Logitek had DSP-based audio level indicators on display. The various models display level, stereo phase, and stereo image. Some also include a variable peak hold time, a "fine" mode (0.2 dB per LED), alarm outputs and a loudness filter (similar to an A-weighted frequency response curve).

If you just have to have a VU meter, **Selco Products** has a whole line of VU and PPM meters to meet your every desire. They even have a new line of meters called "Vintage," which are right out of the '50s, or maybe even before.

Videoquip Research displayed a VP-2 dual extended range VU/PPM meter. This LED bar graph meter is used to monitor stereo audio levels with either VU or PPM ballistics.

Audio test equipment

Audio Precision showed a series of switchers to work with its "dual domain" audio test equipment. The System Two measures characteristics and impairments to the digital audio data stream.

Autogram introduced a rackmount chassis that accepts a variety of modules including a four-frequency audio oscillator. This unit has four oscillators, each with an independent level control allowing for testing of pre-emphasized audio circuits, such as FM or tape.

CRL displayed the DAA-50. This digital audio analyzer receives and decodes AES/EBU, IEC958, SPDIF and EIAJCP-340 data. It tells you what format it is and lets you listen to it. It almost lets you hang a pair of headphones across the program line, just like the old days.

Delta Electronics showed the SNG-1 stereo noise generator. It generates white, pink and USASI noise. It also has a clever "clipped noise" capability that makes positive and negative peaks of the noise distinctive so you can check stereo phasing throughout the audio chain.

Neutrik Instrumentation showed a line of audio signal analysis equipment that accepts analog or digital audio in a variety of formats. The equipment can also be controlled from a Windows computer via a high-speed serial link.

Potomac Instruments showed its latest audio test equipment. The distortion analyzer looks a bit like the old HP330D many of us grew up with. However, this analyzer includes an automatic nulling harmonic distortion analyzer that also measures intermodulation distortion. To aid in troubleshooting audio circuits, the instrument includes a high-pass filter that can be switched in to determine if a problem is due to hum.

Prism Media Products exhibited the DSA-1 handheld digital audio analyzer.

The DAA-50 From CRL

This unit analyzes digital audio streams and reports a variety of characteristics such as sample rate, jitter, carrier level and error counts.

Radio Design Labs displayed its RU-OSC4-A, which puts four audio oscillators in one package. The unit automatically steps through four frequencies — 100 Hz, 1 kHz, 7.5 kHz and 15 kHz — allowing a quick system frequency response check. Since the output of each oscillator is independently adjustable, levels can be adjusted to compensate for equalization or pre-emphasis.

Modulation monitors

Belar has added some sophisticated microprocessor hardware and software to their precise analog monitoring circuitry. This year it introduced a subcarrier monitor based entirely on DSP techniques. The baseband is digitized, then all filtering and demodulation is done in the digital domain.

Belar also added RBDS and subcarrier monitors to the Wizard system. The Wizard is available for both AM and FM. A unique feature on the Wizard is a remotely adjustable audio (or composite stereo) loop-through, allowing remote adjustment of the audio level driving the exciter or driving a composite clipper. The monitor input can also be switched to the loop-through points allowing analysis of the audio at various points.

Delta was showing the ASM-1 AM stereo monitor. Along with the typical AM modulation monitor capabilities, this unit demodulates C-QUAM stereo, allowing analysis of the stereo signal.

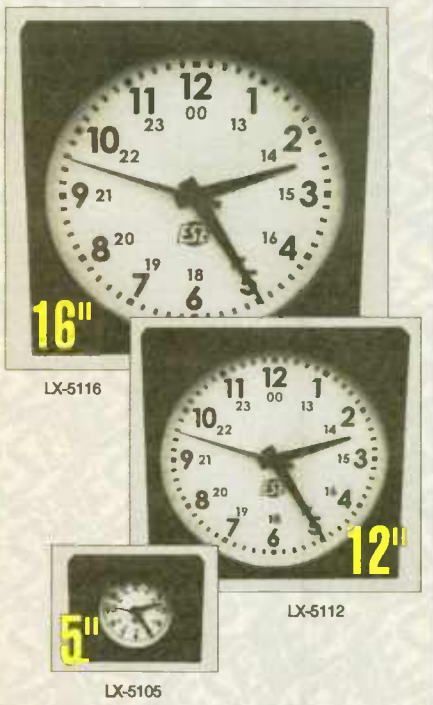
Inovonics had its Model 530 off-air modulation monitor on display. This monitor includes eight station presets and measures total modulation, pilot injection and residual 38 kHz.

Also on display from Inovonics was its model 540 subcarrier monitor that can measure the injection of analog or digital subcarriers in the 55 to 100 kHz range.

Modulation Sciences Inc. showed the ModMinder. By making the monitor precisely meet the pre-1983 rules defining modulation monitor performance (since deleted), Modulation Sciences was able to ignore very short peaks, allowing

See TEST, page 66 ▶

ANALOG CLOCKS
"5100" Series



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World Radio History

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Shure FP410 Automatic Mixer

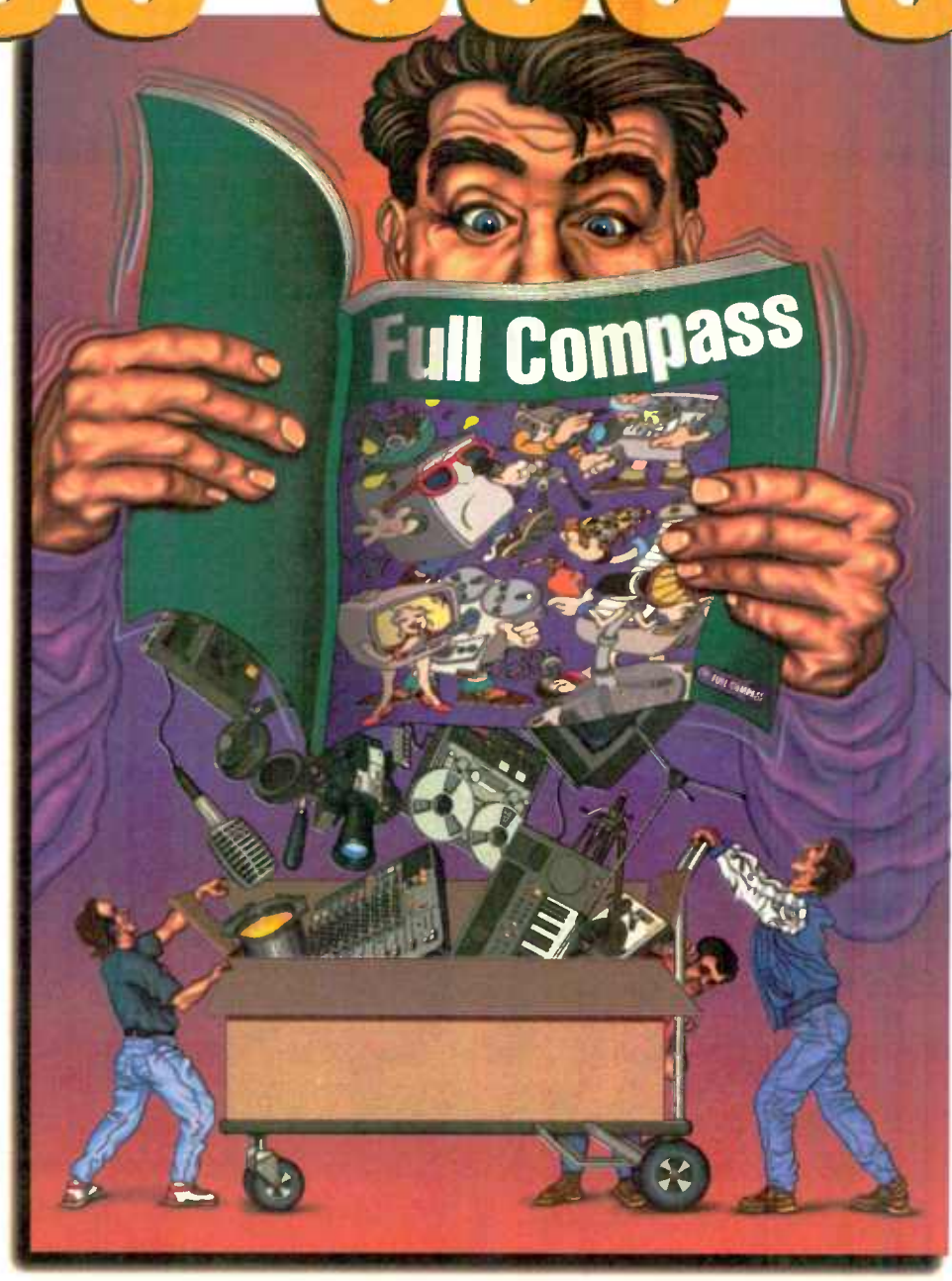
The world's first portable automatic microphone mixer. The Noise Adaptive Threshold activates microphones for speech but not constant room noise. Max Bus Circuitry limits the number of activated microphones to one per talker and Defeatable Last Microphone Lock-On keeps the most recently activated microphone open until a newly activated microphone takes its place. All 4 inputs can also be switched to line level. Additional FP410 Mixers can be connected via the rear-panel link jacks by using the supplied link cable. Rack ears included.

LIST 1650.00 Call For Price!

Shure FP42

Four XLR transformer balanced mic/line inputs and two XLRs out make this mixer ideal for mixdowns in video editing suites or anywhere a portable high quality stereo mixer is required. Other features are pull-pot cueing in all inputs, low cut filters, mono/stereo switch, Mix Bus linking, headphone amplifier, tone oscillator, switchable limiter, phantom power and dual VU meters.

LIST 1240.00 Call For Price!



Shure M267 Field Production Mixer

Features include switchable limiter, phantom power, LED peak indicator, 1/4" headphone jack, battery check function, tone oscillator, mic/line switches on all 4 inputs and outputs, low-cut switches, mix bus jack and much more. Battery or 120/240 Vac power. Option: Rack mountable with A268R.

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Improving on the success of the Shure M267 microphone mixer, the M367 incorporates all the M267 features plus 6 XLR inputs, extremely low noise operation, 2 XLR outputs, detachable power cord, 2 heaphone outputs, 12 and 48 volt phantom power and a two position Mix Bus. Battery powered or 120/230 Vac and rackmountable with the A367R.

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World Radio History

YOU MOVE ME

The 16000 Audio Routing System is the powerful new compact switcher from Sierra Automated Systems.

This spirited performer really moves audio around—with operational ease and long-term reliability.

Completely self-contained, the 16000 handles 32x32 routing in a mere two rack-units. Through a variety of schemes utilizing off-the-shelf, pre-made cable assemblies and cross-connect blocks, system interconnect is now faster than ever before.

This switcher gives you full-system access 'XY' controls; plus a bright read-out for displaying inputs/outputs, and system settings. Source and destination confidence monitoring is available via the convenient front panel speaker.

The 16000 makes everything easy—with programmable salvo switching, stereo linking, PC software control, scheduled event switching, universal serial ports for distributed control networks, and employs the full range of SAS remote control panels.

The 16000 moves with high-octane performance. The control system is versatile and thorough. Quality and reliability are never compromised.

Wired thing... We think you'll love it. For more information about the SAS 16000, please give us a call.

Radio World
Cool Stuff Award
NAB 1997

SAS

Sierra Automated Systems and Engineering Corp.

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World Radio History

Transmitter Excitement At NAB

▶ FM, continued from page 59

"You can monitor anything in our transmitter with this," said Steve Claterbaugh of Continental.

The EDU uses a serial interface and a custom software package that runs on a personal computer. All Continental transmitters can be configured with either an analog or digital exciter.

Itelco was on hand at NAB with new TV and L-Band products. The company also displayed its line of solid-state FM radio transmitters.

The Stealth line is a new series of transmitters offered by **Energy-Onix**. This series is available in a range of powers up to 1 kW. An interesting feature of this transmitter is the ability to set the frequency of the exciter remotely. This allows the Stealth to serve as a standby transmitter for a multiple-station facility with co-located transmitters. The transmitter features internal automatic gain control and requires only 12 RU for the 1 kW model.

DB Elettronica from Italy introduced several new products, including a new stereo generator and MOSFET power amplifiers. The Vivaldi stereo generator is a high-fidelity design that uses analog techniques. The KF500 500 W amplifier uses a new technique the company calls "Cold FET" to optimize amplifier performance. The KF1000 uses the same power modules to provide 1 kW.

Solid-state and DAB devices were in the news at transmitter booths.

The Quantum 1000E from **QEI Corp.** was on display as its entry in the compact transmitter category. The entire 1 kW transmitter takes up only 9 rack units of space. The transmitter includes an integrated composite clipper for modulation control.

Armstrong Transmitter Corp. showed the FMX100LCD, a new digital exciter that can be configured as a small stand-alone transmitter.

This new exciter is available at 30 or 100 W and can be optionally configured with a built-in stereo generator and audio processing. A serial remote control interface and software program allows this transmitter to be remotely controlled via modem.

OMB America was on hand at NAB '97 with its line of FM and TV transmitters.

Superior Electric demonstrated its WHR Series of Stabiline voltage regulators for radio and TV broadcast installations.

Models are available in power ratings from 2 to 1680 kVA. Features include high overload capacity, maintenance bypass switch and no waveform distortion.

Hipotronics came to NAB to demonstrate its Peschel automatic voltage regulators.

Selling points include dry-type transformers, efficiency of up to 98 percent, single- and three-phase designs, and correction of up to +/- 30 percent.

Litton Life Support told attendees about its InstaGas nitrogen concentrators, which provide protection to coaxial cable while pressurizing with nitrogen. The system saves in gas costs, and eliminates safety hazards and problems associated with transporting bottles.

Radio World Cool Stuff Award NAB 1997

John Siau at **Benchmark Media** displays both the AD2004 quad 20-bit ADC and its NAB 1997 Cool Stuff Award from **RW**.

The unit features 20-bit four-channel digital to analog conversion with low-noise and distortion conversion and the company's "jitter" reduction technology providing up to 50 dB of jitter reduction.

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World Radio History

Passing the Monitoring Test

▶ TEST, continued from page 62

stations somewhat higher modulation levels without tripping the peak flasher. A couple of other clever features include a "loss of dynamic range" alarm output which will indicate a loss of audio or substitution of tone or hum for audio.

Radio Design Labs showed the ACM-2 amplitude component monitor. This unit displays the AM component of the signal on the output of an FM transmitter. The transmitter is then tuned to minimize this AM component. The unit includes a front panel display and remote outputs.

TFT showed its line of AM, FM, stereo, and subcarrier monitors. The TFT 844A stereo monitor combines two monitors into one. It serves as an FM monitor providing a synthesized RF amp/preselector, FM baseband demodulation and metering; and a stereo monitor providing stereo demodulation and metering.

Dorrough had its 1200 series on display.

QEI showed its 691 FM modulation monitor. QEI recently added a variable peak-time threshold to this monitor, making it ignore peaks of less than a user specified duration. This all-in-one monitor combines an FM monitor, stereo monitor and subcarrier monitor into a single unit.

Field strength meters

Holaday Industries showed its line of meters and monitors for determining compliance with RF radiation requirements.

Narda Microwave exhibited equipment useful in determining compliance with FCC radiation protection requirements. The Nardalert Personal Monitors come in different models to cover various frequency ranges and have an alarm preset at a certain percentage of the regulatory limited maximum-permitted power density.

Those working in high RF fields wear monitors on their belts. Should the RF field approach the allowed limit, the unit starts beeping. The beep rate varies with the field, allowing the worker to determine which way to travel to reduce the field. In addition, Narda supplies field measuring probes that have a frequency response shaped to track the exposure limits in various frequency ranges.

Potomac Instruments showed its line of field strength meters. These include the FIM-71 (45 - 225 MHz), the FIM-22 (200 - 550 kHz) and the FIM-41 (540 kHz - 5 MHz). The FIM-41 is required for directional AM stations to check their monitor points and do antenna proofs.

Circle (68) On Reader Service Card

If you just have to have a VU meter, Selco Products has a whole line of VU and PPM meters to meet your every desire.

Dummy loads and wattmeters

Altronics exhibited air-cooled dummy loads suitable for indoor or outdoor use. In the 5 kW to 75 kW load range, the power being dissipated can be determined by measuring air flow, input temperature, output temperature, humidity and barometric pressure.

Bird introduced new 5 and 10 kW air-cooled terminations, while **Coaxial Dynamics** showed air-and oil-cooled dummy loads along with their insertion wattmeters. The wattmeters are available with analog or digital displays. They also offer an alarm panel that can shut down the transmitter should reflected power become excessive.

Kintronic Labs showed a line of air-cooled dummy loads designed for AM broadcast service available for either indoor or outdoor use.

Other RF test equipment

Delta showed a pulse reflectometer. This time domain reflectometer supplies a several KV pulse to a transmission line.

Delta also showed the SM-1 AM "splatter monitor." This device can serve as a manually tuned spectrum analyzer to test for compliance with FCC AM occupied-bandwidth requirements. Another interesting feature is the inclusion of a quadrature demodulator.

Gorman Redlich showed its line of digital antenna monitors while **Potomac Instruments** had the 1900 series digital antenna monitor on display.

World Radio History

Antennas, Towers Up the Ante

Don Elliot
& Ann Schwab

Prepare now for the inevitable.

That was the message to radio broadcasters from the antenna, tower and cable companies displaying at NAB '97. The recent FCC ruling that will allow television broadcasters to carry HDTV could potentially leave many radio broadcasters without a home on their current tower. As radio stations' tower leases expire, tower owners are expected to offer leases to HDTV outlets instead.

Everyone is in a tower crunch ... All of a sudden there's great interest in the panel antennas on display.

— Paul Smith
Micro Communications, Inc.

It's time to make your plans.

Plan your actions

Dan Doty, president of Doty-Moore Tower Services, urged radio stations to be aware of their leases and plan ahead. He noted a good strategy would be for "several stations to work together on panel antennas."

He suggests that stations cooperate to minimize their costs. He draws the parallel of towers to a pickup truck: when buying a half-ton, only so much can be put in it. The additional HDTV requirements will cause FM stations to be scrambling for places from which to broadcast.

Tom Hoenninger of Stainless Inc. said, "Every tower will need to be evaluated," unless stations want to build new towers. The company was promoting its tower analysis services, including physical inspection, structural analysis and documentation analysis. I

n addition, the company designs, fabricates, and erects new towers. He suggests that in major markets, stations can combine onto the same tower using a "candelabra" structure.

Micro Communications Inc.'s Paul Smith said, "Everyone is in a tower crunch. Our products have been around for years, and all of a sudden there's great interest in the panel antennas on display."

RF solutions

Antenna Concepts introduced the "first sidelobe-free FM antenna," the Ultra Tracker. It is designed specifically to be used safely in a densely populated residential or commercial area without causing RF interference or RF radiation problems.

ERI displayed its full line of professional broadcast equipment, including antennas, towers, lightning protection and grounding systems.

Jampro displayed broadband UHF panel antennas, and rigid 6-1/8-inch waveguides with no inner conductors or internal insulators and no pressurization requirement. Jampro's RWC dual mode UHF Combiners allow different high-power UHF channels to use one common aperture/antenna.

Using 4-pole dual-mode filters, the size of the combiner is reduced greatly while still maintaining low insertion loss and the capability to handle greater than 120 kW per channel.

OMB America featured its line of FM and TV antennas, transmitters and links.

RFS Cablewave Systems showcased its 904 series panel array, designed as a building block for broadband, high power arrays, as well as sidemount FM antennas.

Systems With Reliability (SWR) showed its FM3 series medium-power FM antenna, built like the FM10 version but priced for the Class A station. It features a wide VSWR bandwidth and is ideally suited to stereo, SCA and quad broadcasting.

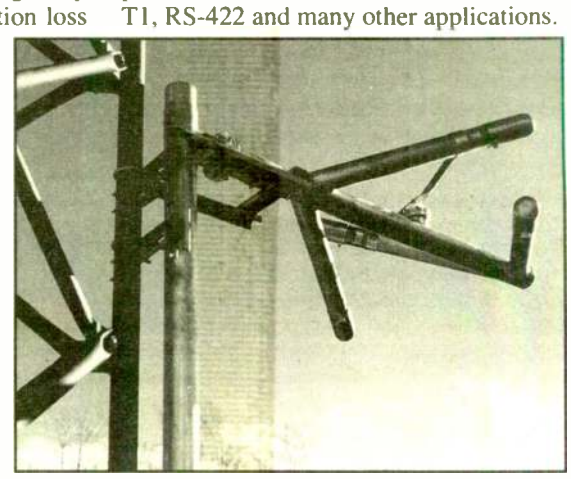
Shively Labs also displayed a multitude of FM, UHF and MMDS antennas, including the new model 6513 FM antenna. For the broadcaster who doesn't require circular polarization, this is a proven, reliable antenna rated conservatively at 3 kW with an upper feedline power limit of 12 kW. VSWR is 1.08 or better over the channel.

Transmission line and cables

Shively also unveiled B-Line coaxial transmission line, which virtually prevents catastrophic arcing and burnup, according to the inventor. It features a unique, patent-pending "watch-band" spring connector system that allows for quick, stable connections. Availability is in several sizes, from 3-1/8 to 8-3/16 inches.

Belden exhibited several new cables. The 9913F is a flexible, cost-effective RF cable for low-power applications. The 9913F, a 50-ohm design, has the same specs as the 9913 — out to 4 GHz — but uses a stranded center conductor and gas-injected, high-velocity, hard-cell foam dielectric.

Belden introduced the MediaTwist, a "multimedia cable" that can support phone, fax, modem, Switched 56, ISDN, T1, RS-422 and many other applications.



SWR FM3 Series Antenna

In addition the company introduced: AudioFlat, a flat cable designed specifically for audio applications, an AES/EBU digital microphone cable, the 1800F and the 1172A, a quad microphone cable.

Andrew Corp. introduced a new type of hanger for 6-1/8-inch and 3-1/8-inch rigid transmission line. The Hinged Hanger rotates to open, saving installation labor.

Another benefit is that the hanger can be installed first with the jaws open either to the right or the left, as determined by other equipment mounted on the tower.

MYAT displayed its rigid coaxial transmission lines, components and accessories, including a new 12-inch, 50-ohm line designed for medium-wave and AM stations and a 9-inch line designed for multiplexing FM stations.

Masts and hardware

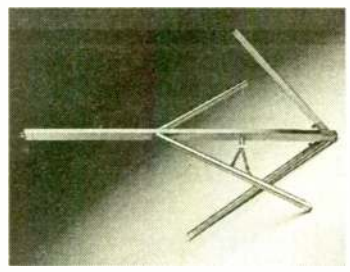
Will-Burt introduced its D-TEC safety package for telescoping masts. The package uses a three-feature system: a bright light at the top of the mast to illuminate the area above; an AC-detection system to sense charged wires overhead; and an anti-collision system which detects obstructions — such as tree limbs — blocking the mast's path.

If wires or other obstructions are detected, the anti-collision system emits audible and visual signals and automatically stops the mast extension.

Bob Cribbet, Will-Burt's director of mast and lighting sales, said, "People's lives can be endangered when a mast hits electrical lines. This system helps ensure that accidents are avoided."

Coaxial Dynamics featured its entire line of RF hardware, including terminating RF liquid and air loads, terminating load resistors, directional wattmeters, RF station alarm systems and RF filters.

Announcing the New
BEXT Antenna Division



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World Radio History

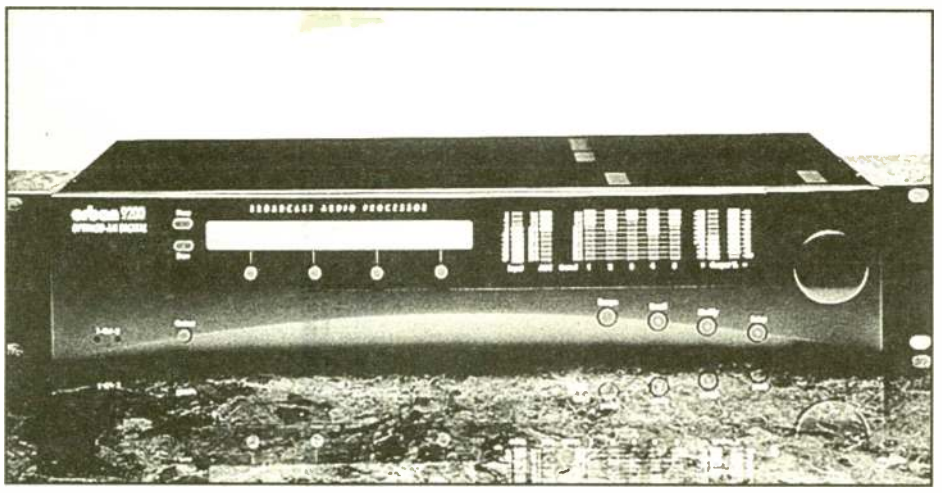
Finding Audio Processing Applications

Val Davis

Digital audio has changed many aspects of broadcast, but one aspect that has felt the impact of digital audio quite dramatically is the field of audio processing.

It changes everything about how broadcast engineers view the audio chain. Keeping up with the latest products is essential to any engineer.

The following is a list of audio processor manufacturers and the latest and great additions brought by them to the NAB convention.



RW Cool Stuff Award Winner — the Orban Optimod-AM 9200

New toys

The **Aphex Systems** Model 2020 is fully programmable, remotely operable and can be automated for 20 individual dayparts. In addition, the Model 2020 is completely digital. Also available were Aphex Systems Model 109 20 parametric EQ, and Aphex Systems Model 661 Tube Compressor/Limiter.

Last year **Benchmark Media** introduced the AD2004 Analog-to-Digital Quad 20-Bit Converter. And once again this year, nothing comes close to touching the AD2004. Just one look at the oscilloscopic analysis told the story.

The **Cutting Edge** line of Unity audio processors for both AM and FM are completely programmable, offer remote access and the sound is all their own. These are state-of-the-art from the inside out.

In addition, Cutting Edge introduced the Omnia.fm, a digital processor with a stereo encoder that overcomes the harsh, metallic sound qualities inherent with previous DSP-based broadcast processors.

dbx brought several new toys to the show this year including the 160S stereo compressor, limiter and gate.

Other products in the line included TDM plug-ins, the new 20 Series EQs, the recently upgraded Project 1 Series 266 Dual Compressor Gate and the Project 1 model 286 mic processor, ideal for both live and studio applications. All of these products represent a new direction for dbx and you have to hear them.

TC Electronic launched the DBMax digital broadcast maximizer, the first in a series of new broadcast products to be offered by the company.

It will provide a louder, more consistent signal and, thereby, expanding the actual coverage area.

The **Inovonics** 250 is a versatile and comprehensive stereo audio processor. Programmability of the 250 enables the user to quickly change parameters or "schedule" changes throughout the day. The 250 performs all of the signal conditioning required between the broadcast console and the transmitter.

Versatility

The Inovonics 255 is a stereo audio processor that offers almost unlimited control over program spectral distribution and density. The 255 is a multifunction AGC device with a three-band compressor/limiter of unusual flexibility.

The Inovonics "David" is a versatile and universally applicable audio processor that has been engineered to yield the dense, hot sound demanded by contemporary music programmers.

Processing Solutions introduced the Banshee IV, an analog processor that is an all-inclusive four-band leveler, compressor, peak limiter clipper and stereo generator.

The **Lexicon** line includes the PCM 80, PCM 90, M300, 300L, 480L and LR4 processors.

The PCM 80 and PCM 90 are affordable studio units while the others are more upper-end units. Lexicon is a world leader in digital effect processing and listening to any one of these units would have shown you why.

Last year the hot new **Orban** product was the OPTIMOD-FM 2200. This year in addition to its new automation system, Orban has introduced its brand of digital audio processing to the AM world in the form of the Optimod AM-9200. Slipping the headphones on I thought this could be AM's big comeback. Your AM station will want to hear this one.

If you have ever worked with the **Symetrix** 528 voice processor, you know what a great tool it is. Now Symetrix has released the 628 digital voice processor. It features a mic preamp, 20 bit A/D converter, de-esser, downward expander/gate, compressor/limiter, .nd parametric EQ.

Fidelipac and **Graham-Patten** introduced a four-channel digital mixing router. The DMR combines up to four balanced AES/EBU inputs into one balanced or unbalanced AES/EBU or DATS output.

A Look at Monitors

▶ MONITORS, continued from page 48

Supply powers from one to four channels of intercom and supports up to 60 headset stations or 20 speaker stations.

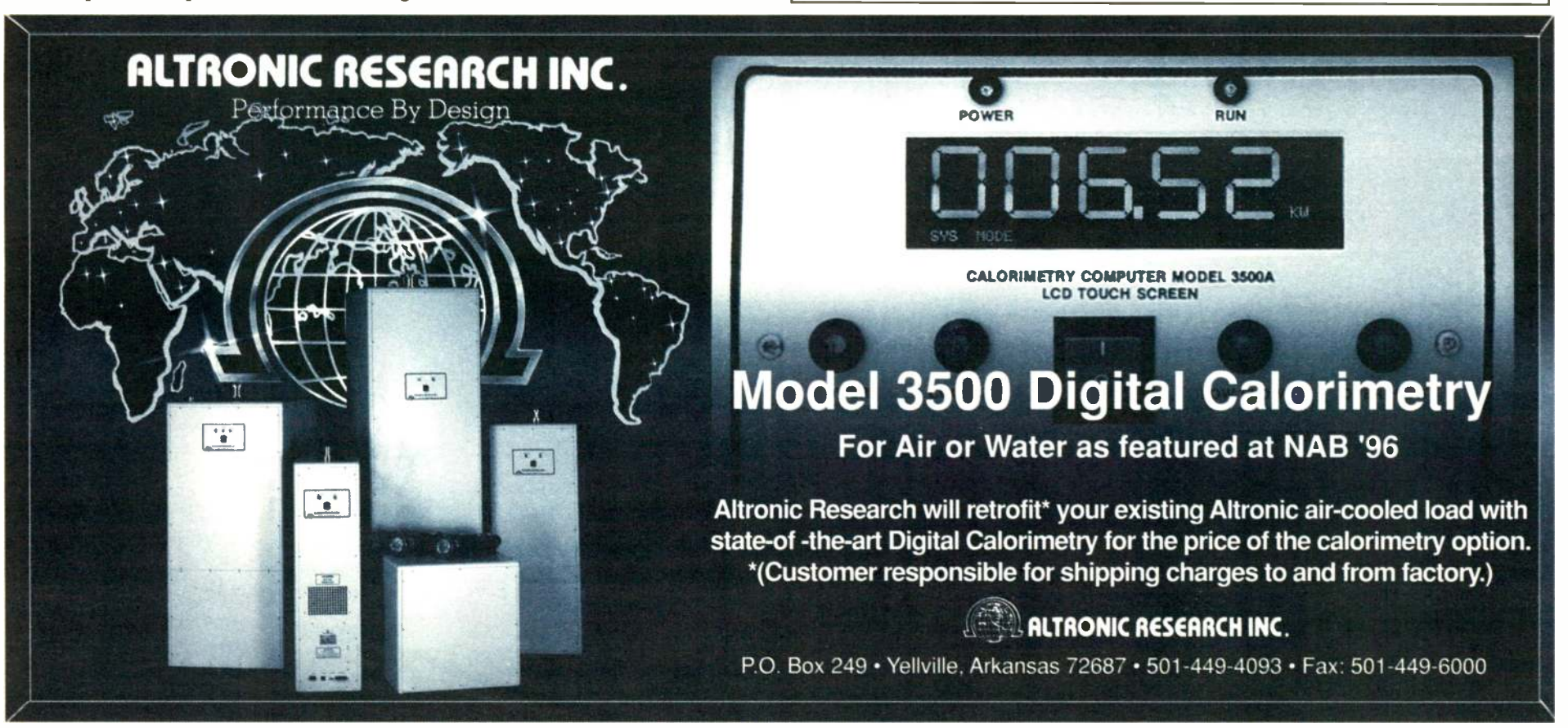
Program input is assignable to any or all channels, and it fits into one rack space; MS-232 Two-Channel Main Station with two independent yet linkable channels of intercom supports up to 60 beltpacks or 20 speaker stations. Each channel features separate short-circuit protection and reset circuitry, with talk and call buttons and listen level controls, as well as program feeds and Channel A/B linking.

Systems Wireless Ltd. displayed its Matrix Plus III digital intercom system, and its Clear-Com cabled intercom system was also on display.

Whirlwind spotlighted its MD-1, which combines a high quality mic/line input stage with a transformer-isolated line driver and independent headphone amplifier. The MD-1 provides phantom power, local monitoring and a line-level balanced output for noise immunity over long cable runs. The input stage features a level control, a mic/line input level switch, plus switchable 18V phantom power for condenser mics. The output can be switch-selected between the isolated gain stage and a straight loop-through.

The new DT 200 headset series from **beyerdynamic** have an aesthetically pleasing lower profile design and improved audio/intelligibility. The headsets are available in single or dual earmuff designs, and with or without mics.

Sennheiser offers numerous popular headphones, including the HD 25 SP, noted for excellent isolation and clear, accurate reproduction.



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World Radio History

AM Transmitters Power Up

▶ AM, continued from page 61

meters.

Also on display in the Delta booth were the RG-4 receiver-generator, the OIB-3 extended-range operating impedance bridge, the Splatter Monitor and the CPB-1 common point bridge. Delta also offers a full line of C-Quam AM Stereo exciters and a stereo modulation monitor.

The stars of the show in the **Continental Electronics** booth were three new solid-state AM transmitters — the 314D (1 kW), 315D (5 kW) and 316D (10 kW). These transmitters looked clean and compact, with a simple and rugged design. The 5 kW transmitter was operating on the exhibit floor. To show its modulation capability, Continental had it cranked wide open with 140 percent positive and 100 percent negative peaks being made.

Phasetek Inc. had one of its custom phasors on display in its booth, in addition to its complete line of AM transmission components. Static drain chokes, spark gaps, RF ammeters and RF switches in all sizes were shown. To demonstrate its tower skirt kit, a tower section was set up in the booth with the skirt components installed.

Featured in the **Nautel** booth was the new XL series of solid-state AM transmitters. This series features a simpler, more compact design than the previous AMPFET and ND series designs. The XL-12 (12 kW) — sure to be a hit with expanded band stations — was shown, along with the XL-60 (60 kW), which is about one-third the size of the ND-50 that it replaces. Also shown was an ND-5 5 kW transmitter. Also available, 1 kW and 2.5 kW versions of the ND series transmitter with optional built-in C-Quam stereo exciter.

With expanded band now a reality, the **Kintronic Laboratories** booth was busy with engineers exploring options for diplexed operation with existing stations. Kintronic had a completed diplexer — bound for Los Angeles after the show — on display. New at the show was Kintronic's software-programmable antenna system controllers, which use PCL technology to permit full local and remote control of antenna switching. In addition to antenna control, features are available for RF current monitoring and on/off control of transmitters.

Kintronic showcased its AM dummy loads as well as its line of static drain chokes, spark gaps, RF switches, grounding bulkhead panels and other AM transmission components.

Harris Corp. had its established DX line of digitally modulated AM transmitters on display. These high-efficiency transmitters feature a patented digital modulation scheme. A Gates Five 5 kW solid-state AM transmitter was also on display, along with a custom antenna tuning unit.

A line of 30-, 60- and 120-W low-power AM transmitters was on display at the **LPB** booth. These low-power transmitters are ideal for pre-sunrise/post-sunset power levels as well as some of the secondary nighttime service power levels stations now have.

Alert for EAS Systems At NAB '97

▶ EAS, continued from page 60

part of the accessory LX-4 module.

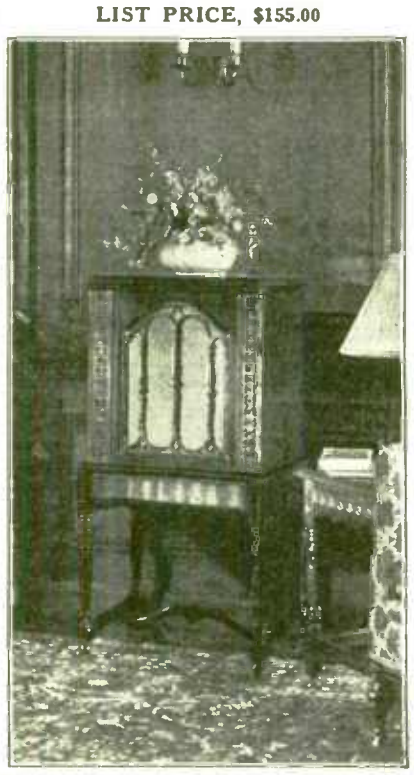
On display at the **Gorman-Redlich Mfg.** booth was the EAS1 system. The EAS1 includes a large four-line, 40-character LCD display for easy viewing and five internal programmable relays for interface with external equipment such as automation systems.

EAS print activity is output via a standard 25-pin parallel port to a user-supplied printer. A BNC coaxial output connector allows output directly to the composite input of an FM exciter.

The company said this feature is unique. Pre-programming of the encoder is available from Gorman-Redlich for a small fee.

68 Years Ago

Reprinted from Radio World (September 21, 1929).
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.



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World Radio History

Studio Sessions

Radio World — Resource for Radio Production and Recording — May 14, 1997

The Shortcut Arrives From 360 Systems See Page 74

PRODUCER'S FILE

Orban Audicy: First Test Flight

Ty Ford

It had to happen. The Orban DSE7000 came to market back in 1990. Originally developed by AKG, its U.S. software and hardware developers were later moved under the Orban banner when Harman bought both companies.

There have been eight significant — and free — software upgrades in seven years. Naming all of the changes would require too much space, but among the most significant are: Time-Fit, the DSE digital I/O, the FX upgrade and video sync as shown at NAB with the Rorke digital video hard drive.

Time-Fit arguably is the best time compression/expansion algorithm in DAWland. I have run it at ±25 percent with no glitches, but once the human voice is shifted much above 15 percent, the cadence sounds a bit whacked.

The digital I/O, with AES/EBU, S/PDIF, video sync input and word clock, has dual sample rate converters that provide real-time sample rate conversion without pitch change. This means you don't have to worry about what sample rate the original audio was recorded at. I have streamed 48 kHz audio through a 32 kHz production and into a 44.1 kHz output in real-time — just to watch it happen — with absolutely no problems.

Better and faster

The FX upgrade provided faster cards and 24-bit processors, enabling high-quality onboard Lexicon reverbs, Orban parametric EQ and Optimod dynamics processing. In the last revision, timecode was added.

At NAB '97, Orban appeared with a Rorke Data hard drive for storing video, allowing the DSE7000 to enter the mix-to-pix market.

Only the DSE7000, per se, was no longer in existence. It had been replaced by the Audicy, a new, expanded hardware controller with an expanded feature set. The DSE7000 unit and DSE sound files are all upwardly compatible with the Audicy and an upgrade path for DSE owners will be forthcoming shortly from Orban.

The New Audicy From Orban

The DSE7000's main controller panel had not changed in more than seven years. Its utilitarian appearance made it easy to use, but increasingly easy to overlook. And, even though the software and hardware had grown rather potent, the increased features meant more maneuvering through menus.

The Audicy is not just a cosmetic facelift for the DSE7000. It provides the sorely needed increase in the number of dedicated controls.

There are other differences. Whereas the DSE7000 had eight channel faders to control eight tracks of audio, the Audicy has a maximum of 24 tracks, 10 of which can be assigned to the unit's 10 faders.

Audicy also has a new Submix fader, so you don't have to dig through the menus to get to the returns. There are also 10 new dedicated effects buttons and 10 rotary controls in the newly designed slant top above the record and play-enable buttons. These time savers keep you from having to "pock" through the menu to get to the effects.

And, instead of using the faders to adjust the effects parameters, the new rotary controls are dedicated to effects. This allows you to adjust levels with the faders as you tweak the effects with the knobs. The redesign has made the screens easier to read, providing a more obvious intent of the navigation buttons.

The edit buttons were moved closer to the transport controls so your hand doesn't have to move around so much. The seldom-used, full-sized ASCII keyboard was replaced with a smaller version that slides into the base of the new controller. You can now use it to enter the usual information as well as name the 10 individual tracks, but not elements on a track.

The cable extension option allows the tower — and its noise — to be placed up to 150 feet from the controller and monitor.

The Audicy now supports 1 GB removable Jaz drives. The 2 GB standard internal drive stores eight hours of audio, and the DAT archiving system provides seven hours of off-line storage per tape.

SMPTE

If you've been thinking about doing mix-to-pix work, the Audicy supports 24, 25, 29.97 drop-frame, 29.97 non-drop and 30 fps formats. It runs in continuous chase, offers adjustable input and output time code adjustments, instant offset capture to .1 frame, .1 subframe bumps and sync reference to NTSC, PAL or house clock.

Although the Audicy will chase a videotape transport, it was being run with a Rorke video drive chasing it at the NAB show. No more waiting for preroll, or tape sync; the Rorke VMOD was just chugging right along with the Audicy, even in scrub mode.

Although the Audicy has the right tools for the mix-to-pix market, where audio is the main focus in the suite, it might take another redesign before Audicy is accepted into the postproduction community. Space is at a premium

See ORBAN, page 77 ▶

PRODUCT EVALUATION

Sony Mini-monitor Scores in Studio

Bruce Bartlett with Jenny Bartlett

Looks professional, sounds good. Sony is tops in its industrial design, and their work on this active mini-monitor is no exception.

The SMS-1P employs a single 4-inch cone driver in a ported cabinet, with a built-in 15 W power amp. Intended as a studio reference monitor, the SMS-1P also is suited for multimedia and digital workstations. Its driver is shielded magnetically to prevent interference with computer screens.

The monitor is packaged with a sturdy protective cover which the user removes. The solid cabinet measures about 5 x 8 x 9 inches. Weight is 7 pounds 4 ounces.

On the front of each unit are controls for bass, treble and volume. Bass adjustment is ±6 dB at 100 Hz; treble is ±6 dB at 10 kHz. The rear panel houses an on-off switch, AC power connector, heat sink and input connectors.

Each monitor has two input channels so you can mix two signals. Channel 1 has a phone and phono jack; channel 2 has a phone jack and 3-pin XLR connector. I appreciate that Sony provided more than one type of connector.

Specs and tests

Capable of handling pro signal levels, the XLR accepts up to +22 dB and the others accept +8 dB. (The reference level for dB was not specified). Nominal input levels are +4 dB for the XLR and -10 dB for the phone and phono.

Sony specs the frequency response as 80 Hz to 16 kHz (10 dB down points). Claimed THD for the internal power amp is 0.9 percent up to 14 W RMS from 40 Hz to 20 kHz.

I placed the SMS-1P monitors about 3 feet from me and 3 feet apart, just behind my mixing console. Tone controls were set flat. This is what I heard:

• Cymbals and percussion: Slightly

See SONY, page 75 ▶

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World Radio History

Small Circuits Mean Better DAWs

Alan R. Peterson

Computer chips — and digital workstations — will soon become faster, thanks to an innovative manufacturing technique developed by Intel Corp.

The new technology will have a direct effect on many popular PC-based DAWs now in use for radio production, in terms of speed, processing power and reduced heat output.

Intel has developed a method to manufacture computer chips with transistors that are 1/400th as wide as a human hair, or about 0.25 microns. Present miniaturization techniques can achieve 0.35 microns. This accomplishment means Intel can hike the speed of the Pentium processor from the current limit of 233 MHz to more than 300 MHz. The Pentium Pro chip now used in file servers will be able to clock speeds of 500 MHz.

The increased speed of the computer chip will result in a faster, more efficient workstation.

At 0.25 microns, Intel can load 60,000 transistors into one square millimeter of silicon. The shorter surface distance between components on the chip means faster computational speed and a cooler operating temperature. By this time next year, about 40 percent of Intel's output will be made using this new technology.

The radio connection

The increased speed of the computer chip will result in a faster, more efficient brain for computer-based audio recorders and editors. This will not necessarily translate into a perceptively faster system or one with more tracks, but certainly one a lot more powerful.

Bob Lentini, owner of Innovative Quality Software (IQS) and the maker of the SAW line of audio editors, told *Studio Sessions*, "Any improvement they come out with obviously directly affects a product like SAW. It means faster real time processing for our product."

Lentini pointed out the number of tracks would not necessarily increase as a result of a faster processor, as the upper limit is primarily a factor of hard drive speed. But existing features would run at top performance.

"When we did the original SAW (Classic), it was for the 386 processor," said Lentini. "When the 486 came along, all the features of SAW ran a lot smoother," which is when IQS raised the bar and moved into the next level of product development.

"What we do is build it and throw in enough features to stretch the capabilities of the machine," said Lentini. "It's good news when they try to pick the speed up."

Caleb Pourchot, product specialist with Sonic Foundry, agreed the new processor speed should not affect track count in most multitrack systems, but did note the increased power such a development would bring.

"For Sound Forge, it means our plug-ins can be chained serially," said Pourchot. "A faster processor means more of them can be chained and more can all function serially."

Pourchot confirmed Lentini's assertion that a faster processor will result in increased performance of a product. "On a multitrack system, it means you can do more effects in real time than you could before."

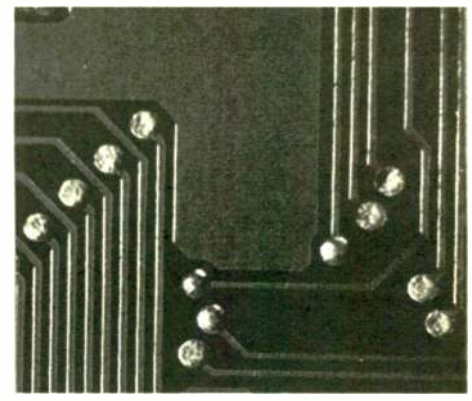
More samples

A faster processor at the heart of a DAW also means achieving a 96 kHz sample rate with some calculative overhead to spare, but Pourchot warns of the tradeoffs.

"Sound Forge already supports 96 kHz, but how many soundcards are out there that can handle it? Besides, even with the increased processor speed, the number of tracks you are using will get cut in half to accommodate the higher rate," said Pourchot.

The new processors — in large numbers — are still some time off. But according to computer industry analysts, the effect could be felt even sooner in the form of a potential price cut in current Pentium processors. And it will not be long before Intel competitors also announce new manufacturing technologies that improve each respective company's chips.

The reduced heat output of the new chip means a more energy-efficient design and longer component life. And according to Lentini and Pourchot, the result at the station end will be a PC-based DAW that looks and feels pretty much the same, but with the power to handle easily all the options along with some extra muscle to plug in a few more.



Smaller transistors mean faster microprocessors.

No manual required

but we'll send you one anyway

If traditional audio production is analogous to walking, a digital audio workstation is the equivalent to flying.

Unfortunately, a lot of audio production software can seem like the equivalent of 747 cockpit controls: serious technoid overkill when you're just trying to get from point A to point B.

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Not that we cut out any feature you might *need*; we just took out all the stuff you *hate* about digital workstation software. Like nested menus, tricky hardware set-up, and way too many screens piled up on top of each other.

But Express isn't just some kind of "dumbed down" product. Lurking underneath this deceptively simple interface lies a tremendous amount of power and capability that allows you to accomplish even the most difficult editing tasks. Powerful tools like time compression/expansion, normalization and one-touch submix.

Prisma systems also work well in groups, with Internet-compatible network audio transfer between systems in different rooms or across the planet. You can even send a spot you've created in Express directly to one of several popular digital on-air delivery systems — all ready to play.

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World Radio History

SHORT TAKE

'A Poke in the Ear' For Radio Production

Alan R. Peterson

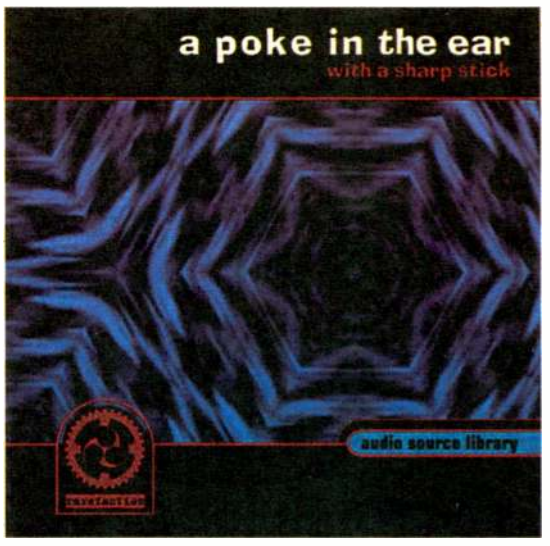
What can one say about a sound collection called, "A Poke in the Ear With a Sharp Stick," except that it sounds like a very uncomfortable prospect?

Well surprise, because "Poke in the Ear" — issued and distributed by Rarefaction of San Francisco — is one of those sound collections you are going to find all kinds of uses for in alternative and rock radio production.

"Poke in the Ear" is not a music collection, but, to borrow from the liner notes, it is an assortment of "brain-twisted sound" put together by a small group of "music industry refugees." Indeed, the CD provided to **RW** is filled completely with heavily processed real and synthetic sounds that will remind you of all the childhood monsters that used to live in your closet.

All can be dubbed to your DAW or sampler, and infinitely looped and manipulated to provide truly aggressive and eerie ambiences. Layering several tracks together intensifies the effect.

Sampling several effects and triggering them rhythmically as MIDI events creates one truly demonic drum set for strangely original productions.



On the disc

The CD Audio version is a first for Rarefaction. The original volumes of "Poke in the Ear" were available only as AIFF-formatted CD-ROMs, and the audio version is a compilation of cuts from Volumes 1 and 2 of the CD-ROM series.

The disc is divided into several categories, including Ambience, Voice, Machines, Rhythmic Loops and Percussive, to name a few. Descriptive titles include "Cyberpunk 4," "Limbripper" and "Marimbazoid."

The first cut on the CD is a 440 Hz sine wave at 0 dB to set record levels. After that, all cuts on "Poke in the Ear" are at maximum record level without clipping.

Hot, contemporary promo production demands lots of quick-cut music, effects and drop-ins. The material featured on "Poke in the Ear" is more than up to the task. Loop a couple of ambient beds, drop in several in-your-face "hits" on pertinent copy points, layer some "noise rhythms" and there you go.

There are some sounds on "Poke in the Ear" that will make you wonder why they ever ended up on the disc. A great many percussive effects will seem either too tame or too bland when compared to other tracks on the CD. Remember, these are just building blocks of sound for you to use as you need or wish; nothing is stopping you from taking the milder of the cuts and processing them to extremes inside your own studio.

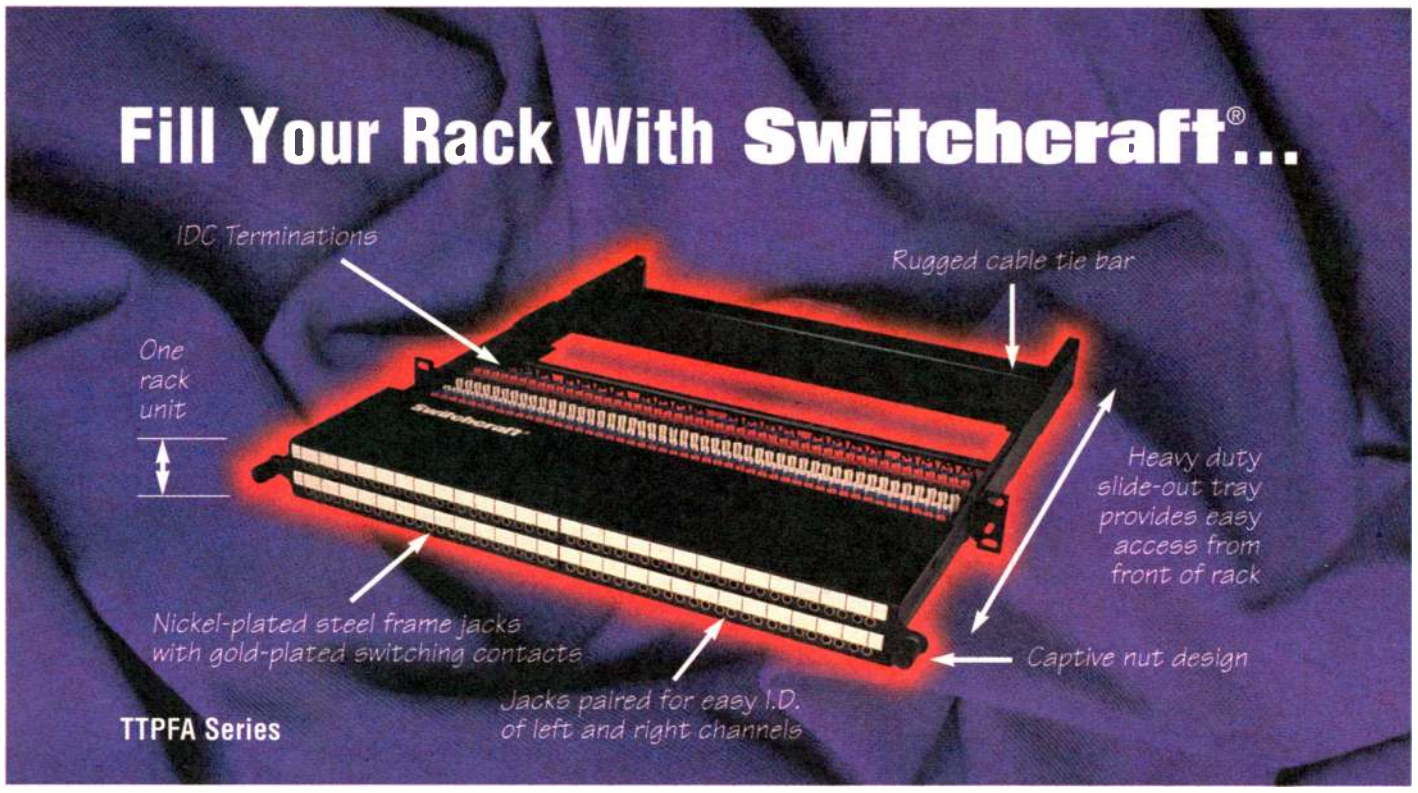
'Poke in the Ear' is an assortment of 'brain-twisted sound' put together by 'music industry refugees.'

Indeed, one group of cuts called "drumlike" ended up quite nightmarish after being run through a multiprocessor configured as a runaway hi-resonance delay, flanger and ring modulator. Had I stopped to loop one of the ambient pads and vocoded it, I probably would not have been able to sleep for a week.

"Poke in the Ear" is the first of several similar products to come. Rarefaction plans to issue a second volume called "Poked Again," also based on clips from the CD-ROM series.

"Poke in the Ear" costs $99 and is available from two sources: East-West Warehouse, a source of sampling CDs for musicians and sound designers at (800) 833-8339; and from Rarefaction at (415) 346-1840.

For information, e-mail paul@rarefaction.com *or* ***circle Reader Service 139.***



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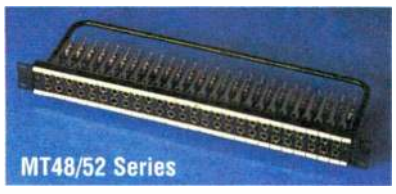

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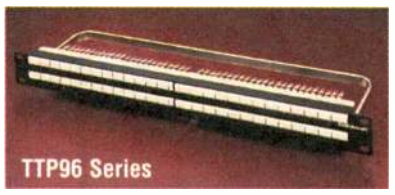

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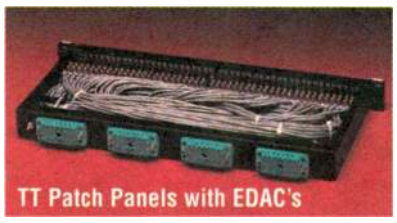

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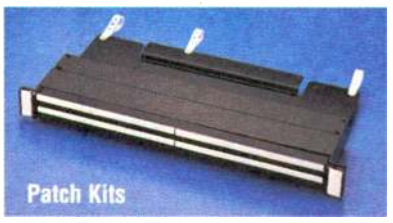

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Doing a '360' With the Shortcut

Read Why Stations Have Been Lined Up Since Last Year's NAB Show to Get Their Hands on This Box

Flip Michaels

"Love, love me do. You know I love you."

That Beatles classic takes morning man Jim London, producer Don Wicklin and the morning crew of Washington's Oldies 100 WBIG(FM) to the top of another hour full of combustible laughs, news, weather and traffic ... plus comedic sound clips, listener sound bites and — oh yeah — music.

Okay, so I'm a WBIG listener, but I am also a fellow corporate-related employee. So when I found this primo oldies morning show was using an unnamed digital editor never intended for broadcast, I, too, started making funny faces.

"In a format such as ours, time is crucial. Blow your nose and the song is over," producer Wicklin told me. "What we use now has been okay, but it's just not broadcast equipment. You never know when the unit will freeze up on you or just decide not to recognize something. To be honest, hard drive space is also a problem."

Enter a little 12-pounder named "Shortcut" from 360 Systems. It is a self-contained, two-track digital recorder/editor that puts the old studio two-tracker down for the count.

Size and specs

"The most impressive thing is the size!" said Wicklin. "It's incredible what they have fit into it."

The Shortcut succeeds where many before have failed. How often do you find a digital editor that performs as good as it looks? Not often enough.

"Send a jock up to a DAW such as the DSE7000 — which is a great unit — and it will take some time to master it," said Wicklin. "On the other hand, walk that same person up to the Shortcut and they'll come out sounding like a top jock in just an hour."

Translation: this digital two-tracker is user-friendly, fast and efficient.

The ergonomics of this box are ideal,

to say the least. The surface can stand up to the hits and knocks that jocks can dish out and there is enough to the Shortcut's appearance to remind you of its big brother, the Instant Replay. Ten hot keys on the Shortcut give an additional nod to its legacy.

All in one place

Having all essential editing keys positioned around the weighted scrub wheel is no accident; it was carefully designed for speed and to place all functions under one hand. Time is not wasted on searching for the right keys, looking for the Fast Forward or marking edits. The Shortcut concept has been long, long overdue. Captain Hook could use this box without breaking stride.

"Speed is what I really depend on," said Wicklin. "For basic editing, I would suggest this and nothing else."

The concept is familiar to everyone. Take a word processing program — Microsoft WORD, for example — and mate it with audio. Cut here, copy there and insert that. Whoops, undo, undo, undo.

Simple, right? You've just learned how to do production on the Shortcut.

I can't show you the mouse, because there isn't one. Instead you use the scrub wheel. This makes life so much easier, allowing you to move from frame to frame or file to file. 360 Systems took a giant leap in the right direction by eliminating the mouse while still managing to maintain the ability to make accurate, pinpoint, zoom and unzoom edits.

"Hot keys come in handy, too," said Wicklin. Yes, especially ones you can assign. Six jocks could pull up their own special hot key settings, saved and ready to go at the beginning of each daypart.

Did I forget to mention that each jock has their choice of passwords for their file protection? Any general user with knowledge of the master password has the system rights to set his or her special password. A miniature QWERTY keyboard lets you directly enter passwords and label cuts without "wheeling in" the letters.

Stress test: did you say Robin Williams is coming in tomorrow? Name a file "RobinW" and start recording/designating movie sound clips as hot keys.

What if there's an icky word on one of the clips? Hold down the round red "Bleep" key for the desired duration. The Bleep key wisely is located away from the normal hot keys and sounds a 1 kHz tone.

Silence can be selected instead of the tone. Either way, it's blissful: no time delay dump, no hotline calls from the program director and no wondering if the FCC heard that really bad one.

Editing telephone playbacks on an oldies station is not without its quirks. When most songs run 2:30, a lot of work has to be compressed into a very short time.

We noticed early on that the Shortcut takes a moment to "think" about an edit decision before committing to it. When a phonecall requires four or more edits to make it airable — and a quick audition to make sure we didn't miss anything — we sometimes found ourselves rolling into another song or into a stopset just to get the time we needed.

By contrast, our "other" audio editor was a little faster. But this advantage was offset by constant freeze-ups when we really needed to play back "that" winner.

When we compare the tiny delay of the Shortcut against the lunacy of cutting a phonecall saved to tape, we realize how good we really have it. Okay, so we sometimes roll into a second song. Sure beats rolling into a third or a fourth.

The linear display is a big plus. Over the last seven years, broadcasters have become as adept at editing by eye as they have in the past by ear. We all know our way around the visual spike of a cough or the sharp click of a phone being hung up to help locate our place in the recording.

The display is the right size for the box and has enough resolution to make the job easy. While capable of very fine edits, the Shortcut's ability to do "slash-and-burn" telephone edits made us really take notice.

On the bridge

"It's a solid piece of gear," said Wicklin. And for just $2,995, it feels as if you are working on the starship Enterprise. That ease of operation can come in handy, especially if your cohorts like to take the small studio and turn it in to Production Studio No. 2.

We all know what kind of beatings those rooms go through, and the Shortcut really likes that kind of stuff. Surprisingly, the box survived a two-week test in the big room, where jocks beat on equipment the way gorillas beat on luggage in old TV commercials.

See SHORTCUT, page 77 ▶

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World Radio History

Sony SMS-1P Speakers

▶ SONY, continued from page 70

dull. Not crisp, but not harsh either. Listenable.

- Drums: Powerful attacks.
- Kick drum: Strong attack, no deep thump. Deep bass-drum rolls are audible but not weighty.
- Acoustic guitar: Fairly natural, not boomy. A little "hard" or forward.
- Electric guitar: Clear, tight, aggressive midrange, lots of "bite."
- Bass: Warm, not boomy. Deepest bass notes are weak — as you'd expect from a small monitor — but the bass is certainly better than in most other speakers this size.
- Piano: Clear, "hard."
- Sax: Aggressive, lacks high-frequency "air."
- Vocals: Slightly midrangey. Neither boomy nor sibilant.
- Strings: Harsh.
- My master tapes: The mixes translate well to the SMS-1P, but with some added midrange punch.

The Sony SMS-1P is well-balanced from top to bottom. Dynamics are impressive. The SMS-1P can play quite loud for a small monitor.

According to Sony, "This speaker was designed as a reference for use in recording studios to provide an accurate reproduction of the mix balance."

I'm not sure that I would agree, because the unit has a 2 kHz rise and a rolloff at both ends. Boosting the bass and treble does not remove the 2 kHz bump.

I would not use the SMS-1P for critical mixing or EQ decisions.

But it does provide a real-world reference because it sounds like a quality boom box or car stereo.

Once you set up a good mix on larger monitors, check the mix on the Sonys to see what most listeners will hear.

Product Capsule:
Sony SMS-1P Powered Mini-monitors

Thumbs Up	Thumbs Down
✓ Real-world sound	✓ Weak deep bass (normal for small speakers)
✓ Tone and volume controls	✓ Midrange rise.
✓ Professional inputs.	

For more information call Sony Electronics at (800) 635-7669, or circle **Reader Service 140**

You may find that you need to touch up the balances, EQ or reverb. In that application the SMS-1P is invaluable.

Other uses for the SMS-1P are for digital editing workstations and multimedia. It is compact, sounds better than most multimedia speakers, and is much more professional.

Priced at $600 per pair list, the Sony SMS-1P comes with a one-year limited warranty.

More info is available from Sony Customer Information Center, One Sony Drive, Park Ridge, NJ 07656-8003.

■■■

Bruce Bartlett is a mic engineer, writer and recording engineer and the author of "Practical Recording Techniques" published by Focal Press. Jenny Bartlett is a technical writer. Bruce can be reached at (219) 294-8388.

Radio World Cool Stuff Award NAB 1997

Yamaha introduced its lower-cost digital mixing board, the multifeatured Yamaha 03D at NAB'97, and netted an NAB 1997 Cool Stuff Award from **RW.**

From the same family as the popular 02R digital recording console, the 03D is a smaller, less expensive model designed for project studios and smaller post-production facilities that might not need the larger 02R, or for 02R-equipped studios looking for a fully compatible mixer for in-house project studios. For bigger projects an 03D and an 02R can be closely linked with a cascade kit.

Pictured with the 03D is Yamaha Commercial Audio Sales and Marketing Manager Larry Italia.

*For more information, contact Yamaha at (714) 522-9011; or circle **Reader Service 166.***

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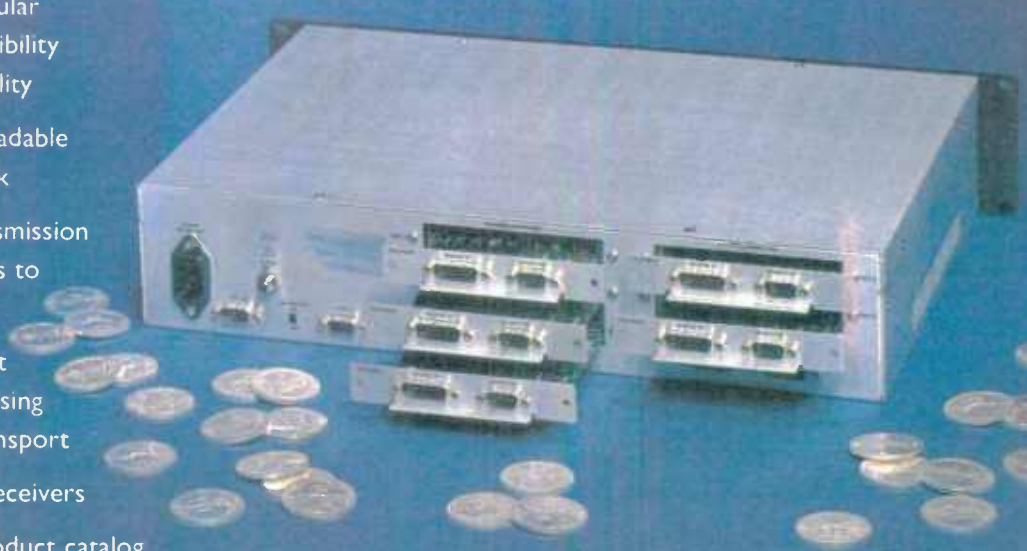

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PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to:
Radio World, c/o Studio Sessions Editor, P.O. Box 1214, Falls Church, VA. 22041

CreamWare tripleDAT

CreamWare has introduced the tripleDAT digital audio system, a software/hardware combination that turns a Windows-compatible PC into a multitrack recording and editing system.

The package consists of the 16-bit ISA tripleBOARD interface card, the tripleDAT software, a MIDI interface, all cables and WaveWalkers real-time DSP modules for reverb, EQ and dynamics.

Four to 16 tracks are possible on a single machine, depending on speed and configuration. All processing is done in 32-bit code for unprecedented speed.

For information, contact CreamWare in Washington State at (800) 899-1939; check out their website at www.creamware.com*;* ***or circle Reader Service 142.***

Tracer Technologies Converter

Tracer Technologies has a new, inexpensive D/A-A/D converter for production people using digital I/O cards on PC workstations.

Big Daadi is a 20-bit two-way converter that takes analog conversions away from the proximity of the computer and delivers AES/EBU and S/PDIF signals to the inputs of the workstation. Close to 100 dB of A-weighted dynamic range is possible in both A/D and D/A signal paths.

Sample rates of 32, 44.1 and 48 kHz are supported, and the Big Daadi can lock to an external AES/EBU clock reference.

The Big Daadi has a suggested price of $599.

For information, contact Tracer Technologies in Pennsylvania at (717) 843-5833, or ***circle Reader Service 213.***

Yamaha 02R Upgrade

Users of the Yamaha 02R digital recording console should know about Version 2.0 System Software, providing increased capabilities and more functions for music recording and post-production work.

The new software improves automation with copy-and-paste functions for all sections of an automix, adds timecode capture for locating positions in an automix and enhances MIDI remote control functions with pre-loaded templates of many popular MIDI processors and synthesizers.

Enhancements also include the ability to use 24-bit recording (by using two recorder tracks together), the ability to decode MS microphone signals and the addition of surround sound functions in the 2+2, 3+1 and 5.1 Surround modes.

For information, contact Yamaha in California at (714) 522-9011, or ***circle Reader Service 165.***

Josephson Interchangeable Mics

Josephson Engineering has the Series Six microphone line, featuring interchangeable microphone elements from the KA series and electronics from the C600 series.

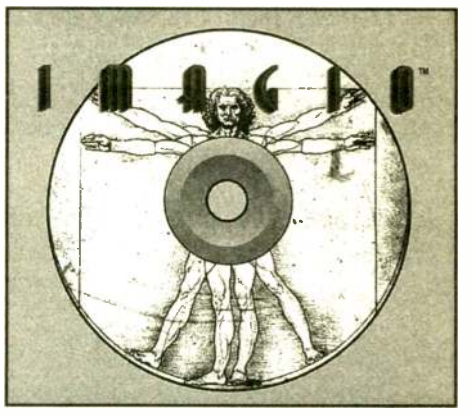
The electronics are considered sonically neutral, with frequency and phase response from 5 Hz to above 50 kHz, as determined by the mic capsule in use. Three separate power supplies are included to power the input and output stages and the high-voltage capsule.

One available configuration combines the 606B mic body and a Microtech Gefell MK221 capsule, for a frequency response of up to 40 kHz. Other configurations provide flat response up to 20 kHz.

For information, contact Josephson Engineering in California at (408) 238-6062, or ***circle Reader Service 160.***

TM Century 'Imagio'

With the slogan "Image is Everything" leading the way, TM Century has released "Imagio," an imaging library for radio station promo production.



Rather than a production library or jingle package, Imagio is a collection of production elements strictly for the creation of liners, IDs, sounders and beds. The library is updated quarterly, with a new two-CD box set every three months; one CD filled with 20 new compositions and another with effects, stagers and sounders.

Each update also comes with a CD-ROM audio database to locate cuts and tracks. Imagio is available on a market-exclusive basis only.

For information, contact TM Century in Texas at (972) 406-6800, or ***circle Reader Service 189.***

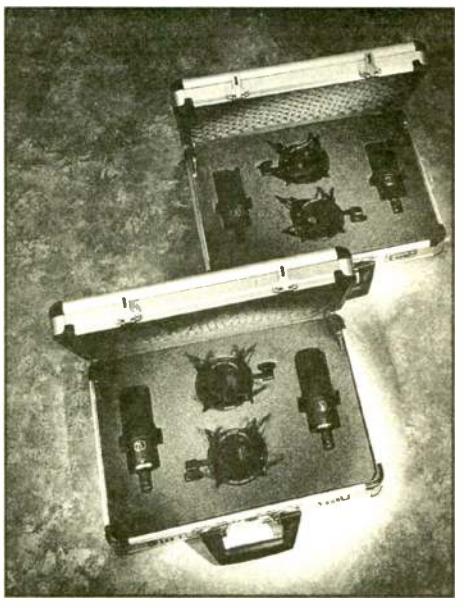
Matched Audio-Technica Kits

Audio-Technica is offering two stereo mic kits consisting of products from the AT4 line.

The AT4050/SK and AT4033/SK mic kits are transformerless, large-diaphragm studio capacitor microphones with warm, transparent response and high-SPL capability. Each kit comes with two AT8441 shock mounts and aluminum flight case.

The AT4050 is a multi-pattern studio mic with dual gold-plated mic elements. Switchable omni, cardioid and figure-8 patterns are combined with low-noise electronics and up to 149 dB SPL without capsule or electronic distortion above 1 percent THD.

The AT4033 also uses a gold-plated capacitor element, but has an internal baffle plate to improve the signal-to-



noise ratio of the mic system. Upper SPL limit is 140 dB without distortion above 1 percent THD. Both mics include switchable 80 Hz high-pass filters and 10 dB pads.

For information, contact Audio-Technica at (330) 686-2600, or ***circle Reader Service 141.***

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World Radio History

Orban Launches New Workstation

▶ ORBAN, continued from page 70

in video suites, and the last thing most video editors want is to learn another control surface.

Perhaps the nine-pin socket sprouting from the human head on the Audicy brochure means Orban has already figured out an answer to that problem.

RAM, bam, thanks Orban

Audicy's RAM-based speed is both an advantage and disadvantage. While most processing is instantaneous, and you can scrub 10 tracks in both directions more smoothly than any system on the market,

The Audicy's Older Brother, the DSE7000

the 70 track-minute maximum per production and "two-in/four-out" configuration may not fit everyone's needs.

Seventy minutes of RAM at 32 kHz is more than enough for a flight of spots and many medium-length video productions. Even a one-hour show is usually done in shorter segments. However, 10 tracks times seven minutes equal 70 minutes. If you are actually using new audio wall-to-wall over all 10 tracks, seven minutes is the limit.

I have been able to produce theatrical

The Audicy provides the sorely needed increase in the number of dedicated controls.

sound design projects for two-and-a-half hour stage shows on the DSE7000 with only 30 minutes of RAM. Each scene was produced separately, using eight tracks. The longest scene was just over 25 minutes. I looped three stereo tracks of ambience, completely filling six tracks of the production, used two other tracks for individual effects and still had memory left.

In conclusion

As the Audicy prepares to expand past the relative shelter of the radio production environment in which the DSE7000 has been so successful, it will be interesting to watch how its simplicity and power fares against ProTools III v 4.0 and its plug-ins, the Scenaria, AudioFile and other high-end audio workstations.

The entry level Audicy provides 17.4 minutes of RAM memory at 32 kHz, 2 GB drive and lifetime software updates for $19,950. The SMPTE time code option is $1,950. The digital I/O board and sample rate converters option is $1,950.

The only things I see lacking from Audicy at this point are mix automation and the ability to export AIFF and WAV files for the growing multimedia market, but the folks at Orban have done a nice job at reinventing a system that was better than most in the first place, and they do listen to their users.

■■■

Ty Ford is the author of "Advanced Audio Production Techniques" from Focal Press and has been a DSE7000 user since 1990. You can download his voice demo at FTP.Jagunet.com/pub/users/tford

Tabletop Two-Track

▶ SHORTCUT, continued from page 74

Lots of thought was devoted to the little things, too. Like L and R XLR input connectors with switchable levels to avoid "matchboxing" when connecting to phone interfaces, mics or consoles.

Who would have thought to use built-in cue speakers to monitor your edits without involving the cue bus on the console? 360 Systems, that's who.

Thinking ahead even further, 360 Systems has left the door wide open for stations already in the digital domain with its D-NET file transfer network capability. D-NET technology uses the AES ports for high-speed transfers of audio files, with their corresponding names and running times attached. That is a real bonus for stations like WBIG, a current user of DigiCarts.

Wicklin said, "Another one of my favorite features would have to be the analog and digital in/out options. All XLR (analog) I/Os are balanced, there's a microphone preamp plus a headphone jack for leave-me-alone listening. This was a fun test drive!"

There are just too many pluses with this toy. Now I see why broadcasters have been patiently waiting since last year's NAB show to touch it.

Do you dare try it?

360 Systems offers 10-day free tryouts for all call letter radio stations. Believe me, that will be all you will need to make up your mind.

Be it in the morning show, the production room or even recording in the field, the 360 Systems Shortcut should soon find a home in your facility.

■■■

For more information, contact 360 Systems at (818) 991-0360, visit their website at www.360systems.com, *or* ***circle Reader Service 143.***

Flip Michaels is production director for sister station WGMS(FM) Washington. Visit his home page at members.tripod.com/~FMichaels/

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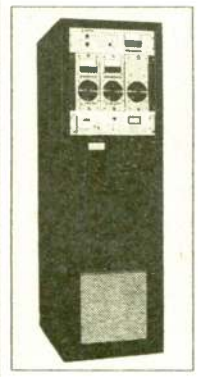

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World Radio History

Running Radio

Radio World | Resource for Business, Programming & Sales | May 14, 1997

WBZ Makes Digital News

See Page 82

STATION SNAPSHOT

KKBY: The Rocky Balboa of Tacoma Radio

Chris Hamaker

Building bridges. The image is familiar to us. It struck a collective chord during the presidential campaign last year. But in downtown Tacoma, Wash., the image is more than just figurative.

Pick up a regional economic report for Pierce County in Tacoma, part of the market served by country station KKBY-FM, and you'll read about a bridge, currently under construction, that will cross the Thea Foss Waterway into downtown Tacoma. It will lead to the new International Glass Museum, a symbol of cultural renewal that city leaders hope will rejuvenate the area.

David Graybill, president and chief executive officer of the Tacoma-Pierce County Chamber of Commerce, referred to the museum project as the cornerstone of "the long-awaited renaissance of the Tacoma community's core."

KKBY, "The Cowboy," looks forward to a renaissance of its own. Struggling against higher-powered country stations in the market, and overshadowed by its Seattle neighbors just to the north, KKBY has gained a foothold by keeping its focus on the surrounding Tacoma community and by picking up top local talent left in the wake of consolidation fever.

The station succeeds with an emphasis on localism and recognized air personalities.

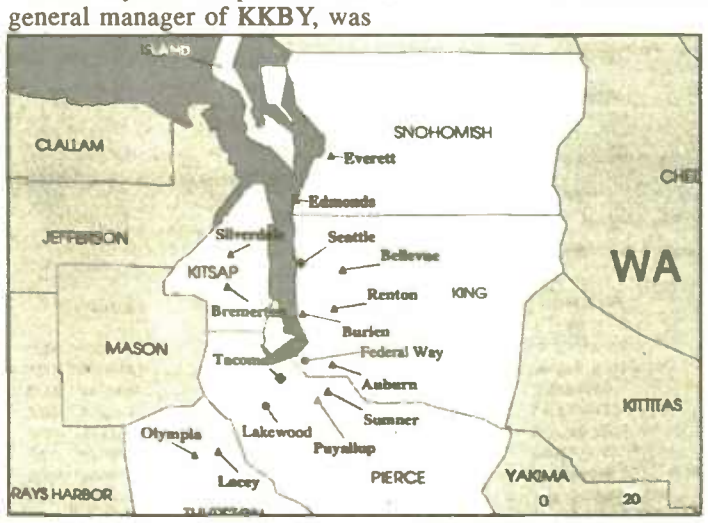
With new talent and an invigorated sales staff, KKBY hopes to build a bridge to higher ratings and greater respect, while retaining its independent spirit.

Barbara Chase and Eddie Jaymes own KKBY-AM-FM.

A match made in heaven

An outgrowth of the well-established KKBY(AM), which went on the air in 1951, the country-formatted FM started up in 1995.

Eddie Jaymes, vice president and general manager of KKBY, was working for the AM station when the owner, Barbara Chase, was granted the permit for the combo. "I think the struggle to build the station was a contributing factor in our relationship," said Jaymes, who later married Chase. Their marriage, he pointed out, makes KKBY a mom-and-pop station — literally.

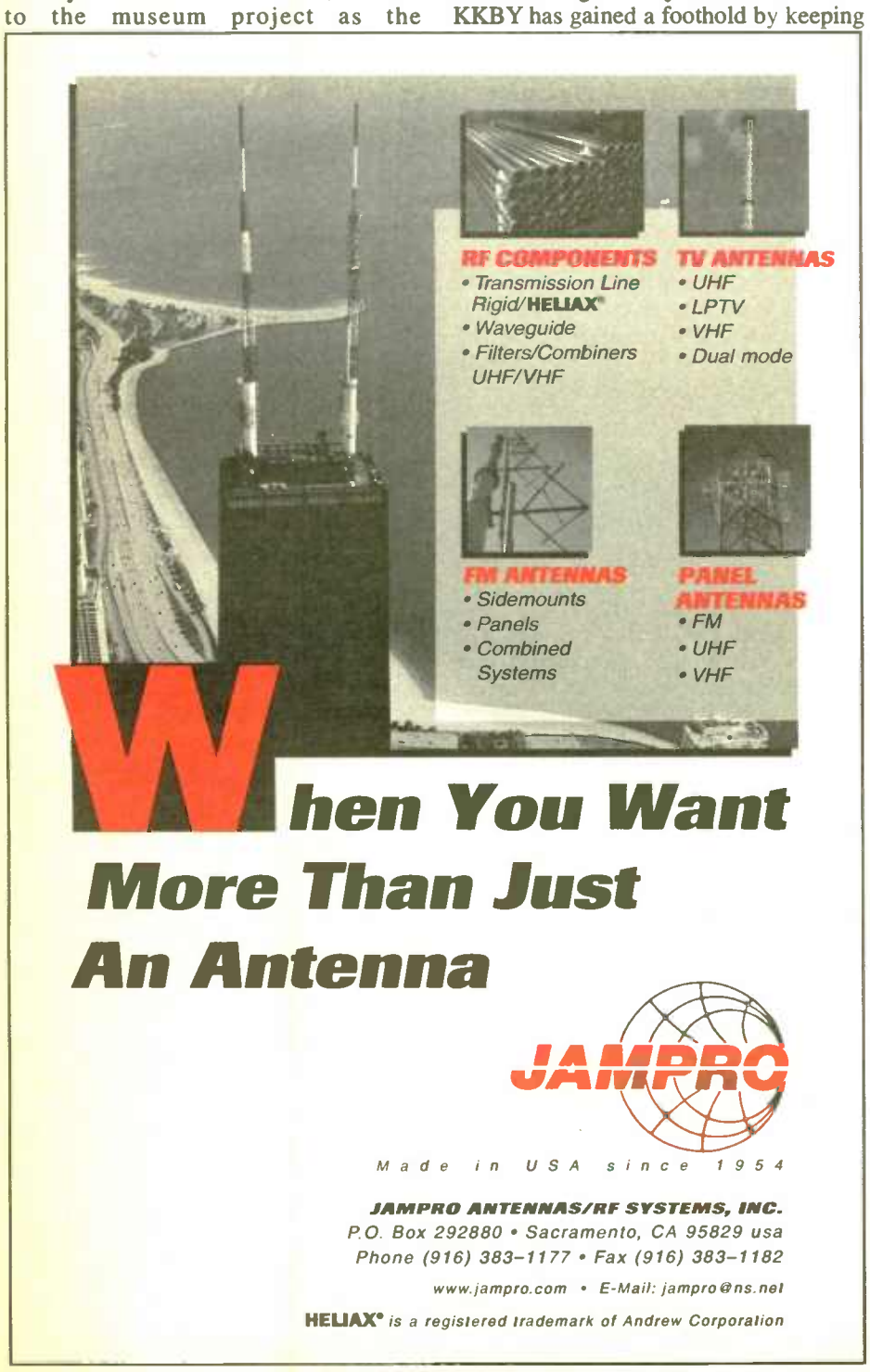


Map courtesy of BIA Publications.

Reality in Tacoma: Seattle is nearby.

"We ... built (the FM) from scratch with the money we had generated from our AM," he said. "We're the only stick, as far as I know, in the Puget Sound metro, that doesn't have a lick of debt attached to

See KKBY, page 81 ▶



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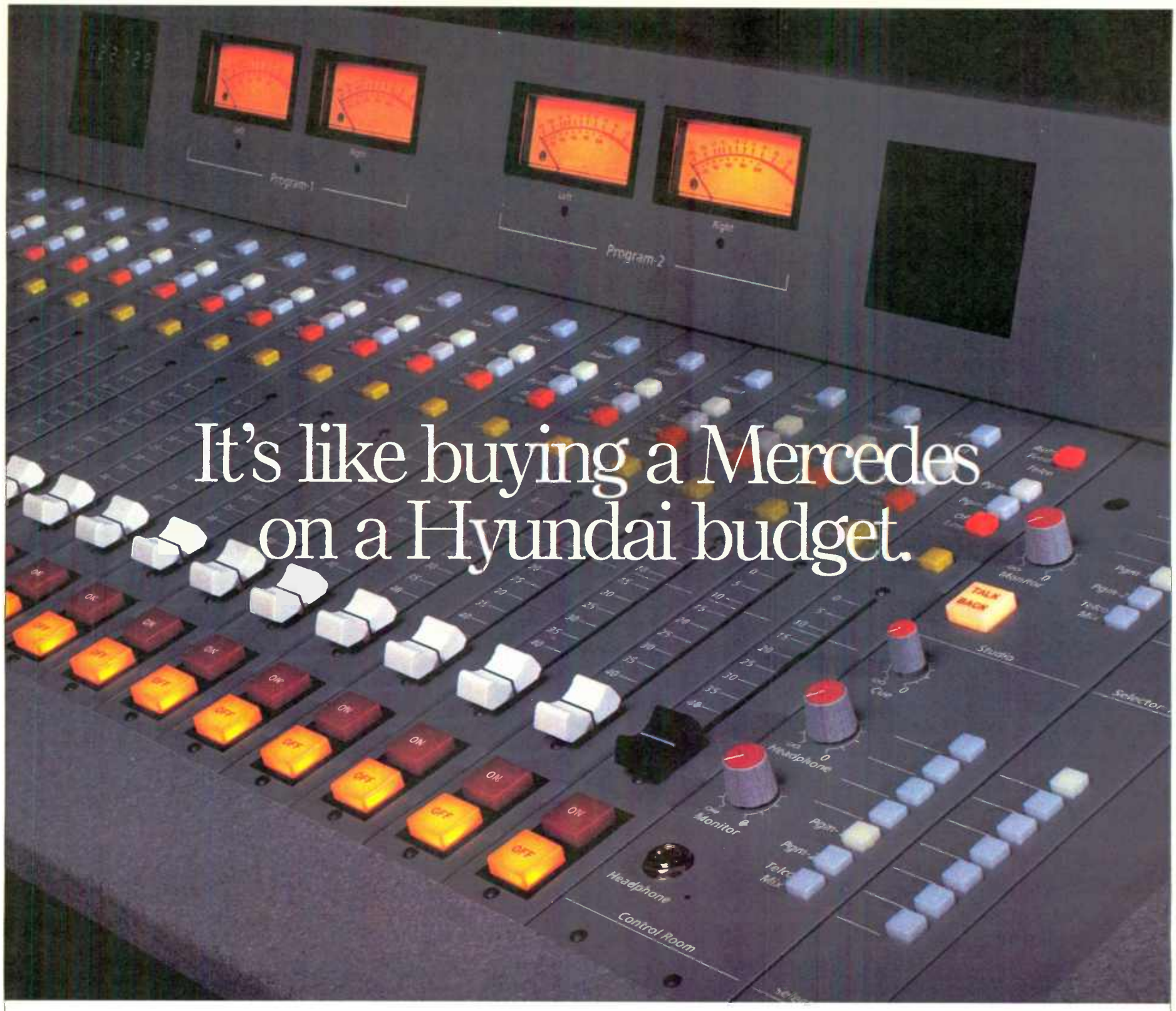
Radio World Cool Stuff Award NAB 1997

When a utilitarian device such as an audio router wins an NAB 1997 Cool Stuff award, it must be one very good audio router.

The SAS 16000 from Sierra Automated Systems is a high-performance microprocessor-based switcher that fits 32x32 routing capabilities into two RU spaces. Alphanumeric displays show routing plots while a built-in confidence monitor confirms audio on the line. The system is controllable through remote panels and by dedicated PC. The SAS 16000 has full 20 Hz - 20 kHz response and greater than 118 dB dynamic range.

For information, contact Sierra Automated Systems at (818) 840-6749 or circle Reader Service 155.

World Radio History



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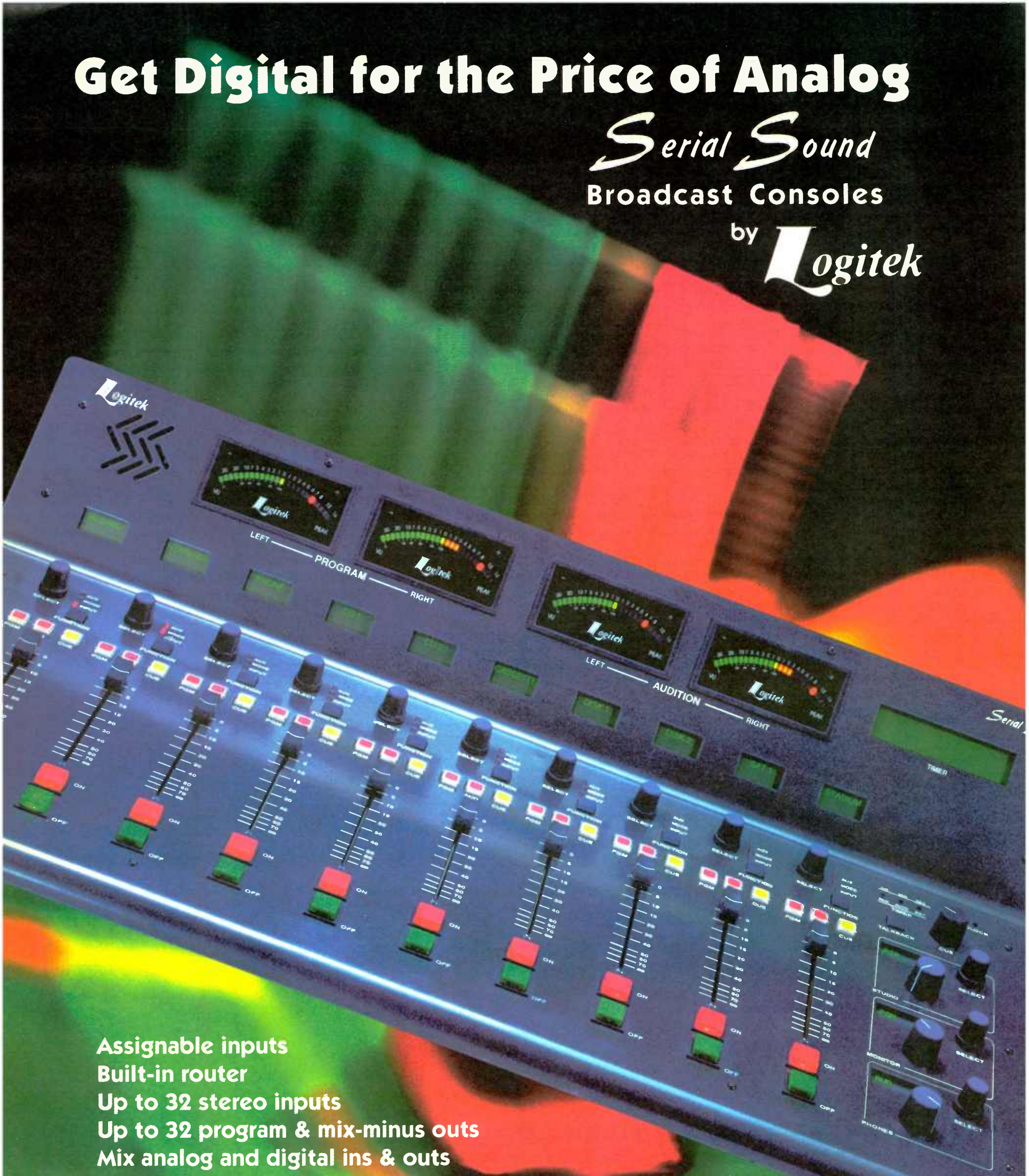

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World Radio History

Tacoma's 'Cowboy'

▶ KKBY, continued from page 78

it. We billed about $20,000 a month off of that (AM) station, using largely non-traditional revenue," Jaymes said.

But when the AM business started to dry up, management decided to apply for an FM license in nearby Eatonville. "The struggle we had with our AM was the same struggle that every owner in the modern era faced. (The AM) was there 50 some-odd years, and it just gets to the point where we're going out to hit the same businesses on the same Main Street for 50 years," Jaymes said.

The heyday of KKBY(AM) likely is behind it now; managers are focused on promoting its sister FM station.

"I think the main reason you see the AM not making money now is because ... we throw the AM in free when you buy the FM," Jaymes said.

In the shadow of Seattle

The industry usually thinks of Seattle-Tacoma as one market, and Arbitron bundles them together as the 13th-largest market in the country. With Seattle stations sitting to the north, blanketing the area with their signals, do advertisers want to buy into Tacoma? Jaymes thinks outsiders need only to be educated to see the value of advertising there.

The differences in audience size in the two regions are negligible, according to Jaymes. When you lump in two military bases located just outside of the city limits, "Our population is roughly the same as Seattle's," Jaymes said. "When people say, 'Buy Seattle!' what they're really saying is, 'Buy the metro.' Seattle ... is one of the best cities to live, but it's the outlying areas where the large urban dwellings are."

Factoring in the difference in advertising rates and the breakdown of country music listenership, Jaymes thinks other stations are missing out on the advantages of spreading their messages in Tacoma.

"We physically go after Tacoma. That's where our signal is strongest, that's where we have the strongest presence. That's where over 70 percent of the country music listeners in the metro live," Jaymes said. "We have the ability to go up to a direct retailer here in Tacoma and ask them, 'Would you pay $300 to advertise on a Seattle station that reaches (every town in the metro) ... or spend $30 to talk to your backyard in Tacoma?'

KKBY must compete with stations in nearby Seattle.

"Spending a couple thousand dollars in Seattle doesn't get you a whole lot of attention. But to a mom-and-pop retailer, that's a big chunk of money. And to a station like us, it's not that bad of a hit."

Convincing local companies to spend ad money in Tacoma is less challenging after Jaymes explains to them the differences in rates and available slots.

He claims that advertising on The Cowboy costs 70 percent less than advertising on Seattle rivals.

"Basically, our pitch is: 'Two-thirds of your radio advertising dollar is being wasted when you advertise in Seattle, because quite honestly, sir, who is going to drive a half-hour to go down and look at your couch? If you were the only furniture store in the metro, I'd say, go for it! But I think Seattle has a Levitz or two up there. They've got a couple of furniture stores.'

"If you're spending all your money trying to get somebody to drive a half-hour to see you, you're going to be out of business pretty soon. You need people a couple of blocks away to walk in," Jaymes said.

The station does not subscribe to Arbitron, and can't flaunt numbers to potential clients. Sales Manager Doc Reiss said testimonials from satisfied advertisers do the job just fine.

Not a tough sell

"Most of the stations in America are not rated by Arbitron," Reiss said. "In contacting a national company like J.C. Penney, you show them all the success letters you have from people. Like the guy who ran 10 commercials over a weekend and got 14 phone calls; the people who have been on the air three days and they're getting an average of 20 calls a day in response to their ad. You buy (ad spots) on the history of other people who have done well with it."

"It really isn't that hard to convince people they can't afford Seattle radio," Jaymes said. "The avails they get are nights, weekends ... because the prime's all filled up with agency stuff. Why not go the opposite way? Businesses live and die on their local area. There's plenty of money down here."

Convincing people that The Cowboy is a player in the metro became a whole lot easier just after the Telecom Act passed.

Nine stations in the metro changed hands last year, and The Cowboy capitalized on the inevitable layoffs and personnel transitions. According to Jaymes, new owners "put their big-time air talent out of work, they put their sales people out of work, they put their program directors out of work — you name it. And we're talking about personalities that they threw hundreds of thousands of dollars behind to promote on TV and in print.

"When all that happened, there was this giant talent pool of people that had nowhere to go. Guess where they landed?"

Local favorites including morning man Ichabod Caine and Sunday-night host Madman Moskowitz found a new home at KKBY. Jaymes said both came to KKBY backed by consistent number-one rankings during preceding years at their former stations.

The benefits have been immediate and enormous. The new talent has something to prove.

"All of the sudden we got this giant infusion of talent. People started paying attention to us — and it's their own doing, because they fired all these people! When you get fired from a job, you're a little bit upset! Maybe a little bit vengeful. (The new talent isn't) making nearly as much money as they made ... but they're working twice as hard. Know why? Because they wanna beat 'em!"

Offers to buy The Cowboy have started landing on Jaymes' desk, bringing a smile and a sense of satisfaction. But for now, he's content to stay his course.

"We've had offers, but we're not ready to let this go yet. We haven't proved our point," Jaymes said. "We are the Rocky Balboa of Seattle radio! You can punch us, you can knock us down, and we will get up again and again and again.

"I don't think (radio) is as much fun as it used to be, and I blame it on consolidation. Less people do more work, they have more demands set upon them, and it's not fun anymore."

Bucking the trend of consolidation is a challenge that Jaymes relishes. It's all about gaining ground in the market by doing things a different way, a fun way.

"This is not only the last independent FM in the market, it's the last fun station in the market! People come in here and they still have a smile on their face," Jaymes said. "I don't want to lose that. I don't want to get swallowed up. People turn to us as almost being like 'Radio-free Seattle,' the anti-radio station, the million-to-one underdog," Jaymes said.

And for now, the Lone Ranger approach seems to be working for this Cowboy.

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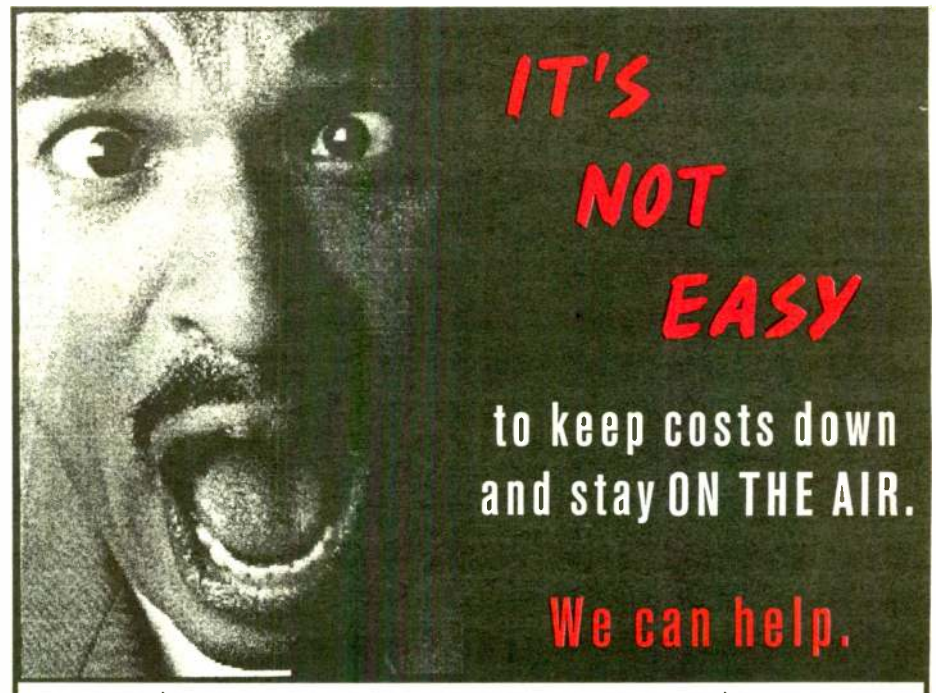

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World Radio History

WBZ Makes Digital News

Dee McVicker

Think of the venerable newsdesk, if you must, as a place where a bespectacled newsman the likes of Edward Murrow presides over the hunt for the day's news quarry. But, if you're going to subscribe to life in this century, you need to include a computer somewhere atop this platform.

And, you'll probably have to make the leap from not one, but several news desks — in fact, get rid of that desk concept altogether, and think more along the lines of small, computerized workstations. Even at that, you would hardly be prepared for news/talk station WBZ(AM) in Boston, where the change in news recording and editing is nothing short of revolutionary.

"We had Instacarts one day and digital audio the next," said Mark Manuelian, WBZ radio engineering manager, describing the move to a MediaTouch-controlled system for 17 news workstations, two news studios, a control room with a talk studio attached and two edit booths.

The usual arguments favored a digital news facility, namely to improve quality and lower the cost of maintenance, but the most important was expediency. WBZ management recognized that, if news stations are going to live and die by the expediency creed of the information age, it makes sense for them to do so with the technology of the time.

Special needs for news

Indeed, the entire CBS Boston news facility for WBZ, and eventually WODS(FM) and WBZ-TV, was built for newscasting in the late 20th century. "In the whole on-air news facility, there's one reel-to-reel and one cart machine, and that's primarily to handle the outside world," said Bob Hess, director of engineering for all three stations.

Even so, digitizing the news facility took some forward thinking. While it is probably best to have a master/slave computer arrangement in the on-air studios, so that only one person has his or her finger on the button, the same is not true for the news workstations.

A newscast at WBZ demands a group effort. Two anchors rotate every half hour, each requiring a team of no fewer than eight people working in the background to supply a steady stream of news collecting, interviewing and reporting. It's a busy place, to say the least, and the move to digital helped tremendously. Management could move most of the producing, writing and recording of news events from a central studio to the desktop.

The 17 news workstations include a computer and specially-designed mixer by Spectrum Broadcast, all with built-in mix/minus, telephone hybrid and a monitor mixer to listen to sources. The consoles are 5-3/4 inches tall, fit into a 19-inch rack space and cost only $1,500 each. Each workstation has access to network and news feeds from an SAS router. Reporters can record telephone line interviews and talk to interviewees using AKG sportscaster headsets, and their field recorders plug right into the workstation through phone jacks, so they can dub actualities into the system for editing.

If you're going to subscribe to life in this century, you need to include a computer somewhere.

"They used to have to go into a studio to get a hybrid and a console, and make a call. Now they can do that right at their desk," said Manuelian. No longer must staffers worry about carts that jam or run past their stop cue.

Special mix-minus

MediaTouch developed special software to allow WBZ reporters and producers to work in tandem. Each individual can see the play events of others' workstations. When an actuality is queued from one studio, others in other studios can play it, for example.

"Basically, the mix/minus is dynamic," said Manuelian, "it knows who's on what air, and if you and I are doing the same thing, that is, two different rooms doing the same thing, mix/minuses include each others' work. So that if I put up a call, my caller will hear what you're doing, and your caller will hear what I am doing. And that is very unique. Most radio stations can't do that." Ward Beck consoles in the news studios were equipped with custom cards to accommodate the dynamic mix/minus capability, as were SAS routers.

See WBZ, page 83 ▶

Puzzles Need Different Approaches...

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World Radio History

▶ WBZ, continued from page 82

"This is so important to us, because it takes basically two or three people to do a broadcast. We have to be able to operate from any screen instantaneously," said Manuelian.

That group effort also extends to the program director, who can listen to feeds and news packages from his office computer, and beyond, to the home studio of WBZ's morning talk show host David Brudnoy.

The station built a home studio for Brudnoy two years ago, after the host collapsed from AIDS complications. Miraculously surviving a rough bout with the disease, Brudnoy returned to work from his home studio in order to reduce the demands on his schedule. "We said, 'OK, we're going to bring work to you,'" said Manuelian, who installed a MediaTouch computer, a Shure M367 mixer and two broadcast loops in the host's home.

At the WBZ news studios, a master router has 32 stereo and 64 mono inputs for studio inputs, about 20 satellite channels, several telco loops, six channels of ISDN codecs, and other peripheral feeds. In total, some 70 inputs feed the station's studios.

For recording AP and network feeds, the system includes a background recorder to handle up to four events or audio sources at one time, based on a log similar to a program log. Rather than play an event, the system records it. The MediaTouch system then "talks" to the router, to ask which channel at what time must be recorded. It will monitor the line for signaling tones from networks and satellite feeds.

The WBZ console work areas are served by multiple computer screens.

News playlist

Once the feed is downloaded to a workstation, WBZ news personnel go into a MediaTouch program to create a "playlist" of their newscasts. Anchors and producers then have access to the file from a central server. A Novell 4.1 server with 8 GB of hard drive storage holds all the recorded audio material as well as feeds from AP, CBS and others. Audio recordings are stored using bit rate reduction. Cuts and network feeds are deleted if not used within a 24-hour period. The hard drive has not approached capacity yet, Manuelian said.

On-air studios each have a console, microphone, computers and phone lines. There are no DATs or CD players, and everything is choreographed by three computers. One computer holds all the commercial logs. Another computer, in the middle of the studio, is loaded with a MediaTouch program called Pick N Play. From here, news personnel can pull up a playlist and rearrange the content of the newscast. News staffers need only touch the screen to turn on the console.

It's a busy place, to say the least, and the move to digital helped tremendously.

"It's a beautiful marriage between the console and the PCs," said Manuelian, who throughout the project worked closely with Eric Sackowitz, the group's manager of information systems, as well as the program department.

Eventually, WODS news activity will migrate entirely to the news facility, and soon after, the CBS television station will also join the foray, creating not only a perfect marriage of console and PC, but of radio and television news coverage as well. Just the sort of facility in which Edward Murrow would be comfortable.

■ ■ ■

Dee McVicker is a regular contributor to ***RW****. Reach her at (602) 545-7363 or* roots@primenet.com

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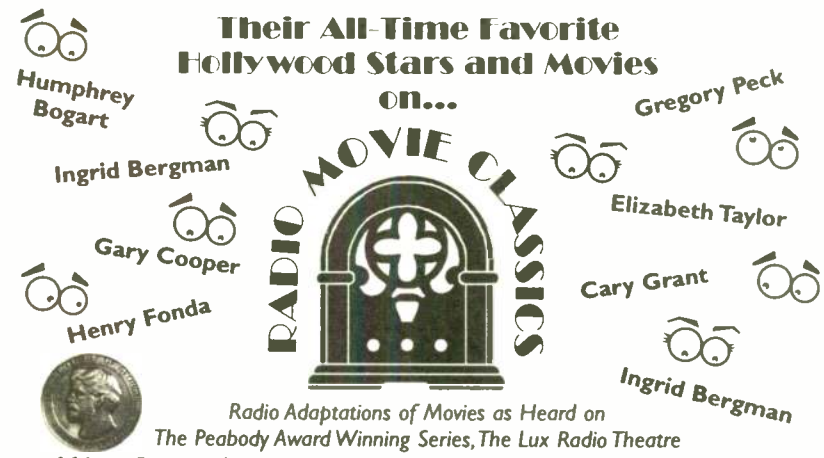

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World Radio History

Beyond the FM Transmitter

Ed Montgomery

This is the ninth installment in a multi-part series intended "to make the new generation of FM broadcast station managers aware of the equipment for which they are responsible and to help them periodically review how the equipment is operating." The previous part appeared April 30.

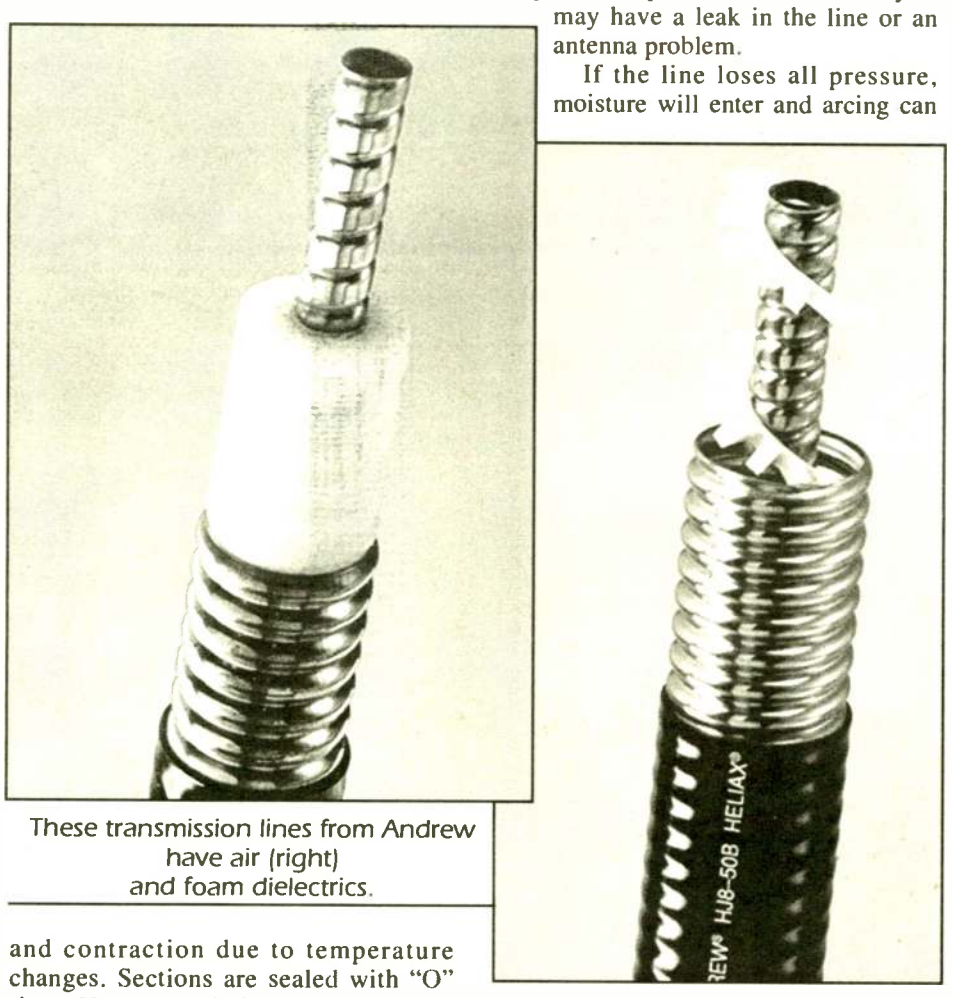
Last time, we discussed important elements of the transmission chain. Let's continue our review.

The transmission line connects the transmitter to the antenna. This is a coaxial line or cable, in which an inner conductor is surrounded by a fully-shielded outer conductor. The space between, or dielectric, can be solid or air. Transmission line can be semi-flexible cable, as shown in the examples, or rigid hard line. Air dielectric hard line actually looks like copper plumbing soldered and bolted together.

If the line loses all pressure, moisture will enter, causing damage to the line.

The air dielectric line usually is pressurized with nitrogen, an inert gas that prevents the build-up of moisture and increases the power that the line can handle. Dehydrated compressed air can also be used.

The transmission line is bolted together and hung on the tower in a way to accommodate temperature expansion and contraction due to temperature changes. Sections are sealed with "O" rings. However, wind can make the sections of tower and line move, permitting moisture to enter. Temperature variations cause moisture to develop as well. Nitrogen or dehydrated compressed air will prevent this. Two valves on the nitrogen tank indicate tank capacity and gas pressure in the line. Check the amount of nitrogen left in the tank. If it drops 1,000 pounds in a month, you may have a leak in the line or an antenna problem.



These transmission lines from Andrew have air (right) and foam dielectrics.

If the line loses all pressure, moisture will enter and arcing can develop, causing damage and even burning to the transmission line.

Solid dielectric line normally is filled with poly-foam. This does not require pressurization. This type of line commonly is used on AM systems at all power levels, as well as some low-power FMs.

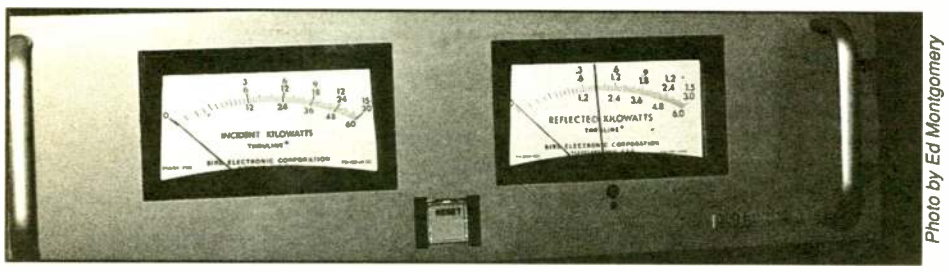


Photo by Ed Montgomery

The VSWR meter is used to measure forward and reflected power in a transmission line.

Reflected power

Many transmission lines are equipped with a VSWR meter. This measures Voltage Standing Wave Ratio, or the forward and reflected energy on the line. In simple terms, we want to maximize the energy accepted by the system, and minimize the energy reflected back by the system. The operation and accuracy of the meters should be checked occasionally. A VSWR reading of 1.0 to 1 or 1.1 to 1 is normal, indicating that the system is working as it should. A reading of 1.2 to 1 or greater could indicate a problem with the line or antenna. Convey this information to an engineer so he or she can correct the problem.

The FCC permits unattended operation of broadcast transmitters. The transmitter, modulation and tower lights can be monitored by computer. If a parameter is exceeded, the system will call the operator. If repairs cannot be made in three hours, the system will shut down. A three-minute shutdown is also required in case of extreme emergencies.

Some stations use translators or boosters to assist in the transmission of their signals. A translator operates on a frequency different from your main frequency, and is used to "fill in" the broadcast signal at a location where your regular signal is weak or inhibited by terrain. A booster operates on the same frequency as the broadcast station and provides additional signal strength to areas within the primary service area that do not receive adequate signal. These transmitters operate at low power but must be tended at periodic intervals. If your station employs them, they must be inspected, kept clean and secure.

■■■

Ed Montgomery is lab director at Thomas Jefferson High School for Science and Technology in Alexandria, Va., and a part-time radio engineer. He also taught college-level broadcast engineering technology and has written educational columns for RW. Contact him via e-mail at emontgom@lan.tjhsst.edu

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World Radio History

COLE'S LAW

If Your Own Fingers Walk to the FCC

Harry Cole

As a public service to our readers, Team Cole's Law devotes today's column to a topic that may be helpful to the great unwashed among our readership — that is, all you non-lawyers. The topic: some do's and don'ts should you decide to contact the FCC on your own behalf, without using your communications counsel.

The desire, if not the need, to call the FCC staff no doubt arises often, particularly if you have an application that has been pending a long time, or if you have a simple question (well, at least you think it's a simple question) about how to comply with the rules. Normally, we here at the Cole's Law Central Complex recommend that, in such cases, you first contact your communications lawyer. We say that because (a) we're lawyers, and we're supposed to say things like that; and (b) it really tends to be the safest and most effective way of getting an answer.

But it is not cheapest way of getting an answer. It isn't hard to perceive lawyers as modern-day alchemists, turning time and talk into gold before your very eyes. It is little wonder many right-thinking folks are not eager to start the meter running if they don't have to.

So let's say you really, really want to call the commission on your own. Here are a few factors to keep in mind before you pick up the phone.

Think first, call second

First, what do you hope to accomplish with the call? If you want to determine the status of an application, that's one thing. But if you're looking for some kind of substantive answer (for instance, you want somebody to tell you when an application or pleading is due to be filed, or whether you're in compliance with the rules), that's a completely different thing. And if all you expect to do is to rant and rave about the evils of bureaucracy, that's still something else.

For status checks, a quick answer may be possible. You should be able to find out where your application (or other matter) stands, and whether there are any hang-ups that you might be able to resolve with an amendment or further filing.

For substantive questions, however, be careful. Know whom to call. If you do decide to make the call, do your homework first. Find out who on the staff is most likely to be dealing firsthand with your application or other proceeding. You may be able to figure it out from correspondence, or you may have to make a couple of preliminary calls to the commission to find out.

You also have to be sure that you frame the question correctly to be sure that you get the information you want. And be sure that you hear and understand the answer correctly — remember, the answer you get will be based on the question you have asked. If you have omitted additional information, or if the staffer is not focusing on all of the factors you mention in your question, or other relevant factors exist that neither you nor the staffer is focusing on, the answer you get may not apply to your situation.

Even if you ask the right question of the right person, and get a clear answer, you have no guarantee that the commission will stick with that answer later. The commission and the courts have repeatedly held that, where an applicant or other private party has relied on advice given informally (i.e., over the phone) concerning substantive matters, and the advice turns out to be wrong, the applicant cannot claim that it reasonably relied on the wrong advice. As odd as it may sound, informal advice may not be reliable advice, even if it comes from an FCC staffer.

Even if you get a clear answer, you have no guarantee that the commission will stick with that answer later.

Be prepared before you call. Remember that the FCC is a big place and they have lots of things to do other than worry about your application. This is not to denigrate your application, which certainly is a matter of considerable importance to you. But appreciate that it is just one of hundreds or thousands processed at any one time.

Some things take time

If you do call, have in hand the information necessary to let the staff know what you're talking about: the relevant file number, docket number, reference number, city of license, frequency, call sign, etc. Also, let the staff know the date(s) on which things were filed, as that may give them some idea of where along the processing line an item might be found, and whether they have the complete file in front of them while you are talking.

Resist the impulse to call the staff about an application you have not yet filed, or that was filed only a couple of days earlier. Use your head. Normal processing for even the simplest routine FM modification application runs about six months, at least. Some pro forma assignment applications may be granted in less than a month, but long-form assignments generally take at least two months. Calling about such applications in the first days after filing probably is futile.

On the other hand, if you have a request for special temporary authority that must be granted by a particular date, it may be helpful to call that fact to the staff's attention in a phone call (although, presumably, you would have done so already in the written STA request).

See COLE, page 89 ▶

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And the Peabody Goes to ...

Teaching kids about science is more rewarding than ever.

"Kinetic City Super Crew," an adventure series that instructs children about science, has received a George Foster Peabody Award. The Peabody Awards honor media programming for "distinguished achievement and meritorious public service." The show was profiled in **RW** last fall.

Stations in 50 markets air "Kinetic City Super Crew," including stations of the Radio AAHS network, which features all-children's programming.

Among the 31 winners this year, "Kinetic City Super Crew" is the only program targeting children, according to its producer, the American Association for the Advancement of Science (AAAS).

The association has also launched a new, "hip" science program called "Sonic Boom," targeted to Top 40 stations. Pilots will air soon on college radio stations; if the response is positive, full production will begin this summer. AAAS will offer the program at no charge, with market exclusivity granted to the first stations that pick up the program.

"We'll answer questions like how a band makes some new sound on a hit song, or why hair care products have a thousand ingredients in them. This is not 'Mr. Wizard,'" said "Sonic Boom" Executive Producer Bob Hirshon. The program airs in 90-second spots.

For information contact Ellen Cooper at AAAS in Washington, D.C., at (202) 326-6431; or ***circle Reader Service 133.***

More Market Feedback

Responding to requests from program directors, general managers and group vice presidents who want more feedback on their markets, Strategic Media Research has released a new tracking system that measures "audience size, perceptual dimensions and marketing awareness."

AccuTrack provides weekly data on cume, share and cume conversion. Awareness of a station's latest ad campaign and any competing campaigns is tracked continuously, and reported weekly and monthly.

The firm also offers monthly image tracking on "10 key perceptual images serving as a virtual rolling perceptual tracking."

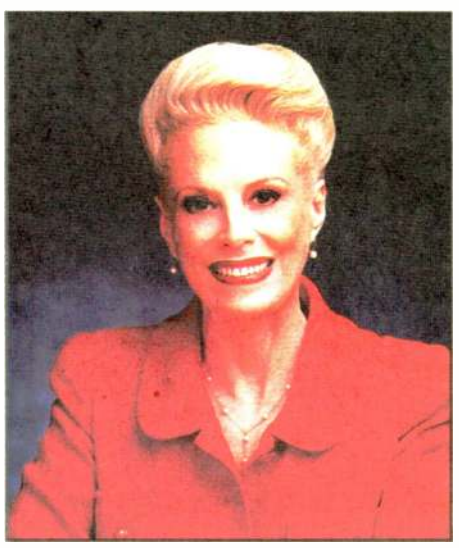
"Ratings only reveal the aggregate number of listeners. AccuTrack integrates the 'how many' with the 'why's'," said Bruce Masterson, chief executive officer for Strategic Media Research.

For information contact Tripp Eldridge at Strategic Media Research in Chicago, (312) 726-8300; or ***circle Reader Service 134.***

The Doctor Is (Back) In

Duty calls for Dr. Toni Grant.

After a seven-year radio hiatus, the doctor has returned to the airwaves. "The Dr. Toni Grant Show" currently is syndicated to more than 15 stations across the country.



Dr. Toni Grant

The three-hour program from Radio Shows Ltd. airs Monday through Friday, 3 to 6 p.m. EST.

Grant is a practicing licensed psychologist and best-selling author. Her book "Being a Woman" was on the New York Times best-seller list for a year.

For information contact Christa Dahlander at Radio Shows Ltd. in Texas, (972) 402-4534; or ***circle Reader Service 136.***

Violence Toward Animals

Violence has an animal connection, and animal abuse can lead to human abuse. That is the message from Psychologists for the Ethical Treatment of Animals (PSYETA).

Radio presentations on the connection between animal and human violence are one way PSYETA wants to spread its message. Interested stations can contact the executive director of the organization, who will refer stations to PSYETA members available to make radio presentations.

PSYETA statistics indicate that in 88 percent of homes where a child is abused, an animal is also abused, and 75 percent of prison inmates charged with violent crimes have an early record of cruelty to animals.

For information contact Kenneth Shapiro, executive director for PSYETA, in Maryland at (301) 963-4751; or ***circle Reader Service 137.***

The Secrets of Success

"Success Journal," which spotlights financially successful figures pursuing the American Dream, achieved a new level of success by topping 100 affiliates.

Stations in Los Angeles, Phoenix and Detroit are among the major-market affiliates carrying "Success Journal." Some stations air the program several times each day.

Internet surfers can access "Success Journal" on the World Wide Web at *http://www.successjournal.com* and listen to it via RealAudio. The website includes a list of stations that air "Success Journal" and a list of companies profiled by the program.

For information contact Glenn Fisher, Affiliate Relations for Success Journal Corp. in Illinois, at (408) 420-1400; or ***circle Reader Service 138.***

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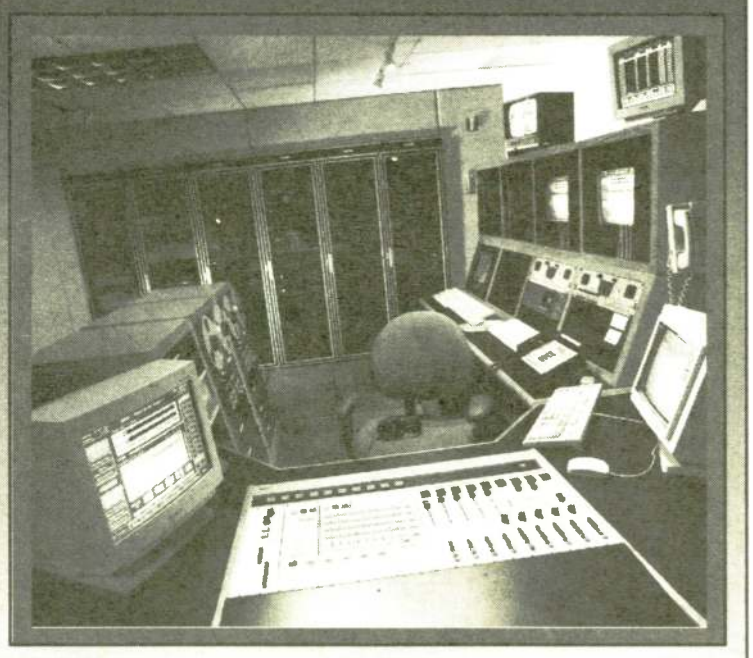

The Master Control Studio, shown right, is one of seven Arrakis studios in Sony's Manhattan network origination center for SW Networks.

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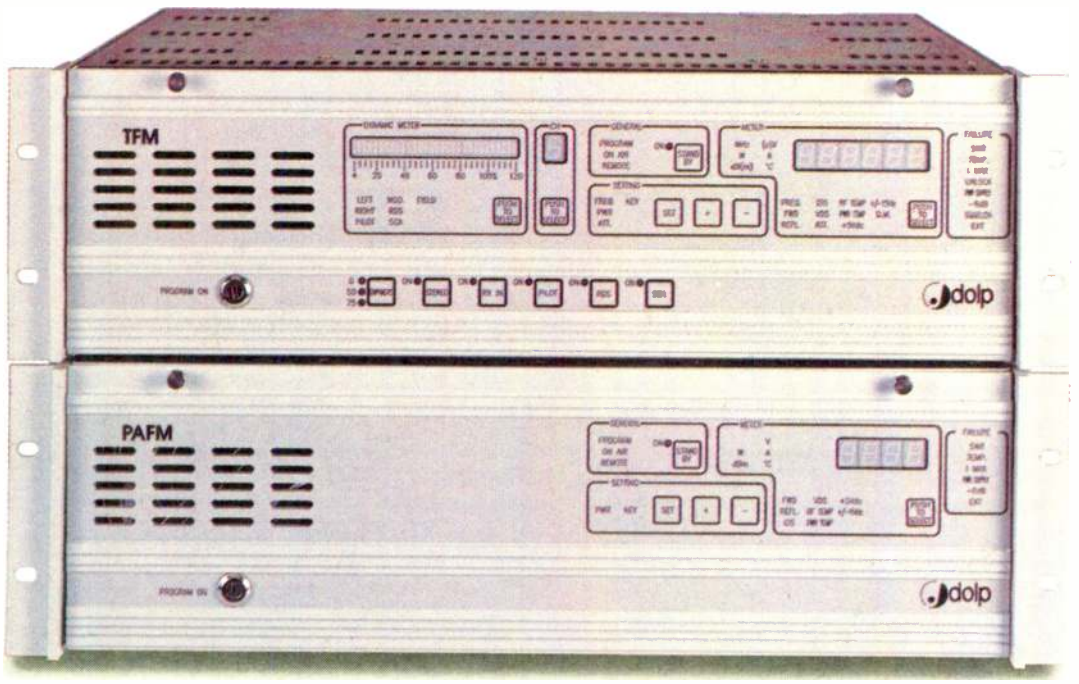

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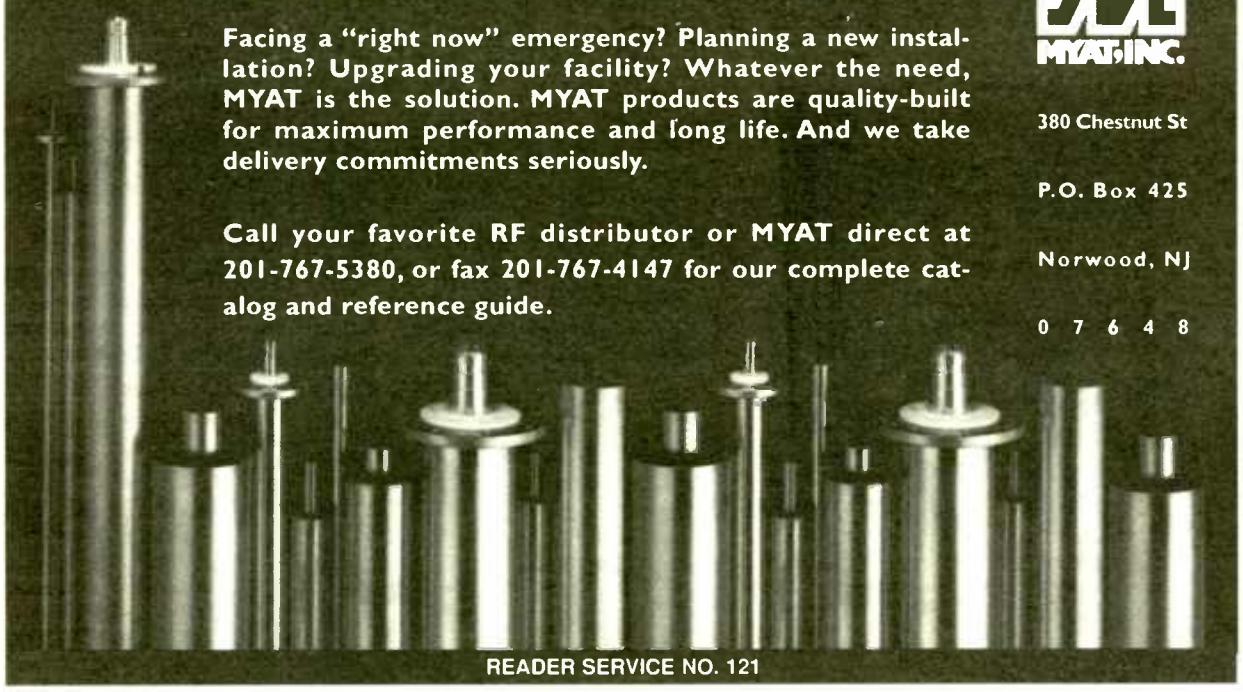

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READER SERVICE NO. 129

World Radio History

Tips for Calling the Commission

▶ COLE, continued from page 85

Avoid at all cost "ex parte" communications. If the only thing you are looking for is a pure status check (for instance, where the application stands), it's probably safe to call. But you should be aware that if the matter you plan to call about is "restricted," FCC personnel are prohibited from engaging in any conversation about the merits of the case.

Restricted proceedings include situations involving mutually exclusive applications, petitions or objections against an application and many rule-making proceedings. A single, non-mutually exclusive application that is not the subject of any petitions or objections generally is not subject to ex parte limitations, so you are probably safe here.

But any factors might make the case "restricted," be very careful. A good policy is to advise the staffperson up front of all relevant factors relative to the matter. Even if you aren't sure whether the ex parte rules apply, the staffperson may be able to reach her or his own conclusion.

... and eat your beans

Be polite and patient. Don't expect the staff to jump through hoops for you, just because you want them to. If you do get an answer on which you intend to rely, follow up with a letter to the staffer, in which you lay out what you said, what was said to you and what you intend to do (although caution here is warranted; such a letter will create a written record of what you are doing).

The message to take home is that, on the pecking order of those contacting the FCC without counsel, you are at the top if you are just looking for status information about an uncontested and unrestricted matter. The more effort you make to obtain substantive advice or secure a particular result, especially if the result involves a contested matter, the closer you get to big trouble.

Lawyers tend to know how far to venture and when. That's a very good reason to rely on them.

Need FCC phone numbers? The commission's internal phone directory is available at the FCC's website at *http://www.fcc.gov*. By the way, that site also features a wealth of other information, and a dandy search engine that helps you find it, all for free.

■ ■ ■

Harry Cole is a principal in the Washington-based law firm of Bechtel & Cole, Chartered. Reach him at (202) 833-4190, or on the Internet at coleslaw@erols.com

NARTSH Tees Up at Malibu

On June 19, more than 30 radio talk show hosts will tee off at the Malibu Country Club in California to begin the first annual Talk Radio Golf Tournament. It's part of the National Association of Radio Talk Show Hosts Annual Convention, Educational Conference and Exhibit.

Michael Jackson and Michael Reagan will tee up in the NARTSH tourney.

Presented by NARTSH Foundation, the golf tournament will be organized by Paudie O'Connor of Killarney, Ireland and Las Vegas.

The NARTSH mission: to ensure and promote excellence in international, national and local talk broadcasting through the protection of First Amendment rights. The convention is scheduled for June 19-22, and will be held at the Century Plaza Hotel.

Among those scheduled to participate in the golf tournament are talkers Michael Jackson, Bob Agnew, Michael Reagan, Ronn Owens, Vince Mastracco, Joe Busey, Frank Rush and Debra Gilbert.

For more information on both the golf tournament and conference, call (888) 562-2874.

— Susan Gary

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World Radio History

Home-made Radio, Texas Style

Bill Clough

We called it ABS — the Amarillo Broadcast System.

We had thought it unique — a thing bred by a bunch of Texas teenagers with more passion than prudence, who were determined to forge an apprenticeship to a business not necessarily anxious to allow us into its fold.

But was it unique? Late-night conversations with colleagues reveal that many in this rarefied business of broadcast journalism started under similar circumstances, learning by imitation.

ABS was headquartered in a garage-turned-studio in my parent's house. Ultimately, it featured a control board, two Realistic turntables with viscous-damped tonearms, microphones, headsets, on-air lights, an equipment rack, a multiband shortwave radio, egg-carton soundproofing, a clock the size of Big Ben, a Stromburg-Carlson cue amp and a power amplifier with enough tubes to heat the place and to supply audio to speakers installed in every room of the adjoining house.

No transmitter

At its height, we staffed the station from 8 a.m. until midnight — entertaining my mother, father and the dog (we were a radio family; didn't buy a television until 1967). In the process, we cut our teeth on both a vocation and an avocation.

ABS did not just happen; it evolved. First, we had to build the studio. Only in retrospect do I appreciate my father's woodworking skills. He built the console, the shelves and an equipment rack, complete with a trendy sloping front and enough storage compartments to make a yachtsman proud. It didn't hurt that he also was an electrical engineer and a part-time radio announcer.

Audio equipment was accumulated through a combination of Keynesean and supply-sergeant economics. Many a birthday and Christmas gift was presented in advance: the Bogen pre-amplifier, the turntables and tonearms, the shortwave radio.

The rest was up to us.

Like Fagin and his band of pickpockets, I and my friends Galyn Shelby, Bill Wellman, Billy Blackwell, RuNell Stitt and Jerry Searcy disappeared on missions clandestine and discrete — and we usually returned with full pockets.

ABS owed Amarillo High School a lasting debt, one I freely acknowledge — now that the statute of limitations has expired.

What we could not con the school maintenance people into donating, we would simply ... well, "steal" is an ugly word. We adhered to the pragmatic philosophy that equipment gathering cobwebs in a dusty old corner deserved a new lease on life.

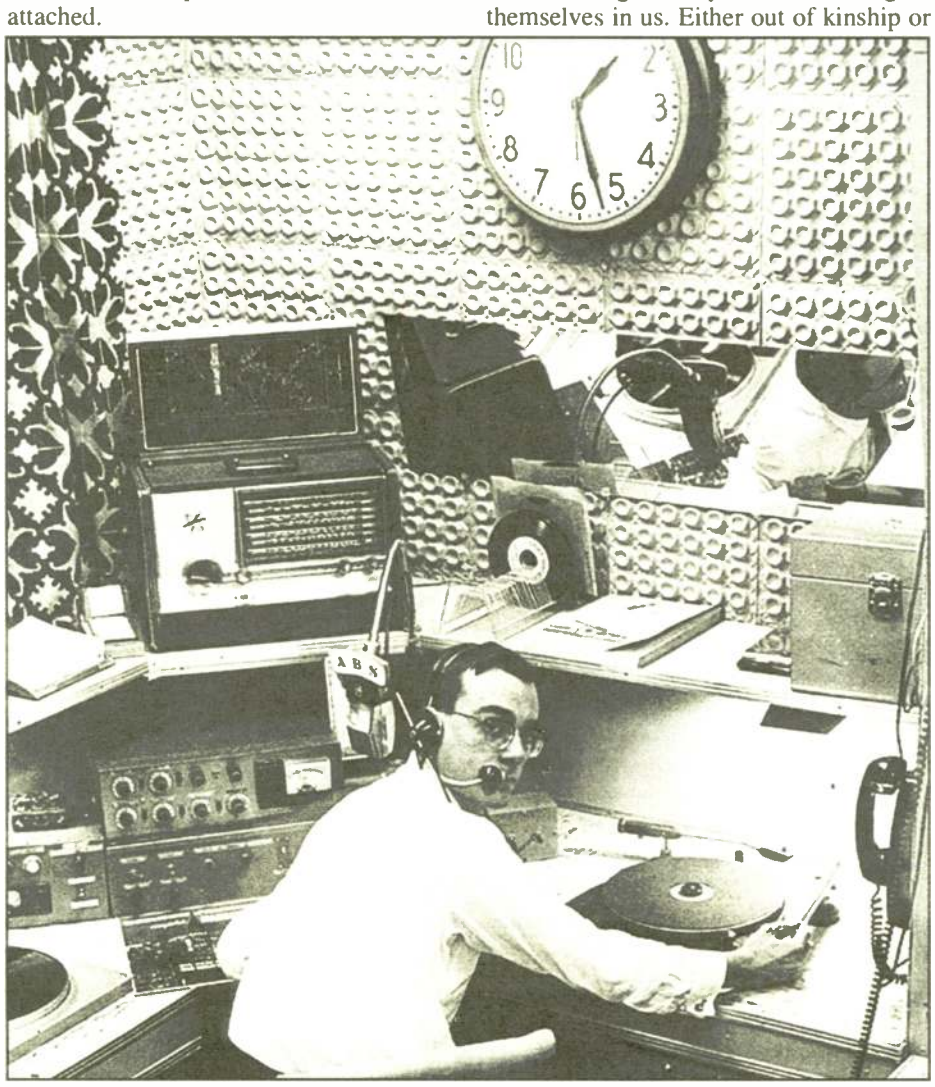
We found a Western Electric power amplifier in an attic storage area that I don't think even the principal knew about. It was easier for him to let us have it than to account for its sudden reappearance on an inventory.

What is a studio without a really fine monitor speaker? In those formative days of high fidelity, we worked by a simple formula: bigger was better. During one of those interminable high school assemblies, Galyn and I had a revelation that instantly expanded into inspiration. Until then, we had failed to notice that while the sides of the vast auditorium stage were serviced by two public address speakers, only the left one produced sound.

Discovery zone

What, we wondered, was behind the right speaker baffle?

After school, we climbed the stagehand stairs to investigate. Sure enough, in a true dusty old corner, there sat a giant, horned theater speaker — with no wires attached.



March 1962

We didn't steal it; we traded.

The horn served us well for the life of ABS. And had anyone later looked behind the right speaker baffle in the auditorium, he would have found the speaker wires dutifully reattached ... to an earphone.

The most coveted object was the high school RCA Junior Velocity microphone, which we borrowed during the summer vacation. Somehow, Shelby convinced the principal that the rigorous environment of a high school demanded the stamina of a dynamic microphone — such as one that Galyn somehow had acquired.

The principal gladly traded and ABS acquired a ribbon microphone that could add the bass response that young teenage talent so desperately wanted.

But the high school was just one source of supply for our demand. In short order, we were on intimate terms with the chief engineers at most of the radio stations. I imagine they saw something of themselves in us. Either out of kinship or amusement, they allowed us to graze.

We covered parades and air shows. We had our DJ shows and we chased news — by laboriously mapping the numbers on pay phones around the city. We would send a reporter to the pay phone nearest a news event and call him. No charge. A dime was a major investment, then.

Photo by Thomas Caldwell

The Author Today in Tokyo's Imperial Park.

The highlight of the year was the Christmas Festival — a three-hour special. We would start planning in November. On the night of the production, usually Dec. 23, mother would make refreshments for the 20-odd family and friends invited to hear the show. Even now, thousands of miles and decades removed, Christmas doesn't seem complete without a radio production. Every November I still feel a faint stirring.

Over New Year's, we would invite all the foreign exchange students to spend an hour discussing international events. If CBS could have its "Years of Crisis," ABS could have its "Decisive Decade."

Through college and military service we held fast to the to the spirit of ABS, if not the substance. At Christmas, either we would return to produce the annual program, or we would send correspondent tapes.

It could not last forever, of course. Marriage, the military, careers and circumstances prevailed. When my father died, my mother sold the house. I dreaded the thought of tearing out all that wiring, even if our monument to a dusty old corner had deteriorated into just that.

"Not on your life," the new owner said. "Leave it."

And we did. And a part of us as well.

The ABS engineer, Galyn Shelby, started his own production studio before taking up a different type of engineering — aboard Santa Fe Railroad freight trains.

Billy Blackwell was a DJ before entering his father's manufacturing business.

Bill Wellman lived for years in Tucson selling some kind of merchandise. In his last letter he still talked about ABS.

RuNell Stitt, now Coons, teaches broadcasting at West Texas State University in nearby Canyon.

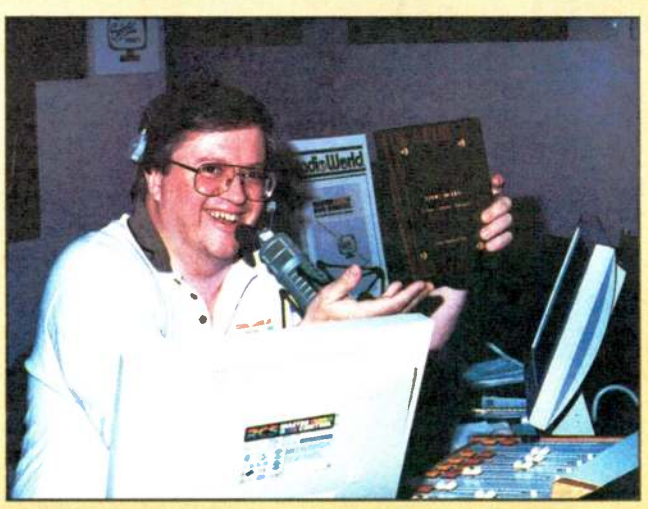
Jerry Searcy became the business editor of the local newspaper.

See ABS, page 91 ▶

Radio World Cool Stuff Award NAB 1997

The hot news from Radio Computing Services (RCS) is that Master Control is now NT-based. Hot enough for an NAB 1997 Cool Stuff Award from **RW**. Pictured, Tom Zarecki demo'd the product and displayed the award for very impressed attendees in the Radio/Audio Hall. Master Control-NT does "Real Feel" Voice Tracking and integrates perfectly with Selector. The "Living Log" allows for easy last-minute log changes, and the new in-studio web browser runs under Windows NT.

For more information, contact ***RCS*** *at (914) 723-8567; or circle* ***Reader Service 151.***



World Radio History

▶ ABS, continued from page 90

And in my apartment in Arlington, Va., that RCA Junior Velocity microphone commands a respected and honored place in my production studio. It is not in retirement. It still sports the ABS microphone flag my mother made; I often use it to file stories over a radio loop to the UPI World Headquarters.

Somehow, I think that Galyn and RuNell and Billy and Bill and Jerry and Mike would appreciate that.

■■■

Bill Clough covers the House of Representatives and the White House for the UPI Radio Network.

Bring Back That Knob!

All radio shops have a box or two filled with treasure: XLR connectors and phone jacks and goosenecks and terminal strips and power supplies and pots and pilot lights and switches and relays and resistors — all the miscellaneous hardware that ABS required and which the engineer dearly wanted to be rid of but legally could not.

"Now, don't go overboard," the engineer said at the transmitter site for KAMQ, a CBS affiliate where my father worked at that time. Bill Wellman and I were on a foray.

Thirty minutes later, we drove away with a contentment only pirates know.

Wellman drove a Cadillac that hadn't seen a shock absorber since the Korean armistice but which was equipped with fins that would have made Boeing proud.

In those days, the chief teenage occupation, besides taking a girl "out in the country," was to "do the drag" down Polk street. At 10th and Polk, Wellman fished something out of his pocket. "Here," he asked, "can we use this?"

There, in my hand, was the control knob for the station's transmitter.

It was physically coded with protrusions and indentations so the engineer could change the transmitting direction and, unfortunately, which also was required to turn the high voltage on and off.

I looked at my watch. Sign-off was 8 minutes away; the transmitter was 5 miles east of town.

"Go!" I yelled. Wellman gunned the Caddy.

Amarillo did not have storm drains in those days. Each intersection had dips that did more to control velocity than any speed bump ever made. Wellman's shockless Cadillac did not traverse the dips, it plowed them, leaving a trail of sparks that Comet Hale-Bopp would envy.

By the time we pulled into the front gate, it was 5 minutes after midnight; the DJ, Burt Wayne, was playing the national anthem for the third time.

Wellman swung by in a wide arc, I tossed the knob to the engineer and watched him deftly catch it with one hand.

I never went back.

— Bill Clough

Price Hike Accusations 'Not True'

Interep Official Says Radio Is Being Tarred Unfairly in the Aftermath of the Telecom Act

Contrary to perception, radio is not hiking rates unfairly in the wake of consolidation. That is the conclusion of a recent Interep analysis of market data, comparing radio rates to newspaper rates.

The analysis found that newspapers are raising rates even in the face of declining readership. Meanwhile, the radio industry suffers from an unjustified perception that consolidation resulted in rate increases, when in fact costs remain flat.

Media Market Guide measured the top 10 metros and found a 12-percent increase in newspaper ad rates, despite circulation declines in most of those markets. The guide found that radio cost-per-points in the top 10 metros for adults 18+ was flat between the second quarters of 1996 and 1997. Interep analyzed the data from the guide.

"Because of consolidation, radio has become an open target for accusations of price hiking that are simply not true," said Marla Pirner, executive vice president, director of research at Interep. "(Radio) will not sit back and accept undue criticism, while dollars continue to roll unquestioningly to our competition."

Pirner did not rule out future radio cost-per-points increases.

The 10 markets measured by the guide were New York, Los Angeles, Chicago, San Francisco, Philadelphia, Detroit, Dallas, Washington, Houston and Boston. Newspaper circulation gains occurred in New York, Houston and Philadelphia. Interep attributed the large circulation boost in Houston in part to the closing of the Houston Post in 1995.

— Chris Hamaker

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World Radio History

Internet Converges at NAB '97

Alan Haber

Radio website operators face a problem: should they continue to invest in improvements to their sites, including ever-better audio and video streaming tools? At what point do they stop considering themselves radio people, and cross into multimedia? Will improved streaming tools allow big video players, with big budgets and existing video hardware, to dominate this new field?

That's what convergence is all about, and it was happening everywhere at NAB'97. At the Sands Expo Center, where the packed NAB MultiMedia World and Internet@NAB.97 played out, radio broadcasters found a virtual fork in the road. From here out, it may not be enough for radio stations to simply webcast and maintain basic, graphically enabled sites. The proliferation of multimedia-enabled sites, offering video-enhanced interactive experiences, may propel some stations to upgrade to keep up.

NAB '97 was an Internet playground. Exhibitors offered visually oriented products designed to up the "coolness" factor of a broadcaster's site. "But why does my station need multimedia content on its site?" you ask. "We're radio, not TV!"

Not when you're on the Web. In cyberspace, a radio station is a content provider. The level of content a station wishes to provide, however, is another thing entirely.

A swing through the exhibit area and the presentations in the Microsoft-sponsored What's New! What's Cool! Internet Theater suggested that radio stations doing business in cyberspace may have to think about becoming multimedia content providers if they're going to compete for website visitors' time.

Higher stakes

In 1997, the stakes are higher on the Web than ever before: radio stations are not simply competing with other radio stations. They are competing with television stations, corporations and Internet-only content providers that offer interactive games, videos and live chat.

Managers of some radio stations may find themselves unable to become multimedia content providers just yet. Still others may feel it is unnecessary to do so. Once stations decide which market to compete in — local or global or both — the choice will be easier, but potentially more expensive.

For now, there seems to be no pressing demand for radio stations to join the *multimedia-enabled* Internet revolution. It would be wise, however, for managers to keep their eyes and ears open, for if anything is certain on the Internet, it is change.

What will not change, however, is the need for websites to be "cool." Sites must be visually inviting, interactive and continually updated. Every website — radio or otherwise — should offer consistently fresh, compelling reasons for visitors to return.

Telos Systems and Progressive Networks webcasting solutions were demonstrated. Telos Audioactive is an audio-only solution; Progressive, like Microsoft, which demonstrated its NetShow product, showed versatile audio and video streaming solutions. WebbRadio.com was showing its "complete Internet broadcasting solution," featuring audio and interactive 3D chat applications.

It was said many times at NAB '97 that content was driving some of the current webcasting solutions; although this seems especially true with video streaming, owing to bandwidth issues, it seems less true with audio streaming, where quality is generally better overall but sometimes bogged down by bandwidth problems.

Content was key at Internet@NAB.97. For radio stations wishing to improve their websites, the choices were plentiful.

Cheetah Broadcasting, a division of Cheetah Systems, showed broadcasters how they can use captioning technology to bring real-time transcripts of a station's audio to all kinds of people visiting a website, including the hearing-impaired or those for whom English is a second language.

The coolness factor was pushed at Nucleus Interactive's booth, where Proton Pro, the company's animation production software, was on display. Proton Pro is an example of a product that can jazz up a station website to promote return visits; the animated characters that the product creates can talk and move in real time.

In the area of "push," arguably the hottest current Internet buzzword, BackWeb Technologies was showing its solution, which brings content from a selection of "channels" to users' computers.

WavePhore was previewing its push solution, WaveTop, set to debut in the fall. WaveTop is different than other push solutions in that its programming is embedded into the nationwide PBS television broadcast signal and received by personal computers with TV tuners and WaveTop software.

One of the choices offered through WaveTop is the RadioTop broadcast, "a nationwide FM-like radio station," according to the company, "which will automatically launch a user's RealAudio player for receiving live streaming audio."

Content is still being pushed to website visitors in the old-fashioned way (as much as anything Internet-related can be termed "old-fashioned"). AccuWeather showed dramatic alternatives to static, text-oriented weather information. The company, which provides weather forecasts to 500 radio stations, offers customized national, regional and local information.

Loyalty

AccuWeather's president and founder, Dr. Joel N. Myers, said, "Most people over the next couple of years are going to listen to the radio (and) continue to get their forecasts and other information" from radio stations. The key "for all media," he said, "is building that loyalty."

That loyalty translates to brand awareness. "You've got those listeners, you've got that brand awareness, and you want to capitalize on it," said Myers. "Those who do will survive and grow. Those who don't will perish."

This will be equally true for stations providing minimum content on their sites and stations looking to become full-fledged multimedia content providers. Whether that means they can maintain their primary status as radio station content providers remains to be seen.

After all, the meaning of business on the Web for radio stations and other content providers will change. The playing field is constantly revamped. Witness the Microsoft announcement at NAB'97 that it was acquiring WebTV Networks.

For the long term, this may signal a more widespread audience for streamed audio. In the short term, station managers must at least watch developments carefully.

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KLBJ Website Tops List of Radio Internet Winners

Radio website content syndicator ElectricVillage is doing its part to encourage station participation on the Internet, rewarding the best websites among its affiliates.

The Radio Website Awards are presented quarterly based on "technical implementation, graphics, content and functionality." Station KLBJ-FM (*www.lbj.com/fm*), in Austin, Texas, won for Overall Best Site. KLBJ Program Director Jeff Carrol acknowledged the work of the station's web master, Chuck Green. "Because of Chuck's great work, our listeners can 'see' and 'grab' our programming in the convenience of their home and office, instead of just hearing it," Carrol said.

Electric Village also handed out format-specific awards for Best Site and to the top 5 percent of sites in each format.

The Best Site awards went to: KSHE(FM) (*www.kshe95.com*), St. Louis, for the classic rock format; KLBJ-FM, for modern rock; WKSW(FM) (*www.kiss-country.com*), Dayton, Ohio, for country; and KBOS-FM (*www.kbos.com*), Fresno, Calif., for Top 40.

— Chris Hamaker

World Radio History

Elements of Tower Inspections

Troy Conner

Let's continue our discussion of routine tower inspections, which we began in the April 16 issue.

As noted then, routine inspections are critical. Our inspections are composed of three distinct elements: a written text, numerous detailed photographs and a set of tower drawings. It would be impossible to list all of the information covered in a good inspection report in one or two articles. Suffice it to say that there is considerably more to a tower than meets the eye of the untrained observer. I will attempt to provide an overview of the types of topics and the scope of coverage.

Perhaps I should describe the "product" to you. Think of an inspection as having two parts or stages. The first is the actual climbing inspection; the second is preparation and presentation of the data. Basically you are purchasing a record of the structure, at that point in time, complete with detailed information about any problem areas, complete tower drawings and a set of recommendations including corrective actions.

Pictures, notes and sketches

In the process of performing a typical tower inspection, I usually shoot more than 100 photos and take enough notes to fill a small steno notebook. Our completed inspection report contains five to 20 pages of text, another 10 to 30 pages of captioned photographs and a basic set of tower drawings. Accurately presented, the written text, photographs and drawings should provide the layperson with a wealth of information in understandable terms.

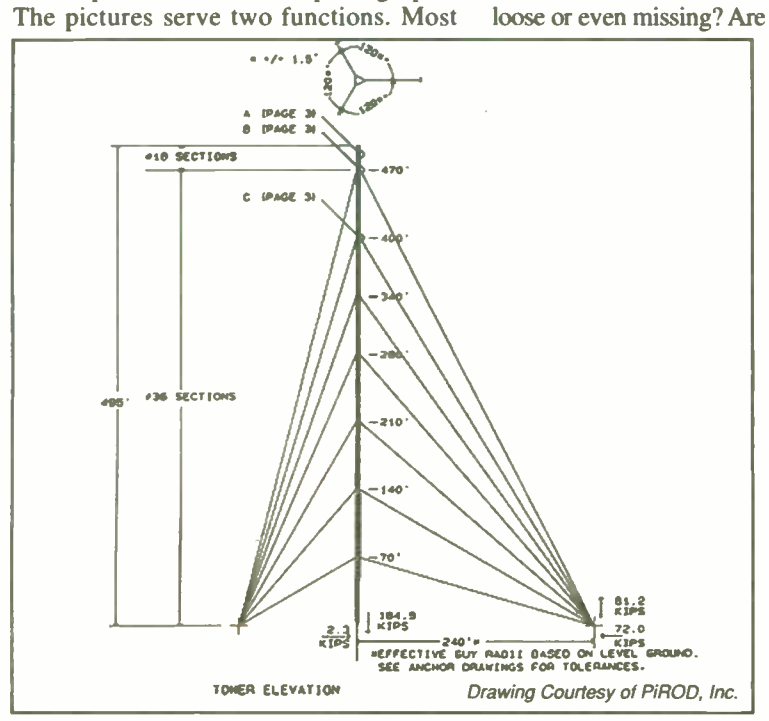
Tower drawings

One of the first questions a good inspector will ask is, "Do you have a set of tower drawings?" If you do, the inspection likely will go much quicker and cost less. If you don't have drawings, you definitely need some! An inspection is the first step in their creation. To me, the difference is enormous. When I approach a tower with drawings in hand, I feel much more comfortable. With drawings, an inspection becomes more a matter of verification.

Without any documentation, we must physically measure every single structural element to provide the draftsperson with the raw data required to create an accurate set of drawings later. This task slows the climbing portion of the inspection and adds to the office time needed to prepare the report. Put simply, a set of drawings allows the inspector to concentrate on the task at hand: looking for changes and problem areas.

An up-to-date, accurate set of tower drawings are the foundation of a structural analysis. The drawings, created or revised based on the climber's measurements, provide a structural engineer with the data to create a model or "build" the tower in a computer. This model can then be subjected to computer-generated loading or simulations of severe wind and ice storms. These simulations are compared with current engineering standards and are used to determine the strengths (and any weaknesses) of the tower. An analysis tells us whether the tower meets the standard and what must be done to bring it up to par.

The second fundamental element of our inspections is a set of photographs. The pictures serve two functions. Most important, they provide the customer with a visual record of each problem or area of concern. They also should offer the customer a look at the basic structural elements that compose the tower, and the ancillary equipment installed on it.



Drawing Courtesy of PiROD, Inc.

A photograph of a glaring problem is difficult to ignore, and often provides an under-financed engineer with necessary ammunition when budget time comes around. By nature, a photograph is just about as objective as information gets. The camera doesn't interpret or make judgments.

The written word

Text is the third fundamental part of a good inspection report, and probably the most boring. However, when written well, it should be rich with technical detail. To me, the written portion of the report ties the photographs and drawings into a whole. The text should contain the known history of the structure and a list of prioritized recommendations. It should provide a reference source regarding the tower.

TIA/EIA guidelines

The TIA/EIA standard contains a general list of tower inspection procedures. Within this list are three divisions. The first is concerned with items common to all towers. The second covers issues specific to guyed structures. The last section is dedicated to transmission equipment supported by the structure.

To give you an idea of the scope of a complete tower inspection, I will list many of the sub-topics contained in the standard. Because I am naturally verbose, brevity imposes a hardship upon me, but here goes.

The first section is sub-divided into eight topics: Members, Finish, Lighting, Grounding, Tower Base Foundation, Tower Assembly Profile, Tower Alignment (Plumb and Twist) and Insulators. This section concentrates only on the tower proper.

The categories for lighting, grounding, insulators, foundation and plumb and twist are self-explanatory. "Finish" involves the condition of the paint and galvanizing. "Members" involves the physical condition of the steel. Are structural elements bent, loose or even missing? Are things all secure and ship-shape? "Assembly Profile" describes creation or revision of the tower drawings.

The second section addresses the additional elements common to guyed towers. Within this section are two sub-divisions: Anchors and Tower Guys.

The discussion of anchors is concerned with the condition of the guy anchor system. Has there been any movement, settling or shifting of the anchor below grade? Is there proper grounding? What about the inevitable corrosion of the anchor steel and any degradation of the concrete?

The sub-division for Tower Guys looks at the condition of the cables and the associated termination hardware. Guy cable tension is also covered.

The third and final section concerns Antennas and Feedlines. This section concentrates on the physical and operational condition of any and all transmission systems. If you have a small AM tower, with no other radiating elements, this section doesn't really apply to you. It is meant to guide an inspector who is documenting the condition of a tower with a number of antennas and transmission lines.

Basically, each antenna and mount should be checked for broken, bent, missing or loose components. Additionally, each corresponding rigid transmission line, waveguide or heliax (and support system) must also be scrutinized. The lines must be studied carefully for dents, abrasions, holes and grounding. Among the many questions: Is there any ice damage? Are there ice shields? Are radomes or element covers intact and in good condition?

I cannot stress enough the importance of routine tower inspections. The structural integrity of a tower may depend on the timely identification (and correction) of a small problem, before it becomes a calamitous problem!

■ ■ ■

Troy Conner is the owner of Tower Maintenance Specialists. Reach him by phone at (704) 837-3526 or via fax at (704) 837-1015.

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World Radio History

BOOK REVIEW

New Book Creates Powerful Radio

Peter Hunn

Any station worth its spectrum space has entertained the controversy. Within the walls of the studio, sales office and engineering shop, broadcast people have long argued the question: "What single element is most vital to radio's future?"

"Great programming," yells the air staff.

"You gotta have the time sold or you got nothing," counter the account executives. The tech-types quietly point out that programming and sales would fall flat without a viable signal.

Each argument has its merits. When combined, they cement a bridge strong enough to send radio safely into the new century. Missing from this mix, however, is the ingredient required to assure footsteps on that span.

The magic ingredient

Although essential, it is seldom discussed with any sense of value. Too often, the Fifth Estate's phantom is *encouragement*, an energy source happily given preeminence in Valerie Geller's new work, "Creating Powerful Radio, A Communicator's Handbook," from M Street Publications.

Geller's résumé qualifies her to pontificate. Her background includes a stint as news director at a major San Francisco outlet, and she was part of the team that set up the talk format on KFI(AM) Los Angeles. She also was a program director at WABC(AM). Rush Limbaugh did his New York show during her command.

Geller now heads an internationally recognized broadcast consulting firm, at which she works with news, talk and personality stations throughout the world. "Creating Powerful Radio" will edify anyone who wants to get the most from a broadcast career. Her style is upbeat and easy to like.

The book contains more than 200 pages and 20 chapters, painted by radio pros with enviable track records, including **RW** contributor Lee Harris. The guidance from Geller and her subjects is well worth the $24.95 cover price.

All bases are covered, including show preparation, research, managing difficult talent, finding the right talk show producer and how to successfully transform an ordinary jock into an extraordinary talk show personality. Other topics include enjoyable interviewing, PSAs, promotion, sales and commercials, and powerful news style.

The book handles well the sensitive topic of career burnout. Even the best-known radio vets have experienced a fading career honeymoon. The book suggests ways to "take a break from the biz" without jeopardizing radio's real romance in our lives.

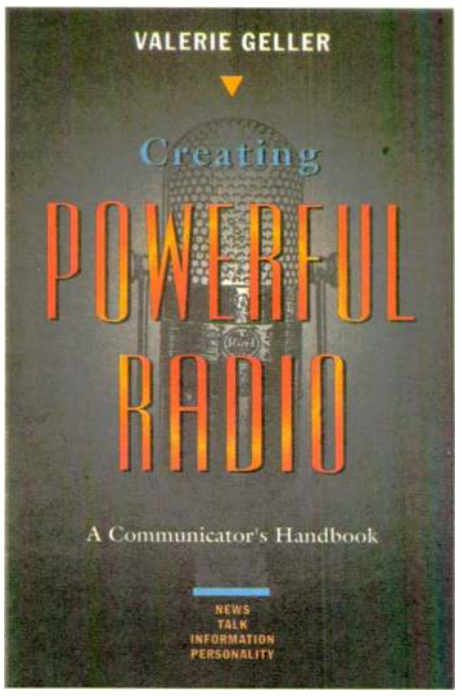
It also shows how we can put new life in our vocation by diversifying and trying a different role at the old station.

Powerful news

One chapter should be required reading in every radio newsroom. It offers the "multi-version" approach to writing and producing, vital to keeping even the most routine story fresh.

The book's liberal bullet lists are especially useful. For example:

- Don't ignore or mistreat people under you.
- The talent may be great, but the setting, city or station may be wrong.
- Get in there and *flop*. Try everything. Powerful radio is experimentation.
- The only job security is the ability to secure a new job. Know when to move on.



Imagine what we could have accomplished had we actualized these tips at our first station!

Miscommunication

Anyone who saw Howard Stern's movie "Private Parts" caught a glimpse of the unproductive miscommunication typical between on-air person and program director. "Creating Powerful Radio" serves to bridge that gap through a look at "Talent vs. Management."

The talent feels unappreciated, and cries for positive feedback. But this reminds the general manager of his or her frustrating, whiny, attention-seeking toddler. Forewarned is forearmed.

Geller demonstrates that psychology, as well as programming and managerial skills, are useful in any radio station staffed by at least two people.

Lately, discussions about radio's role in the 21st century seem to assume that big business will further deflate the fun from broadcasting. Some people hold little hope that creative types will again be motivated to hone their talent at the local mic. Geller's book is refreshing.

Encouragement to be creative is an important part of powerful radio. Used wisely by enough broadcast students, air personalities, news, sales and management people, "Creating Powerful Radio, A Communicator's Handbook" might eventually make an executive's job at a satellite-formatted affiliate much tougher.

If you like this brand of broadcast encouragement and creativity, contact M Street Publications at (800) 248-4242.

■■■

Peter Hunn is a professor in the Communications Studies Department at the State University of New York in Oswego and an applicant for a new FM in the Syracuse area. You can reach him at hunn@oswego.edu

Radio World Cool Stuff Award NAB 1997

It was an idea broadcasters considered overdue: a dual DAT recorder. It took Tascam to build the new DA-302 recorder and the company efforts brought home an NAB 1997 Cool Stuff Award.

The twin decks in the DA-302 can record simultaneously, allowing mastering and backup recording in one pass. There are S/PDIF digital inputs for each deck and switchable AES/EBU and S/PDIF outputs. Independent I/O for each deck allows digital recording to one deck while the second is transferring entirely different material to an external device.

For more information, contact ***Tascam*** *at (213) 726-0303 or* ***circle Reader Service 154.***

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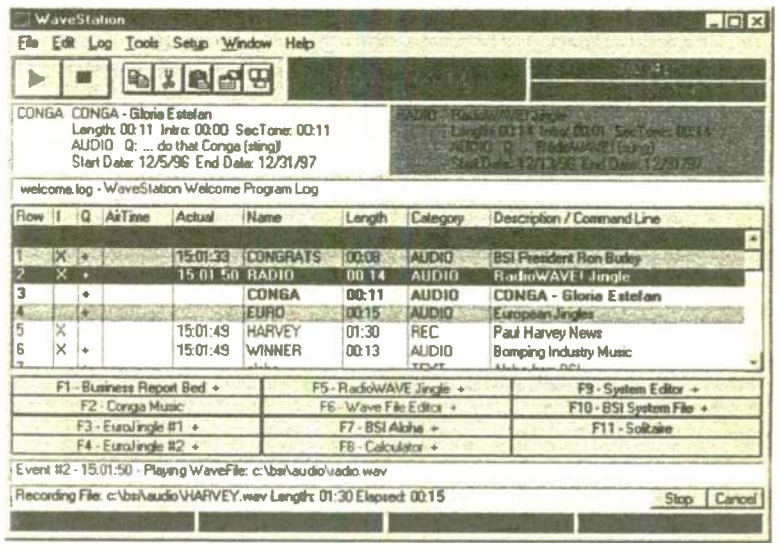

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World Radio History

Workbench

Radio World, May 14, 1997

Cut Center Conductor Safely

John Bisset

Who says you can't teach an old dog new tricks? Take a look at Figure 1 for a new way to cut the center conductor of 1-5/8 inch rigid line.

You can damage the Teflon spacers by laying the center conductor on a workbench or floor, and hacking away with a saw. A better idea is provided by Gary Crouch, CE at WCEM-AM-FM in Cambridge, Md. Because we were hanging transmission line, there was plenty of Kindorf strut available. Gary showed me a way to support the inner conductor so it won't wiggle around, and at the same time, protect the spacers.

Slide your center conductor into the end of a short piece of Kindorf strut/channel. The strut should be long enough to span at least two sets of the Teflon spacers, so the center conductor will be held snug against the sides of the strut. You'll swear the strut was made for this purpose, the fit is so perfect. Move the inner so that your "cut point" extends just beyond the outside edge of the strut, and begin sawing. The spacers aren't damaged, the inner doesn't wiggle around. The result is a nice, even cut.

If you have a hard time making a nice, even cut, use this trick that I learned years ago from Joe Davis when he was with EZ Communications. Take a piece of paper — a sheet of copy paper will do. Tape the edge to the rigid line, and wrap the sheet around the pipe. Line up the edges and tape the paper in place.

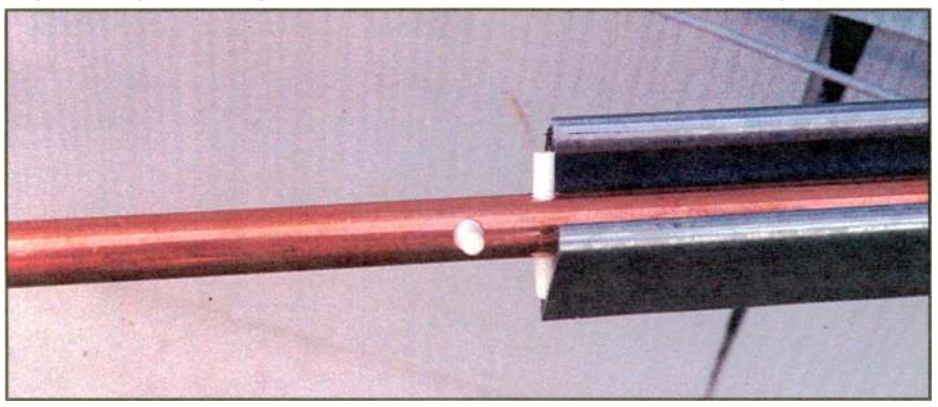


Figure 1: A Better Way to Cut Center Conductor

Now scribe a line, following the paper edge, all the way around the pipe, using a Sharpie Fine Point Permanent Marker. Remove the paper, and you have a nice, even line to follow.

Reach Gary Crouch at (410) 228-4800, and Joe Davis at (703) 591-0110.

★★★

The Nakamichi MR-1 has been a worthy cassette deck for most of our clients. We've assembled a few hints that you may find useful, but they are not "factory authorized"; complete them at your own risk.

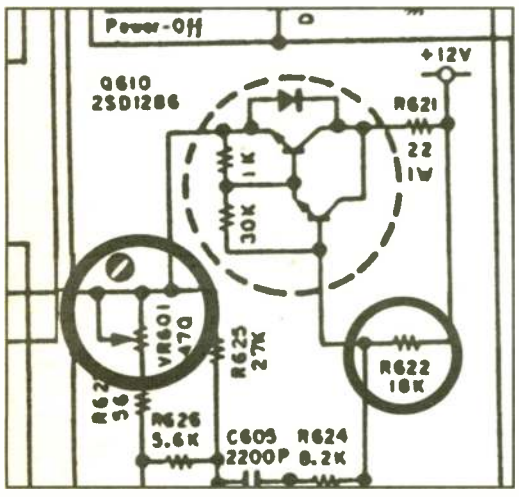


Figure 2: Inside the MR-1

First, if you find the rewind or fast-forward modes unreliable or sluggish, it may be time for a new idler wheel, located behind the front plate.

If you have a need to increase the speed of the take-up/rewind motors, add a 22K-Ohm resistor in parallel with R622 (see Figure 2). This increases the voltage across the motor to about 7 V. It typically measures nearly 6 V. If you make this modification, you must slightly decrease VR601 to keep the proper take-up tension during playback.

If you haven't invested in a Service Manual, do so. It's well written, and summarizes maintenance and troubleshooting tips so you won't lose you mind trying to service a machine.

★★★

Ever wonder what that little vial of oil, which is shipped with every Otari MX-5050, is for? Rather than throw it away, mark your calendar in three-month intervals. The Otari capstan motors contain an oilite bearing at the front end, which requires periodic lubrication (every three to six months, depending on use).

Use only Otari Oil (p/n PZ9E003). To access the bearing for lubrication, remove the capstan shaft dust cap. On most machines, the dust cap unscrews. Depending on your machine, there are two basic types of motors. One has a foam ring surrounding the bronze-colored oilite bearing; one has a felt pad on top of the bronze-colored oilite bearing.

If the motor has a felt pad on top of the bearing, remove the pad and insert three drops of oil in the cavity surrounding the bearing. If the motor has the foam ring surrounding the bearing, apply three drops of oil to the foam ring.

After the initial application, add one drop of oil every three to six months, depending on usage. It is important not to over-lubricate. Be careful not to apply oil to the portion of the capstan shaft that contacts the tape.

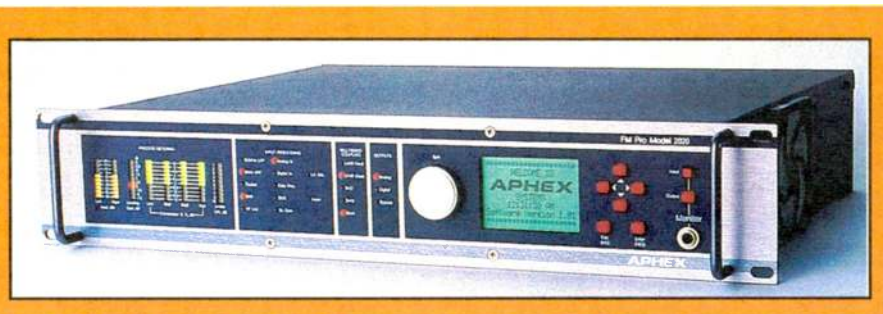
For more information, contact Otari Corporation at (415) 341-5900.

■ ■ ■

John Bisset is a principal with Multiphase, a technical services company. Reach him at (703) 323-7180. Printed submissions qualify for SBE recertification credit. Fax submissions to (703) 764-0751, or send them via e-mail to WRWBENCH@AOL.COM

Radio World Cool Stuff Award

NAB 1997



NAB 1997 Cool Stuff Honorable Mention goes to the **Aphex Systems** 2020 FM Pro digitally controlled FM audio processor.

The unit allows the design of an on-air sound tailored to a specific market and format.

The unit is fully programmable, remotely operable and day-part automatable.

The FM Pro offers analog stereo inputs and outputs, a Frequency Discriminate Leveler, multiband compressor, bass processor, peak limiter and digital remote control. The unit is supplied with 16 user-programmable read-write presets for instant or manual automated recall and eight read-only presets for numerous radio program formats.

For more information, contact Aphex Systems at (818) 767-2929; or ***circle Reader Service 170.***

65 Years Ago

Reprinted from Radio World (September 3, 1932).
Editor's note: The RW of old, printed for a time in the 1920s and 1930s, and today's RW are unrelated except in name.

A RIBBON THAT VIBRATES USED IN NEW "MIKE"

Announcement has been made by the RCA-Victor Company of the perfection of a new microphone which is said to respond with fidelity to all frequencies in the audible range up to 14,000 cycles per second. The new instrument is of the velocity type, which means that it responds to the motion of the air resulting from sound rather than to the pressure of air due to sound. In place of the usual diaphragm the new microphone utilizes a sensitive duralumin ribbon which vibrates exactly with the movement of the air set up by the sound wave.

It is well known that if a very light disc or ribbon be placed in the way of a sound wave, and if the angle made by the plane of the disc or ribbon bears a certain relation to the direction of the wave, the ribbon or disc will tend to set itself at right angles to the wave. This principle is used in the calibration of other microphones because the intensity of the wave can be computed from the amount the disc turns out of its original position.

But the disc, or ribbon, responds to the intensity of the sound without regard to direction, that is, whether the air is moving in one direction or in the opposite. In a sound wave the movement of the air is back and forth. Hence a device like that would respond to twice the frequency if the disc were used as microphone.

World Radio History

Radio World

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Yamaha 2150 ISO w/ch, 300W mono, excel cond, $300. A Wurel, ILCC, 1209 N 7th St, Estherville IA 51334. 712-362-7939.

Ham Radio linear kilowatt parts, roller coils, air-vacuum capacitors, tubes, sockets, meters, dial counters, chassis, panels, cabinets & pwr supply parts. F Yonker, Penn State Univ, 1229 Inverary Pl, State College PA 16801. 814-867-1400.

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Andrew 1-5/8" 193', new, $5/ft; DB half moon STL antennas; RCA 3" 4 port. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

ERI 1105 7 bay FM CP tuned to 92.7, $5000/BO; Comark/ Cablewave CFM-LP 3 bay FM w/radomes, CP, tuned to 94.3, used as backup, $2500/BO. L Fuss, WDTL, POB 1438, Cleveland MS 38732. 601-846-0929.

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Scala CA5-FM, 5 element yagi, rear mount, 9.0 dB gain, $200 ea/$300 both; Scala PD4, 4-way pwr divider, $50. D Magnuson, LPTV W50CC, POB 332, Seymour TN 37865. 423-525-6258.

Hughey & Phillips KG-114 300mm code beacon, excel cond, $500 ea; Puregas 1500 air dryer, 1500 cu ft/day, gd cond, $950. E Black, KXXY, 100 NE 28 St, Oklahoma City OK 73105. 405-524-3770.

Philips-Dodge 3 bay FM, 6 kW on 100.3, $1500. C Jones, WMNY, 7620 Old #6, Santee SC 29142. 803-854-6396.

Stainless steel tower dissipator, $400; 5 kW isocoupler 104.9 MHz, $500. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

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Symetrix TI-101 telephone interface; 501 compressor, 528 voice proc; Eventide Harmonizer H949; Gentner ETF-100 digital freq ext; Motorola C-Quam exciter; CRL SEP 400, PMC 300, Dynafex. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Yamaha GC2020B stereo limiter/expander XLR & 1/4" connections, +4 & -10 switchable inputs & outputs, like new, box, manual, etc, $200. M Schackow, Schackow Recdg, 307 4th Ave E, Lemmon SD 57638. 605-374-3424.

Shure FP32a field mixer, full featured, w/case, $900/trade? Bruce, 406-542-2563.

Shure M67 mic mixer, $75; Wilkinson gain control amp, $50; Wilkinson limiting amp, $50. H Bertram, America First Radio, POB 88, Maidsville WV 26541. 304-328-5810.

Teac 2A mixer, 6x2 w/MB-20 meter bridge, $100. J Borden, Handbasket Prod, 2909 S Logan Ave, Milwaukee WI 53207. 414-482-8954.

Wards Airline 14BR 78 rpm disc cutter w/Shure 9842B mic & blank discs, $200; Symetrix SX202 dual mic-preamp, balanced in & out, phantom power & phase invert switch, $125. J Borden, Handbasket Prod, 2909 S Logan Ave, Milwaukee WI 53207. 414-482-8954.

Tannoy 15" speaker pair, newly recond, $1450; vintage recond tube mic pre's & mixers, $300-$700; new ADC patch bays _" 52 points, $169; ADC TT bays, $129 up; new ADC TT or _" TRS cords, $9; Furman _" to _" patchbays, $95 ea; like new tape, _"x2500' 456, $15 ea; 1" 456, 226, 250, $25 ea; Digitec 3.6 sec delay, $150; new pwr dist/filter rack mt, $75. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

Want to Buy

Ramko ARA-1612 output boards (2+) to populate a routing switcher. J Olson, KPBX, 2319 N Monroe, Spokane WA 99205. 509-328-5729.

Compressors & EQs, tube and solid state. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

AUTOMATION EQUIPMENT

Want to Sell

Conex CG-25 25 Hz gen; Telewave TS 4680 band coupler; Gentner VRC-1000 silent sense. T Moore, WSWR FM, Shelby OH. 419-347-9797.

Kingdom Technologies automation control boxes (2) w/IBM interface card, $75 ea. A McEwing, WGLY, POB 8260, Essex VT 05451. 802-878-8885.

Smartcaster digital automation system, (2) 1.2 GB internal drives, monochrome monitor, $3500/BO; (2) Sony CDK-006 CD jukeboxes used for TM Century UDS, Format Sentry or other automation systems, $700 ea/$1200 both. L Fuss, WDTL, POB 1438, Cleveland MS 38732. 601-846-0929.

SMC 450, 3 Carousels, 24 trays ea, 3 dual cart drawers mdl 721, MSP-12 controller, DAS-12 audio switcher, complete w/video mon, keyboard, in 2 bay racks w/manuals, $12000/BO. Don or Mike, KOPY, POB 731, Alice TX 78333. 512-664-1884.

SMC DP-2 controller, DS-20 & DS-20A switcher, pwr supplies, PDC-4 clocks, 350 Carousels, dual stereo & mono cart players, racks, $2000 +shpg or you pick up. V Richardson, WCYO, 1030 Winchester Rd, Irvine KY 40336. 606-723-5138.

SMC various pieces, CCU Carousel controller (2), TS-25 tone sensors, MA-4 mon amp, stereo, BO. G Gibbs, KWSL, 1113 Nebraska St, Sioux City IA 51104. 712-258-0628.

TM Century UDSI/Sony, complete automation/live assist system w/hardware, software, interfaces, 4 Sony CDK-0067 CD Jukeboxes, excel cond, $5000. T Marker, KPLM, 441 S Calle Encuia #B, Palm Springs CA 92262. 619-320-4550.

Revox A77, $150; SMC 452 Carousel, $300; SMC pwr supply, $100; Schafer 903E Audiofile parts; ITC 750 r-r, $150. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

SMC 3060, 2 racks, 2 Carousels R/S, complete manual & spare parts, $500. C Jones, WMNY, 7620 Old #6, Santee SC 29142. 803-854-6396.

Sony-Mag 3000 automation, 5 reels, 2 Carousels, all brains, 3 racks, working when removed in '95, $1000/BO, u-ship. F Martin, WSNW, 450-B By-Pass 123, Seneco SC 29679. 864-882-9769.

CART MACHINES

Want to Sell

Fidelipac CTR 124 stereo R/P like new, under 100 hrs, $1295. J Ostler, KTKK, 2470 N Fairfield, Layton UT 84041. 801-771-4271.

Harris cart PB's (3). T Moore, WSWR FM, Shelby OH. 419-347-9797.

ITC 99B, 3 deck, SP, RP; BE & Audi-Cord, both mono & stereo. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

ITC SP-0003 (2) mono single play in OK cond, $125 ea +shpg; ITC R/P 0003 mono R/P in OK cond, $200 +shpg. G Gibbs, KWSL, 1113 Nebraska St, Sioux City IA 51104. 712-258-0628.

ITC WP, $500/BO; ITC RP, $750/BO; Gates/Harris 994-6701-002 (2), $1200/BO. Don or Mike, KOPY, POB 731, Alice TX 78333. 512-664-1884.

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ITC Delta - new pinch rollers: Mono playback (2), record/play (2), stereo record/play (1). MOTIVATED! Spotmaster series 2000 record (1). Wes, 818-798-9128.

ITC upgrade PB to record, amps only-no deck, 3 tone, stereo, $175. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

CONSOLES

Want to Sell

Sparta Centurion II 10 chnl stereo; CCA 10 chnl stereo; BE 8 chnl mono; Auditronics 110 Grandson. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Harris Stereo 80, $1000. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

Opamp Labs 425 DC (5), octal plug-in units, new, BO. M Crosby, 408-363-1646.

Shure M-67 mic mixer, excel cond, will pay shpg, $175; McMartin MX-5 5 input mono mixer, excel cond, will pay shpg, $125. D Meyer, 1123 Del Mar, Santa Barbara CA 93109. 805-962-8273.

Sparta A-15 5 input rotary pots, mono, gd cond, $100. E Swanson, WPKR, POB 3450, Oshkosh WI 54903. 414-236-4242.

Soundcraft 600 32x16 w/patchbay, mint, $4950; Tascam 512 12x8 mixer, $750; Tascam 520 20x8x16 mixer, $1750; Tascam 30 8x4, $450; Allen & Heath Syncon 28x24, great sounding, $5000. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-9728.

Want to Buy

LPB Monogram II, need 2 or 3 line level chnl module cards. F Truatt, WTBO, 62 N Main St, Florida NY 10921. 914-651-1110.

Collins 212R1 audio rack pwr supply, schematics, switches, meters. P Schartel, KCXL, 310 S La Frenz, Liberty MO 64068. 816-792-1140.

Howe 7500 or parts, any Howe console. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

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Complete mobile DJ system w/all equip & over 10,000 music titles, $6000. D Smith, D Smith Recording, 356 Baldwinville State Rd, Winchenoon MA 01475. 508-297-4856.

EV SH-1502ER (2) two-way mobile loudspeakers for music PB/snd reinforcement, 15" cast frame woofer & titanium driver/horn, bkl road-carpet covered, steel corners, handles & rubber ft, 800 W peak pwr handling, excel cond, $295 ea (1 pr). B Fisher, KPOK, POB 829, Bowman, ND 58623. 701-523-3883.

Fostex EQ, $100; (4) bass reflex instrument speakers, $100 ea; portable DJ outfit, $1000. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

RCA Automatic, giant 5"x7" cassette, heavy duty, 2 motors, battleship construction. F Yonker, Penn State Univ, 1229 Inverary Pl, State College PA 16801. 814-867-1400.

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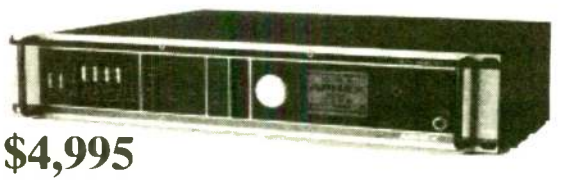

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CRL MBL-100 AM mod bandwidth, hardly used, $3100/BO. F Truatt, WTBO, 62 N Main St, Florida NY 10921. 914-651-1110.

DAPs 310 (2) limiters. T Moore, WSWR FM, Shelby OH. 419-347-9797.

MicroCon Flexi-Mod system one composite clipper, new, rack mount, $750. E Swanson, WPKR, POB 3450, Oshkosh WI 54903. 414-236-4242.

Orban 2200 digital Optimod, as new w/digital AES/EAU interface, $3400. P Christensen, Christensen Prod, 11142 Ralsy Creek S, Jacksonville FL 32225. 904-619-3899.

UREI, dbx, WE, Gates, Collins, Altec, all tube types, etc. The Great Wireless Talking Machine, 419-782-8591.

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 972-271-7625.

MICROPHONES

Want to Sell

EV 660 mic, dual Z, super cardioid, brushed aluminum, excel cond, BO; Telex headset mic, single muff, like new, BO. A Wurel, ILCC, 1209 N 7th St, Estherville IA 51334. 712-362-7939.

EV MC-150 low Z, cardioid, blk finish, new cond, $75. A Wurel, ILCC, 1209 N 7th St, Estherville IA 51334. 712-362-7939.

WE 639-B w/yoke, connector & stand, mint, $900; WE 639-B w/WE table stand, mint, $900; Altec 639-B, $600; RCA44A, 44B, 44BX, Telefunken tube mic preamps V76, V72, V72a, Telefunken tube bottle mic w/connector & pwr supply w/M-7, M-9 capsule set, call before 10PM EST. 423-821-6099.

Wurlitzer 1950 & 1960 juke boxes; metal & wood cart racks; movie props from Howard Stern's movie "Private Parts". J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

RCA 74B junior velocity bi-directional ribbon mic, $350; Turner S33D brushed chrome art-deco style cardioid dynamic, $125. J Borden, Handbasket Prod, 2909 S Logan Ave, Milwaukee WI 53207. 414-482-8954.

Sony ECM-22 (2) condenser mics in excel cond, $100 ea; EV 635-A w/cable & clamp, as new, $50. G Hutchins, Hutchins Snd Prod, 116 Roberta Dr, Hendersonville TN 37075. 615-264-1373.

RCA 77DX, BK1A, $395; vintage PA mics, Shure 51 Elvis, $75, EV731, $95, EV 630 or 635, $75, RCA mini 77" shaped, $295. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

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RCA, Neumann, WE, all types, on air lights, etc. The Great Wireless Talking Machine, 419-782-8591.

Mic's with slags (call letters), slags, on-air lights, clocks with call letters & other interesting old mics, etc. 1-800-727-2369.

Neumann, Sennheiser, AKG, many models. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 972-271-7625.

RCA 77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

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Rotron Blowers for Elcom, Harris, CCA, CSI, McMartin, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St. Omaha, NE 68164 402 493 1886 FAX 402 493 6821

Nordic Traffic System, MacIntosh system, complete hardware & software for commercial station, operates on 2 networked MacII's, 3 yrs old, excel cond, support avail, $2500. T Marker, KPLM, 441 S Calle Encuia #B, Palm Springs CA 92262. 619-320-4550.

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General Radio 2 kW Variac heavy duty cased w/spoke wheel knob, 230 V input, 0-240V output. F Yonker, Penn State Univ, 1229 Inverary Pl, State College PA 16801. 814-867-1400.

Johnson Cardwell B/W roller inductors, counter dials, vacuum/air capacitors, Barker-Williamson 5 band output coils & more. F Yonker, Penn State Univ, 1229 Inverary Pl, State College PA 16801. 814-867-1400.

Telfax TX80 sports mixer, $300; 1929-1945 vintage AM radio collection, $800; Russco preamps, $50 ea. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

Want to Buy

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NYNY 10003. 212-674-3060.

MONITORS

Want to Sell

Belar FMM-1 mod mon tuned to 92.7 & Belar FMS-1 stereo mon, $1000/BO; Belar RFA-1 FM RF amp tuned to 92.7, cracked meter, otherwise OK, $250/BO. L Fuss, WDTL, POB 1438, Cleveland MS 38732. 601-846-0929.

Philips 567 bi-amplified motion feedback 3 way speaker system w/built in pwr amps, 22x13x11, 60 W ea, $500/pr +shpg. S Lawson, KAK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

EAS FM Crystal Controlled receivers, New and Used. Also SCA Receivers. Goodrich ent inc, 11435 Manderson St, Omaha NE 68164. 402-493-1886.

Professional SCA decoder cards, $20; SCA radios, $35 up. 1-800-944-0630.

RECORDERS

Want to Sell

Ampex 350 transport only, FT, 10.5" reel, 7.5-15 ips, gd cond, $500; Ampex PR-10 (2) tube electr micpre, mono, vgc, $400 ea; Teac X3 1/4 trk, 7.5-33.75 ips rack mount, gd cond, $350; Revox A-77, 2 trk 3.75-7.5 ips rack mount, gd cond, $400; Shure M688 stereo mic mixer, 4 mic inputs, mint cond, $150. A Funk, Masque Snd & Rcdg Corp, NYNY, 718-421-0582.

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Revox A77 (4) r-r decks. T Moore, WSWR FM, Shelby OH. 419-347-9797.

Revox A-77 R/P tape deck, 7.5 & 15 ips, gd cond; 7.5 & 3.75 ips, $225 +shpg; Revox PR-99 stereo PB only, gd working cond, $325 +shpg; ITC 850 r-r tape deck w/factory remote control assembly, NAB hub, 7.5 & 15 ips, gd cond, $300 +shpg. G Gibbs, KWSL, 1113 Nebraska St, Sioux City IA 51104. 712-258-0628.

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Teac tube type, looks like Ampex; Otari 5050 MKII; Revox PR-99. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Teac/Tascam 40-4 4 trk; Teac 3340 4 trk, both in gd cond, $250/BO; Teac A3300SX (2), fair cond, both need new heads, $100/both/BO; Revox A77, needs work, BO. J Winters, Winterssound, 45 E Washington St, Elizabethtown PA 17022. 717-367-1119.

Teac/Tascam W520R dbl auto reverse cassette deck, fits standard 19" rack, immaculate, $225 includes shpg/ins. S Lawson, KAK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

ITC 770 2 trk reproducer (4), fair cond, 7.5 ips, 10", $100 ea. E Swanson, WPKR, POB 3450, Oshkosh WI 54903. 414-236-4242.

Schafer 2 chnl logger, _" tape; Metrotech 400 series 4 chnl, 1 pass logger, _" tape; (2) Metrotech 500 series 2 chnl, 2 pass logger, _" tape; (2) Dictaphone 4000 series 10 chnl logger, _" tape w/time code gen/reader, all working when removed, cond unknown, sold as is, BO +shpg. M Crosby, 408-363-1646.

Technics RP-9690 remote control box for RS-1500, 1506 & 1520 r-r's, $75. D Meyer, 1123 Del Mar, Santa Barbara CA 93109. 805-962-8273.

Technics RS1520, 10" r-r, 3 speed & pitch control, excel cond, $350. M Trumble, Trumble & Assoc, 409 Washington #422, Hoboken NJ 07030. 201-795-1201.

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Moseley TRC-15 studio & xmtr units, BO. T Moore, WSWR FM, Shelby OH. 419-347-9797.

Moseley Tri 450 MHz link; Marti M30B; Marti RPT-1; Motorola 161.76 base station; Moseley 505C rcvr. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Comrex Nexus codec, like new, used twice, 1 yr old (2), $3500. Dave, WYLI, 233 Pennsylvania Ave, Marietta OH 45750. 614-373-0910.

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LNB amps LA-915 in line, 20 dB gain, low noise, $10 ea. A Wurel, ILCC, 1209 N 7th St, Estherville IA 51334. 712-362-7939.

Microdyne 1100 (2) FFC(XI)R(DC)L & one each SCPC demod PCDR(S), cond unknown, BO; Zephyr 304 main frame w/tuner, 391 rcvr & 321 audio demod, BO. G Gibbs, KWSL, 1113 Nebraska St, Sioux City IA 51104. 712-258-0628.

Wegener FM squared sat rcvr w/1606-II, 1606-02, 1603-08, 1646, 1645, 162901O & 1605-12 modules. T Moore, WSWR FM, Shelby OH. 419-347-9797.

Scientific Atlanta CSR-3610 digital sat rcvr, $250. Dave, WYLI, 233 Pennsylvania Ave, Marietta OH 45750. 614-373-0910.

Wegener satellite rcvr for Jones Network, like new. Kevin, KMCM Rm 1404 E, 332 Minnesota St, St Paul MN 55101. 406-232-5626.

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World Radio History

TAPES continued...

WNNZ, 1500 Main St, Springfield MA 01115. 413-736-6400.

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Denon 970FA CD player, like new, digital out/analog out, $1350. K Thomas, Rebel Recdg, 5555 Radio Ln, Jacksonville FL 32205. 904-388-7711.

Microtran table top tape degausser, handles 1"-2" tapes, $150/BO; mechanical tape timers, Lyrec & Seike/Spotmaster, new & used. M Crosby, 408-363-1646.

WE Hickok KS15750-L1 three meter tube tester, navy gray aluminum case, 1963 tube roller chart, tests transmitting & receiving tubes; Kin-Tel 202-B microvolt meter, DC, 0.3 mV to 1000 V, tube type, meter mirror scale, zero ctr. F Yonker, Penn State Univ, 1229 Inverary Pl, State College PA 16801. 814-867-1400.

Want to Buy

Heathkit IO-10 small portable tube type oscilloscope from late 1960s. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

TUBES

Want to Sell

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Tektronix 453 oscilloscope; Floatron 48UDC 200 amp; Leader LBO 35B oscilloscope. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

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3CX15,000H3
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3CW20,000H7
3CW30,000H3
4CX250B
4CX250BC
4CX250BM
4CX250BT
4CX250R
4CX350A
4CX350AC
4CX400A
4CX800A
4CPX800A
4CX1500A
4CX1600B
4CX3500A
4CX5000A
4CX5000R
4CX7500A
4CX10,000D
4CX15,000A
4CX15,000J
4CW10,000A
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Amperex, EIMAC, RCA, 833C, 4-400, 8877, 4CX250B, 4X150A, 807, 4CX5000A, 3CX2500A3. Westgate 800-213-4563.

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Call Simone Mullins,
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to reserve space in the next issue.
Use your credit card to pay, we now accept VISA and MASTERCARD.

Select from these categories for best ad positioning:

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Audio Production (Other)
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Tapes, Carts & Reels
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Tubes
Turntables
Positions Wanted
Help Wanted

Classified Advertising Rates Effective January 1, 1997

	1x	3x	6x	13x
1-9 col inch (per inch)	$69	66	61	55
10-19 col inch (per inch)	$52	59	55	50
Distributor Directory	$105	100	95	90
Professional Card	$74	68	62	56
Classified Line Ad		$2.00 per word		
Blind Box Ad		$15 additional		

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is $207, at the 3x rate $195, at the 6x rate $183, at the 12x rate $165, etc.

World Radio History

TRANSMITTERS

Want to Sell

BE FM-1B w/o exciter, w/MVDC controller, excel cond, $10,995. T Marker, KPLM, 441 S Calle Encuia #B, Palm Springs CA 92262. 619-320-4550.

CCA 10,000P FM; Harris SX-1 1000 AM; CSI T-1-A 250 AM. J Phillips, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Collins 831D-1 2 kW FM in gd working cond, pick up only, $3995/firm. ID Byars, WCPI, 110 S Court Sq, McMinnville TN 37110. 615-506-9274.

Dielectric DCRH3 3 bay FM tuned to 104.9, medium pwr, $4000; 400' 1-5/8" coaxial cable, $2000. N Hershberger, WKKY, 95 W Main St, Geneva OH 44041. 216-466-9559.

Gates 250GY AM, 250-500 W on 1420 kHz, in Lubbock TX in working cond, $2100; CCA 10DS FM 10 W exciter, 101.1 MHz mono, $400; Cunningham CM30-50 AM, newly mfg, tube type FCC approved, adjusts 0-50 W, rack mount 19"x8.75"x12", 15 lbs, $750. J Cunningham, KEOR, Rt 2 Box 113BG, Stonewall OK 74871. 405-265-4496.

Gates BC1-H in gd cond, tuned to 640 kHz, $2000. C Hahn, WNNZ, 1500 Main St, Springfield MA 01115. 413-736-6400.

Gates FM1H3 1 kW FM & Harris MS-15 FM exciter, currently on air on 95.3, $5000/BO. L Fuss, WDTL, POB 1438, Cleveland MS 38732. 601-846-0929.

Gates FM-2H3 2 kW FM xmtr w/brand new final tube & solid state IPA w/o exciter, $6000; Gates FM250C 250 W FM xmtr w/manuals, $500. J Stromquist, WNCB, 2828 Piedmont Ave, Duluth MN 55811. 218-722-3017.

Harris 2.5 kW 1978 w/MS-15 exciter tuned to 104.3 in gd cond, you pick up, $9000; Collins 1967 831-D1 kW w/TW-3 exciter tuned to 103.3 in gd cond, $2500. A McEwing, WGLY, POB 8260, Essex VT 05451. 802-878-8885.

ITA 10 kW FM, on air until 2/97, $5500/BO. J Kellstrom, KZBR, 125 Corporate Terr, Hot Springs AR 71913. 501-525-9700.

Collins 21M 10 kW AM w/manuals, needs pwr supply transformer, 1954 vintage, BO; Collins KWS-1 amateur xmtr, never used, companion Collins amateur rcvr mdl 75A-4 also avail w/manuals, BO. R Epperson, WPAQ, POB 907, Mount Airy NC 27030. 910-786-6111.

Collins 300-G, 250 W AM in excel cond, $800/firm. Scott, WMRO, 701 N Blythe St, Gallatin TN 37066. 615-451-2131.

CSI T-1-F 1 kW FM. D Davis, KMIN, 1217 Valencia NE, Albuquerque NM 87110. 505-255-2431.

DEMO DIGIT™ Exciters for sale.

Limited availability of Harris DIGIT™ exciters used for demo. These exciters have been out to various customer sites to demonstrate the world standard DIGIT™ audio performance. We have a limited number available for immediate sale. Tuned and tested to your frequency, these exciters carry a 90 day warranty. $6,000.00 each, specify digital or analog I/O.

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20 KW	FM	1973	Collins 831G	50 KW	AM	1978 Harris MW50C3 (1100 KHZ)
20 KW	FM	1974	Harris FM20H/K	50 KW	AM	1973 Continental 317C
20 KW	FM	1967	Collins 830H-1B	50 KW	AM	1978 Continental 317C-1
				50 KW	AM	1981 Continental 317C-1
				50 KW	AM	1981 Harris MW-50B
				50 KW	AM	1982 Harris MW-50B

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ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name _____
Title _____
Company/Station _____
Address _____
City/State _____
Zip Code _____ — _____
Telephone _____

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a **paid** basis. Line ad listings & display advertising are available on a per word or per inch basis.

I would like to receive or continue receiving **Radio World** FREE each month. ❑ Yes ❑ No

Signature _____ Date _____

Please check only one entry for each category:

I. Type of Firm

- ☐ D. Combination AM/FM station
- ☐ A. Commercial AM station
- ☐ B. Commercial FM station
- ☐ C. Educational FM station
- ☐ E. Network/group owner
- ☐ F. Recording Studio
- ☐ K. Radio Station Services
- ☐ G. TV station/teleprod facility
- ☐ H. Consultant/ind engineer
- ☐ I.Mfg, distributor or dealer
- ☐ J.Other _____

II. Job Function

- ☐ A. Ownership
- ☐ B. General management
- ☐ C. Engineering
- ☐ D. Programming/production
- ☐ G. Sales
- ☐ E. News operations
- ☐ F. Other (specify) _____

WTS ❑ WTB ❑ Category: _____
Make: _____ Model: _____
Brief Description: _____
Price: _____

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Make: _____ Model: _____
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*Closing for listings is every other Friday for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

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World Radio History

EMPLOYMENT

TRANSMITTERS continued...

Used McMartin BG-5M, 5 kW FM tuned & tested on your frequency, completely refurbished; Also: 3.5 kW & 25 kW. Goodrich ent inc, 402-493-1886.

Want to Buy

Gates BC-1J 1 kW AM xmtr. D Davis, Davis Bdctg, 1217 Valencia Dr NE, Albuquerque NM 87110. 505-255-2431.

RF line panel meter for Collins 20V-3 AM xmtr, working or not. Scott, WMRO, 701 N Blythe St, Gallatin TN 37066. 615-451-2131.

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

TURNTABLES

Want to Sell

Harris CB 1201 TT's. T Moore, WSWR FM, Shelby OH. 419-347-9797.

Stanton 310, like new cond (2), $110 +shpg; Russco FPSB Fidelity Pro in gd cond (2), $125 +shpg. G Gibbs, KWSL, 1113 Nebraska St, Sioux City IA 51104. 712-258-0628.

Gates CB 1200 TT w/preamp, 3 speed, mint cond, $135 +shpg. W Tinsley, Airchecks USA, 1123 Holcomb St, Watertown NY 13601. 315-788-0914.

ABOUT OUR EMPLOYMENT SECTION

HELP WANTED: Any company or station can run "Help Wanted" ads for $2/word or buy a display box for $69/column inch. Payment must accompany insert, use your MasterCard or VISA; **there will be no invoicing.** Blind box numbers will be provided at an extra charge of $15. Responses will be forwarded to listee, unopened, upon receipt. Call 703-998-7600 for details.

POSITIONS WANTED: Anyone can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 2 issues of *Radio World*. Contact information will be provided, but if a blind box number is required, there is a $15 fee which must be paid with the listing **(there will be no invoicing).** Responses will be forwarded to the listee, unopened.

Mail to: Broadcast Equipment Exchange
P.O. Box 1214, Falls Church, VA 22041 Attn: Simone Mullins

HELP WANTED

AM/FM Engineer for group of five Los Angeles stations. At least five years experience in transmitter/studio/STL repair and maintenance, and special projects. Contact: Bill banks, Liberman Broadcasting Inc, 5724 Hollywood Blvd, Hollywood CA 90028.

Broadcast Engineer: Chancellor Broadcasting Company, Sacramento, seeks a qualified individual to maintain AM/FM transmitters, studio and related equipment. Position requires basic knowledge of electronics, including AC/DC and RF theory. Applicant must be able to understand andd use UHF transmission equipment and have working knowledge of professional audio techniques. Clean DMV record a must. Candidate must be flexible with work hours as some duties require early morning, late evening, or on-call shifts. Candidate must also work well with others. Computer, networking, and digital electronics experience a plus. SBE certification required. Resume to: Joe Torsitano, 1440 Ethan Way #200, Sacramento CA 95825, or fax 916-922-9921.

CBS owned KRLA-AM and KLSX-FM in Los Angeles are looking for a motivated, positive and experienced individual to fill the position of Chief Engineer. Applicants must have at least 5 years hands-on experience with AM, DA and FM operations from studio to transmitter, and strong computer hardware knowledge. Duties include managing budgets, and an engineering staff while maintaining FCC compliance for both stations. This person must be a team player with a great attitude. Interested parties should send their information to Bob Moore, Vice President, General Manager, KRLA, KLSX-FM, 3580 Wilshire Blvd., Los Angeles, CA 90010. CBS Radio is an equal opportunity employer.

Engineer/Game Producer Needed! Major College Radio Sports Network is seeking a qualified, full-time engineer/producer. Can you fix things? Maintain radio broadcast equipment? Build a studio? Use a digital editor? Do you have a good ear for production and mixing at game site? For the right person, this is a great job in one of the top places in America to live. Hard workers only please. Send resume to: Mick Mixon, Tar Heel Sports Network, PO Box 3300, Chapel Hill NC 27515.

PRODUCTION DIRECTOR
Immediate opportunity. Full time, off-air Production Director for Chancellor's successful Sacramento cluster: KFBK, KGBY, KHYL, KSTE. We need a pro experienced in multi-track, digital production. Candidates should have great organizational skills, be able to think, write and produce creatively, have a great attitude, and good voice and diction. RUSH resume and production samples to 1440 Ethan Way, Suite 200, Sacramento, Ca. 95825. Attention: Bob Laurence.

Radio Engineer: Chief engineer for university public radio and campus cable radio station. Includes FCC compliance; repair and maintenance of transmitters, buildings, and towers; selection, installation and networking of computer hardware and software; installation and maintenance of all broadcast equipment; and working with students in broadcasting. Requires bachelor's degree or equivalent experience and working knowledge of areas listed above. Prefer Senior Broadcast Engineer designation. Application deadline: May 19, 1997 or until filled. Send letter of application, resume, and names and telephone numbers of three references to: Director of Human Resources Management, Northwest Missouri State University, 800 University Drive, Maryville, MO 64468. AA/EOE. Northwest encourages women and minorities to apply.

POSITIONS WANTED

Any on-air, copywriting or production position wanted. M Wolf, 405-325-9584.

Broadcasting school graduate ready & willing to relocate, enjoys air shifts, prod & hard work, 30 yrs old interested in Western US. Darren, 405-298-5292.

Experienced engr/tech seeks AM/FM station, will consider relocation. 512-321-3594.

Experienced, dedicated, knowledgeable, high school/college sports reporter seeks position, professional attitude team player, computer skills, Western America. Jay, 972-480-8918.

News announcer, production, AT, adult sounding, tape avail on www.airtalents.com & then go to new 004, or call Alex Kuhn, 513-777-8423.

Experienced, Desire air show w/prod, any format, for creative demo & resume call: 906-226-2962.

If you program directors are looking for a truly knowledgeable & prof R&B disc jockey w/a great personality that can boost your bottom line & get your rating quarter a lift then call me to receive a free 1 hr audiotape. G Foster, 1-800-414-4348.

Looking to be part of your future success, 2 yrs on-air, creative, dynamic, hungry, motivated. B Cooper, POB 1054, Cincinnati OH 45253-1054.

Joseph McClane, broadcast graduate, hard-charging & motivated seeking position in East Coast station. 405-677-8147.

News anchor/producer, commercial prod, air talent for adult formats avail now, downsizing casualty. Alex Kuhn, 513-777-8423.

Recent graduate seeks on-air announcer position with religious station, willing to travel. Lyndall, 405-677-6524.

Veteran FM/SM/PD/MD/air talent coming back from early retirement w/new Country format that will make your FM a winner. Will consider all situations & locations, salary, compensation & availability are negotiable. Call 407-246-4534 or write in confidence to: J.B. Russell, POB 1662, Stuart FL 34995.

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This listing is provided for the convenience of our readers.
Radio World assumes no liability for inaccuracy.

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A-500 Console S/N 20789 delivered April 1993
A-500 Console S/N 20792 delivered April 1993
A-6000 Studio Furniture delivered March 1995
A-6000 Console S/N 22536 delivered March 1995
R-16 Console S/N 22557 delivered March 1995
SP-5 Console S/N 22593 delivered April 1995

1995 Academy of Country Music Award
1995 Marconi Country Music Award
1995 Billboard Country Music Award
1995 Country Music Association Award
1995 Country Music Association SRO Award
1995 Gavin Country Music Award
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1996 Academy of Country Music Award

Wheatstone Model A-6000 Audio Console shown

Wheatstone Corporation
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