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Are You Protected?

Act now to prevent lightning damage to your facility next spring.
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Breaking the Code

Charles Fitch begins a new series in RW explaining the National Electrical Code.
See Page 38



Radio World®

The Newspaper for Radio Managers and Engineers

October 14, 1998

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Visit RW Online at www.rwonline.com

USADR to File 'Historic' Petition

CBS-Backed Firm Seeks DAB Rulemaking; Claims Use of IBOC and DAB Names

by Leslie Stimson

COLUMBIA, Md. In what it calls a historic step, USA Digital Radio said it would file a petition for rulemaking with the FCC aimed at establishing in-band, on-channel digital audio broadcasting in the United States.

USADR, funded by CBS Corp., has been working toward this goal for some time. It planned to be the first of the three

IBOC DAB developers to file a petition for rulemaking at the FCC. Observers say this is an important step toward making DAB both a regulated technology and a viable business.

USADR began developing IBOC DAB in 1990. Since that time, digital radio in other forms has moved ahead. The FCC has licensed digital radio services from satellites, and broadcasters in other countries have begun to send programming in digital on other bands.

In 1991, USADR filed comments at the FCC in the proceeding to license satellite-delivered DAB. In those, USADR expressed its intentions to develop IBOC DAB. But this is the first time that any proponent has reached the point of asking the FCC to consider a rulemaking for a terrestrial DAB system in the United States.

USADR planned to turn over hundreds of pages of documents on or about Oct. 6, and to brief Chairman FCC Chairman Bill

Kennard and Mass Media Bureau Chief Roy Stewart about the filing. USADR also planned to brief NAB and the Consumer Electronics Manufacturers Association about the petition.



Getting the regulatory process moving is important for USADR's business plan for IBOC DAB. President and CEO Robert Struble said, "Every time we talk to receiver manufacturers, we have the same discussion. The second or third question is always, 'How far along are you on the regulatory process?'"

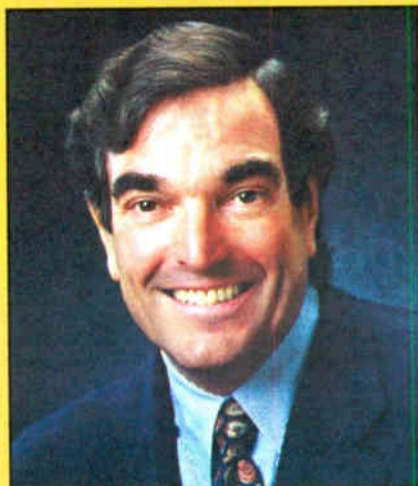
In the filing, USADR planned to argue three points: First, the radio industry must convert to digital; second, in-band, on-channel is the only practical way to

See IBOC, page 12 ▶

NEWS MAKER

Jeff Marcus, Across Platforms

DALLAS When cable executive Jeffrey Marcus was named Chancellor Media Corp. president and chief executive officer, Chairman Thomas Hicks said one of the key factors behind the



Jeffrey Marcus

success of Marcus' previous company, Marcus Cable, was "Jeff's ability to identify and consummate accretive transactions, and ... create an environment in which the newly assembled management team worked together cooperatively."

See MARCUS, page 18 ▶

Next level radio solutions: booth #606 at the Fall NAB.



On display this year at the Fall NAB Radio Show in Harris booth number 606 will be the Harris ZCD FM transmitter, DX AM transmitter, DIGIT CD Digital FM Exciter, CD LINK all-digital uncompressed 950 MHz STL, DRC2000 Digital Audio Console; Orban AirTime and Audicy, and VoxPro by Audion Labs

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next level solutions



NEWSWATCH

Kennard Eyes EEO Revisions

WASHINGTON FCC Chairman Bill Kennard said he soon will propose revising the equal employment opportunity policies of the FCC to address the concerns of the U.S. Court of Appeals for Washington, D.C., which overturned those policies earlier this year. The court in September denied an FCC request to rehear the earlier decision by a three-judge court panel. The policies remain in effect while the case is pending.

Before the latest decision, Kennard told attendees at the convention of the American

Women in Radio and Television, "We know the rules work ... I am a product of those rules. And I know that we still need them."

NAB President/CEO Eddie Fritts said, "Broadcasters are committed to diversity in the workforce and we are proud of our industry's record. Despite the court's decision, we encourage the industry to continue vigorously pursuing this goal."

Minority Owners Consolidate

WASHINGTON As the nation's broadcast owners consolidate, so, too, do minority

owners, leaving overall minority station ownership at low levels, according to a 1998 study released by the Commerce Department's National Telecommunications and Information Administration. The 1998 survey of minority ownership of full-power commercial radio and TV stations in the U.S. found 160 minority owners controlled 337 stations, out of a total 11,524 stations. Last year, there were 182 minority owners.

Overall, minority ownership showed a negligible increase from 2.8 percent in last year's survey to 2.9 percent this year, or a 15-station gain. The most significant gains were made by Hispanic owners, while black and Native American ownership fell, NTIA said.

Emmis Reports Strong Q2

INDIANAPOLIS Emmis Comm. Corp. reported record second-quarter performance. Led by the performance of its radio operations, station net revenue increased 13 percent in the second quarter of this year, compared to the same period a year ago. Of the positive numbers, Emmis Chairman and Chief Executive Officer Jeff Smulyan said, "At Emmis, we believe in managed vs. mass acquisition."

After-tax cash flow was \$0.92 per share, up 31 percent over last year's second quarter. Smulyan said even Emmis' standalone stations in Chicago and Los Angeles performed well.

Take a LOOK at THIS:



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DIM	
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Line	114dB
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When the President Hits the Road

by Lynn Meadows

WASHINGTON President Clinton, like presidents before him, often heads overseas, whether to take part in diplomacy or, some might say, to escape the crush of media coverage at home.

When he arrives abroad, the mass of media that normally follows him around cannot crowd around him at every stop. That is when the pool concept kicks in.

The pool system is a fact of life for radio reporters covering the president, but it wasn't always so. It began after Richard Nixon visited China in 1972. Instead of every network sending its own technician and equipment to every site the president visited, network officials jointly decided to set up and share one good system wherever the president traveled.

Radio pool

Participants in the radio pool are ABC Radio, CBS Radio, Voice of America, Associated Press Radio, National Public Radio and Westwood One. Each network has a White House correspondent who travels with the president. The pool also

serves correspondents for German radio and the British Broadcasting Corporation for a fee.



Photos by Steve Stefany, ABC Radio

Accra, Ghana — first stop in a six-nation African trip. From left: Rusty Lutz, ABC Radio; Mark Smith, AP Radio; Peter Mayer, Westwood One Radio Network; Mark Knoller, CBS Radio

For every presidential trip, one radio network is responsible for setting up the pool facilities. Generally, the radio pool producer will be from the same network as the television pool producer.

For example, CBS Radio sets up the radio pool when CBS Television is setting up the television pool. Likewise,

ABC Radio takes over the job when ABC Television handles the TV pool; and Westwood One takes over when NBC Television sets up the TV pool. NPR or AP Radio take turns setting up the radio pool when Fox or CNN handle the TV pool.

The primary responsibility of the radio pool producer is to work with the White House advance team to set up the filing centers. The radio pool producer usually takes a trip with the White House advance group before each presidential trip overseas to survey the cities the president will visit.

\$80,000 depending on the trip. That sum covers costs such as transportation and lodging for the people working on behalf of all the networks. The figure also covers the cost of shipping equipment and installing ISDN lines. The budget varies depending on the length of the trip and what city the president is visiting.

The pool concept relies on cooperation among organizations that normally consider themselves competitors. After the survey trip and before the president's trip, the pool producer conducts several conference calls with the other networks to discuss the schedule, what the networks will need on site and the facilities that are available.

Most important is setting up the pool line — preferably an ISDN line — back to

Budgets for the radio pool run from \$50,000 to \$80,000 (for equipment shipping, installation etc.) depending on the trip.

One representative each from television, radio and print media go on this trip. The radio pool producer reports to the other networks and recommends what is necessary to do the job, including a rough estimate of the budget. Budgets for the radio pool run from \$50,000 to

the United States. The line is used to send all presidential speeches directly to the network news desks in the United States. The producer makes sure that all the available material that can be used by everyone gets down the pool line to the newsrooms at the

See POOL, page 8 ▶

Five Countries ... No, Better Make It Six

KIGALI, Rwanda Rusty Lutz, assignment editor for ABC Radio in Washington, has been in rotation as a radio pool producer for eight years. (See story above.)

He and ABC Radio Technician Steve Stefany set up the pool for Bill Clinton's Africa trip this spring.

"Africa was different because of the lack of infrastructure within the countries we visited," said Lutz. From the start, the trip was described as a five-nation trip to Ghana, Uganda, South Africa, Botswana and Senegal. As the plane was about to leave, the pool learned that Clinton would stop in Rwanda for six hours.

"That was a hell of a challenge," Lutz said. He and Stefany set up the pool in the archway of the airport. "It was raining," he recalled.

The ABC team took an Explorer satellite phone from Globecom Systems Inc. Lutz called the little device a "godsend."

Stefany and Lutz used two codecs on their Africa trip. For most of the visit, they used the Musicam USA MICRO56+ codec. In Cape Town, South Africa, they used a Telos Zephyr codec and connected directly to New York on an ISDN line without a satellite.

This pool was a bit different than usual. Typically, Stefany said, the pool people go ahead of the president and leapfrog from city to city if he is making several stops.

On the Africa trip, however, Lutz and Stefany did not go ahead of time and instead traveled on the press plane which usually flies a little bit in front of Air Force One to allow time for the press to set up their equipment.

"A lot of times, we would have two or three hours before there was an event, but in Rwanda, we landed at the

airport, the president was there and he spoke very shortly thereafter and it was raining and we had to set up right then and there," said Stefany.

There is no time for error in that situation.

"It's hair-raising to travel with the president and have to set up at each stop as everybody arrives because all the correspondents want to file right after they land," he said. Further, he and Lutz never knew what resources would be available at their stops.

"The plugs are different and you usually end up making some kind of tree of adapters going into the local socket. And that tends towards a loose connection if it leans the wrong way," said Stefany.

For all the time pressure, however, Lutz said that the Africa trip was much less hectic than when he served as pool producer for the 50th anniversary of the D-Day invasion of Normandy.

That was a three-nation stop, but at one point the pool was feeding from both Great Britain, where the president was at the time, and from Normandy. Lutz said working with the different governments and embassies and trying to secure passes was difficult.

"In Africa, we were dealing with one government at a time even though there were five different governments," said Lutz. For the D-Day celebration, governments of all the countries that took part in the invasion wanted to be involved, including the British, Canadian, American and Polish.

"It was such a major media event for the 50th anniversary of D-Day that everybody was interested — not just the White House press corps — so it made clamoring for their attention that much more difficult."

WHAT COMES AFTER DIGITAL?

In the beginning, there were stone axes. Then came fire, the wheel, and the steam engine. Then came analog audio and then digital audio. What comes next?

Certainly the stone wheel must have looked to the caveman to be the greatest discovery that ever could be. And to the simple farmer of the 1800's, the steam engine was the most modern contrivance that his mind could imagine. But neither was a terminal technology. Both have been replaced as time marches on.

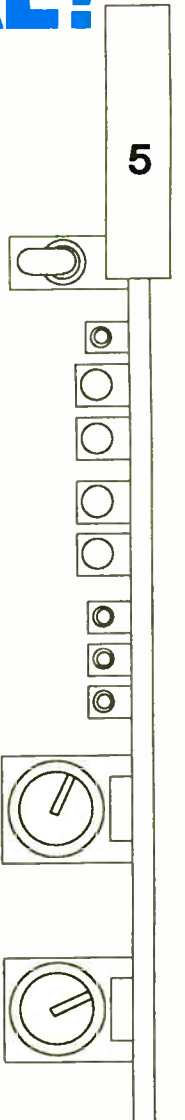
Digital audio is also not a terminal technology. It is simply where we are now.

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5



Know Any Good Engineers?

I was standing in the exhibit area of a regional radio show recently. Nearby was Frank McCoy, top engineer for GulfStar and one of the engineering decision-makers at Capstar.

The topic of conversation was the difficulty in hiring good engineering talent. I heard him say to a fellow attendee, "You know of any good engineers? I've got four great openings right now. Here's a stack of my business cards."

Not one card. A stack.

I can repeat Frank's lament on behalf of other radio groups. If you are an engineer interested in moving up and along, and you don't know where to start, drop me a line at radioworld@imaspub.com. I can put you in touch with several top-notch broadcast groups just dying to talk to you. Computer knowledge and willingness to relocate are big pluses.

★ ★ ★

That conversation took place at the Harris EXPO '98 in Richmond, Ind., where Frank was a speaker. You'll recall that we profiled Frank in a recent issue. As usual, he had plenty of good insights. He called on group engineering managers in larger markets to share their less experienced technical talent with him — in other words, to consider GulfStar as something like a farm team.

"Give me your inexperienced people," Frank argues, "let me teach them the ropes, with the understanding that they will eventually move on. They'll get invaluable experience working in our group. In the meantime, I get good tech help. You eventually get more-qualified people. And I promise not to raid your staffs willy-nilly."

As usual, Frank's uncommon approach to radio goes beyond his cool bow ties.

The Harris event, described on page 8, is the last to be held in Richmond. Harris is in the process of consolidating several operations into its new headquarters in Cincinnati.

Among new acquaintances for me was Jeff Littlejohn, director of engineering for Chancellor Media. I enjoyed seeing long-time radio friends, including Jim Loupas of Loupas Associates, whom I've known since my newsroom days at

WDEL(AM) in Wilmington, Del.; engineer Gary Liebisch, now with Chancellor; and Ralph Messer of West Virginia Radio Corp., both of whom were customers of mine when I worked for Radio Systems. Also on hand: Roy Ridge, founder of Allied, the company that eventually became the Harris Richmond operation, now a consultant to the company.

RW writers John Bisset of Harris, Jeff Johnson of WVXU(FM) Cincinnati and Steve Lampen of Belden were on hand.



Scala is based in Medford, Ore.

as were a whole batch of RW's supportive advertisers.

One person notably missing from the Expo was Dave Burns, the Harris product manager who is familiar to many readers of this column. I'm sorry to report that Dave suffered a heart attack shortly before the event, and was obliged to sit this one out. But he is doing well at this writing, and told me he hopes to be back on the job within a few weeks.

Meanwhile, he reports many calls, cards and flowers bringing good wishes — even from the competition! Well, here's one more: Get well soon, Dave.

★ ★ ★

Also last month, Audio Broadcast Group held its annual trade show in Durham, N.C.

RW Technical Editor Al Peterson attended, and met many industry colleagues and supporters of RW. As you can read on page 17, he reports that the ABG event has grown into a very strong

regional equipment show.

Cindy Edwards, among our industry's best vendor salespeople, gets the kudos for making that show happen.

If you are based near one of these annual events, make an effort to attend next year. They provide an opportunity to meet your peers and suppliers in a low-key setting.

★ ★ ★

A number of readers responded to the strong opinions voiced here by an engineer whom I call "Dave the Dinosaur" (RW,

Sept. 2). He said, among other things, that radio is going to hell in a handbasket, run by groups with no soul and all eyes for the bottom line, and that if we lose sight of localism, we'll have nothing left.

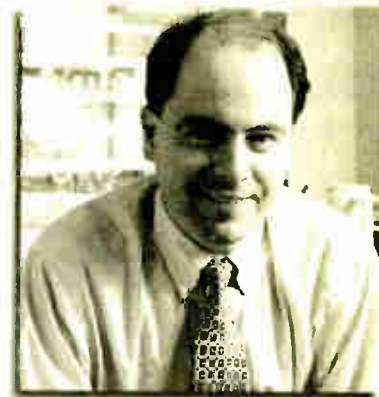
I want to respond to one caller in particular, who asked if Dave really exists. The answer is yes, he does. I have a strong imagination, but Dave found me, not the other way around.

★ ★ ★

Congratulations to the folks at Scala Electronic Corp. The company recently completed a building addition and celebrated with an Open House.

Scala is familiar to RW readers. It was founded in San Francisco in 1954 by Bruno and Connie Zucconi, and purchased in 1979 by Ellis Feinstein, Ray Johnson, John Dellenback and the late Les DeArmond. According to a history provided by the company, Scala began a relationship with antenna manufacturer Kathrein-Werke KG in Germany in 1985.

From the Editor



Paul J. McLane

at first as a North America reseller of Kathrein antennas.

In 1988, Scala entered into a contract under which Kathrein made its technology available for Scala production and arranged for Kathrein to purchase the company over 10 years. With the purchase completed this year, Scala will operate as an independent American company affiliated with the global Kathrein Group.

Scala purchased a 4.3-acre site in Medford and completed a 41,000-square-foot building in 1990. This year, to accommodate what a spokeswoman called "dramatic" growth, the company started the second phase, which is now complete. It has an impressive 84,000 square feet, plus 17,000 of leased warehouse space nearby. Over 18 years, Scala has grown from 11 to 115 employees. Sales have increased an average of 22 percent per year in that time.

Keep up the good work, guys.

★ ★ ★

Perhaps you are reading this as you enjoy The NAB Radio Show. Don't miss our story in this issue about fun things to do and places to go after the show, when you have a day or two to relax.

For quirky insights into Seattle, visit Broadcast Programming's Web site, containing tips and views about Seattle from BP staffers. Seattle is Broadcast Programming's home town. Dave Newton asked me to be sure to mention the rare closeup photo of Bill Gates' celebrated lakefront home, taken by a BP person working undercover as a duck.

The site is www.bpradio.com

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READERS FORUM

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Y2K compliance

Dear RW,

I read Randy Stine's article in the July 22 RW ("Traffic and Billing in 2000 and Beyond"). An important thing to remember with Y2K-compliant software is that stations will begin booking orders that end in 2000 in just a few months.

Broadcast Data has been around since 1986 when we first introduced The Music Director for classical radio stations. A few years later, we added traffic capabilities to the system and then began marketing a standalone version called The Traffic C.O.P. A year-and-a-half ago, we released The Traffic C.O.P. for Windows.

Since then, our business has experienced a steady, manageable growth.

We are currently in the process of porting our Music Director II (pop music scheduler) to Windows.

Our software has been Y2K-compliant since the first release of our software 12 years ago.

Neil Edwards
President

Broadcast Data Consultants
Clearwater, Fla.

Disagrees with Dinosaur

Dear RW,

This letter is in response to Paul McLane's Page 4 editorial in the Sept. 2 RW, "A Dinosaur Frets About Extinction," and the comments by the engineer he quotes.

Networks are not a bad thing! The talent pool of qualified announcers on the small-market level has been shrinking for a long time.

Networks are not a bad thing!

— Bob Foster

At KIKD(FM) we use Jones CD Country 21 hours per day with a local morning show. We still have plenty of opportunity for localization including remote broadcasts. Local sports is strong at our station. Advise your people to not use words like "canned," "satellite" or "syndication." We look at Jones as a "network" just like ABC, CBS, Fox, NBC, is to television.

Write to Us

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I'm a 28-year broadcaster who is adapting with the trends. Learn to use the new technology and new playing field to your advantage. There is still some good radio to be done at the grassroots level if you think "outside the box."

Bob Foster
General Manager
KIKD(FM)
Carroll, Iowa

Alliteration attention

Dear RW,

Re "Meek Makes Mark With Mics." RW, Aug. 5:

Has somebody there been reading Daily Variety?

Paul Roehm
Engineer
WRTV
Indianapolis

Studio Sessions editor Al Peterson responds. Pick your favorite:

Kudos for IEEE

Here's an editorial tip of the hat to the organizers of one of the more useful engineering events on the annual calendar.

We're talking about the Broadcast Symposium of the Institute of Electrical and Electronics Engineers Broadcast Technology Society. The 48th annual event was held in Washington, D.C., last month over two days.

It attracted a roomful of the most influential consulting engineers, regulators, lobbyists and industry decision-makers — approximately 160 people for the radio portion of the proceedings.

We salute the group in particular for putting together a morning dedicated specifically to digital radio broadcasting. Session Chair Bob Surette of Shively Labs hosted speakers and panels that included "MF Digital AM Station Antennas" by Argentina's Valentin Trainotti; "NRSC Evaluation of High-Speed FM Data Subcarrier Systems" by the NAB's David Loyer; and a digital radio panel featuring engineers from the three proponents of in-band, on-channel digital audio broadcasting: Digital Radio Express, Lucent Digital Radio and USA Digital Radio. (We suggest the organizers leave more session time for that important topic next year.)

Other sessions highlighted antennas, propagation and the special concerns of digital television. Featured speakers included Larry Irving, the Clinton Administration point man on communications policy matters; Robert T. Coonrod, president and CEO of the Corporation for Public Broadcasting; and Dale Hatfield, chief of the FCC Office of Engineering & Technology.

The speakers and participants were some of the best brains in the business. And the folks listening to them were no slouches in that department, either.

Credit goes to Edmund Williams of PBS and the other members of the 1998 symposium committee — Richard Mertz, Thomas Gurley, Ted Kuligowski and Gerald Berman — for their work.

The IEEE slogan is Networking the World. The folks that put together the Broadcast Symposium certainly helped engineers reach that goal. Put it on your calendar for next year.

— RW

- Couldn't help it. The PIP Printers down the street were having a sale on the letter "M" that issue
- The original title was supposed to be "Beak Bakes Bark with Bikes," but the B on my keyboard wasn't working
- No, "Highlights for Children" actually. Turn the page sideways and find the hidden pony.

by being the mirror of the engineering community.

R. Sparks Scott
Broadcast Engineer
Eugene, Ore.

Engineering profiles

Dear RW,

It seems as though every issue of RW lately has had an obituary for a member of the engineering community. While it is commendable that your publication chooses to devote some print space to commemorate the lives and careers of these hard-working individuals who gave so much to the industry, perhaps you should consider also doing write-ups on some of us while we are still around.

The sad fact is that the engineer is seldom missed until he is gone, so how about profiling someone in each issue? Everyone loves appreciation, and it's always better to get it before moving on to that big transmitter shack in the sky. This might also help convince the GM and PD that they really do have a valued employee who deserves recognition and reward.

Go out and interview the guy who is reading those AM base meters, building a new studio or just quietly keeping the equipment running. Find someone who reminds us of ourselves and tell us more about him. It would also be interesting to read more about those people who we talk to on the phone regularly in the industry. I'm thinking about people like Jim Jones, John Schneider, Bob Richards and so many others.

In short, let us know ourselves better



Man of Steel

Dear RW,

Troy Conner's column "Man of Steel" is great. I have learned more about towers over the last year than I learned in the last 25.

Jim Arcaro, CPBE
Field Service Technician
B & C Communications
Cleveland

Correction

On page 50 of the Sept. 2 issue, the headline of the article by Doug Walker incorrectly identified the call letters of his station as WKCR. The actual call letters are WKRC.

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October 28, 1998

U.S., Canada Reach DARS Pact

by James Careless

OTTAWA Canada and the United States have reached a deal that allows both nations to proceed with separate plans to implement digital radio — terrestrially-delivered for Canada, and satellite-delivered for the United States.

"We have reached an agreement," said Ralph Zeitoun, director of broadcast planning and technical policy for Industry Canada, the government ministry that manages radio spectrum. Zeitoun said the agreement allows Canada to introduce digital radio terrestrial broadcasting in L-band, between 1452 MHz and 1492 MHz.

In the United States, satellite DAB services would operate on S-band between 2320 and 2345 MHz (*RW*, Sept. 30). The two satellite DAB license holders, CD Radio and American Mobile Radio Corp., plan to launch their pay-radio services in 1999 and 2000, respectively.

In Canada, the agreement allowed that country to begin its service Sept. 1. To date, only experimental transmitters are on the air in Toronto, Vancouver, Montreal and Ottawa. However, digital simulcasting of Toronto's AM and FM stations is scheduled to begin later this year, once equipment has been installed at the CN Tower. DAB simulcasts in Vancouver and Montreal are expected to begin soon after.

Still, even this launch isn't likely to affect U.S. efforts to develop a land-based, in-channel DAB system. That's because U.S. audiences, in general, don't tend to tune into Canadian stations.

General satisfaction

Zeitoun was generally satisfied with the deal, as was Carl Frank, counsel for CD Radio. "This is a good agreement for both sides," Frank said.

The agreement cleans up what had been conflicting uses of certain frequency bands for these services. The United States plans to introduce DARS in the S-

band, part of which is used by Canada for mobile aeronautical telemetry broadcasts.

Similarly, Canada plans to use L-band for Eureka-147 DAB services; the United States still uses L-band for some of its aeronautical telemetry.

Reaching the agreement required concessions from both sides. For example, the United States is ensuring a degree of protection of L-band DAB signals for Canadian broadcasters and, in order to respect U.S. use of the L-band for aeronautical flight test telemetry broadcasts,

the ability to provide digital radio signals in both formats was a big selling point for Eureka-147 DAB, especially during the early 1990s when Canada started researching DAB in earnest.

Satellite-delivered DAB

However, the loss is not as big as it may appear, according to Steve Edwards, vice president of corporate engineering and technology at Rogers Broadcasting, one of the major Canadian radio chains.

Edwards said the real death knell for

Canada paid a price, forsaking plans to supplement terrestrial DAB with satellite-delivered service.

Canada agreed to not implement satellite-delivered DAB.

Canada also agreed to move its own mobile aeronautical telemetry broadcasts out of the 25 MHz of S-band spectrum space the United States plans to use for DARS. As of press time it was unclear just how soon the Canadians would vacate the spectrum.

Sources close to the negotiations, speaking on background, said the Canadians wanted a two-year withdrawal period, while the Americans wanted the move to occur more quickly so that DARS could be introduced by the end of 1999, when CD Radio plans to have its service operational.

For both sides, the agreement represents a graceful end to a sticky conflict. However, it is clear that Canada paid a price for U.S. agreement, namely forsaking plans to supplement its terrestrial DAB services with satellite-delivered DAB.

Given the vast geography of Canada,

satellite-delivered DAB in Canada was sounded not by the United States, but by the World Radio Administrative Conference back in 1992, when worldwide DAB spectrum — with the exception of service in the United States — was assigned. In January of 1995, the FCC proposed that 50 MHz of spectrum be made available for DARS on S-band.

"To make comprehensive use of the L-band for satellite DAB, more spectrum would be required than the 40 MHz we have," he said. "Originally, we went to WARC looking for 70 MHz of spectrum space."

The United States also wanted more spectrum, 50 MHz, for satellite-delivered DAB. The 25 MHz the service received was a compromise, after the WARC participants said U.S. DARS proponents could deliver the service without interference to other countries like Canada and Mexico only if it stayed within the 25 MHz range. This reduction in spectrum is

the reason there are now only two U.S. license-holders to provide the service. Four applicants originally applied to the FCC to provide the service. When it became clear that only 12.5 MHz would be available for each applicant, the FCC held an auction and sold the licenses to the two highest bidders, treating the DARS spectrum similarly to wireless spectrum, also sold at auction.

The most far-reaching result of the pending Canada-U.S. agreement is that it allows both nations to pursue their separate plans for digital radio relatively unfettered. Any bigger issues that broadcasters may have wanted to see addressed were avoided in the negotiations.

For instance, the Canadians' fond hopes that the United States give up on plans for an in-band, on-channel (IBOC) DAB system and adopt Eureka-147 DAB instead were not helped by the deal. In fact, by reaffirming its use of L band for aeronautical research, the United States appears to be making clear that it has no intentions of abandoning either terrestrial IBOC or satellite S-band DARS.

In reverse, relentless Canadian progress toward L-band DAB commercial simulcasts means there is no apparent room for compromise on the Canadian side either.

In essence, the Canadian-U.S. agreement on L- and S-band use is a fence. It allows each nation to pursue its own goals without interfering with what happens on the other side.

RW News Editor/Washington Bureau Chief Leslie Stimson contributed to this report.

DIGITAL NEWS

CD Radio Begins Repeater Deployment

NEW YORK CD Radio Inc. has begun deploying an FM repeater network in San Francisco for its satellite DAB service. System testing and a demonstration of the network was expected to take place this month.

In the next 12 months, the company plans to install repeaters in other urban areas where its signal needs a boost to be received by subscribers. The company is one of two FCC license-holders to provide satellite-delivered DAB service. CD plans to offer 100 channels of pay radio by late next year.

AMRC Snags Sony Executive

WASHINGTON American Mobile Radio Corp., the other satellite DAB license-holder, is adding to its team. AMRC has named Daniel Murphy as vice president of receiver distribution. Murphy mostly recently was sales vice president for consumer electronics for Sony Electronics, Inc.

AMRC President Hugh Panero said, "During the past two decades, Murphy has proven his ability to make portable audio products a hit with consumers by building an exceptional record of sales and marketing successes."

At Sony, Murphy managed a \$300 million audio/video sales budget and Sony's distribution channels.

AMRC plans to launch its satellites and have its pay radio service operational by the year 2000.

— Leslie Stimson

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Circle (121) On Reader Service Card

Harris Seeks to Retool Image

by Paul J. McLane

Harris Corp. has a new campaign to raise awareness of the company's products and services.

As part of what it describes as a comprehensive branding campaign, Harris has unveiled a new logo, thus changing one of the more recognizable corporate symbols in the communications and electronics industries.

The announcement was made by Harris Chairman Phillip W. Farmer. Harris is an international company with annual sales of \$3.9 billion, based in Melbourne, Fla.

Among the Harris businesses affected by the announcement is the Harris Broadcast Systems Division, which supplies products for the radio and TV

station truck. The company said the TV day was indicative of its "leadership position" in digital television.

On the dedicated radio day, attendees visited several dozen equipment ven-



HARRIS

Old ...

dors and heard presentations about the future of radio and ways to help small-market radio stations compete through consistent engineering.

Harris also introduced a license-free digital T1/E1 studio-transmitter link that integrates the new Aurora 2400

"We will design or work with partners on designing gear that is exclusively (for sale by) Harris," said Bruce Allan, vice president and general manager of broadcast systems. But, he said,



... and New Harris Logos

distribution of other companies' products will remain part of the Harris business plan. "We won't make it all."

The new logo is part of what Allan called a retooling of the Harris image.

"We talked to hundreds of clients," Allan said at the Richmond event. "Customers confirmed that we were seen as a 1960s, space-age technology company. It's time to change that

image ... Harris has always had great technology, no question. But you need technology with marketing behind it. We want to adapt our technology to fit the customers' needs."

As examples, he pointed to Harris work in digital television, and new radio products including the Z-CD transmitter line, digital STLs and spread-spectrum equipment. "We've had more new products in radio over the last four years than in TV," Allan said.

Asked if the pending consolidation of several Harris operations into the new Broadcast Systems Division headquarters in Cincinnati would cost jobs, Allan said it would not.

"I don't need three people doing inventory, for example," Allan said. "I need those people, they have a job, but doing different things." But Harris, he said, remains committed to its transmitter plant in Quincy, Ill. "That plant will grow."

The new headquarters in northeast Cincinnati is scheduled for completion in the spring.



Bruce Allan unveils the new Harris logo on the DTV Express truck.

industries. Harris employees unveiled the new logo and a new Harris vision statement, "next level solutions," during the division's annual Broadcast Expo in Richmond, Ind., last month.

More than 300 broadcasters attended the Expo, now in its 15th year. It was expanded this year to include a dedicated television day, highlighted by tours of the Harris/PBS DTV Express demon-

spread-spectrum radio with the Intraplex STL PLUS. Jim Woods, Harris vice president, radio and studio product lines, said the partnership is a good one, thanks to the digital transmission experience of Intraplex and the products and distribution network of Harris.

Company officials said Harris customers should expect more such alliances.

The Pool on the Road

► POOL, continued from page 3

networks. Correspondents also use the pool line to file their reports.

"The line's there. If nobody is on it, it's yours. The only guy who gets any kind of priority is the president. It he's about to speak, nobody gets on it," said Tony Brunton, director of radio special events for CBS. Brunton was the radio pool producer on President Clinton's recent China trip.

The White House communications personnel are responsible for getting the president's voice back into the filing center, but the radio pool producer must also make sure that video sound is available.

If the president is in a motorcade, only one radio correspondent typically gets to go with him.

"It's just another sound source for us," Brunton said. "We bring this to the radio pool work area and we put a video monitor up so the radio correspondents can see who's talking."

Filing centers often are set up in hotel ballrooms with banquet tables for desks. Brunton said producers try to find a quiet corner in the filing center, generally on one end toward the back of the room.

In some cases, if the phone lines are good enough, reporters will file directly over the phone. In others, where ISDN lines are reasonably cheap, networks will order an ISDN line for themselves above and beyond the pool line. That way the reporters can be certain they will have a line whenever they want it — like during morning and afternoon drive times.

The radio pool goes beyond simply sharing equipment, however. Not all

reporters can go everywhere the president does. If he is in a motorcade, only one radio correspondent typically gets



to go with him. That slot is rotated.

"When the president is out there, you've got someone with him all the time who is capable through the radio pool of coming back to all the networks to tell them what is going on," explained Brunton.

On the Great Wall

When he was with Clinton on the Great Wall in China, for instance, Westwood correspondent Peter Mayer was responsible for describing to his colleagues what was happening. When he had finished that obligation, then he was able to file for his own network.

Rusty Lutz, assignment editor for ABC Radio in Washington, said that typically, the reporter calls in on a cell phone which is run through a mixer and into a mult box for all the other members of the pool. The reporter describes the sites and scenery and provides a description of what is happening that other reporters can use in their reports.

"It's a thing of trusting your colleagues. The print reporters do the same thing. The TV reporters do the same thing. You can't be too cut-throat because if you try that, you're going to end up screwing yourself in the long run," said Lutz.

Although they can use that pool reporter's voice, Brunton said, most reporters rarely do. There are exceptions, however. Brunton said that when President Bush threw up in Japan, "The pool reporter went on everyone's air till it was figured out that it wasn't anything too serious."

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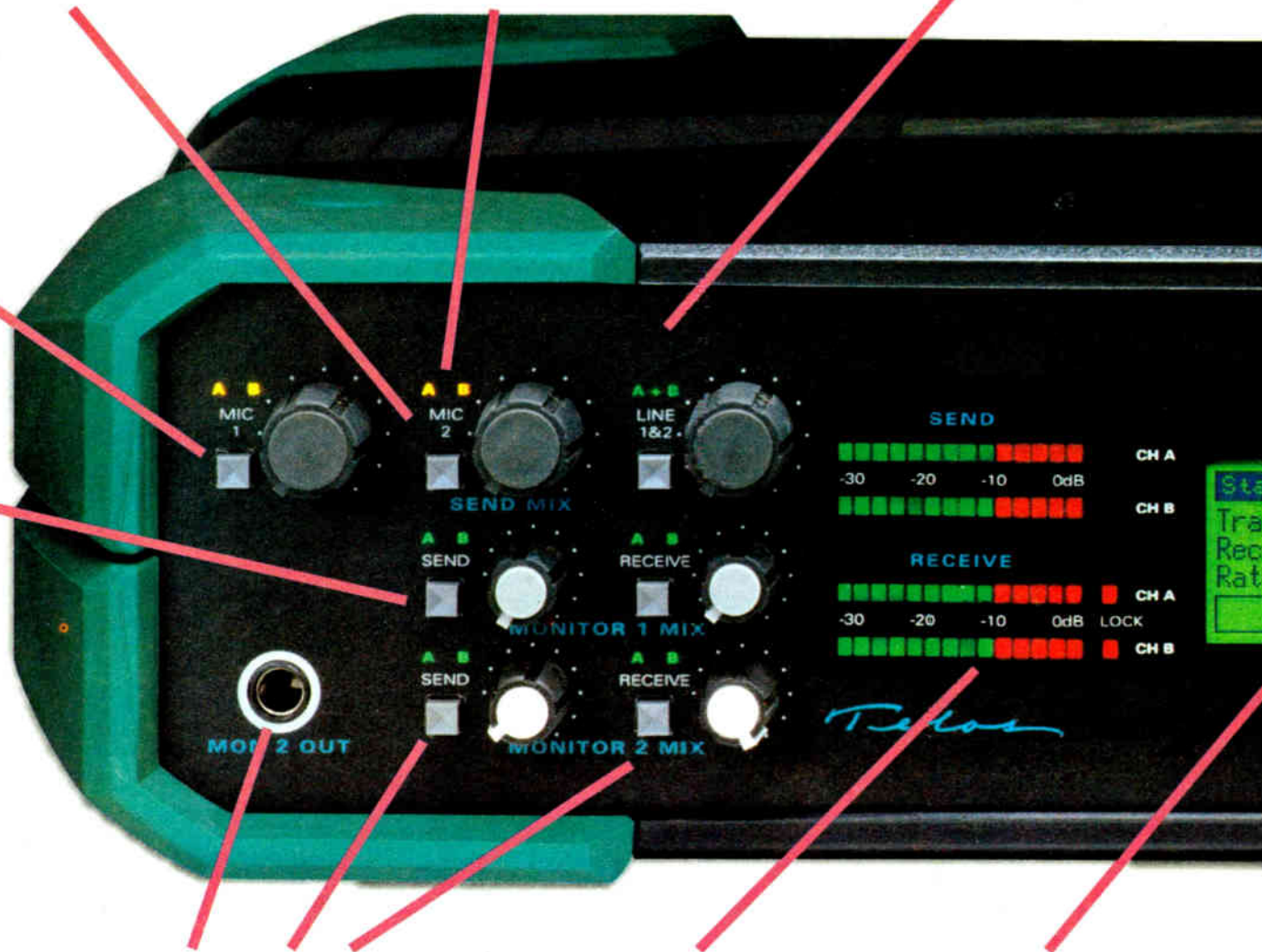
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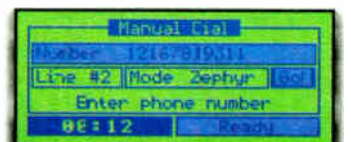
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USADR DAB Petition

► IBOC, continued from page 1
implement DAB in this country; third, the USADR system is the only way to make the first two points happen.

Struble conceded that the other IBOC proponents, Lucent Digital Radio and Digital Radio Express, would not agree that USADR's system is the only IBOC system that could work.

Of the petition, USADR Vice President, Engineering, Glynn Walden, said "Westinghouse-owned KDKA(AM) delivered the first commercial radio broadcast in the 1920s. It is a great honor to be part of that legacy, as USA Digital Radio builds on the heritage of Westinghouse Broadcasting, in developing the radio system for the next century."

Walden said the filing showed "that USADR has done its homework, with comprehensive studies of interference and channel characterizations in the AM and FM bands."

USADR also has filed trademark applications with the U.S. Patent and Trademark Office for several terms it says it invented, including IBOC, IBOC DAB, In-Band, On-Channel, IBOC2000R and IBOC2000E. Several, including in-band, on-channel and IBOC DAB, are in general use in the radio industry now. USADR Vice President Jeff Jury said, "We've been using these terms since 1991. We wanted to establish what we were using ... so there'd be no confusion."

The registration process takes several

months. USADR wants to establish these terms for its products, and preclude any other company from using them on their equipment, Jury said.

If granted, the trademark would not preclude mass media publications from using IBOC DAB as a generic term, Jury said. As for how it would affect other IBOC proponents, that remained unclear.

"As we begin developing prototype equipment, we feel it is important to establish the naming conventions we will use going forward," Jury said. "As for other proponents, they are free to do whatever they want, as long as it does not infringe on USADR patents and trademarks."

Of the FCC filing, industry observers of the IBOC DAB development process have said that no receiver or transmitter manufacturer would commit a production line unless IBOC DAB has been

approved by the FCC.

Jury said the major intent of the filing is to address the public policy issues involved in implementing IBOC DAB. "We are focusing on these areas because that is what we are asking the FCC to do — approve IBOC DAB."

The filing

Jury said USADR needs to ask for FCC approval, establish the requirements for the system in terms of today's radio environment, and move forward with a standard-setting process. Technical issues would be addressed, but only as a subset of the overall filing.

As in any public proceeding, whoever files first takes a risk by being the first proponent to file what will become a public document as the other two IBOC developers continue to work on their systems. Struble said the company would be careful to limit the contents of the initial filing to what it has published before, and to use information covered by patents.

"Clearly, IBOC DAB won't happen without FCC involvement. But we won't compromise our technical or business position," he said.

USADR hoped the FCC would ask for public comment on the petition soon. USADR predicts the regulatory process, from beginning to completed rulemaking, will take 18 to 24 months.

USADR has been a participant in the National Radio Systems Committee DAB subcommittee. To date, the group has agreed only to give test guidelines to proponents, rather than selecting a system, as most of the industry had supposed when the subcommittee was revived in January. USADR and the other IBOC proponents have set up testing deadlines independent of the committee, and have said they would be prepared to submit system proposals to the FCC on their own if they felt constrained by the committee process.

When asked if USADR's action cuts the NRSC out of the equation, Struble said, "We don't view it as going around anybody. It's a parallel track."

Wheatstone Feels Storm

NEW BERN, N.C. When Hurricane Bonnie hit the coast of North Carolina in late August, it seemed as if it detected a bull's eye on Wheatstone Corp.'s new 51,000-square-foot manufacturing facility in New Bern. The multimillion-dollar plant held up well to 115 mph winds, although some operations at Wheatstone were interrupted.

"We still had some customer service people here both days," said Vice President Andy Calvanese. The plant has 93 employees; most of them stayed home on the advice of local authorities.

Calvanese said the most serious building damage was to ceiling tiles that got wet when rain blew in. "We did lose power for most of the day Wednesday, which means none of our automated equipment would run," he said. Shipping from the facility was halted for two days.

Bonnie came ashore just south of New Bern. "No flooding at the facility at all," said Calvanese. Parts of the state reported 15 to 20 inches of rain.

Wheatstone moved operations from Syracuse, N.Y., to New Bern in February (RW, June 24).

— Randy Stine

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NAB Board Leaders on Microradio, Free Time

The NAB Radio Show in Seattle this week offers many radio managers the first chance to meet their new NAB board representatives and express their concerns. The top names on the NAB Radio Board changed in June. Election results were announced at the association's semi-annual board meeting.

William McElveen was elected radio board chairman after serving as vice chairman. He is president and general manager of Columbia, S. C. stations WTCB(FM), WOMG(FM) and WISW(AM).

J. William Poole was elected vice

chairman. Poole is general manager of Fredericksburg, Va., stations WFLS-FM and WYSK-AM-FM.

Richard Ferguson was re-elected joint board chairman. Ferguson is vice president and chief operating officer of Cox Radio in Bridgeport, Conn.

Joint (Radio & TV) Board Chairman Richard Ferguson:

RW: Why is the NAB Radio Board important?

Ferguson: The radio board provides an important forum for broadcasters to discuss important issues that affect our

industry and the people we serve and then to give direction to the NAB staff to carry out the policies that the board votes on. An elected member is a little bit like a congressman (who must) not only see to the issues of the people who elect them in their district, but take a global look at what's best for the industry.

The NAB board is a way for radio station owners to provide a united front to the folks we have to deal with in Washington, D.C., and to



Richard Ferguson

RW: What are the most important issues

robustly discuss issues as they come up. **Ferguson:** Broadcasters are appreciative of the strong stance the FCC has taken ... working to shut down pirate stations. That is also important to listeners who want interference-free radio or micro-radio broadcasting, which most broadcasters see as basically the legalization of pirate radio. Infringement on broadcasters' First Amendment rights is always a concern as well, specifically attempts to give free time to politicians on a required basis.

Radio Board Chairman William McElveen:

RW: Why is the NAB Radio Board important?

McElveen: The NAB Radio Board ... is an important organization because we advise NAB staff on the views and concerns of radio broadcasters and provide



William McElveen

direction for the association. On behalf of the radio industry, we determine and validate NAB's public policy and administrative objectives so that the association can move forward in serving and representing broadcasters. The board also advises NAB staff on events such as this fall's NAB Radio Show in Seattle.

RW: What are the most important issues facing radio?

McElveen: Developments in technology for in-band, on-channel digital audio broadcasting and satellite digital audio radio service will likely have a tremendous impact on our business.

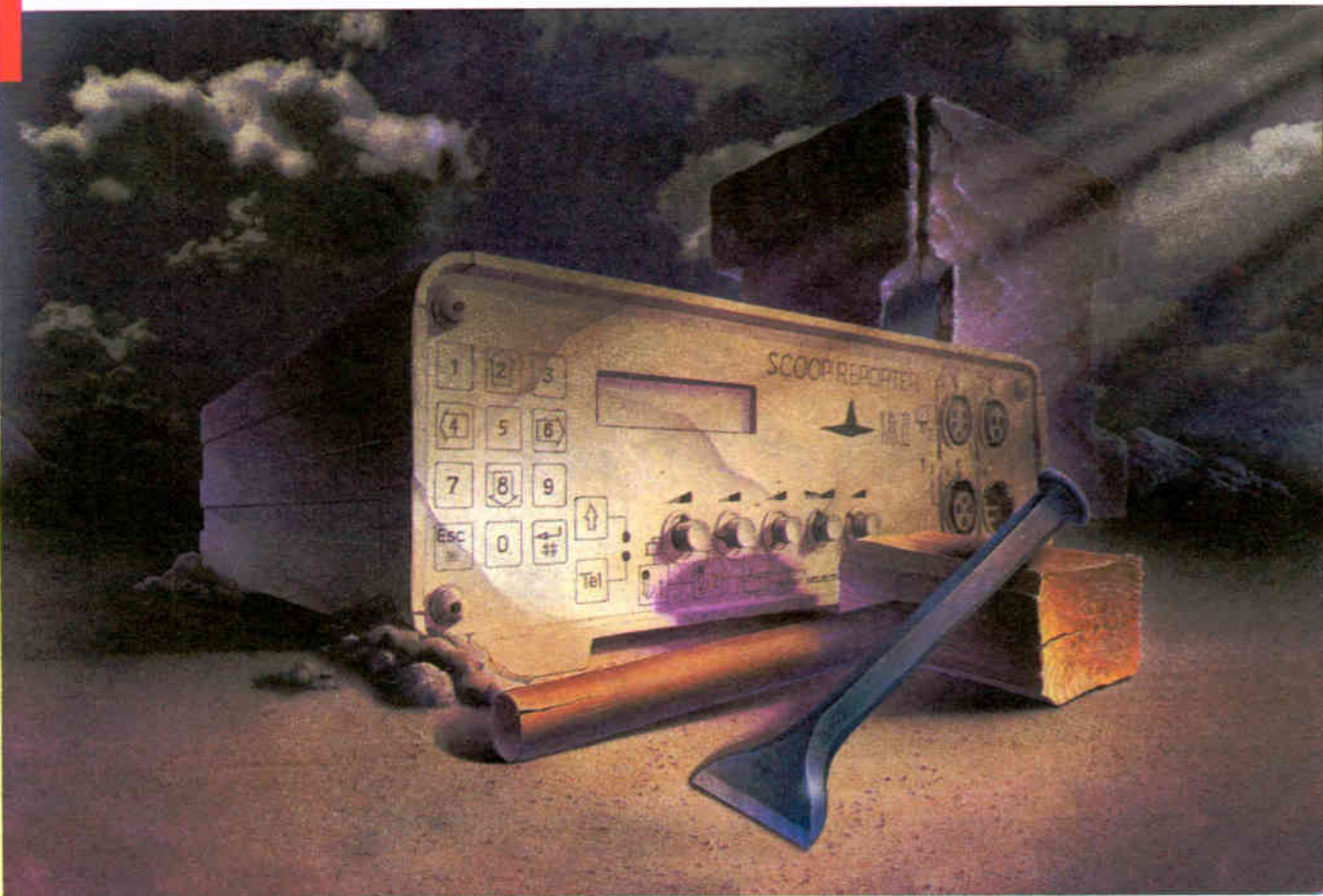


J. William Poole

Microradio threatens to create serious interference problems for existing stations and could hinder radio's transition to digital audio broadcasting. In addition, illegal radio operators, or pirate radio operators, threaten the

See BOARD, page 17 ▶

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World Radio History

CE Robert Herman Remembered

by Bob Rusk

BURNSVILLE, N.C. Robert Herman is remembered by friends and colleagues for the sense of humor that he brought to engineering.

A chief engineer and consultant at radio stations throughout North Carolina, Herman died on June 19, following a lengthy battle with liver failure. He was 50.

Since the early 1970s, Herman had worked for several stations, including North Carolina stations WWNC(AM) Asheville, WPTF(AM) Raleigh, WQDR(FM) Raleigh, WRDU(FM) Wilson and WMAG(FM) High Point.

From 1985 to 1993, Herman operated an engineering consulting firm, RF working with Bob for almost 20 years," said Carl W. Davis Jr., a district sales

'He had a unique talent for taking a less-than-perfect situation and making it into a great-sounding radio station.'

Projects, and worked at stations from North Carolina to California. "I had the pleasure of knowing and manager for Harris Corp. "Bob's specialty was FM antennas and there was no one better. He had a

unique talent for taking a less-than-perfect situation and making it into a great-sounding radio station. There are dozens of stations on the air with excellent signals, thanks to Bob's efforts."

Maryanne Herman recalled her husband's ability "to wake up in the middle of the night and orient himself in about a minute" when a station called with an engineering problem.



Robert Herman

"He would immediately be able to remember what equipment the station had, what it looked like, how old it was — everything. He could usually troubleshoot the problem over the phone so the station could get back on the air," she said.

In 1994, when the severity of his illness prevented Herman from walking, he began consulting on the telephone, she said.

"He had started on a job before he got sick," she said. "When it got to the point that his physical presence was needed, he ended up crawling through the transmitter room. He was able to finish the job and give the station a superior signal."

Davis said that despite Herman's declining health, he kept talking about radio. "Even then," Davis said, "he tried to follow the business and the people in it."

Humor recalled

In addition to Herman's engineering skills, Davis also said that Herman possessed a keen sense of humor. "He could find something to laugh about in the most disastrous technical situations," Davis said. "Bob had a dry wit and always had a new joke to tell."

"When we were together at NAB management school at Purdue, we were asked to prepare and present a five-minute speech. Most of us gave dull, short, and mundane presentations. Not Bob Herman. He spoke for 10 minutes on the merits of North Carolina vs. Texas barbecue."

Maryanne Herman said, "Nobody could tell a story better than Bob. Everybody he had dealings with in radio found out that Bob had a really quirky sense of humor. He will be remembered for his sense of humor as much as his engineering ability."

Herman was born in Washington, D.C., where his father served as an agent for the United States Secret Service in the Truman administration. In his teens, Herman developed a lifelong interest in ham radio. He held an Extra Class Ham operator license. Herman's call sign was N4NC.

Herman is survived by his wife, three daughters and three grandchildren.

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Michelle Mercer, PD - KPWR FM, Los Angeles

Tom Koza, Chief Engineer, top rated afternoon personalities "The Baka Boys" surround Program Director Michelle Mercer

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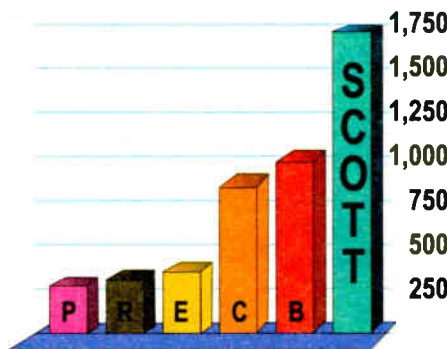
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ABG Draws Buyers to Durham Show

by Alan R. Peterson

DURHAM, N.C. "I like these little shows," said one Richmond, Va., radio engineer, still marveling about the latest in MiniDisc technology, digital processors and digital workstations shown at the Audio Broadcast Group regional trade show.

The annual event, held last month at the Radisson Governors Inn, drew 30 exhibitors and nearly 100 attendees.

"That is the same that attended last year," said organizer Cindy Edwards of ABG. "The manufacturers were happy with the turnout."

The second-floor conference area was occupied by exhibitors, with a room set aside for sessions and panel discussions.

New technology and basic "glue" items for the radio station were well represented.

Analog and digital consoles were in abundance, courtesy of Radio Systems, Auditronics (now owned by Broadcast Electronics), Logitek, AEQ and Fidelipac. Martin Dombey of Yamaha demonstrated the new O1V digital console and conducted a special session on digital consoles in voice-over production and mixing.

Processing and telco products were in abundance in Durham. Air chain processors from Orban, Cutting Edge, Aphex and CRL were prominently displayed, as were digital codecs from MUSICAM USA, Comrex, Telos and Marti (another BE company). Addressing the digital issue further was Intraplex with its line of STL and intracity links for T1 and E1 lines.

Studio equipment shared space with RF products. Dielectric and Jampro exhibited photos and examples of antennas and transmission line.

Transmitters from Nautel and Crown Broadcast were shown, in addition to remote control devices from Gentner, Davicom and Burk, which now offers the Windows-based AutoPilot software transmitter control system.

Cable manufacturer Gepco exhibited wire and cable products. Of note was a new Gepco digital microphone cable, prepared in anticipation of a new AES/EBU digital microphone from beyerdynamic.



The Expo Floor From the Fidelipac Booth

Two sessions with a serious tone involved audio processing and EAS. Representatives from the four processor manufacturers took on each other's products, with pointed comparisons made between the Orban Optimod and Cutting Edge Omnia.fm models.

"EAS — Does it Work for Your State?" was presented by Tom Ditt of North Carolina Emergency Management. The state's implementation of EAS during Hurricane Bonnie was called "a model" for systems across the country because of its success.

Edwards may be considering changes for next year's show.

"Maybe we'll take it to different cities, maybe quarterly," she said. "We had 150 people registered, and 100 showed up. We're happy with the numbers," she said.



Show Hosts John George, Cindy Edwards, Phyllis Freeman and Dave Howland of ABG

Digital audio systems for broadcast were represented by ENCO. New digital workstations were on display from Roland, as was the power duo of the Short/Cut and Instant Replay from 360 Systems. MiniDisc technology was visible in the Sony MDM-4 multitrack recorder. The ZIP-drive Fidelipac DCR-10 digital cart machine offered an alternative to traditional storage and playback devices.

Across the hall was an all-day parade of new product demonstrations and panel discussions.

Joe Perry of Roland conducted demonstrations of the VS-1680 workstation, and Art Constantine of MUSICAM USA took time to exhibit the Roadrunner codec. A demonstration of the Comrex Vector included a live, full-bandwidth conference call to Massachusetts.

NAB Board Comments

► **BOARD**, continued from page 14
integrity of radio. I encourage the government to continue its vigorous enforcement program, and also oppose any government-mandated speech — free time for political candidates.

Most important, radio must continue to maintain its commitment to public service and localism. Our ability to target local programming to local markets is what sets us apart from other media and is the essence of our success.

Radio Board Vice Chair J. William Poole:

RW: Why is the NAB Radio Board important?

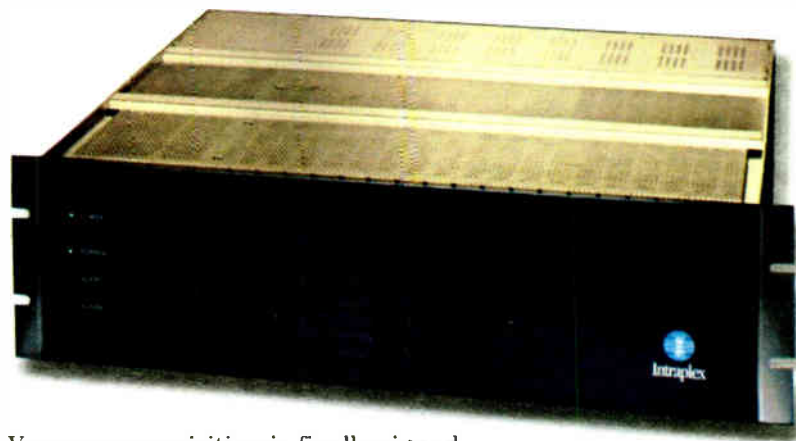
Poole: The board is the liaison between broadcasters and our industry leaders and our national association. We as board members have influence on the policies and activities of the NAB; we set the policy and the staff does the work.

RW: What are the most important issues facing radio?

Poole: The new digital technology, political and advertising time, cable and satellite-delivered programming, and always the issues at the FCC and Congress are important to us.

— compiled by Lisa Romanello

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Marcus Looks Across Platforms

► MARCUS, continued from page 1

Marcus now gets to test those abilities over a much larger company, the combined Chancellor Media and Capstar Broadcasting.

In our previous issue, Hicks, the chairman of the combined companies, spoke about the merger and the future of the radio industry.

What Hicks envisions, Marcus gets to put into practice. Here, in an interview with *RW*, Marcus discusses the details of how executives at the largest radio group in the country are grappling with the challenges of actually managing that group.

Marcus spoke with News Editor/

Washington Bureau Chief Leslie Stimson.

RW: As president and chief executive officer of the combined Chancellor/Capstar, you face integrating the assets for the merged company; not only radio stations, but the TV and outdoor divisions as well. What is your biggest challenge now?

Marcus: Clearly we have put the platform in place, having amassed over \$8 billion in transactions in the last 90 days (as of Sept. 16), none of which were in the pipeline when I joined the company (June 1). It's been a very busy first (few) months as president of Chancellor. Now

we need to get these closed, we need to take the presidents of each of our divisions: Jimmy DeCastro, president of radio, Gary Chapman, president of television, Jim McLaughlin, president of outdoor, and to begin figuring out not only how to run them most effectively and most efficiently, but how to create the synergies that we believe are going to be there to cross-sell and cross-promote these mediums.

RW: Can you expand on that approach?

Marcus: As you know, radio is a very large user of outdoor in terms of promoting radio stations. We believe that superduopoly has proven itself to be a very

effective way of servicing advertisers and has enabled radio companies to have growth beyond what they would have otherwise. We think that by stirring outdoor and television into the mix that we will become one-stop shopping for advertisers in the market and we will make their job much easier in terms of trying to reach the eyes and ears of their customers.

An example is Hartford/New Haven where, when all is said and done, we will have five radio stations. We'll have the leading outdoor presence, and we'll have a television station and an LMA (Local Marketing Agreement), so there are really two television stations in the market.

We will have the ability to offer advertisers one-stop shopping across all of those platforms. If an advertiser's goal is to get their message across to as many people as often as possible, then we become the medium of choice.

Establishing a presence

RW: Speaking of consolidating radio stations because of the merger, can you identify a couple of markets where you have challenges and you are spending time and money to solve them?

Marcus: We haven't closed Capstar yet, but I guess Cleveland would be a good example.

People really haven't focused on this,

By stirring outdoor and television into the mix ... we will become one-stop shopping for advertisers.

but I think it is a very clever strategy, how we were able to assemble a leading presence in the Cleveland market. It is unclear as to whether we are larger or Jacor is larger, but we were able to assemble a leading presence in the market by buying four FMs and two AMs from three different sellers. We brought those all together almost as a developer would assemble a block of land.

Now our challenge is to make sure that those station formats are all complementary to one another, that we are not competing with our own format and (to) introduce the concept of cluster-selling in the market and then hopefully reap big rewards.

RW: Would you give an example of a market where you have major facility build-outs planned for the coming year?

Marcus: In Dallas we have two underdeveloped stations that we purchased from SFX and we are in the process of integrating them into our platform. (Editor's note: The stations are KBFB(FM) and KTXQ(FM))

Dallas would be an area where we will co-locate all of our radio stations. We will do it along with the billboard office that we get out of the Whiteco (outdoor advertising) acquisition. We will have the ability to put everyone under one roof — everybody comes in the morning, figuratively speaking, in the same uniform, and we figure out

See MARCUS, page 19 ►

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► MARCUS, continued from page 18
ways for these mediums to complement one another to do a more efficient and productive job for advertisers.

But, having said all of that, we will remain principally a radio company. In 1999, our pro-forma revenues are \$2.6 billion and our pro-forma cash flow (is) \$1.3 billion, for a margin of 50 percent. But 71 percent of that cash flow will still come from radio, so it is important that your readers think of us as a radio company with television and outdoor complements.

RW: As you start combining stations and building your platforms, what are you going to do with, say, the sales staffs, or the engineers? How are you going to decide what jobs to keep in each department?

Marcus: That is part of the integration challenge. With 463 radio stations, there is going to be plenty of work, plenty of tasks for people to do.

Our purchase of Capstar, our purchase

of LIN (Television), our purchase of all of these assets is not predicated on any job cuts at all, with the exception of the home-office staff. When I say home-office staff, clearly between Capstar and Chancellor we will be able to achieve some economies by bringing the corporate functions together.

RW: So you are giving assurances to employees who might be reading this?

Marcus: We fully intend to look at all synergies that are possible and we think that there is plenty for everyone to do, with that one exception of the back office.

RW: Where do you see the company in five years? You said that you want the readers to know that you are mainly a radio company with TV and outdoor capabilities as well.

Marcus: We will continue to build out on each of these platforms. Clearly, we have markets where we may have outdoor and no TV or radio, or we may have TV but no radio or outdoor, or we may have one or the other. ...

In five years I hope that we will have a full complement of radio stations in most of our markets — that we will have an outdoor presence in most of our markets, and that in selected markets, we will have a television presence and that we will continue to build out our radio platform.

RW: Is the Chancellor/Capstar deal just a merger on paper for the benefit of investors, or will we see real changes in the way decisions are made and positions are staffed within the two companies?

Marcus: Certainly during the pendency of the closing (expected second quarter, 1999) we'll operate as independent companies. But having said that, we are brother/sister companies anyway. We are in the process of creating a transition team from each side to address issues that are really wonderful opportunities of how do we maximize the synergies.

Diversity is enhanced because of consolidation. ... You're going to see more diversity in the Cleveland marketplace ... as a result of our purchase of those stations.

For instance, Capstar has a major presence in Texas in medium and small markets, and Chancellor has a major presence in the Dallas-Ft. Worth-Houston markets. Now, at Chancellor, we have not been able to adequately serve regional advertisers in a way to deliver Texas because we're just in the two larger cities. Capstar has not been able to deliver Texas because they are not in the two larger cities. When we bring Capstar and Chancellor together, all of a sudden the opportunity to deliver Texas becomes very unique and exciting and one that we intend to fully exploit.

Superduopoly, multimedia

RW: As you suggest, Chancellor was known for buying stations in large markets and Capstar is known for the medium- to smaller-market acquisitions. As you are combining, what would be the best kinds of acquisitions for you now?

Marcus: Our goal is to build superduopoly platforms in as many markets as possible, and then to add outdoor and television to them next. If we need an FM in Phoenix to fill out our platform, or if we need an AM in Midland to fill out our platform, we are going to be interested in both of those. We are convinced in the efficacy of not only the superduopoly platforms, but the multimedia platform.

We obviously want to see that grow.

Right now, we are going to focus on the integration aspects of building this platform and we are also going to focus on strengthening our balance sheet because we have just gone through a period of enormous building. You take on (debt) to build the platform and this is an enterprise that pays down debt very quickly. We intend to lower our debt-to-cash-flow ratio in short order.

RW: Would you explain how it is going to pay down your debt quickly?

Marcus: We will generate approximately \$600 million in after-tax cash flow next year, and in excess of \$500 million of free cash flow. We will use that free cash flow to pay down debt. So if our leverage by the end of 1999 is six times, by the end of 2000, assuming we were not to do any more acquisitions, it would be under five times.

Strategic positioning

RW: Capstar went through an IPO recently, what was the strategic reason for that?

Marcus: Capstar has been treated as an independent public company and they needed to do an IPO in order to close SFX. So that was the strategic purpose for the IPO.

RW: Your company is trading on Nasdaq right now. RW has heard speculation that one of your goals is to move it over to the

New York Stock Exchange because that would be more prestigious. Would you comment on that?

Marcus: We have a terrific symbol right now, AMFM. Unfortunately, the New York Stock Exchange only allows three letters. So, we'd have to be either AFM or FMA. That would be hard to give up.

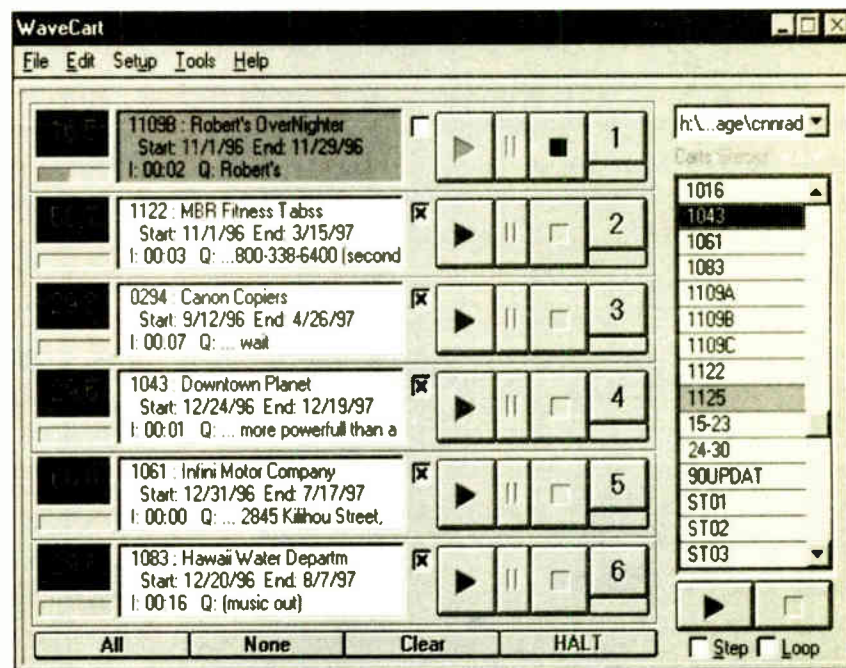
RW: Two companies are preparing to sell 100 channels each of satellite-delivered digital pay radio. After building four cable companies, you've seen people willing to pay for TV, and the effect DBS has had on cable. Will consumers be willing to pay for radio, and if they do, how will that affect existing radio stations?

Marcus: We have seen on the cable side, a CD-quality audio service. I remember when we got it in our home, when it was launched, it was called DMX, and it was a box that essentially enables a listener to hook this cable to their stereo and get 36 or 46 or 50 channels of uninterrupted CD-quality music that are essentially presented by format.

They provide you with a remote control that shows the name of the song that is playing, the artist, the record label and the catalog number. It was a service that was just so compelling we got it in our home and we all sort of marveled at the technology, and then we never used it again. The DMX service has not been

See MARCUS, page 20 ►

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Running Fast

Jeffrey Marcus, who turned 52 on Oct. 13, has served as a director of Chancellor Media since 1997, and now serves as president, CEO of Chancellor Media Corp. In 1995, he joined the board of Chancellor Broadcasting, which merged with Evergreen Media to form Chancellor Media in 1997.

Marcus founded Marcus Cable in 1990 with 15,000 customers. After increasing its customer count to more than 1.2 million subscribers, Marcus sold the company's limited partnership interests in May of 1998. He built three cable companies previously.

Marcus serves on the board of directors for several cable interests, including the National Cable Television Association, the Cable Television Advertising Bureau and C-SPAN.

Marcus on Group Size, DAB

► MARCUS, continued from page 19

successful in the cable world. It has never taken off.

I am not concerned about satellite-delivered radio, or satellite-delivered, CD-quality music, because radio is a local medium, and when you get in your car and drive to your office in Falls Church every morning, and turn on the radio, you want more than music. You have a morning show that you listen to, or you happen to enjoy the personalities of the disc jockeys, you like hearing about the traffic, you like hearing about the weather, and you like hearing the local news. It is your connection to your environment, and that is an impossible task for a service that delivers a national footprint.

I think that if one is traveling on a long road trip, that perhaps CD Radio would be more appropriate, although you could also have your CDs that you could listen to. I do not think that radio will suffer from this technology.

Their business plan as I see it is that they don't need a whole lot of customers to be able to make money, and I think that is how it's eventually going to end up. They are not going to get a whole lot of customers, and they are not going to take share from us. I do not lose sleep over this.

RW: You own AMFM Radio Networks, a syndication subsidiary. Are you talking to either of the satellite licensees about providing them with program content?

Marcus: No, not now.

Digital radio

RW: Another technical issue is the advent of another kind of digital radio, namely in-band, on-channel. Proponents say radio has to go digital because other media are going digital: phones, TV, etc. Do you agree or disagree that radio has to go digital too?

Marcus: People were used to music on AM. I'm old enough to remember that. I grew up with an AM radio that I used to put under my pillow and listen to music before I went to sleep, a little transistor radio, made in Japan. Then, FM came out. In the early days of FM, there were deep baritone-voiced announcers. It was almost like underground radio. It provided a better way of presenting music. Today, music is almost exclusively heard on FM, and AM is reserved for talk and sports.

Now we're talking about another technology. My guess is that, over the next few years, we will see a transition to a higher quality. That's just progress. There will be digital equipment that will be available at ever-decreasing prices, and we will see the advent of some sort of digital enhancement that

I am not concerned about satellite-delivered radio, or satellite-delivered, CD-quality music, because radio is a local medium.

will make music sound better. I have no doubt that that will come, but I don't think it really changes the landscape at all.

RW: One of three IBOC DAB proponents, USA Digital Radio, can test its system on the CBS stations because CBS funds USADR. That leaves two other companies that need to test, Lucent Digital Radio and Digital Radio Express. Have either one of them approached you for testing on your stations?

Marcus: They haven't approached me, but that isn't to say that we are not in contact with them. It's not something that has risen to my radar screen at this point.

Size limits

RW: Radio groups are getting bigger and bigger following passage of the Telecommunications Act. How big is too big? Do you see this consolidation ending at some point?

Marcus: The Department of Justice has set a limit of 40 percent of how much people can own in a market.

RW: Yes, the unofficial 40 percent radio ad share limit in a market...

Marcus: I think that groups will continue to grow and grow and grow. At the end of the day there will be a handful of large companies that will control a large num-

ber of radio stations.

Although radio, it's like cable. There are 11,000 cable systems today and maybe 80 percent of them are owned by the top 10 operators. But they're still a very vibrant industry and innovators and people that can continue to be very successful in a smaller scale, and I think that'll be true with the radio business as well.

Frankly, to those that would bemoan the loss of diversity that comes out of consolidation, I would say it's quite the opposite. Diversity is enhanced because of consolidation. As we, for instance, come into the Cleveland market and buy four FMs and two AMs ... we're hoping to buy one more of each. Our goal is to create diverse formats, not have formats competing with one another.

You're going to see more diversity in the Cleveland marketplace as opposed to less as a result of our purchase of those stations from three owners.

RW: Mel Karmazin is head of the No. 2 group compared to your company. What are you going to do to keep CBS at bay?

Marcus: I think the Capstar-CBS rivalry is not unlike the McGwire-Sosa rivalry. ... CBS is second to us in all measurements today, number of stations, amount of billing and audience share. But that could change if they were to buy Jacor, or if they were to buy somebody else, or if we were to buy somebody else.

I don't think that there's anything that we can do to keep them from experiencing external growth. We are going to compete like crazy to try to beat them in every market where we can beat them, and give them a good run for their money and be great in-market competitors. We can beat them in the area of organic growth, or growth from within our current platforms.

RW: Are there any other groups that you see as potentially just as big and as fierce a competitor as you?

Marcus: Clear Channel is certainly a very potent force. They have the ability to bulk up if Jacor were to come for sale and they chose to buy it. I think they could. That would certainly turbo-charge their growth. If you look at Clear Channel now, they've got about \$475 million in radio billings for 1998, and Jacor's got about a little over \$600 (million). That would put them solidly at No. 3. We're about a \$1.6 billion and CBS is at \$1.5 billion.

Jacor acquisition?

RW: Jacor's in play. Would that be a good acquisition for your company?

Marcus: Jacor would certainly make a good acquisition for us. It's just a matter of when and at what price. Clearly with all the activity that we've experienced so far, we would not be in a position to buy Jacor today because of our debt and where our stock is.

Having said that, if we were in a position to do it and it were available, and we could make it so it would fit our bedrock investment criteria where it would be fairly priced and accretive and it clearly would be strategic, then we would be very, very interested.

RW: Congress and the FCC are discussing possibly changing telecommunication ownership. Congress is more worried about the lack of competition in the telephone industry. The FCC is looking at ownership as specified by the Telecom Act. Do you think there is any chance that radio ownership limits would be changed?

Marcus: I would be foolish to predict what the government might do, because that is something that no one can predict. I think that is, from a public policy perspective, a mistake to change the rules soon after they are adopted. We are talking about rules that were adopted two-and-a-half years ago and we need to let the marketplace work before changes are made.

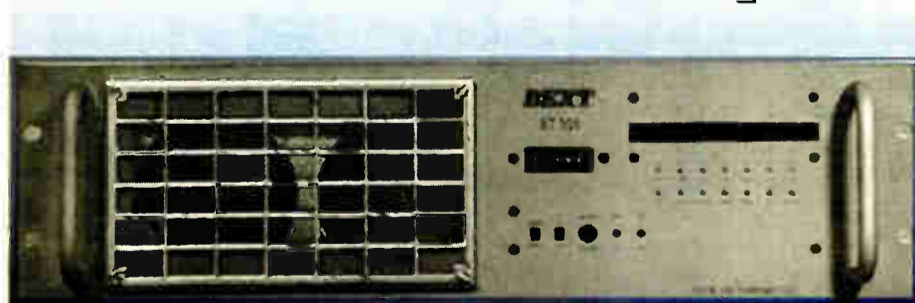
People are finally understanding that tax policy, once set, needs to be maintained for a long time because people make decisions based upon rules that are in place, but then the results take some time to be felt. I think with AT&T buying TCI and some of the other things that are happening, that the forces are stirring in the marketplace that will achieve the goals that the Telecom Act set out to achieve, but it takes time.

RW: With the merger, how have your job responsibilities changed?

Marcus: I spend a lot of time talking to analysts, share holders and reporters. Right now my highest and best use is to make sure that all of our various constituencies are well informed as to what our strategic plans are and how we intend to execute them.

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October 10, 1998

Dear Tech Trek Partners:

Gulfstar wishes to take this opportunity to thank our Tech Trek partners. When first proposed, it was an unusual idea - visit, measure and assess more than eighty radio stations. But the results have been worth it. Harris Corporation as principle underwriter of Tech Trek, along with Orban, Audio Precision, Belar, Gentner, Gepco and Prophet Systems deserve enormous credit for their willingness to support this endeavor. It comes as no surprise, though.

From the time the first radio stations in the 1920s were built entirely by hand, from scratch, Harris and its predecessor companies have been there for broadcasters. When the 1970s gave economic birth to FM, Bob Orban was there. His legendary processors came about partly because Arno Meyer of Belar was there to provide a spark of guidance to a young radio engineer. The interwoven cooperative efforts of many individuals and many companies are what built radio. In this era of high-tech, it is comforting that our industry remains about people and rewards individual and group initiative.

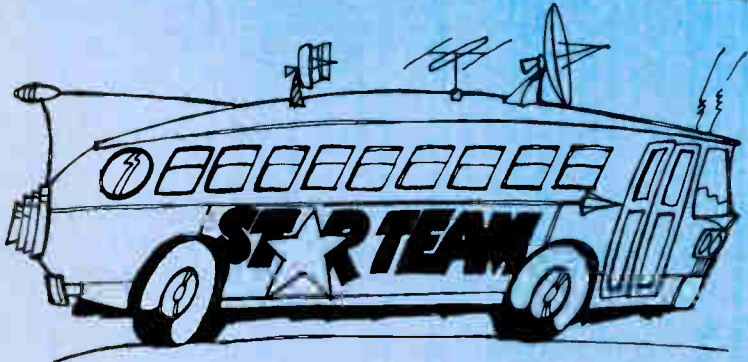
The Star-Team effort of Gulfstar's engineers is a remarkable example. Without it we would not have come anywhere near as far in such a short time. The willingness of Harris and Orban, along with Audio Precision, Belar, Gentner, Gepco and Prophet Systems to act as partners in Gulfstar's technical redevelopment of our stations has made a dramatic difference.

We are fortunate to have the opportunity to work with providers who genuinely care and are there when you need them. Thank you for your support.

John Cullen
President and CEO, Gulfstar Communications
Co-Chief Operating Officer, Capstar Broadcasting

Frank McCoy
Vice President of Engineering, Gulfstar Communications

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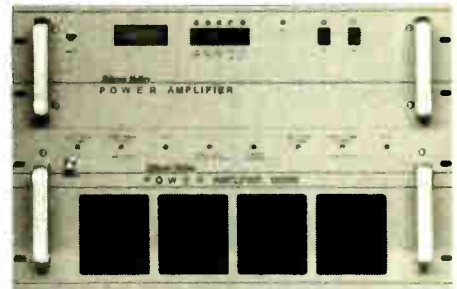
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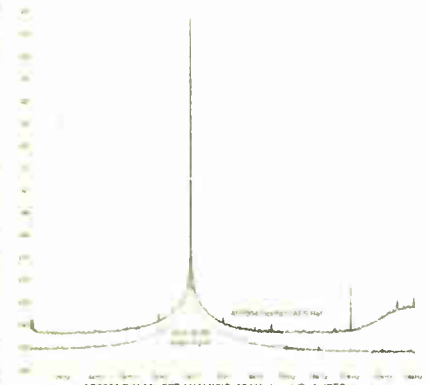

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READER SERVICE NO. 23

Things to Do After the Radio Show

*Gorgeous Mountains, Great Restaurants
Make a Seattle Stayover Worthwhile*

Allison Oakley

So you're in Seattle for The NAB Radio show. Welcome to the Emerald City. Contrary to what the general public might think, Seattle offers much more than flannel, retro-grunge, coffee and the Space Needle. Attendees will discover that the city, in a spectacular setting between water and mountains, accommodates all budgets and schedules.

We told you all about the show itself in our big Sept. 30 preview issue, which you can find in the publication bins at the show. But although your convention trip will likely be taken up with sessions and booth visits, you may find time during or after the show to enjoy what Seattle has to offer the tourist.

The weather

Seattle actually gets less rain than New York, Atlanta or Boston. During October, Seattle gets about 3 inches of

boating operations offer speedboating, ferry trips and dinner and dancing.

Or take a hot-air balloon ride — probably the best view of the city yet. Rainbow Balloon Flight offers daily champagne trips and views of Seattle, Mt. Rainier and Puget Sound. Call (206) 364-0995. For an unusual powered air tour, try a float plane. Kenmore Air charters a three-passenger plane for \$140 for a 20-minute scenic flight over the city or \$275 for a one-hour tour of the region. Call (206) 486-8400. Pier 54 Adventures also offers seaplane rides; visit Web site www.pier54adv.com

There's plenty of more conventional fun to be had. The bustling Seattle Center complex, sprawling over 74 acres not far from the downtown office area, serves as home to the Supersonics, the Thunderbirds, Key Arena, the Space Needle and several museums. The Pacific Science Center, located here, is open seven days a week.

flare and mouths water as the smells of the original Starbucks coffee, fresh-baked breads, sausages and a variety of other dishes fill the air. This also is a good place to do some gift shopping.

More than 20,000 people visit the market area daily. It's no wonder Levi

Nirvana used to play and other groups got their start in this area." The Crocodile Café music line-up is available by calling (206) 441-5611.

This may be your last chance to see the Kingdome, home of the Seattle Seahawks and the Mariners. "The Kingdome is going to be imploded in the year 2000," Grimley said, "and we are having a new stadium built there."



The outdoors are an important part of the texture of Seattle lifestyles.

Strauss featured the market in its ad campaign. The most famous part of the market are the fish vendors.

Pike Place Market

Grimley said, "All seafood vendors pack fish to ship or pack on the plane. They have Styrofoam coolers and packets of ice to ship fresh seafood so people can take a fresh salmon or crabs back."

Music fans can experience the cultured arts scene, home to legends Jimi Hendrix and Kurt Cobain. Hendrix, a Seattle native, is memorialized in Greenwood Cemetery in suburban Renton, just southeast of Bellevue and Seattle. If you find grunge fascinating, head to the Belltown area, which has a lot of the trendy nightspots.

"It has become the new, hip place to go," Grimley said. "The famous Crocodile Café is in this area, and this is where

Tours of the Kingdome are available even if the teams aren't in town. Call (206) 296-3191 on weekdays to schedule a tour.

For the animal lover and traveling traditionalist, Seattle has a standard tourist attraction, the Woodland Park Zoo. Hours are 9:30 a.m. to 6 p.m. daily. Call (206) 684-4800.

Outside

Visit the Seattle Aquarium on Pier 59 and go eye-to-eye with a shark in a coral reef or experience the sensation of a walk on the ocean floor. Admission is \$7.75 for adults, \$7 for seniors and people with disabilities. Call (206) 386-4320 for recorded information.

Guided nature walks and historical walking tours can provide several pleasant hours with a ground-level view of the city.

See SEATTLE, page 27

The home of Ken Griffey, Bill Gates and 'Sleepless' lovers offers much to satisfy the tourist, the epicure and the lover of the outdoors.

rain, with temperatures in the 40-to-60 degree range.

Janet Grimley, assistant editor with the Seattle Post-Intelligencer newspaper, said dress with change in mind.

"The weather could go either way. There is a chance of rain, but there is also a chance for an Indian Summer. Layers is always the way to go here, because we are close enough to the water that there is often a breeze."

At 605 feet, the Space Needle at Seattle Center offers the best view of the Emerald City from land. If you feel yourself rocking a little, don't panic; the Needle sways approximately one inch per 10 mph winds. Elevators operate from 8 a.m. to midnight, and adult ticket prices start at \$9. The Space Needle features two restaurants with world-class 360-degree views.

The Space Needle Restaurant features a casual atmosphere; the Emerald Suite is more formal, but offers diners free access to the observation areas. Make dinner reservations online at www.spaceneedle.com

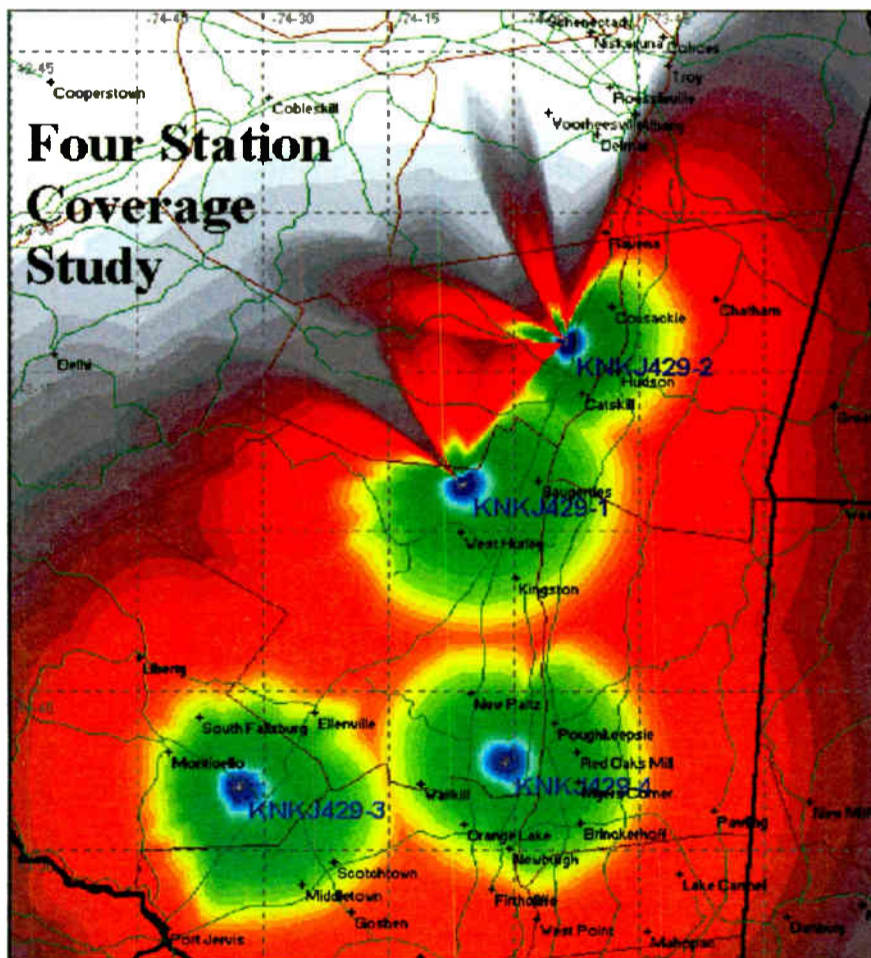
There's more than one way to experience the spectacular view. Although less panoramic, Columbia Seafirst Tower at 701 Fifth Ave. offers an observation deck on the 73rd floor. The deck design isn't 360 degrees, but it is nearly half the price of the Space Needle.

If the word "free" summarizes your budget, then head for an old water tower in Volunteer Park on Capitol Hill, which also offers a spectacular view.

Some of the best views of the Emerald City are from the water. A variety of

The Center House food bazaar, also in the center, offers a variety of fast foods. More than 5,000 events a year happen in Seattle Center; for a listing, call (206) 684-8582.

Pike Place Market is a short walk from the Convention Center and a great place for fresh seafood and local eats. Nostrils



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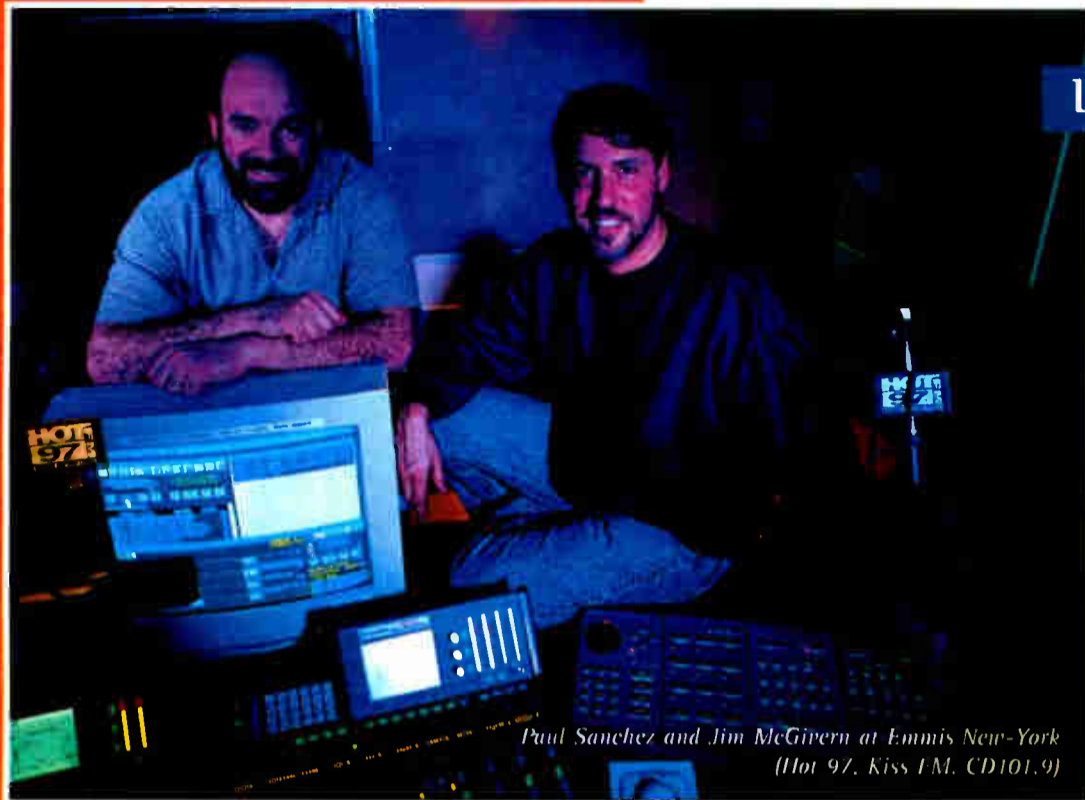
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Paul Sanchez and Jim McGivern at Emmis New York
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Jim McGivern,
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p1/2 Crawford Broadcasting Relies on Dalet for Efficiency and More

p3 InterWeb

p4 British Forces Broadcasting Service Closes Deal with Dalet5

Dalet News
Greg Serian
Bill Keenan
Piotr Tesny
Dalet France

On the Move
Dalet Demos at
NAB Radio Show
& SBES

Crawford Broadcasting Relies on Dalet for Efficiency and More

You've read about it in the press: computer technology will allow broadcast groups to leverage their size and generate group-wide synergies. In this respect, Crawford Broadcasting is showing the way. With 25 radio stations in 13 markets in the US, Crawford has implemented Dalet Digital Media Systems to deliver efficiency and innovation in its operations. Crawford has multiple stations in highly competitive markets. Its stations have the potential to reach an audience of 65 million. Crawford programs each station to target a specific audience segment with its religiously-oriented programming. Dalet is currently at Crawford facilities in Dallas, Denver, Chicago, Birmingham and Detroit. A new system is ready for installation in San Francisco.

Crawford initially purchased a standalone Dalet system for the Denver operation in 1993. At the time, Crawford looked to Dalet to provide an automated solution as it added a second broadcast outlet in the Mile High City. Efficiency, ease of operation and reduced costs were the initial goals. Cris Alexander, Director of Engineering for the group, was involved in the initial decision and he says the desired results were "obvious from the beginning."

Perhaps more importantly, as the Denver operation expanded, the benefits compounded. Alexander says "the openness of the system and its ability to integrate with other systems added



Michelle Hendry, midday host on KLZ, using Dalet for seamless live assist broadcast.

to the efficiencies." The Denver plant grew yet again when Crawford added a third station to its Denver lineup. Now, the co-located but separate stations program their unique versions of music, music/talk and religious block programming to the Denver marketplace.

DALET NEWS 1

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Jim McGivern

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Military Radio Serves U.S. Troops

Andrea Rivetta

For U.S. military personnel based in Aviano, Italy, Z Radio FM is the source for up-to-the-minute information and entertainment.

Located in the Friuli region of north-eastern Italy, Z Radio FM is part of American Forces Network (AFN); its manager is Master Sergeant Bill Reid. Around the world, AFN provides troops with a mix of locally produced programs and radio and TV programming from U.S. networks.

AFN began broadcasting in 1945, at the end of World War II. European broadcasts started in Austria with Radio

Blue Danube. AFN arrived in Italy in the 1970s, first in Verona, then in Vicenza. The AFN station in Aviano is one of the more innovative radio stations in Italy.

The international programming is produced at AFN headquarters at March Air Reserve Base near Los Angeles; from there it is sent to Aviano via AFN European headquarters in Frankfurt am Main, Germany. Some stations, like Z Radio FM, supplement AFN programming with local productions.

U.S. troops in the Asia-Pacific region are served by AFN Tokyo, while those in Latin America are served by AFN Panama. The latter operation will

relocate in 1999, when control of the Panama Canal Zone reverts to Panamanian authorities.

AFN Radio airs news programming from the Associated Press, United Press International and National Public Radio. Westwood One provides adult contemporary, country and classic rock programs, along with Tom Joyner's morning show (midday in Italy). NPR also provides jazz, blues and classical music programming, while golden oldies from the 1950s and the '60s are supplied by Oldies Radio.

AFN counts on the support of thousands of members of the U.S. military. In California alone, 100 people work

for AFN. Five hundred more are based in Europe, 100 of which are in Italy.

At Aviano, 21 people oversee Z Radio FM and a television operation. These people produce five hours of local programming each day, including a morning show hosted by Airman Lina Smith.

"Airman Smith plays the latest hits, generally pop music, while taking telephone calls from listeners and interviewing people who work at the base," said U.S. Air Force Sergeant Bill Hickman, spokesman for the station. "Between 6 and 9 a.m., there are also four radio news programs, reporting happenings at the base, produced by our own news staff."

The other locally produced program is an 6 to 8 p.m. drive-time show presented by Airman Heather Burress. The evening show mixes talk programming with some rock and rap music, and it is aimed at a younger audience.

"The station provides traffic news and information about on-base events, like films being shown and the menu at the base restaurant," Hickman said.

For staff training, AFN organizes seminars. Recently, the Z Radio FM staff took part in a one-day seminar in Vicenza organized by well-known radio coach Dan O'Day. He rated the broadcasters in areas like on-air personality, listener ease and creativity.

Good following

AFN presenters have disparate backgrounds. Many have radio experience as civilians; some, like Smith and Burress, have a natural ability with the medium.

All AFN recruits must pass an audition where their vocal quality and computer skills are tested. Once they pass, they study print and broadcast journalism at a military journalism school in Maryland.

They are then posted to a local station, where specialized, on-the-job training continues for two to three years.

Computer literacy is important for AFN personnel, as computers are utilized heavily at the service.

An Arrakis DigiLink system, for example, is used for editing radio programs. Another computerized system is used to switch automatically between satellite-delivered and local programs. At Aviano, all prerecorded spots are stored digitally on hard disk.

U.S. servicemen and women appreciate the little bit of home that Z Radio FM and other AFN stations provide, but Hickman said local citizens also tune in to the station.

"We commissioned Frank Naged Associates to conduct a listener survey in September 1996," he said. "During a typical week, 95 percent of people at the base tuned in to the station at least once. We are not able to survey the locals, but we know they listen and appreciate the service, too, because we get a lot of phone calls."

For the past two years, Z Radio FM has won the U.S. Air Force radio and television Station of the Year award.

Although AFN is a military operation, the staff is independent of the local chain of command. AFN reporters and staff are under the command of a colonel based in Dallas, which managers say helps ensure an independent and free press.

■ ■ ■

Andrea Rivetta reports on the industry from Milan, Italy.

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Crawford Broadcasting Relies on Dalet for Efficiency and More

You've read about it in the press: computer technology will allow broadcast groups to leverage their size and generate group-wide synergies. In this respect, Crawford Broadcasting is showing the way. With 25 radio stations in 13 markets in the US, Crawford has implemented Dalet Digital Media Systems to deliver efficiency and innovation in its operations. Crawford has multiple stations in highly competitive markets. Its stations have the potential to reach an audience of 65 million. Crawford programs each station to target a specific audience segment with its religiously-oriented programming. Dalet is currently at Crawford facilities in Dallas, Denver, Chicago, Birmingham and Detroit. A new system is ready for installation in San Francisco.

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p1/2 *Crawford Broadcasting Relies on Dalet for Efficiency and More*

p3 *InterWeb*

p4 *British Forces Broadcasting Service Closes Deal with Dalet5*

Dalet News
Greg Serian
Bill Keenan
Piotr Tesny
Dalet France

*On the Move
Dalet Demos at
NAB Radio Show
& SBES*

Live Assist or Unattended Operations

Ed Dulaney, the Chief Engineer at the Denver facility, has seen Dalet grow from the standalone operation serving a single, automated station to a fully networked operation of 3 radio stations (KLZ, KLTN and KLDC) with mirrored servers, and 7 workstations dedicated to on-air, production and external playback controls. Dulaney says "Dalet does just about everything for us on air. We're completely unattended over the weekend, from satellite feeds to recorded programs, but we sound live because our operators have pre-recorded the music, intros and drop-in features into Dalet." Especially important to Dulaney is the fact that system administrators can write macros that allow the system to do what you want it to do – not what the system forces you to do.

Open System Allows Flexibility

The flexibility of Dalet demonstrates itself in other ways. The Denver stations use Dalet in the live-assist mode on weekdays, and have found the Dalet system a flexible partner in its ability to maximize the announcer presence both in and out of the studio. Dulaney says "Even when you're producing material in-house, the system reduces operator errors and potential lost revenue if the wrong programs or spots are played. It saves you from a lot of potential problems." One announcer recently used a laptop loaded with Symantec PC Anywhere along with



Matthew Braughn, producer at KLZ, uses Dalet to create and edit his programs, then saves them on the network for immediate use by the News or Production Departments.

Comrex lines for audio to deliver live reports from the Christian Home Educators meeting in Denver into its scheduled broadcast – all without a studio operator. Dulaney says "Dalet easily integrates itself to our console so we can do remotes with ease. Part of our team is the automation itself." Such flexibility leads Dulaney to say, "I'm thoroughly sold on Dalet. I've worked with a number of other systems in the past – all impressive in their own right. But with Dalet, I don't have to work around anything. Because of its openness, I can make it sing right out of the box."

"We're Doing Things You Can't Even Imagine"

Crawford also operates a major radio network from Dallas, where a standalone system manages the production and satellite distribution for several music formats to

Crawford-owned stations around the country. Cris Alexander says Dalet is the tool that also provides traffic, public affairs, spots and promos to those stations. More recently, Crawford is using the Dallas-based system to share high quality programming, including talent voice tracks among its sister stations. The Dalet system in Dallas serves as the production and distribution hub for this programming. Alexander says "On functionality, I haven't seen anything better than Dalet. We're doing things you can't even imagine. The architecture allows functionality; we've built external systems and Dalet winds up operating all of those."

Dalet Training and Support

Of particular importance to Alexander is the ease of training staff to the production and on-air application. He notes, "It's a very short learning curve. Once the people are integrated into the system, they never want to go back." His colleague Ed Dulaney emphasizes that Dalet's technical support has been great. He notes that "It's so simple to maintain, I rarely need to call tech support; then, it's usually so simple, I'm embarrassed I didn't figure it out myself."

Such confidence has led to additional Dalet installations in Detroit, Birmingham and Chicago. A new install is scheduled for San Francisco in the coming months.

Crawford Broadcasting hopes to expand its programming initiative and reach. As Crawford strives for operational excellence and efficiency, Dalet continues to be a technology partner in its success. ■



Marvin Banton makes a quick edit while using the On Air Navigator application for his live morning drive program on KLDC.

InterWeb

Dalet Puts the Internet to Work for Radio

Dalet networks can now be equipped with a seamless and user-friendly Internet interface called InterWeb. This is a technology that will shortly revolutionize the jobs of radio reporters and producers by providing the capability to preview audio files and transfer them instantly from one location to another. InterWeb allows newsrooms to maximize and pool their resources. As broadcasters convert to digital technology, the days of waiting patiently for real-time audio to be fed from one place to another are numbered. The old "feeds" and "phoners" can't meet the needs of today's radio newsroom. Instead those jobs will be done by applications like Dalet's InterWeb, which harnesses the latest Internet technology. Now, new audio file transfer protocols, faster modems and increasing bandwidth make it possible to listen and move high quality sound anywhere in the world at the click of a mouse.

Features

- Internet-based
- Web-server installation
- Audio file conversion and transfer
- Simultaneous file transfer
- Database search, read and write
- Remote access from PC, Mac or UNIX
- Supports any bandwidth

Shared Resources

The new Dalet software extends the resources of a radio group far beyond its existing scope. Now a broadcaster's central database - running under the Dalet system - can be made available to reporters, affiliates, clients, ad agencies, and even the general public. InterWeb is installed on the web server and it's accessible to people who aren't equipped with Dalet workstations.

Underscoring Dalet's commitment to ease of use and administration, the system allows anyone with an Internet connection, a browser - and the right password - to search the database, preview sound files and upload or download, whether their computer is a PC, Mac or UNIX. Furthermore, the software automatically converts sound files to the appropriate

format without getting the user involved in technical decisions.

Like all Dalet products, InterWeb aims to increase productivity by providing easier and more efficient ways for people to work. Although the product is developed with cutting edge technology, the complexity is invisible to the user. On the contrary, the user's job is easier than ever, due to a familiar and intuitive interface, the web browser.

News: No more hurry up and wait

Field reporters are ideal candidates for the InterWeb system; whether they're part of a big network or a small news bureau, they will appreciate the ability to upload high-grade audio files whenever they choose. The clock never stops and news doesn't wait. That's why bottlenecks in the production chain cause stress and jeopardize quality.

Using Dalet's new system, reporters and editors are free to put their energy into news gathering. The Internet does the heavy lifting, and people no longer need to hang around waiting for satellite time, studios or high-speed lines.

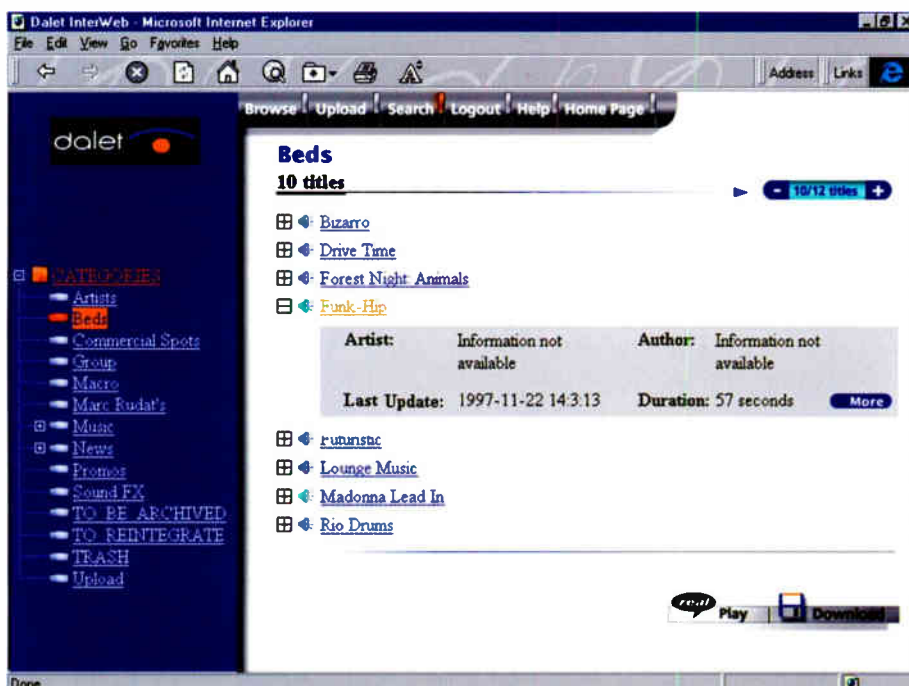
Field reporters can turn their laptops into portable studios. They can access the database, edit, mix and upload stories, using Dalet software and the Internet.

Advertising: Savings in production and shipping costs

InterWeb and Dalet's TeamRadio traffic scheduling system integrate seamlessly, and together they will change the way that stations, ad agencies and clients handle the production and transportation of spots. People can preview sound files on the Internet to make timely production decisions. Using the Internet as an alternative to expensive courier services, InterWeb paves the way for significant cost savings.

Security

InterWeb administration will parallel that of the Dalet database, with a similar user list. The system keeps track of all those who log into the database and strictly allocates all access rights. ■



Dalet's InterWeb allows remote users to search the central database and preview, then transmit files to a local or distant database.

BFBS British Forces Broadcasting Service Closes Deal with Dalet5

British Forces Broadcasting Service and Dalet are now entering the second phase of a project to technically upgrade the global BFBS radio network. With five radio stations broadcasting music and news to the British military in the UK, Germany, Cyprus, Gibraltar and the Falkland Islands, BFBS had done extensive research on the best replacement for its antiquated equipment. The management chose Dalet because of the company's leading edge in digital technology.

The first site is located in the UK and consists of a 25 workstation network with a database of over 20,000 music titles stored on mirrored Novell servers. BFBS UK now

delivers the same program to all remote sites but uses a delay to accommodate the various time zones. This often involves the same audio being used simultaneously in several programs, sometimes being re-recorded live for slightly modified local broadcasts. Dalet5's editing while recording feature was therefore essential for this system.

After the UK and German stations upgrades, the others stations will follow shortly. When all BFBS stations are equipped with the Dalet5 system, full network database and audio sharing can begin, permitting file transfer from one site to another, and on-site adaptation of programming for local broadcasts. ■

DALET NEWS



Greg SERIAN

Technical Operations Director
Based in New York, Greg Serian is in charge of Dalet's tech support. In fact, he created it. With a background in electrical and computer engineering, and seventeen years of engineering management experience Greg is responsible for making sure that expert assistance is on call at Dalet from anywhere in the world - 24 hours a day, 7 days a week. Managing a team of engineers in New York, Greg bears the ultimate responsibility for all technical operations. After analysing customer problems, he designs cost-effective, technically sound solutions. He insures that installations go smoothly, and that everyone is up to speed on their new Dalet systems.

Under Greg's direction, Dalet has recently expanded its support service options to provide more choices for customers.

Additional services can include upgrades, system troubleshooting or on-site training. In his spare time, Greg is a musician. He's been the happy owner of a home-based digital recording studio for the past 10 years.

Bill KEENAN : Regional Sales Manager. Dalet is happy to welcome Bill Keenan as a Regional Sales Manager for the Midwest region of the U.S. Bill has extensive experience in radio broadcasting after working with traffic and broadcasting systems for over ten years.

Piotr TESNY : Manager of the Audio Development Group. Before joining Dalet almost four years ago, Piotr worked in the area of the audiovisual post-production systems. At Dalet, he has been involved in audio research and development. Specialised in audio management, Piotr is presently in charge of the software audio components used for the development of all the Dalet editing and broadcast applications.

Dalet France. Dalet recently enlarged its team of sales Engineers, with Eric Charles, in charge of the French independent radios, Elsa Vuillod who will handle Switzerland, Benelux and South Africa, and Pierre Couret who will manage Eastern European markets, as well as Italy and Portugal.

On the Move

Due to Dalet's recent expansion in the American market, and the creation of a large team of engineers for installation and support in the US and Latin America, we have relocated to a larger office in New York. American customers can now contact Dalet representatives at the following address: Dalet USA, 50 Broadway, Suite 1500, New York, NY 10004 - Tel: + 1 (212) 825-3322 - Fax: + 1 (212) 825-0182. ■

Dalet Demos at NAB Radio Show & SBES

Come and see the
new range of Dalet



products in **Seattle** -
NAB Radio Show,
October 17-20, booth
414, or in **Birmingham** -
SBES, November 4-5,
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TeamRadio is a powerful Traffic and Scheduling package that can be fully integrated with the Dalet Digital Audio System.

TeamNews application captures all standard newswire formats (AP, Reuters, etc.) for reporters to drag into Dalet's text editor. They can embed an audio actuality into the copy, and go on air with the story using Dalet's Newscast application.

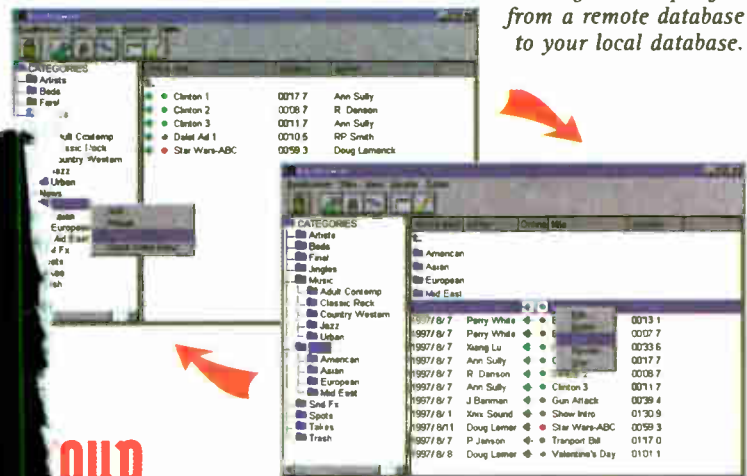
InterWeb allows radio stations within a group to pool their resources. Reporters on the road, affiliates, sister stations, can all download and upload audio remotely simply by dragging and dropping files from one window to another. ■

CONTACT

World Standard in Digital Audio

Local Station

Drag and drop a file from a remote database to your local database.

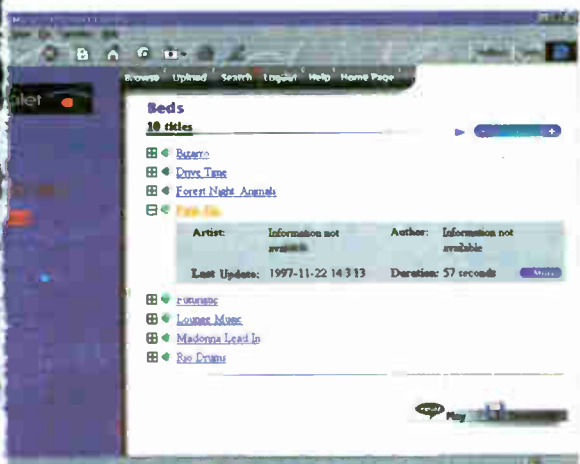


Group Connectivity

Consolidation can generate huge productivity gains, provided groups have the right tools. Dalet is continuously developing new solutions to meet the evolving needs of our clients. With TeamRadio – let's traffic and billing software – the business of over 1000 radio stations can be linked together. Intranet applications allow stations within a group to access each other's orders and audio remotely. Production work done by one station can be used by another, minutes later.



Dalet On Air Workstation



Manage Files through an Intranet Audio Server

Unprecedented Support

Dalet is a service-driven company. With more than 70 engineers, we guarantee your station stays on the air. Dalet's support experts are on call, 24 hours a day. Clients have on-line support over the Internet. We can also provide on-site visits to upgrade an existing system.

"Support on any of these systems, I think, is imperative..."

Dalet support has been excellent."

Jim McGivern

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Military Radio Serves U.S. Troops

Andrea Rivetta

For U.S. military personnel based in Aviano, Italy, Z Radio FM is the source for up-to-the-minute information and entertainment.

Located in the Friuli region of northeastern Italy, Z Radio FM is part of American Forces Network (AFN); its manager is Master Sergeant Bill Reid. Around the world, AFN provides troops with a mix of locally produced programs and radio and TV programming from U.S. networks.

AFN began broadcasting in 1945, at the end of World War II. European broadcasts started in Austria with Radio

Blue Danube. AFN arrived in Italy in the 1970s, first in Verona, then in Vicenza. The AFN station in Aviano is one of the more innovative radio stations in Italy.

The international programming is produced at AFN headquarters at March Air Reserve Base near Los Angeles; from there it is sent to Aviano via AFN European headquarters in Frankfurt am Main, Germany. Some stations, like Z Radio FM, supplement AFN programming with local productions.

U.S. troops in the Asia-Pacific region are served by AFN Tokyo, while those in Latin America are served by AFN Panama. The latter operation will

relocate in 1999, when control of the Panama Canal Zone reverts to Panamanian authorities.

AFN Radio airs news programming from the Associated Press, United Press International and National Public Radio. Westwood One provides adult contemporary, country and classic rock programs, along with Tom Joyner's morning show (midday in Italy). NPR also provides jazz, blues and classical music programming, while golden oldies from the 1950s and the '60s are supplied by Oldies Radio.

AFN counts on the support of thousands of members of the U.S. military. In California alone, 100 people work

for AFN. Five hundred more are based in Europe, 100 of which are in Italy.

At Aviano, 21 people oversee Z Radio FM and a television operation. These people produce five hours of local programming each day, including a morning show hosted by Airman Lina Smith.

"Airman Smith plays the latest hits, generally pop music, while taking telephone calls from listeners and interviewing people who work at the base," said U.S. Air Force Sergeant Bill Hickman, spokesman for the station. "Between 6 and 9 a.m., there are four radio news programs, reporting happenings at the base, produced by our own news staff."

The other locally produced program is an 6 to 8 p.m. drive-time show presented by Airman Heather Burress. The evening show mixes talk programming with some rock and rap music, and it is aimed at a younger audience.

"The station provides traffic news, information about on-base events, local films being shown and the menu at the base restaurant," Hickman said.

For staff training, AFN organizes seminars. Recently, the Z Radio FM staff took part in a one-day seminar in Vicenza organized by well-known radio host Dan O'Day. He rated the broadcasters in areas like on-air personality, listener service and creativity.

Good following

AFN presenters have disparate backgrounds. Many have radio experience as civilians; some, like Smith and Burress, have a natural ability with the medium.

All AFN recruits must pass an audition where their vocal quality and computer skills are tested. Once they pass, they study print and broadcast journalism at a military journalism school in Maryland.

They are then posted to a local station where specialized, on-the-job training continues for two to three years.

Computer literacy is important for AFN personnel, as computers are utilized heavily at the service.

An Arrakis DigiLink system, for example, is used for editing radio programs. Another computerized system is used to switch automatically between satellite-delivered and local programs. At Aviano, all prerecorded spots are stored digitally on hard disk.

U.S. servicemen and women appreciate the little bit of home that Z Radio FM and other AFN stations provide. Hickman said local citizens also tune in to the station.

"We commissioned Frank Nagel Associates to conduct a listener survey in September 1996," he said. "During a typical week, 95 percent of people at the base tuned in to the station at least once. We are not able to survey the locals, but we know they listen and appreciate the service, too, because we get a lot of phone calls."

For the past two years, Z Radio FM has won the U.S. Air Force radio and television Station of the Year award.

Although AFN is a military operation, the staff is independent of the local chain of command. AFN reporters and staff are under the command of a colonel based in Dallas, which managers say helps ensure an independent and free press.

Andrea Rivetta reports on the industry from Milan, Italy.

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Seattle: A Tasty Vacation Spot

► SEATTLE, continued from page 23

You may not have time to plan a tour of the city during the show, but in case you plan to stay a while, consider a Seattle City Pass, which gets you in to several of the area's attractions for half-price. It covers the Space Needle, Museum of Flight, Woodland Park Zoo, Pacific Science Center, Seattle Art Museum and Seattle Aquarium. Purchase ticket booklets at the entrance to any of the participating attractions.



Ample Dining Opportunities

For entertainment value, you can save money by calling Ticket/Ticket for discounted, day-of-show seats to events and venues around the Seattle area, including concert halls, theaters and nightclubs. Call (206) 324-2744.

Getting around

People are friendly in Seattle and willing to help. Free metro buses are available downtown between 6 a.m. and 7 p.m. At night, a charge applies. Buy Metro passes in advance by calling (206) 624-PASS or e-mailing your order to metro.pass-sales@metrokc.gov

You can catch a bus at the Convention Center and get to any downtown location for free during the specified hours. Major attractions are within blocks of the Convention Center and most downtown hotels.

Avis Car Rental is offering NAB convention attendees a car rental discount. When calling, mention meeting code A098499. The Avis phone number is (206) 448-1700. Most cab companies are

available 24 hours a day, seven days a week. Farwest Taxi and GraytopCab/Seattle Dispatch Service are two of the more popular.

Coffee has surpassed grunge as the hot du jour item. Seattle likes muscle coffee, and the city of coffee boasts its adoration for the bean all over town. Seattle parades espresso everywhere. Here is some lingo to help you place your order:

Latte: The unofficial drink of Seattle. Latte is espresso with steamed milk and a thick foam topping.

Americano: This is espresso-lite.

Mocha: For the chocolate lover. The formula: a dash of mocha syrup, espres-

so, a topping of whipped cream and a dusting of cocoa powder.

You can save on same-day event tickets for concerts, plays and nightclubs.

Coffee and espresso sizes come with their own terminology like *short*, *tall* and

grande. Dieting? Use "skinny" as an adjective when ordering an espresso, and it will come with a lower fat content.

Food to dine for

Seattle also loves microbrew beer. Grimley said, "Most of the trendy restaurants also offer a local brew, but you have to ask." Popular brewpubs include Pike Place Brewery, Hale's Pub, Ray's Boat House Restaurant and Redhook Ale Brewery.

Other places to meet and eat include the Brooklyn Seafood, Steak & Oyster House; Anthony's Pier 66/Bell St. Diner, which offers a waterfront view of Elliott Bay; Cutters, at the edge of Pike Place Market on the bay; Wolfgang Puck Café; Flying Fish, a seafood bistro; and Blowfish Asian Café.

Have fun!

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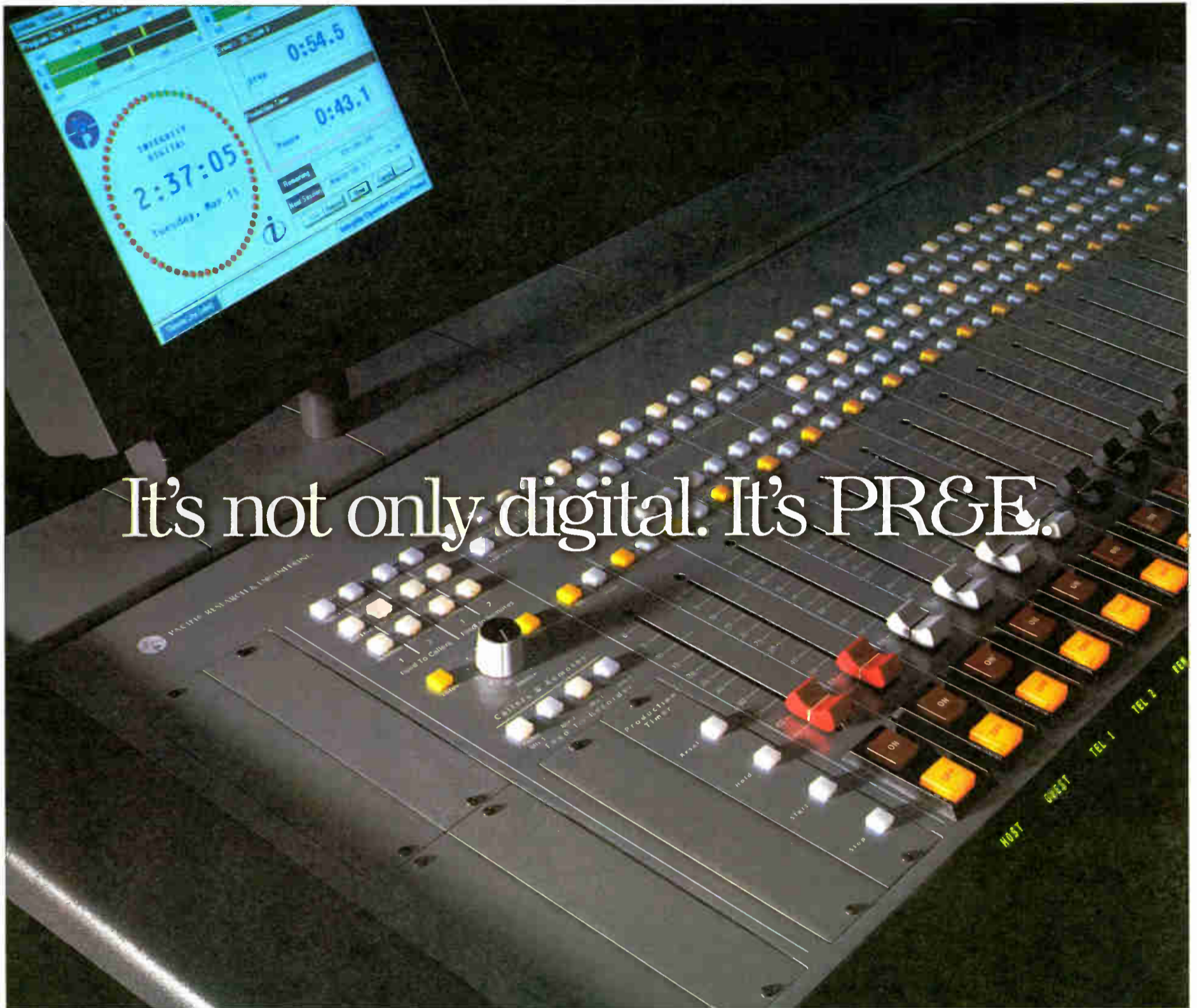
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Each fader has a 10-character alphanumeric display. The display changes when another audio source is assigned, which can happen either manually or at a preassigned time.



PACIFIC RESEARCH & ENGINEERING

PRODUCT EVALUATION

Videoquip's Handy Digital Monitor

Tom Vernon

An item I consistently pack in my toolbox is a Radio Shack utility amp. It is an essential device because it's small and inexpensive, and allows me to check quickly for presence and quality of audio signals. Great for analog, but ineffective for digital.

Recognizing the need for a handheld digital utility device, the folks at Videoquip Research Ltd. in Toronto designed the DM-1 AES/EBU Digital Audio Monitor. Within this small box are a D-to-A converter, a stereo headphone amp and an LED display to indicate the incoming sampling frequency, be it 32, 44.1 or 48 kHz. Power comes from a 9V battery or external supply.

The DM-1 contains a D/A converter, a headphone amp and an LED display.

The front panel contains the power switch and indicator, stereo headphone jack, level control, and sampling frequency indicators. An XLR connector for digital input signals, a switch to select or deselect the 110-ohm terminating resistor, and the AC adapter jack are found on the rear panel.

Although the DM-1 is set up to monitor AES/EBU signals, it can handle S/PDIF audio as well. It lacks an RCA jack and proper termination, but for general listening, this is not a problem. You'll need to make your own XLR-to-female RCA adapter.

Battery life

The quality of workmanship in the DM-1 is very good. All components are on one circuit board, which has component designations silk-screened on the surface. Mechanical construction is solid, with metal end pieces and a plastic

box that fits together accurately.

How long will the 9V battery last? In an unscientific test at the factory, a DM-1 was connected to a CD player set up to play the same CD continuously. Headphones were connected and cranked to full volume. The battery held out for about eight hours. This suggests you'll get more performance time in the field, where off-and-on use is less strenuous.

In the field

There are a couple ways you may want to use the DM-1. You can stuff it in your toolbox and take it in the field



Front and Rear Views of the DM-1

for quick checks, or attach the included rubber feet, power up with an AC adapter, connect an amp, and use it for

working in a high-sound-level environment or if you enjoy pain. My only See VIDEOQUIP, page 30 ▶

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Product Capsule:
Videoquip DM-1 AES/EBU Digital Audio Monitor

Thumbs Up

- ✓ Long battery life
- ✓ Ease of use
- ✓ Cost
- ✓ Quality of construction

Thumbs Down

- ✓ No RCA jack for S/PDIF
- ✓ Need headphones for field work (no internal speaker)

For more information contact Videoquip in Toronto at (888) 293-1071 or visit www.videoquip.com or circle **Reader Service 222**

ROOTS OF RADIO

Powerful Alternators, Circa 1918

Ronald Pesha

Back in the June 24 issue, we described mechanical methods of generating high-power RF in the days before vacuum tube transmitters. The great difficulty of generating power at radio frequencies with rotating machines led to "frequency changing" — experiments in frequency doubling and quadrupling. This technique resulted in final frequencies from mechanical alternators in the 100-to-200 kHz range.

The 1918 book "Radio Telephony" devotes many pages to alternators. These machines, keyed for code transmission, powered many military and government stations. The book describes the "latest and most improved" radiophone sets such as a 10 kW transmitter by Telefunken, capable of putting 6 kW of continuous wave and about 4 kW of modulated RF into an antenna.

Early designs

The alternator feeds series LC including P1 and P2, this circuit tuned to double the alternator's frequency. S1 and S2 and the variable inductance represent the entire antenna circuit. A small DC generator supplies magnetizing current to M1 and M2, necessary for frequency-doubling action by taking advantage of the non-linearity of magnetic hysteresis. For quadrupling the frequency, a similar circuit may be inserted just after the alternator. Modulation

occurs in the final frequency doubler, an early example of modulating the final.

The high-current carbon-type micro-

phone feeds modulated DC through a choke coil (not shown) to prevent RF flow back into the mic. This modulated DC subsequently modulates the mag-

netizing current at an audio rate using windings M' and M". Both modulation and the last stage of RF frequency doubling take place magnetically and simultaneously. There probably is a good deal of audio distortion simultaneously, too.

The photograph shows the complete 10 kW transmitter, operating from 110 V AC. An AC motor drives the alternator. The meters along the top show DC supply voltage, motor current and telegraph key current. On the upper right, a 40 A RF meter reads antenna current. The meters on the second row read large motor current, the M1M2 magnetizing current, the direct alternator output current, the microphone current (up to 10 amps!) and the antenna current for code transmission.

As this transmitter includes four stages of doubling or "frequency changing," large wheels tune stages for 10, 20, 40, 80 and 160 kHz. The sixth wheel presumably tunes the antenna circuit. The round device in the top pediment is a viewing window for a stroboscope-like device that rotates at high speed a small neon bulb excited by the antenna output circuit. Viewing it gives a rough idea of modulation depth.

No modulation monitors in those days. Modulation originated with 10 or more carbon microphones connected in

series-parallel, barely visible coiling upward on the right side of the operating desk. The magnetic amplifier increased the 4 W output of this battery of microphones by almost a thousand times, so modulation may have approached 80 or 90 percent.

Missing sounds

An account of transmission from Berlin, Germany, to Vienna, Austria — 340 miles — claims that intelligibility of spoken words was 100 percent, though "vowels were emphasized while the consonants seemed sometimes to be

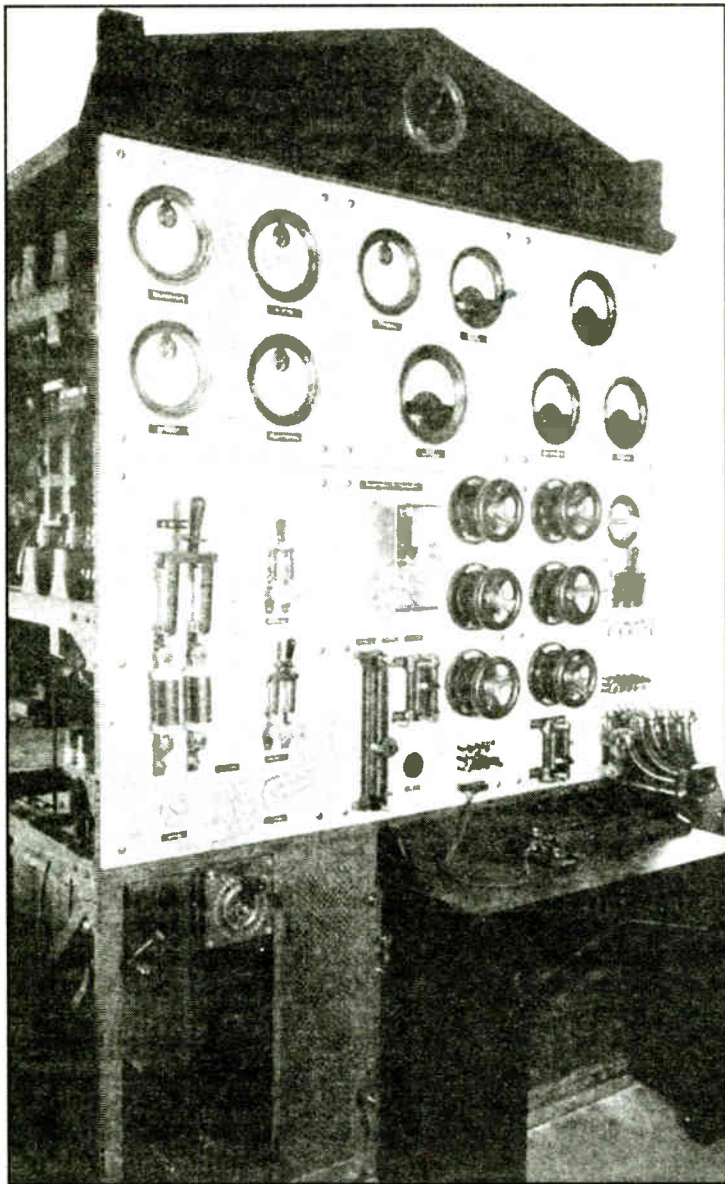


Figure 1: A photo from the 1918 book 'Radio Telephony.' The caption reads: 'Telefunken Company 10 k.w. alternator-frequency doubler radiophone transmitter.'

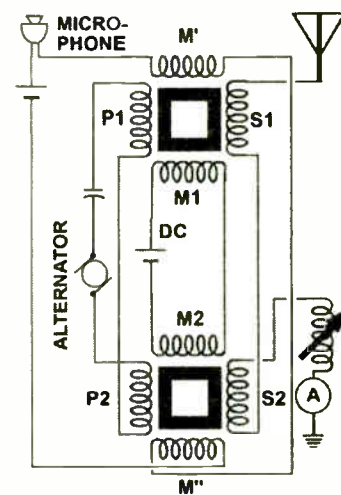


Figure 2

almost missing." Singing was characterized as "faultless." The author of the book, Alfred Goldmith, stated that it was not clear to what extent "iron distortion of the speech forms" contributed to these characteristics. The existence of distortion was recognized.

The light of the vacuum tube was recognized, too, as casting a shadow on the further development of alternators. By 1918, tubes capable of delivering 250 W were available, and schemes of paralleling multiple tubes for increased output were under development. Government stations would continue using their alternators for some time, but all-electronic vacuum tube broadcasting would begin in just two years.

■ ■ ■

Contact Ron Pesha via RW.

Videoquip Earns a Spot in Your Toolkit

▶ VIDEOQUIP, continued from page 29
gripe is the lack of an RCA connector on the back for S/PDIF signals. An XLR-to-RCA adapter is just one more thing to lug around in your toolbox, or one more thing to forget.

If the rest of Videoquip's gear is as good as this digital monitor, it may be a company to watch.

The DM-1 measures 6 x 3.5 x 1.25

inches. It comes with a two-year warranty for parts and labor, and is available for purchase directly from the factory.

Cost is \$249. You can order at (888) 293-1071.

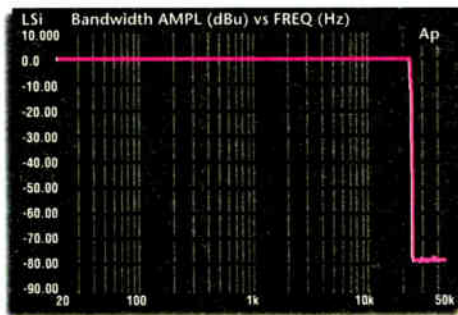
■ ■ ■

Tom Vernon is a multimedia consultant working in Philadelphia.

Reach him in c/o RW.

Videoquip may not be a household name in American broadcast circles, but it has been in business since 1981. Its current product line includes a range of audio, video and automation equipment.

Of special interest to radio broadcasters are Videoquip's 20-bit A/D and D/A converters, as well as its routing switchers. Coming soon are S/PDIF to AES/EBU format converters. For more information on the DM-1 and other Videoquip products, hop on your Web browser and pedal over to www.videoquip.com



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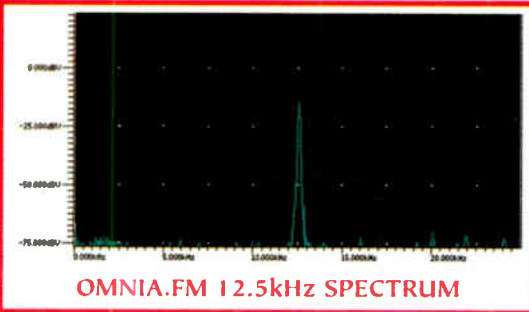


When you hear the Omnia.fm, you'll know why broadcasters the world over choose it: Sound that's as smooth and fluid as analog, with absolutely none of the digital grunge you hear in other digital processors.

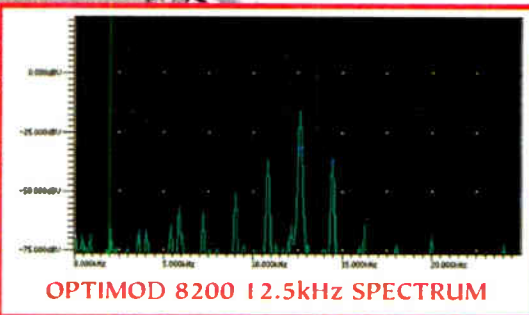
So what's digital grunge? Artifacts caused by aliasing distortion in yesterday's processors that lack the Omnia's 48kHz sampling, 192kHz virtual upsampling and unique anti-aliasing final limiter. In the FFT analyses shown below, you can actually see the grunge as well its absence in the Omnia.

To hear the difference for yourself, contact your Omnia dealer and get your risk-free, 60-day demo*.

Here's how: The test results were obtained with a Hewlett-Packard Audio Test Set, Model 339A; the audio processor under test; and Rapid Systems R1200 Data Acquisition System for FFT analysis. The processors were set for 75µs pre-emphasis, and were carefully adjusted so the input levels were within the normal range of operation. The unit under test was fed a 12.5kHz test tone using the analog inputs. The discrete left channel analog output was connected to the FFT analyzer input. That's it. No tricks, no disclaimers about the test working only in our trade show booth or only in our lab, under the most arcane, non-real-world test conditions. In fact,



OMNIA.FM 12.5kHz SPECTRUM



OPTIMOD 8200 12.5kHz SPECTRUM

you can duplicate the test results yourself in your own shop. Don't have an FFT analyzer? No problem. Just use an oscillator and your ears—you can clearly hear the birdies in the old processor! Of course, this isn't about test tones; it's about music. And Fourier theory says that music—whether it's rap, oldies, urban, country, and yes, even grunge—can be represented as a combination of sine waves. Imagine what this kind of aliasing distortion can do to complex musical signals!

Here's why: The Omnia.fm utilizes 48kHz sampling for dynamics processing and virtual upsampling at 192kHz for the final limiter, which is a unique, anti-aliasing design.

The test used version 1.02 software and the 'Cranked' preset, which is the Omnia's most aggressive stock setting. The Orban® Optimod® 8200 used for testing operates at 32kHz sampling for the dynamics processing and incorporates (4x) 128kHz upsampling for the clipping/low-pass filtering function. The test used version 3.0 software and the 'Urban/Rap-Dense' preset, which is the Optimod's most aggressive stock setting. Aliasing will occur with input signals above 5kHz in 32kHz FM broadcast audio processors unless mechanisms that cause aliasing are eliminated.

For a complete technical report, call us for a copy of our paper entitled "Omnia.fm: An Engineering Study." Or visit our web site at: www.nogrunge.com.



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Circle (171) On Reader Service Card

FM Antenna Configuration vs. Performance

Richard J. Fry

The author is FM Applications Engineer, Radio Product Line for Harris Broadcast Division.

As a transmission product supplier, we often hear customers debate the effects of antenna configuration on their coverage. This debate includes several factors including the number of bays, beam tilt,

When either "good" or "bad" changes are observed in coverage after changing antennas while using the same ERP, transmitting site and HAAT, the changes probably are due to some combination of the following:

- 1) The net radiation pattern of the antenna+tower in the azimuth plane is different between the two antennas.
- 2) Propagation conditions were differ-

Antenna	Depression Angle to 1 st Null	Distance to 1 st Null
4-bay	-14.48°	0.24 miles
3-bay	-19.47°	0.175 miles

Figure 1

ent during the times of comparison. azimuth and null fill. What are the effects of these factors? The real-world results might surprise you. A recent Internet discussion thread prompted this summary, which we share here with readers of **Radio World**.

Number of bays

What is the expected coverage for a three-bay vs. a four-bay FM antenna from 100 m HAAT? For a given set of conditions, there would be no significant change in coverage area, or in field strength values at any radius or azimuth beyond the immediate vicinity of the tower, where the elevation plane pattern minima are found.

(The given conditions: same antenna type, same ERP, same radiation center elevation, same tower site, and same mounting configuration — that is, the h- and v-pol antenna+tower azimuth plane radiation patterns are the same for the two antennas. We should note here that the azimuth radiation patterns of non-panel FM antennas can be strongly affected by the antenna-supporting structure. Tower face widths greater than about 24 inches can introduce multiple nulls of as much as 11dB into the "free-space" h- and v-pol azimuth plane patterns of the antenna. 11dB = a 92 percent reduction of ERP from the RMS value.)

ent during the times of comparison. 3) Changes were expected after the antenna was changed.

Most of the coverage of an antenna is provided by the portion of the elevation plane pattern lying from about zero degrees (the horizontal) to about 2.5 degrees below the horizontal. Antenna relative field over this sector does not vary greatly for all FM antennas of practical physical size. In this example, a three-bay, full-wave spaced antenna with no beam tilt or null fill has a relative field of about 0.975 at -2.5 degrees, and for a four-bay for the same conditions it is about 0.950. Starting from the same ERP directed at the horizontal by the two antennas, the difference in ERP they produce at -2.5 degrees is negligible — 0.21 dB in this case, and that is at a point on the ground only 1.4 miles away from the tower.

Even at 6 kW ERP, field strength at 1.4 miles for these conditions is above 100 mV/m for both antennas, and the difference in field strengths is progressively less than 0.21 dB from that 1.4 miles on out to the radio horizon.

For some perspective on antenna gain or number of bays, consider that most UHF television transmitting antennas

have very high gain when compared to FM transmitting antennas (UHF elevation gains of up to 45X compared to FM elevation gains of less than 16X). Yet UHF antennas have no problems in producing the signal strengths predicted by the FCC propagation curves for UHF, and one seldom, if ever, hears concerns about "overshooting my market," "penetrating power," or similar comments in these cases. And (analog) television transmission is much more susceptible to multipath problems, where time-displaced reflections 20 dB below the main signal are visible as "ghosts" in a television picture, but the same -20 dB reflection from an FM antenna has little or zero affect on FM receivers.

tilt is already very high (30 mV/m or more). Usually there is no need to make it higher in this region.

Azimuth pattern optimization

Improving the azimuth pattern of the antenna can have much more of an effect on coverage in some directions than adding beam tilt, by reducing the depths of the nulls in the net antenna+tower azimuth pattern. This is done on a calibrated test range using one or two bays of the antenna mounted on a tower section similar to the customer's. The azimuth pattern response is measured while the entire assembly is rotated on its vertical axis. Additional "parasitic" radiators are fitted to the

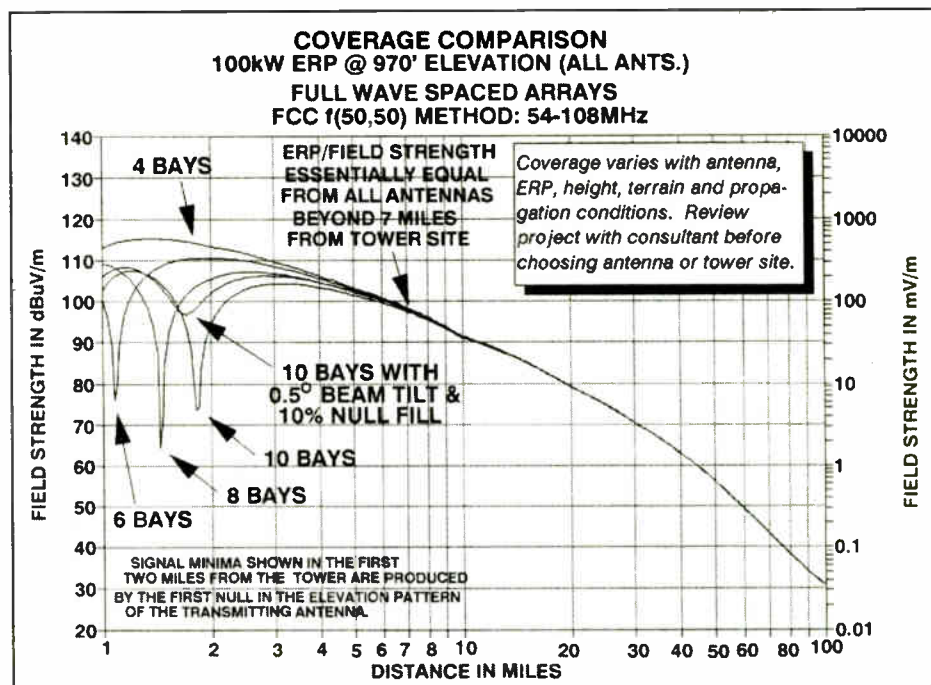


Figure 2

For the reasons stated earlier, adding beam tilt to an FM antenna yields only fairly minor changes in ERP in the sector of the elevation pattern from the horizontal to -2.5 degrees. Beam tilt typically adds only a few tenths of a decibel in field strength over the great majority of the station's coverage area, and actually has much more effect quite close to the tower, where field strength *without* beam

antenna+tower assembly to smooth out the azimuth plane pattern, usually of the v-pol component only.

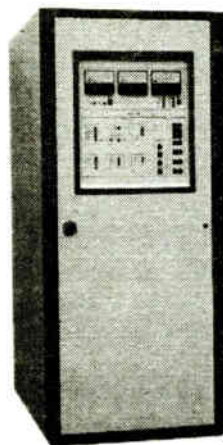
The goal of optimization of an omnidirectional antenna is to avoid any great reduction of ERP at any azimuth in the horizontal plane, and *not* to provide lobes of higher gain so as to increase coverage beyond the contours expected

See FM COVERAGE, page 40 ▶



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Robert George, Owner, Robert George Productions, Naples, Florida

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And Robert George should know—the CDQPrima increased his revenues by about 50%!

George writes and produces radio commercials and masters CDs, audio for video and jingles. “As the owner of a small business, I’m cautious about purchasing new equipment, but buying the CDQPrima was one of the smartest business moves I’ve ever made,” he says. In addition to boosting his revenues, George says the Prima has more than paid for itself and allowed him and his voice-over talents to “live the lifestyle we want to live.”

The Prima also helped George expand his pool of voice-over talents almost instantly. The people he works with have ISDN at their home studios, so he needed a codec that was compatible with most of the others on the market. “The Prima was the only one flexible enough to communicate with everyone on my talent roster,” he says. The fact that, unlike the competition, the Prima performs well at 128 and 256 kb/s and offers SMPTE time code capability was also a big bonus to George. “When sound quality is key,” George says, “the competition is not even close. The noise floor on the competition is simply too high. I’ve seen the waveform on my computer.”

George says the CDQPrima has helped him to “swim with the sharks” and bring in accounts he couldn’t have landed without it. When a car dealer with eight dealerships began taking its business to Miami looking for fresh, distinctive voices, George was ready. With the Prima, he was able to bring in big talent and win the account. “It’s a great piece of equipment,” he says. “No studio should be without it.”

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GUEST COMMENTARY

Detuning: A 'Disappearing' Technology

Ron Nott

In 1994, the FCC passed rules to protect AM stations from new structures licensed to the Public Mobile Service — i.e., cellular. Those rules have stimulated the development of detuning technology that may benefit your station.

One such supplier is Nott Ltd. In this Guest Commentary, Vice President of Engineering Ron Nott explains detuning and how your station might benefit.

When a large metal structure is built near the transmitter site of an AM radio station, distortion of the coverage pattern is likely. This is because part of the energy from the station signal is intercepted by the structure and then re-radiated. There are then two sources of the station signal which, at a distance, either add or subtract to strengthen or weaken the signal in different directions.

Sometimes re-radiation may seem to help a station by directionalizing it, but sometimes this can hurt. In any case, the FCC does not want parasitic re-radiators affecting the signal of an AM station, nor should the owner and engineers of the station.

During the 1980s there were several lawsuits by AM radio stations against the owners of new structures that were built near their transmitter sites. Stations that are directional can have their patterns

knocked out of tolerance by these structures. As a result of the suits, the FCC adopted a policy in 1987, and rules in 1994, protecting AM broadcasters from this problem.

In brief, the rules state that when a new structure such as a tower or monopole is to be built within 3 kilometers (1.86 miles) of a directional AM station or 1 km (0.62 miles) of a non-directional AM station, the newcomer is obligated to perform field intensity measurements before and after construction, and if necessary, must install "detuning apparatus" on the new structure.

What is it?

Detuning apparatus typically consists of two parts: A wire skirt that extends up the sides of the new structure, and a "detuning housing" that contains RF components which, along with the skirt, detune the structure by minimizing RF current flow in the structure metal at the AM frequency.

Depending on how close the new structure is to the AM antenna, a skirt of one to six wires is installed. Self-supporting towers may have an internal (or inverted) skirt. At the bottom end, the housing containing one or more RF components connects between the skirt wires and the structure. It is not complicated, but must be designed and installed properly to be effective.

The length of the skirt is important in order to stabilize the system during varying weather conditions and changing environment over time. If a skirt is made exactly one-quarter wavelength high, the system may be unstable and difficult to tune. The skirt mounted on the structure may be viewed as a length of transmission line, the sign of which inverts at the quarter wave point. At the inversion point, the reactance is changing rapidly, which means that it may be difficult to detune.

Theory

Some years ago, a theory was propounded that stated when a structure is detuned, there is one RF current in the structure moving in one direction and another RF current of equal value moving in the opposite direction within the detuning skirt wires. Each current supposedly generates a field which is 180 degrees out of phase with the other field, but is of equal amplitude. This would result theoretically in effective field cancellation at a distance.

However, one can easily measure the current in the skirt wires to see if this is the case. If a toroidal transformer wound on a ferrite core is slipped over a skirt wire, a sample of its current is readily available. By using this method, it has been determined that when the structure is not detuned, significant RF current can be detected. However, when it is detuned, the current goes to near zero.

The detuning system

The detuning system, consisting of the inductance resulting from the loop formed by the structure and the skirt wires, may be resonated with a variable capacitor in the detuning housing. In simple terms, the system (including the structure itself) becomes a gigantic parallel resonant circuit. This is indicated by high RF voltage across the capacitor and minimal current in the skirt wires and structure, which is characteristic of a parallel resonant circuit. Such a circuit at resonance has very high impedance, so there is a minimal RF current flow that results in insignificant re-radiation from the structure. Under this condition, the pattern of the AM station will then return to normal.

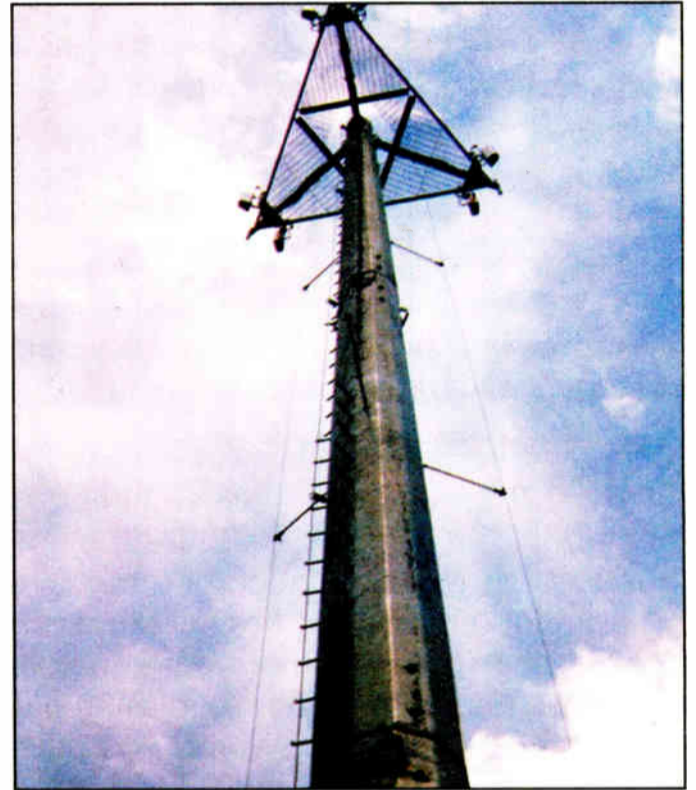
Because they make the detuning process easy and convenient, a toroidal RF current sampler and a filtered detector have become standard in the detuning housings furnished by Nott Ltd. in its detuning systems. In one case, an oil well drilling rig near a 10 kW AM station was detuned by the drilling superintendent using this method, but without any

knowledge of radio technology. Although warned, he still got a couple of bad RF burns. The detuning was later verified by a consultant using a field intensity meter.

Non-technical people (such as tower crews) are often surprised that the skirt wires can give them a severe bite. When a detuned structure is located near an AM transmitter site, particularly if it is a high-power station, warning signs should be posted to prevent shock or injuries.

Application

A guyed tower that is to be detuned must also have the guy wires broken up with insulators the same as any AM broadcast antenna. If a tower has been erected near a transmitter site without these insulators, temporary guys must be rigged, the permanent guys dropped and the insulators inserted at proper intervals. When this happens, as it sometimes does, these insulators and their installation



This detuning skirt is in place on an AT&T Wireless 150-foot monopole near 50 kW radio station KOMA(AM) in Oklahoma City.

become the greatest cost of the detuning system. It is much more expensive to install them afterward than when the tower is first erected.

While the skirt usually is mounted on the outside of the tower or monopole, a self-supporting tower may have an internal skirt in non-critical cases. This frees the exterior of the tower from wires, brackets, etc. A wire cage is suspended down the interior of the tower. It is attached at the top end and insulated at the bottom end. The detuning housing is placed near it and a jumper is connected between the bottom end of the cage and the terminal on the housing. The ground side of the housing must be connected to each of the tower legs with copper strap, which may be buried. This strap is important: it completes the circuit between tower, skirt and detuning capacitor.

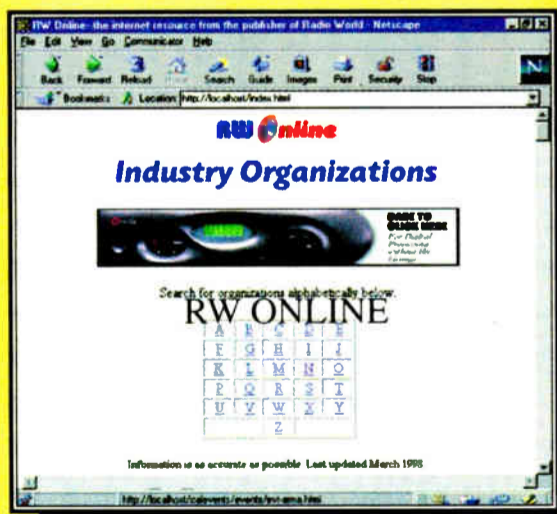
The capacitor in the detuning housing should be a vacuum variable with at least a 3 KV rating. Air-variable capacitors collect insects and dirt, so are not acceptable in this service. The housing itself should be NEMA rated for outdoor service. For guyed towers, the housing may be mounted on a post adjacent to the tower or possibly on the

See DETUNING, page 35 ▶

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► **DETUNING**, continued from page 34 tower itself. For self-supporting towers, the best location is in the center of the tower so that the skirt wires are all the same length. If it must be mounted outside the tower, be aware that there will be a few degrees of phase difference between the wires.

In severe cases, such as when the structure is very close to a high-power or directional station, it may be necessary to provide a detuning housing for each of the skirt wires. If each has a toroidal RF sampler, it is easy to minimize the current in each of the skirt wires.

Tall towers

In some cases, a tower that is electrically tall at the AM frequency must be detuned. This can happen when an FM or TV tower is near an AM antenna. As stated previously, a skirt of more than 70 degrees should be avoided. In this case, a sectionalized detuning system may be utilized. On very tall towers, insulated gap sections help increase the height of the detuning system. These gaps should be no greater than 45 degrees.

When sectionalized detuning systems were designed before, they included remotely tuned capacitors located on the tower at the lower ends of the skirt sections. One characteristic of such capacitors is when you need to remotely tune it, it refuses to cooperate. This means getting a tower man to turn it by hand or repair the drive mechanism.

To place the capacitor down near ground level, a length of coaxial cable can be run between the end of the skirt and the detuning housing. To simplify this, if the cable is exactly one-half wavelength at the AM frequency, whatever impedance is seen at the input to the skirt will also be seen at the input to coaxial cable. Alternatively, you could use a Smith chart to calculate the effect of a random length of cable to determine the value of the component(s) needed to remotely resonate the skirt. Again, the toroidal RF current sensor and detector will allow you to detune the skirt from the ground. Before the current sensor was available, someone had to climb up the tower with a field intensity meter and adjust the capacitor for minimum re-radiation.

Power lines

In general, anything less than about 45 electrical degrees tall will not cause significant re-radiation, but power lines are an exception. Because there are wires on the poles or towers, they are very effectively top-loaded and can create a great deal of pattern distortion. Wooden poles have a heavy wire coming down to the ground. The ground is obtained by wrapping the copper wire in a helical fashion around the base of the pole or nailing it to the butt of the pole in a spiral. Thus, every pole has the capacity to intercept the AM field and re-radiate it. There can be many poles or transmission line towers within a couple of miles of an AM antenna, each contributing to pattern distortion.

Placing an RF choke in each pole ground wire will work, but it must be impervious to weather and bullets. To prevent the latter, the choke is placed just below the surface of the ground. Steel transmission line towers must be detuned with a skirt as described above.

Anything that is conductive and in the near field of a radio station can intercept part of the field and then re-

radiate. Objects of a relatively small size compared to the wavelength will not cause a problem, but when they are more than 45 electrical degrees, they can and do. When the object is 90

power lines, smokestacks, large metal buildings and the like can also cause pattern distortion. The solution is to detune the offending structure so it effectively disappears from the radio station signal.

of a tower in the near field of VHF signals such as FM and TV broadcast, aviation and communications frequencies. Even individual tower members can be detuned if they re-radiate. Guy wires can be detuned, although it's usually easier to break them up with insulators.

If a new tower or monopole shows up near your AM transmitter site, the owners are obligated to protect your station by retaining a consultant to perform field intensity measurements and detune it if necessary. The entire burden is on the newcomer, so don't hesitate to contact him immediately. You don't have to tolerate a distorted coverage pattern.

■ ■ ■

Reach the author in New Mexico at (505) 327-5646 or via e-mail to kSynr@tjantenna.com

RW welcomes other points of view.

Has your coverage been affected by construction of new structures? Detuning may be the answer.

degrees or more and within two or three wavelengths of the transmitting antenna, it can cause serious distortion of the radiation pattern.

Obviously, a new tower or monopole erected nearby can cause problems, but

Due to rules and policies of the FCC intended to protect AM broadcasters, the technology of detuning has become well developed.

Detuning is not only applicable to AM — it can be utilized to minimize the effects

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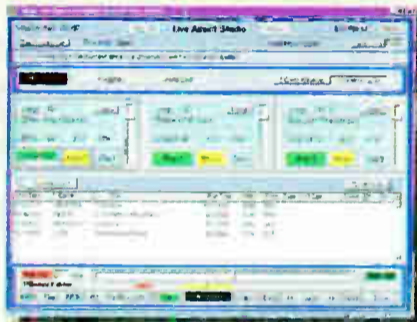
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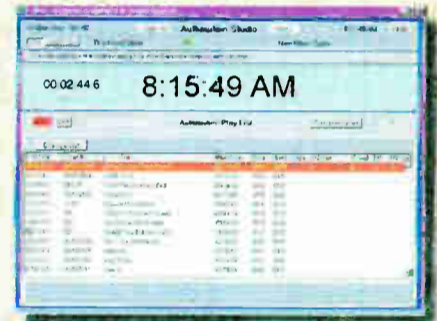
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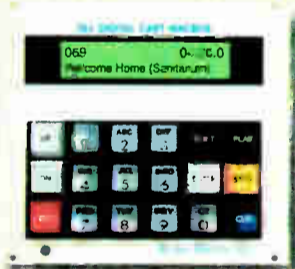


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The National Electrical Code

A Respected Consultant Offers Help in Understanding the Oft-Misunderstood NEC

Charles S. Fitch

This is the first in a multipart series about the National Electrical Code.

The National Electrical Code is an amazing document. It stands as one of the oldest, most widely quoted and most recognizable universal standards extant. It is also one of the most misquoted and misunderstood documents ever *not* read by people who should have read it. This is unfortunate. The application of the NEC has a daily, profound effect on all of us, personally and professionally.

Think about it. How many times today have you turned on a light, switched on an appliance, used electrical power in some way, shape or manner? Every use that you initiated was touched somewhere and somehow by the mandate of the NEC.

The universe of electrical power can be divided into three worlds: generation, delivery and consumption. In the recent past, generation and delivery were most often the sole dominion of the local utility functioning as a monopoly.

(In 1998 this is not necessarily so, as new economies bring competition to generation and delivery.)

The NEC primarily straddles the world of consumption, defining the standards of that section of electrical utilization from where the classic utility left off to where the kilowatt hours (kWh) are used to do some kind of work.

In your radio station, this starts at the point of demarcation where the supplier turns the power over to you. With these

new economies, even this point may be changing. We'll discuss that in future installments.

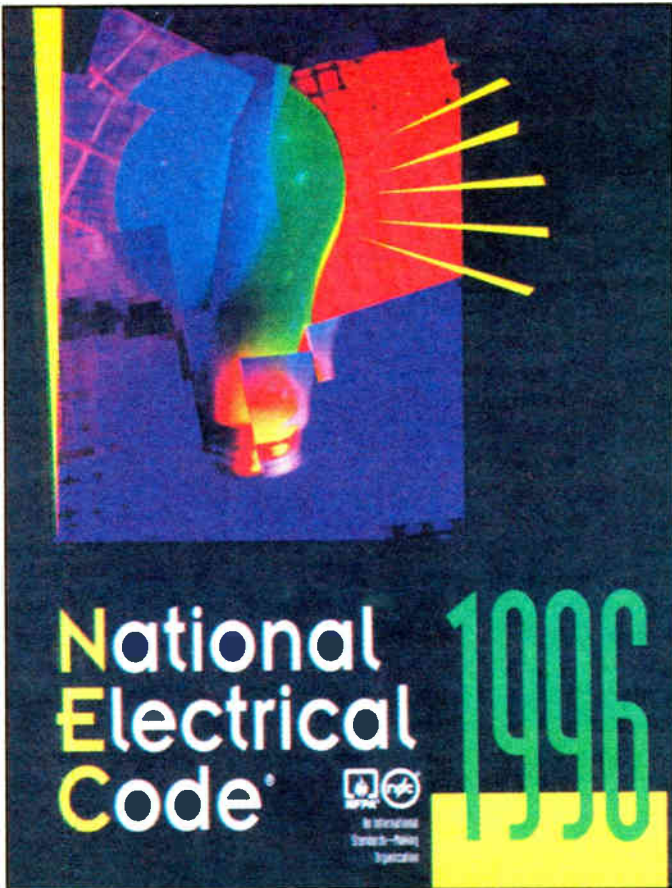
Background

The NEC has an interesting history. It appeared originally during that transition period, around 1900, when early power purveyors such as Thomas Edison, Elihu Thompson and George Westinghouse got out of the "soup to nuts" electrical business. The custom until then had been for a single source to sell you access to generation, delivery, switch gear, premise wiring, lighting and utilization equipment, right down to instruction on use, maintenance, even new electrical arc light stock.

Electricity soon started moving into homes and with that the wiring began to be done by people without technical training who needed guidance.

The organization that first recognized a need for standards was the insurance industry. It would be impossible to insure all the places where power equipment was located unless there was a surety that

the wiring and the devices met minimum and uniform standards. The greatest risk was from fire or personal injury precipi-



tated by improper installation or utilization of electricity. This was a real concern. The sophistication of materials was very low at this time — covering on wire was often knitted or embroidered cotton over paper — and no universal standards existed to assure uniformity between manufacturers.

See NEC, page 48 ▶

What It Is

To be precise, the National Electrical Code is Section 70 of the National Fire Protection Code. Codified standards for many types of installations that present a penchant for fire danger or injury are gathered in the NFPC — for example, range exhaust hoods for food preparation areas are covered in part 94.

In most locations, an official body is involved in the permit and inspection process for new and retrofit construction. For most businesses, this is the building office of your local municipality. Most of us see that authority personified in the building inspector (BI).

To draw together the codes and standards that affect construction, the Building Officials Code Authority publishes the BOCA code. With rare exception, it is the umbrella document used by inspection agencies. For the most part, the NFPC, and with it, the NEC, are taken whole-form into the BOCA. This is similar to how the EIA-222 standard is taken in to cover construction and modification of tower structures. However, when you apply for your building permit, inquire specifically about the codes used and mandatory inspections.

Concerning the code, many jurisdictions, such as Massachusetts, have additive codes. The NEC is taken in whole-body, but an additional set of regulations are strapped on. Massachusetts, for example, has specified exactly the color code for wire that should be used with various voltage systems. The NEC provides some latitude.

1993 vs. 1996

Many municipalities use a previous version to maintain uniformity between inspectors and to allow all arbitrated decisions to be finalized regarding new inclusions *before* they implement it. There are many locations still using the 1993 code and not the current 1996 edition for this reason. In regard to inspections, most locations require at least two: all rough-in and finished wire systems that will be hidden by walls, *and* a final. Occasionally that final inspection can be involved with all loads running so that the inspector can do a voltage drop, current and balance check.

In some locations, inspections are done by a third party, such as an independent underwriter, with the results supplied to the building office. Do not connect a wire to a screw before you speak to and arrange for the underwriter if they are going to be the inspectors. Their involvement varies tremendously from location to location. On some projects involving major construction or elaborately designed systems, a peer review is substituted.

In Massachusetts, these are known as Section 127 inspections, wherein the proponent hires an outside engineer (like me) who in turns actually works for the building inspector. As the project evolves, designs are reviewed, inspections are made, reports of these are filed by the outside engineer with the BI and the work proceeds at its own pace as long as the installation is compliant.

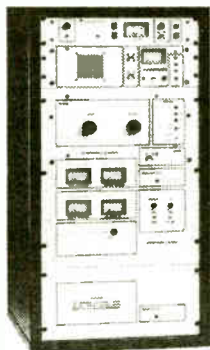
A multi-user tower, a complicated data processing center and a huge shopping complex are three projects that come to mind that were Section 127 events. All were complicated and outside the usual experience of the building office.

No matter what the circumstances, your electrical installation *will* be subject to the NEC.

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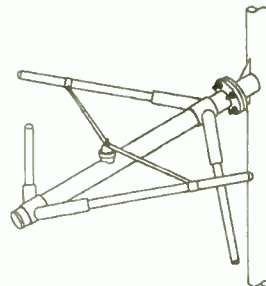
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Coverage vs. Configuration

► **FM COVERAGE**, continued from page 32 by the station's FCC license. Doing so would create a directional FM antenna, which may be used only when and as authorized by the station's construction permit or license.

The nulls in the elevation pattern may need to be filled if they land in a populated area. In the case discussed here, and assuming full-wave vertical spacing of the antenna bays, the first null in the elevation pattern for these antennas, and the point at which the null will "hit the ground" for a 100 m radiation center above level terrain is approximately as shown in the table.

The locations of the nulls in the cases shown in Figure 1 are probably too close to the tower to be a problem in most installations. Higher-order nulls (second, third, etc.) will fall closer to the base of the tower than the first null on any given radial.

Elevation pattern nulls rarely reach their theoretical value due to re-radiation from the tower and reflections from near-

gives improved antenna performance toward and at the radio horizon. However, even when *trying* to affect coverage out near the radio horizon, typically it takes several tuned dipole parasitic radiators positioned within feet or inches of each bay to have much effect on the net azimuth pattern toward the horizon. A reflection from the ground, or even a metal building some few hundreds or thousands of feet away from the base of the tower, is probably negligible at any distant location due to its low amplitude and unfavorable path geometry. The special coverage capabilities claimed for these antennas has yet to be conclusively proven.

Other techniques for reducing sidelobe radiation levels are possible and can be

quoted by most antenna suppliers.

Looking at a rectilinear plot of the relative field of the elevation pattern of an antenna from the horizontal to -90 degrees sometimes causes fears that the relatively narrow-appearing main lobe might not be able to produce adequate field strengths over the station's coverage area. But for most situations this is not an issue.

Remember that most of the coverage area is served by the sector of the main beam lying between zero and -2.5 degrees, where relative field is high. This point is easy to see in the following plot of field strength vs. distance for low to "high" gain antennas, all with the same ERP and HAAT. The plot shows that most of the effect of the different numbers of bays occurs quite close to the tower, where field strength

outside of the "nulls" is very high for all of the antennas compared.

In conclusion, although the number of bays may be less important than commonly believed when specifying an FM antenna, still there are good reasons to select one antenna type or configuration over another, and/or to specify certain pattern measuring options that can help predict or shape the azimuth radiation pattern. If best performance is desired, it is always advisable to use the services of an experienced consulting engineer when choosing or changing any antenna and/or transmitting site.

■ ■ ■

Reach the author via e-mail to dfry@harris.com

RW welcomes other points of view. Contact us at the address on page 5.

Nulls may need to be filled if they land in a populated area.

by terrain, but FM receivers may have greater multipath distortion problems if located in roughly circular zones around the tower centered on each "null."

The FCC has mandated that each transmitting site must meet guidelines to reduce radiation hazards to station personnel, and to the general public that might have access to areas close to the antenna. Several antenna designs will reduce the amplitude and/or number of off-axis sidelobes from the antenna, which in turn reduce the amount of energy radiated toward the ground near the antenna.

'Low RFR' antennas

The most popular way to do this with standard, non-panel FM antennas is to use 1/2-wave vertical spacing of the antenna elements. However, for a given ERP and number of bays, antenna gain is reduced and higher transmitter power is required. Adding more 1/2-wave spaced bays can recover the gain, but the antenna becomes more expensive, and the weight and windload on the tower increases. The wider main lobe of these 1/2-wave spaced antennas for a given number of bays means that power density in some regions close to the tower can actually be *higher* than if a full-wave spaced antenna is used. But usually some number of bays can be found that reduces power density sufficiently, while not overloading the tower or calling for very high transmitter power.

Recently an FM antenna manufacturer has advertised an antenna line with special power distribution among the bays to reduce the amplitude of the sidelobes. Again, gain is reduced over the standard antenna. An additional claim for these antennas is that reducing the reflections from the ground and other surfaces or objects near the tower at ground level

We've come together





You Must Remember This

The Atwater Kent Model 10A "Breadboard" dates from 1924.

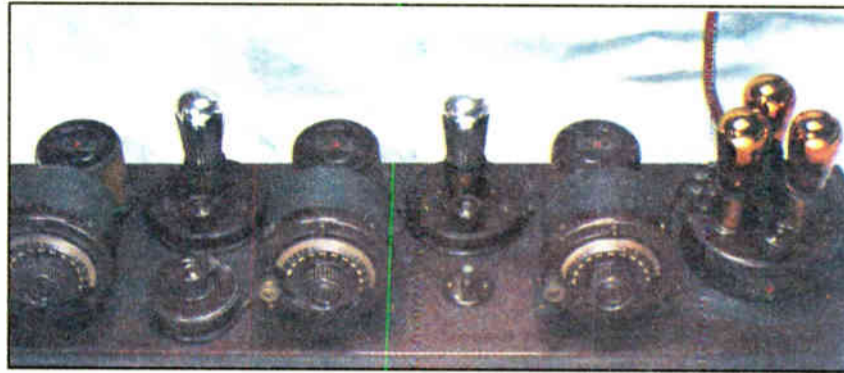
This radio, which was tuned with three large dials on the front, could be used with a horn-type speaker so the whole family could listen. It operated on two 45 V dry cell batteries and one 6 V wet cell, which could be recharged at the gas station or by using a trickle charger at home. The five tubes are type 01A.

To receive the radio signal, the manufacturer suggested using a 50- to 80-foot-long wire antenna with a ground

wire to the house water system.

This is one in a series of photographs in *RW* featuring classic and less well-

known radios. The pictures and descriptions are by collector Bill Overbeck, president of the Delaware Valley Historic Radio Club, who has made every effort to ensure accuracy. Contact him via e-mail at billradio@aol.com or through *RW*.



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BUSINESS DIGEST

OmniAmerica, Dielectric Sign Pact

Tower company OmniAmerica and equipment company Dielectric have entered into a business agreement under which Dielectric will serve as an equipment supplier for OmniAmerica broadcast project sites.

According to Dielectric, it will provide OmniAmerica with radio frequency components for FM radio and for digital and NTSC television, including antennas, transmission lines, combiners and other RF-chain components.

Terms of the agreement were not disclosed. An announcement from Dielectric said, "The relationship ... will build upon the companies' strength in the area of multi-station applications for digital television and FM radio."

Dielectric Communications, based in Maine, is a unit of General Signal. It makes FM and TV transmission gear. OmniAmerica Inc., based in Albuquerque, manages and develops multi-use telecommunications sites. It owns, has agreed to acquire, or is developing approximately 800 towers.

OmniAmerica is traded on the Nasdaq exchange under the symbol XMIT. General Signal is on the NYSE as GSX.

You Read It Here



Five Years Ago

"Digital audio radio makes sense. We are about to bear witness to a historic process ... Keep an open mind as the process plays out over the next several months, culminating in the choosing of a digital audio radio system (or systems) from which we can all benefit."

*Gary Shapiro
 Group Vice President
 Electronic Industries Association
 Nov. 10, 1993*

Ten Years Ago

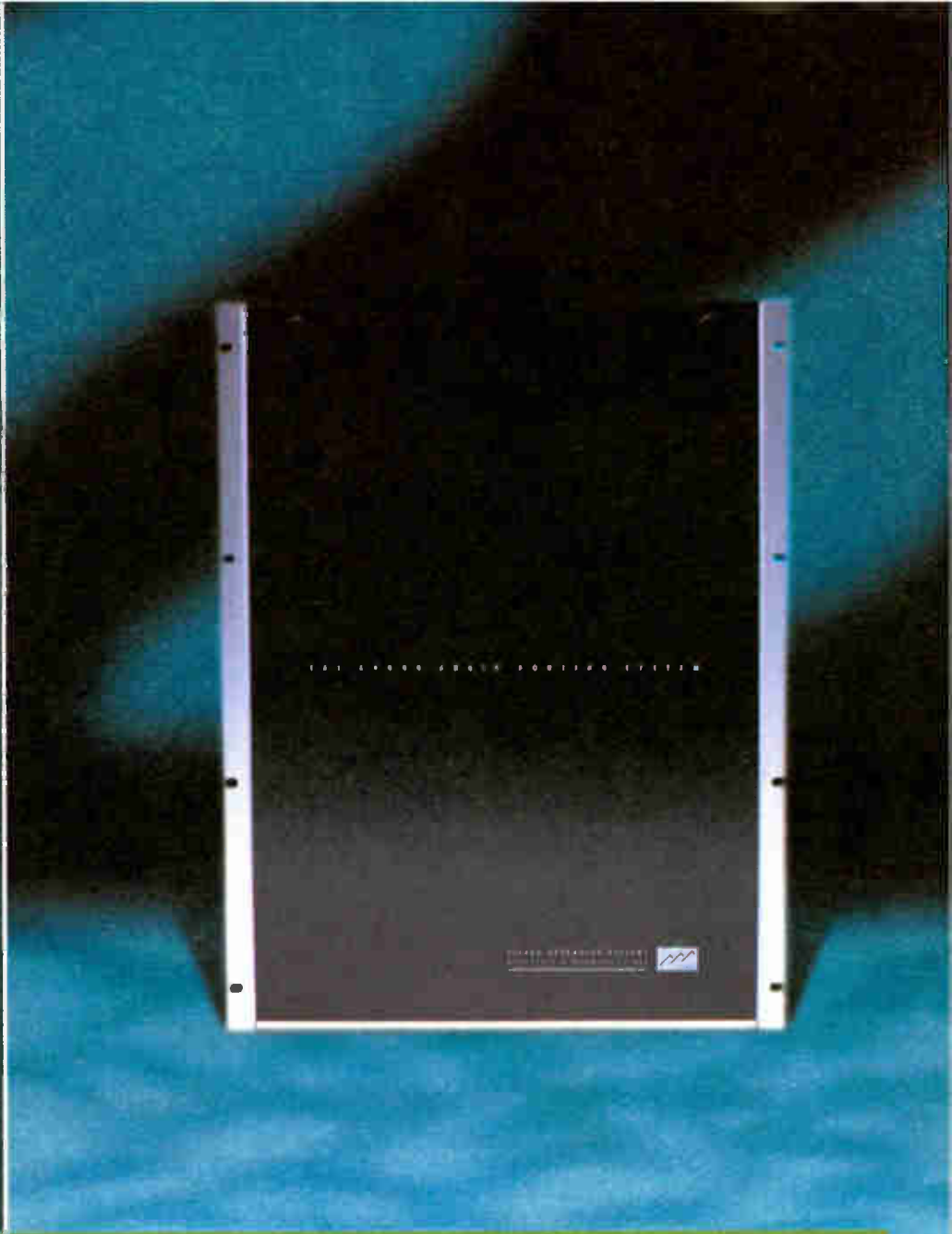
"While Harris and Allied are together, we're also going to retain our individuality. Harris Broadcast will still be manufacturing in Quincy, and we at Allied will still be right here in Richmond and in the regional offices, working to build our business."

*Roy Ridge
 Founder, Allied Broadcast Equipment
 "Harris Plus Allied: What It Really Means"
 Oct. 15, 1988*

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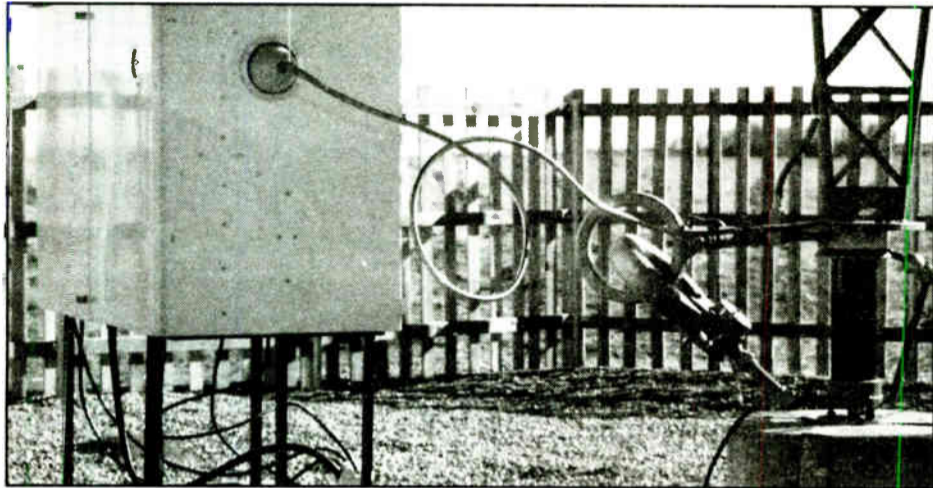
Protect Your Site From Lightning

Autumn Is an Excellent Time to Insure Yourself Against Damage From Spring Storms

W.C. Alexander

We usually think of thunderstorms and lightning during the spring and summer, when the big storms wreak havoc at our transmitter sites and studios. After a damaging strike is often the time we look around to see how we could have better protected our site and equipment.

The type of lightning that does damage to broadcast installations is the discharge of energy from an electrically charged cloud to the ground. Cloud-to-cloud discharges seldom cause damage on the ground. A "typical" lightning strike has a peak amplitude of 20,000 amps and lasts 40 microseconds to half amplitude. Some lightning pulses can



Shown is a properly protected tower base, including ball/horn gaps and feed tubing loop.

The fall is an excellent time to address lightning protection issues. There are few storms around to cause problems, the weather is usually very good, and many of us are working on preparing our sites for winter. If we can get the proper lightning protection in during the fall, we will be ready when the early storms come next spring.

reach four times that current value or more. The rise time of a typical strike is about 5 microseconds to peak amplitude. The current path in a lightning strike is from the cloud to what we call "ground." A perfect ground connection, however, does not really exist, and any real ground connection will have a finite impedance of from several ohms to several hundred

ohms. Applying Ohm's Law, you can see that a large potential can be developed from a ground connection to "real" ground. One million peak volts or more can easily be developed in such a situation.

In a typical broadcast transmitter or tower site, there is a ground at the tower base and a number of other ground points. The current from a lightning strike will see several parallel paths to ground. For example, the ground rod(s) at the tower base will be one path, the outer jacket of the transmission lines through the equipment cabinets to the transmitter building ground will be

another, and the AC safety ground wiring to the distribution panel ground on the tower light wiring still another path.

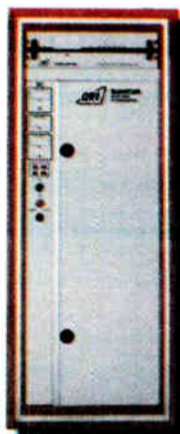
If you can imagine an equivalent circuit of these several resistive paths in parallel, you will be able to grasp the idea that even with a solid ground at the base of the tower, large and damaging potentials can be developed across the other paths. In addition, the fast rise-time currents that will flow in all these paths will produce large magnetic fields that will induce significant unwanted currents in nearby conductors such as AC wiring, control cables, audio lines and the like. These are sometimes the most damaging by-products of a lightning strike.

The most important principle of lightning protection is to provide the best, lowest-impedance local ground connection

See LIGHTNING, page 44 ▶



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FEED LINE

What to Do Until Digital Radio Actually Arrives

W.C. Alexander

In the first installment of this three-part series (RW, Sept. 30), we examined positive steps that stations can take now — not necessarily to be "digital ready," but to sound as good as they possibly can today. Like it or not, we are competing with other digital media — CDs, direct satellite broadcast, MiniDisc, soon television — and to remain competitive, stations have got to narrow the gap between such digital sources and our analog broadcast medium.

We focused mostly on studio issues in last month's column; this time we will take a look at STL and processing issues. We will wrap up next time with a look at transmitter and antenna issues.

STL

An ideal studio-transmitter link system should be transparent. A real-world STL system will degrade the program audio to some degree. The amount of degradation depends on many factors, including the type of

link, path length and clearance, signal strength and interfering signals.

An ideal over-the-air link will be relatively short, completely clear of obstructions and will operate on a channel where there are no other signals present in the local area. This may be attainable in small and medium markets, but in large markets, forget it. Large urban areas almost always require longer paths, present many manmade obstructions, and force many stations to share the few allocated STL frequencies.

To get around these problems, many stations use multiple hops and IF repeaters. Other stations have bailed out of using RF STL systems altogether, opting instead for T1-based digital land-line links. Some have even opted for digital Ku-band satellite delivery.

Stations that find themselves in an STL corner because of path or frequency congestion problems are not always doomed to live with a high noise floor or interference hash. Converting to a digital link may well provide the means to a quiet, virtually transparent

See DIGITAL, page 45 ▶

Avoid a Stormy Relationship

► **LIGHTNING**, continued from page 43 possible as close to the tower base as possible. This is usually best achieved by using an array of at least four ground rods driven around the tower base pier and tied together with a large copper conductor. The rods should be separated by at least twice their length, and ideally they should penetrate below the deepest frost level into the water table.

I recommend cad-welding AWG 0 or larger bare copper wire to the rods, making a ring connecting all the rods and then connecting each rod with a separate length of wire to the tower base. The tower connection should also be cad-welded. A wire connected to the tower by way of a lug or using a bolt and washer will have a much higher resistance than a cad-welded joint.

In some areas where the soil is particularly dry and non-conductive (such as a mountaintop with no water table and little top soil), there are chemical ground rods available to lower the impedance of the ground connection. These rods contain a chemical paste. Over the life of the rod, it seeps into the soil into which the rod is driven through weep holes in the rod. Once the chemical paste has been exhausted, the rod must be replaced. The service time of the various chemical rods is listed in their specifications.

Those of us with AM towers should not be fooled into thinking that the ground screen and radial system provides a good lightning ground. In some areas

with very conductive soil, this may be true, but in many locations it is not. A set of rods should be installed at the tower base and connected with AWG 0 cable or larger to the ground side of all the arc

leaves the chassis. The ground side of this gap needs to be tied into the ground rod array. If your ATU does not have an arc gap at this point, you can purchase one inexpensively from Kintronic Labo-

AM tower bases should have their antenna tuning unit chassis connected to the tower base ground rod array.

gaps. Unless you are absolutely certain that your soil is conductive enough to make the screen and radial system an adequate lightning ground, "better safe than sorry" is the rule.

AM tower bases also should have their antenna tuning unit chassis connected to the tower base ground rod array. Even with the best ground rod array, some portion of the current will flow in the parallel path presented by the tower feed tubing to the antenna tuning unit (ATU). Once it hits the ATU chassis, it needs a low-impedance path to ground to prevent it from flowing through ATU components and into the transmission line. Most modern ATUs have a horn or ball arc gap right at the point where the tower feed tubing

ratories, Phasetek and other manufacturers.

Transmission lines

In most cases, the tower at a broadcast transmitter site is located some distance from the transmitter building. Whether this is 20 feet or several hundred, the transmission-line outer conductor must be firmly connected to the ground rod array at the point where the line leaves the tower in FM and ground-based AM towers. Transmission line manufacturers offer grounding kits for their various lines that provide a secure, weatherproof ground connection to the outer conductor.

A component of the current from a lightning strike that hits the top of a tower with one or more transmission lines will flow down the tower structure and a portion will flow down the parallel path presented by the transmission-line outer conductors. If the transmission-line outer conductors are not bonded properly to the tower structure at the top and bottom (and at the manufacturer's recommended interval along the length of the lines for long runs), large potentials can develop between the lines and the tower structure. When the potential exceeds the breakdown voltage of the outer jackets, it will arc through. Such an arc can be sufficiently hot to actually create a pinhole in the outer conductors, making a way for pressure to leak out and water to get in.

This parallel current in the transmission-line outer conductor needs a place to jump off to ground before it travels into the transmitter building and into your equipment. This is why the outer conductor of every line leaving the tower needs to be bonded to the ground rod array in addition to being bonded to the tower structure.

For long horizontal transmission line runs, provide one additional grounding point for the outer conductor just outside the transmitter building. This ground should be the central ground array for the transmitter building, which we will discuss in the concluding part of this series. Shorter lines, where the tower is within 10 or 15 feet of the transmitter building, do not need the additional ground.

Tower RF feeds

A piece of copper tubing usually is employed to carry the RF current from the AM antenna tuning unit to the tower itself. As we already noted, this tubing presents yet another parallel current path

for lightning currents.

While we can provide a path to ground for this current by way of an arc gap at the output of the ATU, we can create what is in essence a "pi" low-pass filter with the tower feed and the tower and ATU arc gaps, making this parallel current path very unattractive for lightning currents. We do this very simply by winding one or two turns into the tubing on a 12-inch-or-so diameter to form a series inductor. This series inductance will present a high impedance to the fast rise-time lightning current while the arc gaps at either end present a very low impedance to ground. Adding a couple of turns to the feed tubing will often require a slight retuning of the output leg of the ATU network, but the payoff can be greatly reduced potential for ATU damage due to lightning strikes.

Arc gap spacing

We mentioned arc gaps earlier. These devices consist of two conductors spaced a certain distance apart with an air space between them. They give lightning current a path to ground on an insulated tower. When the potential between the two conductors exceeds the breakdown voltage of the dielectric (air), ionization occurs and a very low-impedance path between the conductors develops.

Commonly seen in AM installations are ball gaps, which are common at tower bases, and horn gaps, which are more commonly seen in phasing/coupling equipment and transmitters. Many times, transmitters feature gas-discharge gaps with a specified voltage rating across the RF output terminals.

Proper spacing of air gaps makes the difference between a gap providing the proper level of protection and having little effect in terms of lightning protection. At sea level, the breakdown potential of air is about 5 peak kV per 0.1 inch, or 1 peak kV per 0.020 inches. As altitude increases, the breakdown voltage decreases. A good rule of thumb is to reduce the breakdown voltage by 20 percent for every 5,000 feet AMSL.

The peak modulated RF voltage across the base of an AM tower can be calculated by the following formula:

$$V_{PEAK} = 3.182 \times Z_A \times I_A$$

Where Z_A is antenna impedance in ohms and I_A is antenna current in RMS amps.

Once the peak modulated RF voltage is known, multiply the voltage in kV by 0.020 to determine the proper ball gap spacing. Horn gap spacing can be calculated using the same method, but the sharper points on a horn gap may require slightly wider spacing.

On a practical level, the optimum spacing for an arc gap is that which is just wider than the point which produces arcs during normal full-power modulated operation. Remember that the wider the spacing, the greater the potential which must develop across the gap before the air ionizes and the gap conducts. This translates to higher voltages applied to ATU components, isocouplers and the like, which beyond a certain point will cause serious damage and result in downtime.

Next time we will look at lightning protection techniques that we can apply in the transmitter building.

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World Radio History

Meet the Author: Cris Alexander

W.C. Alexander, author of the *Feed Line* series of articles and a regular contributor to *RW*, is director of engineering for Crawford Broadcasting Co.

He heads the corporate engineering department at Crawford, a group owner of 25 radio stations in 13 U.S. major markets. His career in broadcasting evolved from an early interest in amateur radio. During high school and college, Cris Alexander worked for several radio and one television station in Amarillo, Texas. After moving to the Dallas/Ft. Worth area in 1979, he continued in television for several years, finally returning to radio and settling in with Crawford in 1984. He is a member of the AFCCE and a frequent NAB Broadcast Engineering Conference speaker.



Cris Alexander

While Alexander deals with all technical aspects of the radio broadcast industry, he has a love for AM antenna systems, particularly directional arrays. He has designed and built several arrays and rebuilt many others. This love of AM transmission systems is apparent in his writing, where he often targets transmitter- and antenna-related topics.

About today's engineering field, Alexander says, "Today's radio engineers face many challenges, but perhaps the most difficult is not even technical in nature. Through a decade of consolidation, we have lost many of the engineers who once populated our stations. Now, those that remain must do more — much more — with less. It is incumbent upon those of us who remain to actively seek out and recruit the next generation of radio engineers. If we don't, who will be left when this generation retires?"

Alexander is 37, and has been married for 20 years to his wife, Phyllis. They have two children: Gary, 18, and Amanda, 12. He resides in the wild west Texas town of Ft. Worth.

■■■
This is one in a series about *RW* contributors.

Improvements Today

► DIGITAL, continued from page 43

STL. Several manufacturers offer digital encoders/decoders that will turn a standard composite STL system into a two- or four-channel digital link. These systems are, as a rule, quite robust and can tolerate some link imperfections. For a modest investment, a station with an otherwise clean audio and transmission chain can turn its noisy audio into what is perceived as "CD quality." At least one manufacturer even uses those letters in its model name to reinforce the point.

Digital conversion, however, is not an end-all for STL problems. Multipath, fades, interference, nonlinearity, distortion and other problems can prevent digital encoding from working over an STL link.

In one situation in which I was involved, wideband military shipboard radar would interfere frequently with the STL, resulting in a very short "burp" on the analog link every 10 seconds or so. We tried a digital add-on, and it did work, but when the radar "burp" would occur, the system would unlock and the audio would mute. About the time the decoder had synched back up again and the audio unmuted, around came the next radar "burp." What was a minor irritant in the analog realm was completely disabling in the digital realm. Digital conversion certainly is worth considering, but be aware that in some situations it will not work.

Other stations may be better off getting off the 950 MHz STL band altogether. For short-haul applications, 18-GHz links work well and deserve consideration in some applications. For longer hauls, prices for T1 service have come way down in recent years, and if you are already paying rent for an STL repeater site anyway, this money may be better spent on a T1 line. The cost of the terminal equipment for each end is comparable in most cases to that of a standard over-the-air STL system. T1-based STL systems offer many advantages over RF-based systems, and they are worth looking at. For stations that have been operating using equalized telco lines, T1 will provide a huge improvement in quality and, chances are, a considerable savings in monthly line charges as well. The savings could well pay for the T1 terminal equipment investment in just a few years.

Processing

A station's audio processing works like the color and tint controls on a television receiver. With it, a station operator can make the station sound very good, very bad or somewhere between these two extremes. Next to the playlist, the audio processing probably is the most subjective part of a broadcast station. Every program director and every engineer has his or her own idea of the magic combination of black boxes, and what the settings need to be.

With the advent of digital signal processing, there are more choices now than ever. Processing in the digital realm provides an infinite range of sound signatures. This fact has been manifested in recent years in engineering discussions where the main topic has been how to get the new digital processor to sound like the old analog one!

For most formats, there is an optimum amount of processing with defined parameters. Many processor manufacturers

have done a good deal of research to determine processor settings, and in my experience, stations that adhere to the manufacturer's recommended settings will sound better than those that do not.

Less is more, or at least it can be when trying to make a broadcast station as competitive as possible with digital audio sources. Heavily processed on-air audio will sound inferior to direct digital alternatives. With its processing, a station should be trying to achieve maximum modulation with as little "coloring" of the source material as possible.

To achieve this, there is no way around reducing the dynamic range. That, after all, is mostly what audio processing is all about. This is not necessarily a bad thing when used in moderation, however. After all, how many listeners can hear the full dynamic range of a well-produced CD when driving down the street in a car? In all likelihood, the true dynamic range in a situation like that, from ambient noise floor to peak sound, may only be 20 or 30 dB. Stealing a few dB of dynamic range to achieve maximum modulation is acceptable if one does not go overboard.

Some "coloring" of the sound, or altering of the tonal balance, also is acceptable if done in moderation. The idea is to avoid changing the characteristics of the source material significantly. Any "coloring" of the sound should be done carefully and only to the extent necessary to

overcome deficiencies in the transmission path and most listening environments.

Use the processor manufacturer's recommended settings for your particular format as a starting point. Then you can make small changes over a long period of time to adapt these settings for your particular format and facility. Again, less is more, and the days of hard clipping, booming bass and sibilant highs with 6 dB of dynamic range are long gone.

Digital processors are modern marvels. Using digital signal processing technology, these amazing units can manipulate audio in ways we only dreamed of — and tried to do with whole racks full of "black boxes" — just a few years ago. Just about all digital processors are equipped with digital as well as analog inputs/outputs, and stations using digital STLs and exciters are set to have no analog audio at the transmitter site. This avoids the distortion and noise that can creep into the baseband as a result of multiple passes through modulators/demodulators (such as STLs and exciters).

All-digital paths are not without their potential problems, however. Sample rate conversions can lead to overshoots, and cascaded compression algorithms can lead to the generation of artifacts. Engineers who are contemplating an all-digital STL-processor-exciter path should research these questions and select devices with compatible sample rates and compression algorithms — or better yet, avoid compression altogether in the STL.

We'll conclude with a discussion of transmitter and antenna issues next time.

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MP-4	4	800W	3.3	\$1,280
MP-2-4	4	2,000W	3.3	\$1,820
MP-3-5	5	3,000W	4.1	\$2,270
MP-3-6	6	3,000W	5.2	\$2,740

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GP-3	3	6,000W	1.5	\$1,900
GP-4	4	6,000W	3.4	\$2,600
GP-5	5	6,000W	4.3	\$3,150
GP-6	6	6,000W	5.5	\$3,700

MEDIUM POWER CIRCULAR SERIES

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SGP-2	2	8,000W	0	\$2,690
SGP-3	3	10,000W	1.4	\$3,595
SGP-4	4	10,000W	3.3	\$4,500
SGP-5	5	10,000W	4.1	\$5,300
SGP-6	6	10,000W	5.2	\$6,100

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Workbench

Radio World, October 14, 1998

An Eagle Eye for Trouble Spots

John Bisset

In the June 24 issue of *RW*, we talked about using heavy plastic as a replacement for a plate blocking capacitor. It is not a permanent solution, by any means, but will get the rig up on the air until the right material arrives.

Joe Stack, a frequent contributor to this column, writes that, in one instance, he was able to use electric motor insulation successfully. This paper-like material sometimes is referred to as DMD, and is similar in texture and thickness to construction paper. It has a breakdown voltage of 12.5 kV. It is available at motor/transformer rewinding shops. Joe writes that the cost to re-cap a 3CX3000A7 was less than \$10!

★★★

As the cold weather arrives, it's time for some preventive maintenance at the tower site. See if you can identify three problems in the photo. Answers will appear later in the column.

★★★

Paul Litwinovich is a former power supply and CVS design engineer, now chief engineer of WSHU(FM), WSUF(FM) and WMMM(AM) in the states of New York and Connecticut. Paul writes to point out a significant error in the reasoning behind Ralph Winquist's submission, "Money Saving Circuit for Your CVS" (*RW*, May 13).

While Paul won't argue that you can

save money by shutting off any piece of equipment when it's not needed, he takes issue with giving the CVS a bad reputation

10 cents per kW would be \$82.10 per year, not \$328.50.

If the CVS idles only 50 percent of the



Can you find at least three problems with this tower site?

as a power waster. Paul points out that there is a big difference between volt-amperes and watts with a reactive load. If the CVS in Ralph's example draws 3.125 A at 120 VAC, or 0.375 kVA, and has a power factor of 0.25, then the formula for actual power consumption would be $W = VA \times Pf$, or $0.375 \times 0.25 = 93.75 \text{ W}$.

This adds up to 821 kWh/year. The cost for the CVS idling 24 hours a day at

time, as Ralph suggests, then wasted power would cost \$41.05/year. One must remember that wattless reactive power does not register on your power meter. The 93.75 W can be accounted for in conversion to heat in the $I \times R$ losses of the winding and eddy current losses in the core of the CVS. The high $I \times R$ losses compared to a conventional transformer are a result of the poor power factor and the high eddy current loss as a result of the core's secondary magnetic circuit being excited to the point of saturation.

★★★

Remember our suggestion to use liquid correction fluid to replace the white line in rotary fader knobs (*RW*, July 8)? Scott Dean of Dean Engineering writes that he's had good luck using a white Crayola crayon. You can push the white into the knob's groove by simply running the crayon over the edge. Any excess can be wiped off using a cloth.

★★★

Mike Shane is with Capstar Broadcasting, and writes to ask whether the use of mothballs around a transmitter site can cause any problem with the equipment, due to the vapors emitted by the mothballs.

I've used this method to varmint-proof transmitter sites, phasors and ATUs for years, after hearing about it from a sage engineer many years ago. I've never had any problem, but just to be sure, I asked Don Taylor, who recently retired from Harris after decades of service and innumerable transmitter installations. He had never heard of any adverse problems, and agreed that the mothballs are a great repellent of both snakes and mice, who

long for the warmth of a 4-400 in the middle of winter.

Scatter a couple of handfuls of the mothballs on the floor of the phasor, at the bottom of the ATU, and around the floor of your transmitter building. As the vapors are released, the mothballs will shrink in size, and eventually will disappear.

If you don't use an entire box, store the remainder in an airtight container. Tupperware works great. Otherwise, if the opened box is exposed to air, your box will be empty as the mothballs dissolve.

★★★

Now for that picture. Did you find three problems?

The tower paint is an obvious one, and good for a notice of violation. Remember, towers cannot be painted when it gets real cold.

The vines growing on the ATU building are another. You can see where the wooden roof cap has started to rot, thanks to the moisture that the vines have trapped over time. Excessive growth of weeds and vines around the tower base and on the fences also can wreak havoc in a directional array.

Mothballs are a great repellent of both snakes and mice, who long for the warmth of a 4-400 in the middle of winter.

The third item may be harder to spot. It's the tower fence. No way this fence meets ANSI specifications. The building isn't more than five feet across, with the tower in the middle. That leaves two-and-a-half feet on either side to the fence.

You get extra credit if you noticed the electrical tape coming undone on the photocell. And for you eagle-eyes, there is no plug at the bottom of the tower light conduit — the cable just runs in through open conduit. This makes an ideal entry (and home) for a nest of bees. Plug those holes with silicon caulk, pieces of Fiberglas insulation, or dum-dum.

■■■

John Bisset has worked as a chief engineer and contract engineer for more than 20 years. He is a district sales manager for Harris Corp.

Submissions for this column are encouraged, and qualify for *SBE* recertification credit. Fax your submission to (703) 323-8044, or via e-mail to jbisset@harris.com

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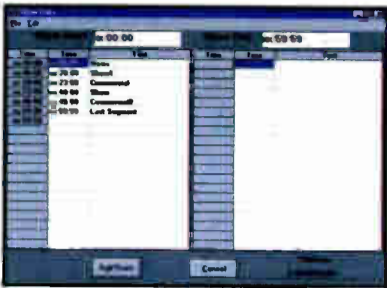
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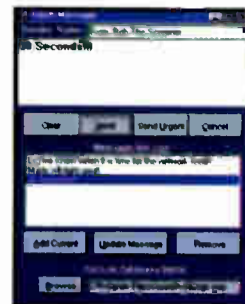
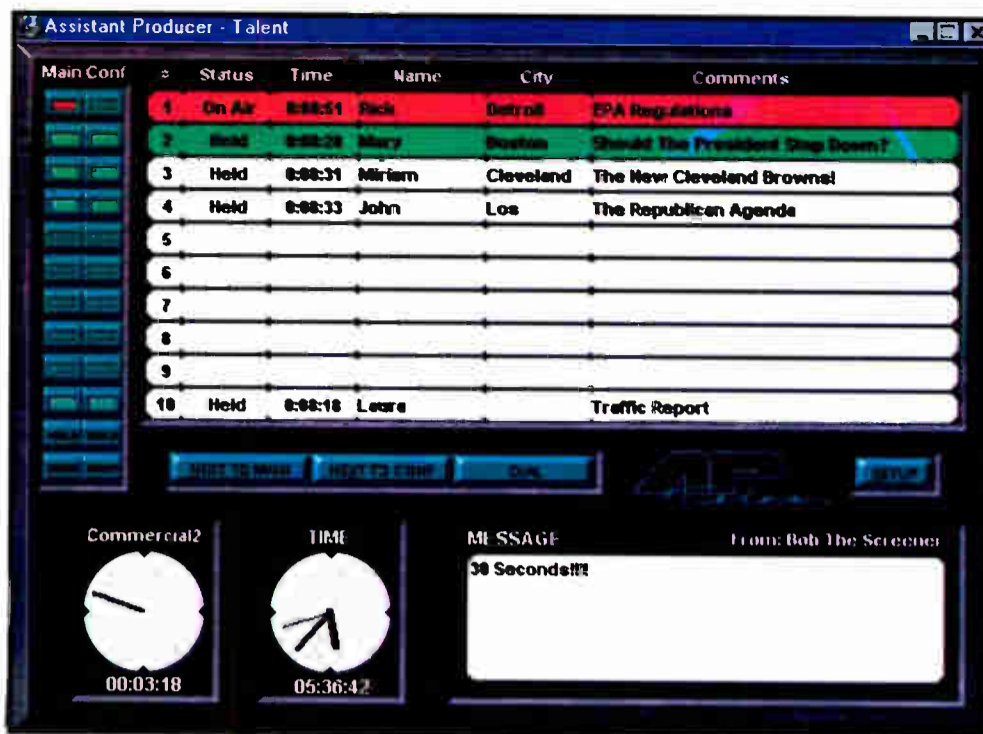
Main and Conference buttons indicate easy-view call status at all times, and provide remote control of a Telos interface. Point-and-click on Conference buttons to pick up calls. The live call will be highlighted as indicated.



The Show Data window is used for scheduling events that occur within a pre-determined time interval—for example, 3:00PM–5:00PM. When an "x" is entered in the hour field, Show Data runs as a generic hourly clock, as shown in the above display.



The caller menu bar displays lines in use and caller information for each line. To enter caller information, simply double-click on the desired line for the caller pop-up box. Enter Caller Name, City, and Comments, then press "exit" to post information on the screen.



The Message Window is a helpful tool for communications throughout the Assistant Producer network. To send a message, double-click inside the message box for the Message Entry pop-up box. Type in a message and press "send" to post it. "Send urgent" makes the message background area bright red. A message "hotbox" allows you to store and send frequently-used messages.



The dialer feature allows you to choose a dialout line, and automatically dial outside calls from the Assistant Producer pop-up dial menu.

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Circle (5) On Reader Service Card

Understand the (Electrical) Code

► NEC, continued from page 38

The National Fire Protection Code, the fire insurance industry's standards tome, got its first electrical section in 1897. That section blossomed into the NEC. It developed into an independently published document, a more expansive, cohesive, specific text with millions of changes perfecting older details and assimilating new materials, technology and techniques. At present, an updated NEC comes out now every three years. The latest copy on my desk is dated 1996. In paperback, the NEC runs to more than 1,000 pages.

One way I can tell if someone has actually read the NEC is to ask them how it

opens. Essentially the document begins by explaining itself in the first section, what it is and what it is not. What it is, is a set of standards that, if followed, will result in a safe — hence insurable — electrical installation. What it is not, we are cautioned by the authors of the NEC, is a "design manual." If we follow the NEC, our installation will be safe, but not necessarily efficient. As long as the installation is compliant, the design for efficiency and quality are left to the engineer.

Not a design manual

My impetus for writing this series comes from two phenomena that I encounter constantly. One is an arro-

gance on the part of station personnel, including managers, who think they

know better than the NEC.

The NEC did not appear in finished

form right out of the head of Jupiter. Over the years, thousands of knowledgeable people from across the industry have provided input and labored over substance and language to meet the goal of safety. In the last version,

The NEC helps make our installation safe — not necessarily efficient.

more than 1,500 people involved with dozens of subcommittees struggled to optimize a few thousand words of changes. These folks brought more than 30,000 years of experience to the task. To the know-it-all managers, I say: Do you think that with your meager experience of a single lifetime, you can or should undercut them on safety factors?

The second impetus are the electrical installation horror stories I have encountered — and sometimes have been part of — during my travels. Most of these Titanic-style disasters occurred when there had been no attempt to follow the dictates of the NEC.

Putting it to use

The NEC normally has its greatest impact on us during new construction or retrofit projects. This is when engineers and contractors are most involved, and the NEC affects both. I have a leg in both camps as a registered professional engineer and a licensed electrical contractor in a flurry of states. These are separate yet complementary activities.

To put it simply, an engineer has a strong mastery of concepts and a workable knowledge of materials and their use. Conversely, a contractor has a strong knowledge of materials and a workable knowledge of concepts.

An experienced engineer can design not only a safe, NEC-compliant installation for you, but one that is also more efficient, flexible, reliable, expandable, suitable with better noise numbers and regulation. Even the best contractors may not be tuned into your specific needs or challenges, although they will supply a workmanlike and compliant (hence safe) installation.

The NEC focuses on several key subcontinents of the consumption systems: grounding, supply, distribution, current limiting/protection and use. This series of articles will cover these areas generally and then more specifically as they affect your broadcast plant. Our focus will be on standards, design, techniques and available materials, with applicable examples related to the broadcast environment. We'll take questions from you and try to answer them in a useful way.

Next time, we'll get started in earnest.

Charles S. Fitch, W2IPI, is a registered professional consultant engineer, a member of the AFCCE, a senior member of the SBE, lifetime CPBE, licensed electrical contractor, station owner and former director of engineering of WTIC-TV in Hartford, Conn., and WSHS-TV in Marlborough, Mass.

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STATION SNAPSHOT

Baltimore's All-Sports Talk Show

Allison Oakley

Along with a change in call letters from WKDB(AM) to WNST(AM) in Baltimore came a format change as well — to all-sports talk radio.

"Nasty 1570 Sports" is Baltimore's first all-sports talk-radio station. Nestor Aparicio, a former sports writer for the Baltimore Sun, was the mastermind behind the change. WKDB was a failed kids-format radio station, and Aparicio was offered a lease with the option to buy the station by owner David Epler. Within 10 days of the initial offer, Aparicio was in control of the radio station, turning it into the all-sports format.

"We had a great concept," said Aparicio. "There's no one doing all-sports here. The reason it works for us ... (but) doesn't work for other people is that we are already established. We have the most popular afternoon, local drive-time radio show in the marketplace — a sports show."

Make the switch

Aparicio's show had been heard on WWLG(AM) in Baltimore, which was

in addition, the "Budweiser Sports Forum," Aparicio's show, was played 24 hours a day on Nasty 1570 Sports until the official switch.

Aparicio officially took over Nasty



'Nasty' Nestor Aparicio

1570 on Aug. 3. After just two weeks of the station's debut, sponsors totaled 75, up from the original 50.



Nasty 1570 Sports — All Day, All Night, All Sports

owned by Michael Hoadies. Hoadies was in the process of selling that station.

Because of the impending sale, Hoadies allowed Aparicio to promote his switch to WNST, Nasty 1570 Sports, for the entire month of July. In

In addition to Aparicio's "Budweiser Sports Forum," Nasty 1570 offers Jim Rome from Los Angeles during the afternoon and the Chicago-based One-On-One network.

"The old saying goes: Do what everybody else does, you'll get what

everybody else gets," said Aparicio. "I don't want to be corporate radio. ... Our target demo is anyone who would enjoy a ball game and enjoy going to a bar before or after the game and talking about it. Anyone who would stand around the water-cooler and talk about

the Orioles and the Ravens or the movie they went to the other day."

Aparicio said the focus is on entertainment.

"We're here for fun. So, we're not trying to compete with big boys. We're not playing there. All we're trying to do is make a living and have some fun."

■■■

Allison Oakley is a free-lance writer based in Fredericksburg, Va. Reach her in c/o RW.

GUEST COMMENTARY

I'm Here to See Your Public Inspection File

Drumming Up Business, a Media Consultant Finds 14 of 22 Stations Out of Compliance

Kelly Orchard

"My name is Kelly, and I am here to see your Public Inspection File."

That's all I said when I walked into the reception area of several radio stations. The results were an eye-opener.

The background: My dad and I recently formed a consulting business called Orchard Media Services. We are focusing on assisting stations affected by mergers, consolidation and engineering challenges, in updating and maintaining their Public Inspection Files.

In a day when stations are bought and sold like cattle or coffee beans, are they paying attention to their legal requirements and their community service and quarterly issues? What about the maintenance of their towers and transmitter sites? Are they following fair practices with political advertising?

When I read articles in industry publications, I am relieved that I am not the only radio veteran who recognizes there are problems. But I won-

dered: Are radio managers hearing that message?

Knock, knock

Major-market stations don't seem to have a problem keeping up with FCC compliance. Large groups have corpo-



Kelly Orchard

rate legal departments to handle this area. Problems are more likely to occur where stations have been run by sole owners since they were built.

See ORCHARD, page 58 ▶

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Images and Listener Benefit

Mark Lapidus

Listening to a rock station recently, I heard the DJ talk about concerts every break for an hour. There's no question that the concert image is a good one for a radio station. However, is it possible for any one station to really "own" a show anymore? With the concert season coming to a close in many markets, let's think back over the summer and be better prepared to handle next year.

Selective promotion

Concert promotion is a die-hard tradition at most radio stations and I'm not

suggesting abandoning the practice. Rather, radio needs to promote more intelligently and more selectively.

Even when handed a "presents" title from a promoter, any smart competitor will use a "welcomes" handle to counter ownership. With crossover artists that play on many formats at once, it's downright impossible for any one station totally to grab the credit. Taken a step further, even when a station does manage to gain the high ground, what does it mean to a listener?

If there's no benefit for listeners, why should they care if your station presents a concert, or any event for that

matter? After all, this is what they expect radio stations to do. Your claim of presenting a concert certainly will not generate more cume or TSL.

Important images

My point is this: Regardless of format, you need to find out just how important various images are to your audience. Ironically, program directors sometimes have this research information, yet out of fear, fail to show it to the promotions director, who is responsible for scheduling the events, writing the liners and airing the promotional schedules.

If the typical listener in your target group attends four shows a year, yet goes to 20 movies, your emphasis is in the wrong place. Many oldies stations have learned this lesson the hard way by presenting too many shows per year. It's time now for other formats to wake up and do a reality check.

The two main reasons stations promote anything are to generate revenue and listening. The first is clear-cut — the client pays you and you promote something. The second is also clear-cut, but rarely considered. To generate listening, potential audience members must be convinced that there is something in it for them — in other words, a benefit. If they believe yours is the primary station presenting concert information and this is important to them, they may listen more. Their benefit, in this instance, is that they get the information they need from you, first. However, with the wealth of information now available on the Web and even in traditional newspapers, it's questionable if this is as true as it once was.

Better benefits

In my view, the better benefit is the one created by you in the form of a discount or contest. If you tell your audience you will give away Garth Brooks tickets in 15 minutes, some will certainly hang around for a few minutes. Or maybe when you tell your audience that if they write your call letters on a piece of paper and present it at the box office, they get \$3 off a concert ticket. They may be motivated to remember you did them a favor, and then do you a favor in return if they get a ratings diary.

Let's cover a few other activities to augment your concert promotion activity. I already mentioned movies, which are convenient and regularly attended by certain demos. Many formats can promote a movie every week and, over the course of a year, please a substantial number of listeners in the process. I'm not even referring to the movie premiere, which is always a winner. Even when a movie is bad, the typical reaction is, "Gee, I'm glad I didn't pay to see that!"

Minor-league mania

Sporting activities also are overlooked by many formats. Minor-league baseball is great fun for young families, but often ignored. Taking busloads of listeners to see nearby teams is tremendous fun. Even a "nosebleed weekend," in which you give away large quantities of nosebleed seats, can be great. They may be a mile up, but they're usually for hot games that folks want to attend.

What I'm suggesting is an adjustment toward thinking of a target demo's interests, rather than relying on what people in our industry have traditionally thought of as being cool. Cool is for stations with double-digit ratings. The rest of us should focus on what's important on a weekly basis to our listeners. For your listeners, that may indeed be concert tickets four times an hour, but you won't know it if you don't find out.

Mark Lapidus is president, Lapidus Media. For marketing and programming consultation, call (703) 383-1805 or e-mail lapidus@erols.com

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Na-na, Na-na-na: Bum Code Blame

Streaming Companies Bicker; Meanwhile, Are Internet-Only Radio Stations Really Radio?

Alan Haber

Not too long ago on an Internet mailing list, a spate of sniping broke out between folks from RealNetworks and Microsoft over a question about some code in RealNetworks' pre-release streaming media player.

Honestly, it took me back ... back to my childhood days, when men were men and a *na-na na-na-na* session spoke volumes and proved a point far more eloquently than a fistful of logic ever could.

Who's To Blame Blvd.

In the race to put the (maybe) bum code blame on each other, Real and Microsoft took the off ramp to Who's To Blame Blvd.

They missed an interesting point. Real's G2 player, at this writing, has *still* not been released. It's in beta form, and it may or may not have some bugs mucking up the works.

I'm not an engineer, so please don't write me letters asking me to point out those bugs. Frankly, I'm just a plain old user, who also happens to write for a national radio trade newspaper. Neither Real's G2 player nor Microsoft's Media Player, for that matter, has given me a single lick of trouble since the day I installed them.

It is generally those pocket-protector types who tend to get minutiae-esque on us more regular types. And you should expect nothing less: engineers, programmers, and the like, get *paid* to get inside code ... so deep inside that getting out may require forklift assistance.

They *don't* get paid to take their battles public, is my guess. And they shouldn't. It's one thing when you go back and forth with your competition on an Internet mailing list, as long as the verbal gymnastics stay there. But there are

regular folks on these lists, and one can lose faith in a company due to poor conduct in the face of a product under construction.

All this "It's *your* code's fault" banter is bad for business. It just promotes confidence-cutting on the part of consumers. When I was a kid, some pint-sized bully who lived on my street used to draw a line on the sidewalk where the property surrounding his house started and tell all the other kids in the neighborhood — those who would listen, anyway — that *from here on in* it was *his* sidewalk.

Is that or is that not just a mite petty, infantile and counterproductive? Of

accepted by the people who will use them day in, day out.

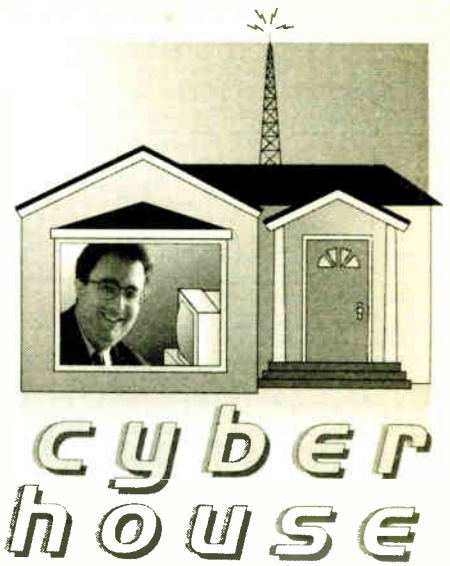
The next time your company feels the need to practice the *na-na na-na-na* way of life, you should remember that it is more important to worry about your own backyard before weeds start to grow and you have to hire a gardener.

In the wide world of the Internet, where weeds can grow and grow and grow (if you get my drift), that's a valuable piece of advice to drag around.

Philosophy of the Net

On another topic:

Are Internet-only radio stations — at least the ones that don't have jocks or commercials or liners, etc. — actually radio stations?



Internet-only radio probably isn't for you.

But if you take it for what it is, Internet-only radio can be quite rewarding. If, like me, you tire easily of hearing the same old oldies over and over again (I know, research shows ...) then you'll probably dig the sounds on the '50s, '60s and '70s oldies channel at www.on-air.com

Both 28.8 and ISDN connections are offered. I'm an ISDN kind of guy these days, so that's how I listen. You get the hits, but you also get plenty of missed-it-by-*that*-much sides and a whole bunch of unfamiliar, but very cool tunes. *And* you get a little window that pops up on your screen, telling you the name of the artist and song you're hearing. DJs may not always say what they're playing, but www.on-air.com always does.

Take a listen and see what you think. And then, if you're not into this Internet-only thing, close your eyes and imagine there's a jock about to wax poetic about the music. That should do it for you.



Alan Haber is a long-time observer of the Internet scene, and a radio buff to boot.

Reach him via e-mail at zoogang@earthlink.net

All this 'It's your fault' banter is bad for business. It just promotes confidence-cutting on the part of consumers.

course it is. Accusatory Ping-Pong is just one step above such silliness. Eventually Real and Microsoft put down their paddles and went back to doing what they do best: building great software.

Who are you?

And please don't ever forget who you *really* are, after you leave work and go home to stretch out safe in your easy chair or sprawl out on the couch. You're a *consumer*. The easier birth one gives to one's products — whether they be airwaves, Webwaves or otherwise-oriented — the more readily they will be

That's the kind of philosophical question I'm posing today. Your thoughts are welcome. Meanwhile, the answer is ... (drum roll, please) ... yes. No. *Maybe*.

I guess it depends on your frame of mind. Or what mood you're in. I dunno ... if you believe what HardRadio's Tracy Barnes said in the first Cyber House column, "A definition of a radio station is playing music for entertainment," then I guess Internet-only radio stations *are* radio stations.

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READER SERVICE NO. 143

COLE'S LAW

Main Studio: Exiled From Main Street?

Harry Cole

With some misgivings, the FCC has yet again relaxed its main studio rule. While this may seem to be good news to many, the negativistic naysayers here at Team Cole's Law see possible troubles down the line.

The main studio rule is a throwback to the days when regulators walked the halls of the FCC, when radio stations were predominantly local, and when the notion of "public interest" inspired fear in the average broadcaster.

Way back then — and we're talking, what, maybe 15 or 20 years — the FCC kept stations on a tight leash, tethered within the confines of their communities of license. The commission felt that, because stations were expected to provide local programming aimed at a local audience, it made sense to require that the station's studio facilities be located locally.

Deregulation

Then deregulation started its inexorable advance. But far from falling victim to that advance, the main studio rule was initially spared, possibly because the deregulationists needed to be able to convince critics that deregulation was really acceptable because the commission would still retain some mechanisms for assuring local public service. Because the main studio rule guaranteed a station's presence within its city of license, there was some assurance of "local" service.

But by the late 1980s, the main studio was already starting to break free from that tight leash. The FCC gave it some slack, saying that a main studio could be located anywhere in the station's city-grade contour, even if the studio ended up outside the city limits of the community of license.

Now the leash has been loosened yet

again. In August, the commission decided that a station's main studio can be located either: anywhere within a 25-mile radius of the reference coordinates of the community of license; or anywhere within the principal community contour of any station of any service (i.e., radio or TV) licensed to that community.

Simple provisions

The first alternative — the simple 25-mile provision — is pretty impressive in its own right. To our way of thinking, 25 miles is a pretty sizable distance.

But the second alternative — the principal city contour of any other station in your community — provides even greater potential for many stations. Imagine, for example, that you happen to be a relatively small AM station, or even a Class A FM, which happens to have the same community of license as a TV station with a city-grade contour radius of more than 40 miles. Suddenly, the area in which you might locate your main studio has grown beyond your dreams.

Is this a great country or what?

But wait, there's more. The commission also has tweaked the local public inspection file rule.

Under the new rules, you are required to keep your public file only at your main studio; gone is the requirement that you must always keep a copy of the file in your city of license if your main studio happens to be outside that city.

Now you are required to make copies of documents from the public file available by mail, upon telephone request (the requester can be charged the reasonable cost of the copying, but the station has to pay for mailing). The FCC has also provided some guidelines for the nature and extent of information which the station is required to provide callers who seek information about particular documents in the public file.

Also, stations will now be permitted to maintain their public files as computer databases, with no hard copies. And if your station happens to have an Internet Web site, the commission is "encouraging" you to post these "electronic public files" on the site for inspection and download over Internet connections.

The FCC also has concluded that, when a station is sold, the buyer must retain in the station's public file the various documents obtained from the seller for the required retention period. No big deal. But get this: The commission will not hold the buyer responsible for correcting any omissions in the file that exist at the time of the sale. So if the seller has failed to put anything at all in its public file, the buyer is not required to try to reconstruct the file. In effect, the sale acts like a reset button, wiping the slate of any problems that may have arisen during the seller's tenure, and effectively allowing the buyer to start fresh.

So let's get this straight. Instead of being confined to the city limits of your community of license, you can now be at least 25 miles away, and possibly as many as 40 or more miles away. You don't need to keep a local public inspection file in the city of license, regardless of where your main studio is. And if you buy a station and find, the day after closing, that, oops, the seller didn't happen to keep any public file at all, no biggie — you're responsible only for documents which need to be placed in the file after you buy the station.

File-flagging feds

(The flip of this point is that, theoretically, you as a licensee can ignore the public file requirement and, as long as you sell the station before your failure to maintain the file gets flagged by the feds, you don't have to warrant or represent anything about the completeness of your file to the buyer.)

So what's not to like in all this?

All these changes weaken to the breaking point the notion that a station is tied in any meaningful sense to its community of license. Rather, the new rules seem to encourage the shift of stations from smaller communities to larger metropolitan areas; the new rules certainly do nothing to encourage stations to stay put in smaller communities.

Localism

And this shift in turn weakens the notion of radio as a truly local medium. Remember that localism has long been an essential characteristic of radio. And it is the primary factor that will distinguish the existing radio industry from the just-over-the-horizon satellite-delivered digital audio service. But if broadcasters abandon their local character, then they also abandon the ability to argue convincingly that they, as broadcasters, are entitled to more sympathetic legislative and administrative treatment than other nonlocal audio program delivery services.

Of course, since the onset of deregulation — and especially since the 1996 onset of the Great Consolidation — radio has been steadily moving away from localism, despite the potential consequences such a move holds. The new main studio/public file rules are just one more step in the same direction. And while it may be a very tempting step to take, we can only wonder whether, at some point in the not-too-distant future, radio broadcasters may regret that they and the commission succumbed to that temptation.



Harry Cole is a principal in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at (202) 833-4190 or on the Internet at coleslaw@erols.com

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PERSONALITY PROFILE

AM's Mid-Michigan Travel Queen

Sharon Rae

Been there? Done that? Jane DeGrow has. Affectionately dubbed "The Travel Queen," DeGrow — owner of DeGrow Travel and president of the Lansing Area Travel Agents in Michigan — wanted to take her love of travel a step further. In the fall of 1994, DeGrow started "The Travel Queen Show" on WJIM(AM) News/Talk 1240.



"She understands the elements of radio and puts on a really good show," said Jack Robbins, WJIM program director. "It's definitely a benefit to the station. It's perfect for a weekend program."

What started as a half-hour, taped program in the wee hours of Sunday morning has blossomed into a live, two-hour broadcast during Saturday morning prime time.

"Radio is a great vehicle for this show," said host DeGrow. "With the pace that people's lives are at these days, radio is perfect because they can listen while driving or doing other things."

Places to go

From in the air to on the air, DeGrow has used her travel adventures and experiences to educate her listeners about the ins and outs of the pastime. Topics on the

show range from travel scams, vacation deals and traveler rights to trip planning for people with special needs.

Why is "The Travel Queen Show" a hit with listeners?

"Travel has gained tremendous popularity in the last couple of decades," said DeGrow. "People didn't used to travel like they do now, and folks are really looking for the knowledge of travel so they can make educated decisions."

"It's a very unique topic," said PD Robbins. "We track her ratings on Saturdays and she always does well. She has a very loyal following ... lots of calls to her show."

It's not just interesting topics that make "The Travel Queen Show" a success in the Lansing-East Lansing area, a market ranked No. 110 by Arbitron as of this spring.

"Jane usually has three guests on her show a week," said Marsha O'Neill, public relations director for the show.

Guests usually include travel industry experts and resort owners, but the show has secured some big names as well.

"We've had Joan Embery, goodwill ambassador for the San Diego Zoo and Wild Animal Park on the air," said O'Neill. "She talked with us about the

educational tours she does in Africa. Russian comedian Yakov Smirnoff joined Jane from his theater in Branson, Mo. Andy Williams was with us for a



Jane DeGrow is the Travel Queen.

Christmas show. Singer Bobby Vinton has also been on the air with us."

While "The Travel Queen Show" may be based in Michigan — a state where tourism is among the top industries — the program highlights attractions from around the world. DeGrow shared her insights from The Great Wall in China. She reported from the secret war tunnels at Dover Castle in England.

"There is more to travel than deadlines and meetings, or beaches and sunshine," said DeGrow. "Sometimes you get to step back in time."

America's favorite destinations are featured on "The Travel Queen Show." With the help of producer Scott Boehme, a live broadcast from Disney World aired for the theme park's 25th anniversary. The Opryland Hotel in Nashville served as a backdrop for another live show.

Lesser-known destinations are featured on the program as well.

"A woman named Carol Lewis owns a bed and breakfast in Tampa, Fla., called 'Wildlife on Easy Street,'" said O'Neill. "They have little cabins on many, many acres, and they save and raise wild animals. Big cats. You can actually have a baby tiger or baby cougar sleep in your room overnight. Where else in the world would you ever have a chance to do that? We love to tell our listeners about stuff like that."

Great expectations

DeGrow would like to syndicate the show nationally.

"We keep raising the bar," said DeGrow. "I want to do what I have to, to make a syndicated national travel talk show happen."

"She definitely has the potential," said PD Robbins. "Usually in this size radio market you can't find this kind of talent."

Sponsorship opportunities abound for such a venture. Lansing-based Travel 2000-Travel Gear is the major sponsor of DeGrow's show.

"We don't normally do advertising," said Steve Latham, founder and CEO of Travel 2000-Travel Gear. "We are mall-based, not a destination store. But I believe in Jane and what she is doing so decided to make an exception."

Despite some initial skepticism, radio has gotten results for Latham.

"Sales are definitely up ... sponsoring a travel show does not really get you finite results, but it does create an image in a listener's mind. If Jane expands her market and if I have stores in that market I'll support her. It's the only advertising I'm really interested in."

Other sponsors for "The Travel Queen Show" include Lansing Limousine ("Fit for a queen!"), Key Tours out of Detroit, and Weissman Reports.

For information on "The Travel Queen Show," call (517) 339-TALK or e-mail DeGrow at jane@travelqueen.com

She's probably out of the office tracking down a new vacation adventure to share with her listeners, but she'll get back to you.

Radio Canada Ready To Rebuild Its Services

James Careless

Twice over the past two years, Radio Canada International (RCI) appeared to be doomed.

Each time, the Canadian foreign service stayed on the air due to last-minute infusions of government funding, a respite originating from domestic and international pressure.

Secure future

Today, RCI seems to have a secure future. It has been assured \$10.7 million in annual funding for the next three fiscal years, as well as an extra \$10.3 million during that time for capital improvements.

The last time RCI had a capital budget was in 1993. Then, the Canadian Broadcasting Corp., the agency originally responsible for RCI until massive budget cuts forced the federal government to take over funding, cut the capital budget completely, said RCI Director of Operations Jean Claude Asseline.

Now that capital funding has been restored, the big question is what RCI will do with it. A survey of its plant reveals that most of the money will go to projects that were put aside.

At the RCI antenna site in Sackville, New Brunswick — which also relays North American programming for the BBC World Service, Deutsche Welle, Radio China International and NHK World and other international broadcasters — some of the money will be used to replace

some very old and far-too-often repaired transmitters.

"Some of them had an expected life



Photo by M. Evelin Letarte

Awaiting Upgrade: With funding secure, RCI is looking to modernize its transmission facility in Sackville, New Brunswick.

of 10 years, and they have been there for 20 years," Asseline said.

"We were, in fact, supposed to have four of our transmitters replaced" at the time the financial crisis hit, he said. "Because we could not get the money for that, we kept the (old) machines in place, and we are still using them."

"We got replacement parts, and we keep the transmitters in great shape, because we do not want them to fail."

Of course, this emphasis on maintenance has a cost: RCI must always have technicians on site in Sackville. Sending them home with a pager — as

See RCI, page 57 ▶



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Radio Rainbow Shines Over Islands

S.D. Yana Davis

In a small Caribbean island community, where severe tropical weather is an almost annual occurrence, a reliable communications network is essential.

But the islands that make up St. Vincent and the Grenadines currently have no national radio service that can reach all the communities in the nation.

Enter the Rainbow Radio League (RRL), a nonprofit organization that is looking for funding to set up a group of low-power FM radio stations for the islands, according to Donald A. De Riggs, who serves as director of RRL and its operating arm, Radio Rainbow Community Radio (RRCR).

With a limited economic base focused on tourism and agriculture, De Riggs said that at least some of the funding for RRCR will have to come from outside the tiny nation.

In addition to serving as a critical civil defense broadcaster in times of dangerous weather, RRCR also will provide national coverage of various events of interest to the community.

RW: What is the history of RRL and RRCR?

De Riggs: The Rainbow Radio League is made up of several hams (amateur radio operators) who have conducted several simulations for several years now. The focus is on handling emergency message and training volunteers, including members of the Red Cross, in the basics of wireless communications.

In the past, we have, via the use of our repeaters, provided live coverage of marathons and fund-raising walks by the Rotary Club along with live on-the-sea reports of the annual Fisherman's Day activities.

RRL is a nonprofit, voluntary community service organization. In the past, our service has been to the benefit of the community at large, and our time and

effort is based on philanthropic and humanitarian needs.

I helped found the organization along with Albert Browne in 1993. All RRL members have some experience in wireless communication.

RRCR is the most recent offshoot of the RRL with specific focus on FM broadcasting.

We will focus primarily on covering cultural, sporting and community activities, adult education and local music.

— Donald A. DeRiggs

RW: What is the need for the proposed RRCR stations?

De Riggs: The stations will provide a reliable means of information to the entire population or to affected communities in times of natural or manmade disasters. This includes ample warning of impending disasters — volcanic eruptions and hurricanes in our case — and instructions to the affected communities after a disaster.

None of the existing commercial or government-owned FM/AM stations have the capability to effectively reach all communities throughout the multi-island state should a disaster strike; none of the existing stations cover 100 percent of the population.

This is partly due to topography and to transmitter location. The system we are proposing, although it is low-powered and uses renewable energy sources, is expected to cover more than 95 percent of the nation.

The use of mobile land- and maritime-based stations will help cover special events or will transmit to specific coverage gaps in times of emergency.

RW: Will the stations operate individually or will they broadcast a single program?

De Riggs: The plan is for a network of low-power FM stations linked together to enable islandwide coverage of cultural, sporting, educational and events of national importance.

RW: Could you explain exactly how it

will operate?

De Riggs: The system will operate as an islandwide network with a central studio linking to other transmitters, with signals repeated on alternate frequencies in a daisy-chain arrangement. However, we are open to suggestions from experts in the field, such as ISDN or satellite-based uplink/downlink technology to transmit signals to remote locations.

Each transmitter can also operate independently if necessary, transmitting to its target audience if a link in the system fails.

RW: What role will RRCR play in the local radio scene?

De Riggs: We will focus primarily on covering cultural, sporting and community activities, including adult education and promoting local music.

We also will educate the general populace about the essentials of preparing for natural disasters, alerting people to impending disasters and, more importantly, transmitting information to affected communities following natural disasters. Because RRCR will not rely on the local

main power grid, the system will be able to stay on-air when the power system is out of order.

Radio Rainbow Community Radio will be used as a training ground for would-be announcers, too.

RW: Will its service reach only St. Vincent and the Grenadines? What about Barbados, Grenada, St. Lucia and other nearby islands?

De Riggs: Due to the proximity of these other island nations, even our low-power signals may reach them. However, beam antennas will be used to minimize interference or, alternately, to send signals to nearby islands if the situation warrants it.

The two frequencies thus far assigned to RRCR by Telecom do not conflict with stations in any of the nearby countries.

RW: Are there similar services elsewhere in the Caribbean?

De Riggs: No. The topography and geography of St. Vincent and the Grenadines make this system unique.

RW: What level of governmental support does RRL/RRCR have or does it need?

De Riggs: RRL, the umbrella organization for RRCR, is a member of the telecom subcommittee of the Central Emergency Relief Organization. CERO relies on the RRL to help provide emergency communications via amateur radio services in the absence of a national emergency operations center.

The government will be required to lease RRCR a few square meters of land to erect some of the standalone transmitters and antennas. The local Telecom is supportive of this project and has already given permission for RRCR to conduct test transmissions. A special community-service FM license is also being sought.

RW: How far along is the RRCR project?

De Riggs: At the moment, RRCR is using 15 W and 30 W stereo transmitters to help identify suitable transmitter locations. Since the end of 1997, tests have been conducted from six locations with

See RAINBOW, page 57 ▶

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PRODUCT REVIEW

Stinger Won't Sting the Budget

Alan R. Peterson

"Instant playback" boxes are immensely popular with radio personalities. Prominent radio hosts such as Tom Joyner and Rick Dees have their names linked to the 360 Systems Instant Replay.

Numerous companies have folded instant recall features into specific digital products. Denon placed hot keys in MD

devices is that they play back only one sound event at a time, with the exception of the Roland. Hit a new button and the drive has to stop the current file playback and look for the new one. Most users of instant-type boxes wished for the ability to overlap sounds for smoother segues or more elaborate on-air production.

BSI addressed this issue in its newest version of Stinger (2.00). Stinger can

possible to move through all eight Tabs by using the function keys (F1 through F8) rather than a mouse, if desired.

Care for a Tab?

A group of Tabs is called a Collection. The Windows title bar contains the name of the Collection on-screen at that moment. Next to the Collection title is a window showing the event playing now or that was played last. A timer window

is to the right of that.

Because Collections only contain data about the events rather than the WAV files themselves, the number of Collections that can be stored in a machine is limitless.

Further maintaining mouse-less operation, Stinger can work with a touch-sensitive screen. It is also possible to fire each audio event from a Tab with the 0 to 9 and A to Z keys on the PC keyboard.

Each event is labeled to show which key to hit to get playback. Pressing the "M" key in this example plays back a cartoon mouse yelling "Narf!"

See STINGER, page 63 ▶

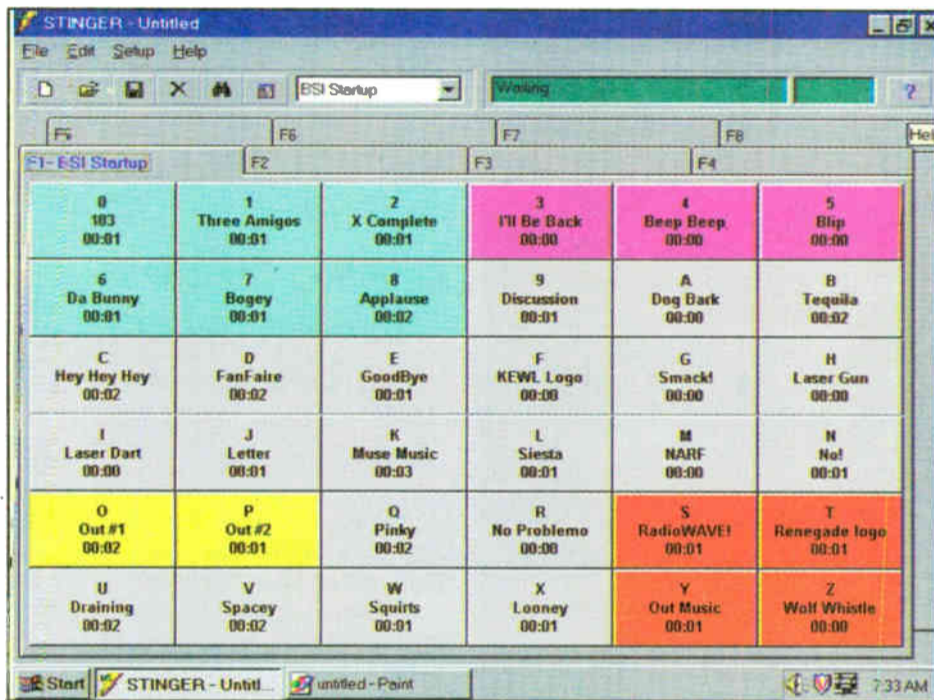


Figure 1: Screenshot of Stinger Version 2.00 Running on a Pentium 233

recorders, Roland has a digital "groove sampler" with 16-button playback capability and Otari put a series of hot keys in its 5050 magneto-optical recorder.

On the PC platform, the inexpensive "Fast EdDit" editor from Minnetonka Software has a Catalog mode that places a series of playback buttons on the screen.

Similarly, Broadcast Software International (BSI) created "Stinger," which turned a garden-variety PC into a 36-button hot-key playback program.

The major drawback to many of these

now load up to 288 sounds on a screen, and Microsoft DirectSound support allows multiple file playback through one regular soundcard. There is no need for a multiple-port card or expensive audio hardware to play several sounds simultaneously. There is also no need to drop much money on the program: Stinger 2.00 is only \$199.

A screen full of buttons comes up after starting Stinger. Each page of 36 buttons is called a Tab and there are eight Tabs to move through, totaling 288 sounds. It is

Tape-Baking Tips for Production Gourmets

Ken R.

By "baking tips," I am not talking Toll House cookies or Cousin Betsy's brownies. I'm talking about taking those old squeaky, oxide-shedding tapes from the '70s, putting them in an oven and making them playable again. For those of you young whipper-snappers who probably think of the Beatles only as "McCartney's old band," let me explain.

In the mid-'70s, major tape manufacturers unknowingly produced a lot of blank media that had backcoating problems. Nobody realized it for a number of years until the attempt was made to play back these tapes a decade later. There were vast quantities of squeaks and squeals as the tape ran through the heads and tape guides.

Eww-ww

Yucky copper-colored oxide came off all over the tape heads, guides, the pinch rollers and your hands. If you tried to listen to these tapes — a procedure not recommended — you would have been greeted with an ear-piercing squeal and distortion.

Sometimes if you bypassed the ten-



Master Tape Chef and Radio Jingle Producer Ken R.

sion bar on the left-hand side of your reel-to-reel deck, you might have been able to get the tapes to play. Sometimes playing the tape at a higher speed helped; say 15 ips for a 7.5 ips reel. Even playing the tape backwards would work in a pinch.

But what if none of these methods would do the trick? Maybe firing up

See BAKE, page 65 ▶



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DIGITAL DOMAIN

Playing the 24/96 Number Game

Mei Lambert

In case you have not noticed, I am a self-confessed futurist. I cannot wait to see what the digital tomorrow brings us, for both consumers — low-cost delivery media, powerful desktop computers, Internet-savvy everything — and the radio community.

I am convinced that all-digital facilities will let us offer better quality for our CD-conscious audiences, and enable us to be more cost- and labor-effective at our business. But I sometimes wonder if some advances are being thrust upon us for all the wrong reasons.

Cutting to the chase, it would seem that a new buzzword is rapidly creeping into our vernacular with unnecessary haste: 24/96. This stands, of course, for 24-bit data streams digitized at a sampling rate of 96 kHz.

These two little numbers are causing many radio professionals to make some premature and, I would hazard, unnecessary buying decisions. But let us take a step backwards and consider the bit/sample-rate continuum.

The Dark Ages

Way back when, during the early '80s, a consortium led by Sony/Philips select-

ed 16-bit and 44.1 kHz for the emergent Compact Disc specification.

Why 16-bits? Simply because that was as far as the chip makers had developed high-resolution DSP, sampling and converter technologies. So why 44.1 kHz? A myriad of reasons, especially convenience — the number represents sub-multiples of the NTSC video-frame rate, and early video processors utilized VCRs as data recorders.

Another reason is that it represented the data capacities of early storage media and transfer protocols. So 16/44.1 it was.

On another track, where did the 48 kHz DAT sample rate come from? This

choice of sample rate was not directly related to CDs to prevent illicit copying and the wish to offer enhanced bandwidth beyond the consumer release media.

That was then

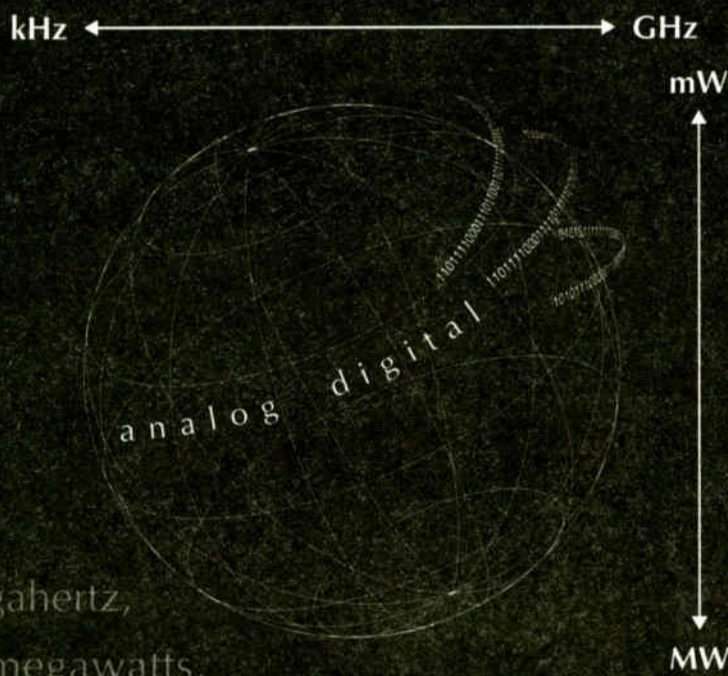
But nowadays, so goes the maxim "Bigger is Better." Hence the race to move beyond our current 16 bits and 44.1/48 kHz standard to more rarefied strata.

For the music and video-post industry, such developments make a measure of sense. Many industry insiders have expressed a frustration that, for many years, the music-recording business was forced to work with a tracking and mixing format that offered minimal digital headroom over the final consumer medium.

Just as 15 ips with Dolby A/SR analog recording outperformed the 33-1/3 rpm phonograph by a wide margin, so the advent of CD should have been accompanied by a digital format that offered an edge over 16/44.1. Until, recently, that was impossible.

Now we have access to an increasing number of 20- and 24-bit converters, some of which can run successfully at 96

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Where is radio ever going to need 144 dB signal-to-noise ratios?

kHz sampling rates. With enough storage capacity — more than three times that required for 16/44.1 session — we can record track elements, and the final stereo and/or surround sound mixes.

But I wonder if there is any dramatic advantage for radio.

Too much?

In most broadcast applications, we are looking for a performance that is restricted to a 17 kHz bandwidth and a dynamic range or around 75 dB, A-weighted. When was the last time you measured the overall specification of your FM air chain? I do not think that these numbers would be atypical.

Because we are normally inloading music, commercials, PSAs and related sound cues to a hard-disk storage system, ready to be played to air in an operator/jock-assist scenario or against a pre-programmed clock, we are immediately ahead of the specification game with conventional 16/44.1. The current specification still offers an easy 90-plus dB of dynamic range and extended 20 kHz frequency response.

Where, we might ponder, are we ever going to need to require 144 dB signal-to-noise ratios or elevated bandwidths? For me, the answer is pretty obvious: Aside from important mastering functions, I don't see the need for such an expense.

I would be the first to admit that important news events should be recorded and/or archived to the highest possible resolution, so that following generations can extract the most data from the materials. But at the same time

See DOMAIN, page 65 ▶

How much are eight miles worth ?

Plenty, if you are a AM broadcaster. What if your station could get out another eight miles of coverage? What would it be worth to you? The audio processing that you use plays a big part in the coverage of your station. Are you getting all the coverage area that you can ?

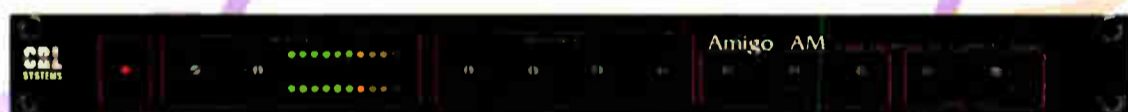
New audio processing from CRL can maximize the coverage area of your station. Our tri-band Limiter design delivers extra sideband and modulation energy to your listeners' radios. Our patented NRSC-1 filtering gives you the tightest peak control of any processor on the market. The result is an average of eight miles of additional coverage area compared to older processing equipment (average at 1200 kHz with 1 Kw power).



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New Coverage Area



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How many miles will a new CRL audio processing system give you? It's easy to find out ! We have a demo program available through our dealer network. Ask us for the details. In just a few weeks you could have better coverage and loudness, plus a larger selling penetration area. Can you afford not to use a CRL AM processing system ?



MBL-100 NEWS/TALK PROCESSING SYSTEM



Circle (102) On Reader Service Card

Old Coverage Area

PRODUCT EVALUATION

Otari CD-R Right for Production

Flip Michaels

There was a time when only the highest-billing stations in the largest markets, owned by innovative corporations, could afford to purchase one compact disc recorder.

Times have changed. Today, top-notch CD-R machines are falling from the sky at price tags just slightly more than \$2,000 with recordable disks as low as \$2 a pop or better.

After test-driving the Otari CDR-18 in preparation for this article, I was curious as to what other companies were competing for professional usage.

I wasn't prepared for the mild surprise

I experienced while leafing through a supplier's catalog. The Otari CDR-18 has a clone: the Fostex CR200. Except for the color differences — the classic black-and-gray of Otari and the putty tan of Fostex — these machines appear completely identical.

So let me preface this review with a purchasing tip: find which model is priced the cheapest and how many free recordable CDs come in the package, then make the purchase.

The rack-mountable Otari CDR-18 has two types of analog inputs and three types of digital inputs. The analog flavors are XLR balanced inputs with +4/-8 dBu

selection switch and RCA connectors at 10 dBv. Digital connectors consist of AES/EBU, coaxial S/PDIF and optical ports for the audio signals. As for digital output, IEC958 and optical connectors are also provided. Hooking up the CDR-18 took only seconds, since the back of the unit reminded me of countless DAT player installations.

What was a bit puzzling was getting the player to work. Had I only read the instructions very carefully at first, I would have learned that the recordable

a 32 or 48 kHz master to a 44.1 copy. I could not distinguish between what was a copy and the master, but then, that's the beauty of digital cloning.

The question will go up, "But what if I keep making mistakes on my CDs? Otari figured out a way to compete with the CD rewriteable (CD-RW) machines. If there are any mistakes made while recording, you can lay down a Skip ID so that these tracks will not be played later during playback. Skip IDs can be set or cleared as often as you would like until you finalize your CD.

The Finalize function is, as you might guess, the final step in making your completed CD-R playable on a conventional CD player. To do this, touch the Finalize button, wait a couple of seconds for the deck to calculate how long it will take (usually about four minutes) and then press the Pause button to begin. Once a disk is finalized, neither recording nor additional Skip IDs are possible on that disc.

It is true that computers can be fitted with a CD-R burner to accomplish the same task as the Otari CDR-18, and can do so for only about \$300. And there certainly is a computer in the production room, isn't there?

The process then becomes somewhat complicated as you need to switch between tasks. Then there is also the additional software purchase to get the job done right. The question becomes: should you really use the computer to burn CDs?

With a dedicated CD recorder, there is no need to tie up the workstation computer for a CD burn and the computer remains free to do other production projects. Four minutes later, look on over at the Otari CDR-18 to see your completed CD, capable of being played on just about any player.

It comes down to usage and cost: usage, if you are burning CDs to the point that a dedicated computer makes sense and the operator is very computer-literate. Cost, if you can total up the price tag of a computer, burner and software, and have it clock in less expensive than a CD-R deck.

With the Otari CDR-18, burning your own CDs is as easy as running a DAT player — a great deal more desirable than complicating matters with a PC. For versatility, there are a variety of state-of-the-art features to satisfy a facility's needs. The CDR-18 is a cost-effective addition to any radio production studio.

The Otari Web site is at www.otari.com

Flip Michaels is production director for Washington's Classical Station, WGMS(FM). His past reviews include the Merging Technologies Pyramix workstation. Reach him c/o RW.



Otari CDR-18 Compact Disc Recorder

CD is put upside-down into the deck. That's right, upside-down.

According to information found at the Otari Web site, "This design ensures a minimum amount of vibration, and results in better-quality recordings." Another unique advantage is that, because the laser fires down onto the disc, less dust and debris can collect on the lens and servo mechanisms of the laser.

The front panel of the CDR-18 is split with digital controls to the left and transport/record controls to the right. With all inputs correctly connected in the rear, the Input Selector button (on the left of the CD-R) allows you to toggle between analog, AES/EBU, S/PDIF coaxial and optical inputs. You will also see displayed names for the inputs like "DAT," "CD" and "AES/EBU," making the Otari recorder easy to learn and operate.

Many modes

As with the number of input modes, you will likewise find a medley of recording modes available, most which resemble your typical studio DAT machine. Track numbering can be done both manually and automatically with threshold options during or after recording. Pull out the Otari manual, turn to page 13 and you will be walked through the various options using the Auto/Manual and Write buttons.

Personally, I have used a number of CD recorders and I found the manual for this one to be a frustration-saver. More than once I propped myself up against the table of contents when I got too big for my britches.

A perfect example would be when I was using the Digital Synchro feature. The CDR-18 will record from any source including a DAT, another CD or a MiniDisc digital port. But for DAT only, the deck will automatically increment the track number by detecting the Start ID in the digital stream.

So why did the unit decide to stop recording after the first track? Not what would be expected from a set-and-forget operation. Well, maybe if I had checked the manual first, I would have learned that the Digital Synchro had been set to the Single-Track mode. Thank you, page 11.

The final product sounded superb. The CDR-18 may be regarded as a great value, but do not let the price tag guide you. Inside is a high-quality 1-bit A/D converter and a sample rate converter for translating

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- ✓ Skip ID prevents ruined discs
- ✓ A variety of A/D inputs
- ✓ Good manual



Thumbs Down

- ✓ No AES/EBU digital output

For more information contact Otari at (800) 877-0577 or circle **Reader Service 7**.

BSI Stinger Software for Studio

► STINGER, continued from page 59

Note that several buttons shown in Figure 1 are color-coded. Should there be a need to identify oft-pressed buttons such as weather beds or traffic sounders, hold down the Shift key and right-click the mouse over a button. A color palette is revealed and a new color may be selected.

BSI tucked some slick mousing features into Stinger. Hold the mouse cursor over a button for longer than two seconds and the long file name and file format appear in the tip text. You may retitle a button or clear one out completely with a combination of CTRL or ALT commands as well.

BSI also included a licensed copy of the Cool Edit recording and editing program from Syntrillium Software (Figure 2). This \$50 shareware editor is becoming available in digital broadcast products from other manufacturers and is widely used for its simplicity and power.

The DirectSound connection

Stinger makes use of the Microsoft DirectSound standard to play back simultaneous multiple files. You may choose either standard audio playback or DirectSound.

The are advantages and drawbacks to both. Under the standard setting, one sound at a time can be played on one card. Multiple soundcards or a card with multiple playback capability will provide multiple file playback.

DirectSound plays multiple files through one soundcard, allowing overlapping audio events on a \$29 soundcard. This feature is dependent on CPU and hard drive speed, so there is a limit to the number of simultaneous audio events.

This mode is best for short files and beds, but loading of large audio files such as long music beds can be very slow under DirectSound.

Note that if you wish to run Stinger under Windows 95, you will need the "second" version, or OSR2, to use

DirectSound performance. Windows 98 and NT will both run DirectSound.

Under Windows, Stinger can be networked to other machines and files may be downloaded or transferred as needed. A spot produced on another computer can be directed to a PC running Stinger with nothing more than basic network hardware and cable, and the "Send To" feature of Windows 95.

be enough to make Stinger do what it must. The drivers can be downloaded from www.microsoft.com/directx

Also, do not settle for a video card that is merely "good enough." For one thing, jocks have to look at the screen all day, and bad colors or screen flicker will drive your airstaff home with headaches and eyestrain. Second, a video card with insufficient memory may leave little



Figure 2: A licensed copy of Cool Edit is included with Stinger.

Minimum requirements to run Stinger are a Pentium 100 with 16 MB RAM (32 MB recommended), a fast hard drive and a soundcard of your choice. Naturally, the better the card, the better the audio quality will be.

Be conscientious of the computer you load Stinger into. An underpowered machine running Windows 95 may lock up if you try to click and drag audio events into Stinger buttons too fast. This issue may be different under Windows 98.

You absolutely need to have the DirectSound drivers in place if you are running Windows 95. The stock drivers that came with your soundcard will not

black "freckles" behind.

When the Select Audio File list is closed after loading new events into the buttons, artifacts of the list could be left behind in the cracks between the buttons. Use a video interface with 2 or 4 MB memory.

Finally, the question of, "Do we really need another computer in the control room?" If a full-sized tower case and 17-inch monitor, my answer is probably not. But Stinger can go in an existing machine and share existing WAV files.

Then again, why not a personal laptop machine? A laptop PC running Stinger can be plugged into the console and used as an event player.

The minimum requirements of Stinger calls for a Pentium 100. I have seen P-133 laptops selling for \$795. Along with the Stinger software, a radio personality can outfit his or herself for less than the cost of a dedicated "instant" box and still keep it portable.

I would not limit Stinger to radio use, either. Television stations can use Stinger with a simple P-100 for bumper and ID playback. Stadium announcers can load more than 200 songs and effects for playback as the action dictates.

Theater organizations would also welcome Stinger: Back in the days when I did sound design for HCT Theater in Pennsylvania, we had the need to run ambient rain effects, punctuated every now and again by a thunderclap or a blast of wind mixed into the rain in real time. This meant three cart decks (when they worked) or rapid manipulation of reels and cassettes. A program such as Stinger would have made the process a lot less cumbersome and easier to execute.

Stinger is available for less than the price of the 40 70-second carts it would be replacing. As all other software products in the BSI line, Stinger is available for evaluation on the company Web site, www.bsiusa.com

Unregistered versions will run for a short evaluation period, then stop. There is no limit to the number of times you may restart the program. Registering the software provides you with a password to unlock Stinger and Cool Edit Lite.

It is difficult if not impossible to hack around the validation requirement, as it is based on the IDs of the motherboard and disk drive.

This keeps Stinger from being pirated and installed in more than one machine. If either component is replaced or upgraded, a new password is needed to unlock Stinger again.

For information, visit the BSI Web site at www.bsiusa.com or circle Reader Service 31.

Alan Peterson is the technical editor for RW.

Products & Services Showcase

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Getting Loopy (Legally) on ACID

Loop-Based Music Production Tool Simplifies the Creation and Scoring of Music Beds for Radio Use

Carl Lindemann

Several years ago, a musician told me about the incredible changes computers were bringing to music-making. The next generation of composers, he said, would be able to create their music without having to master an instrument.

Having been trained at Julliard, this was a scandalous statement for him to make. Imagine computer-aided composition tools that allow non-musicians to make music! Well, in essence, that is what ACID from Sonic Foundry does.

ACID is a revolutionary software package that certainly could become an essential part of every production director's computer toolkit. If you use music beds behind your production, you will want to try ACID to make them for yourself.

It doesn't mean pH

What is ACID? According to company literature, it is a "loop-based music production tool." It takes snippets of music (or "samples") and pastes them together in a quasi-multitrack environment.

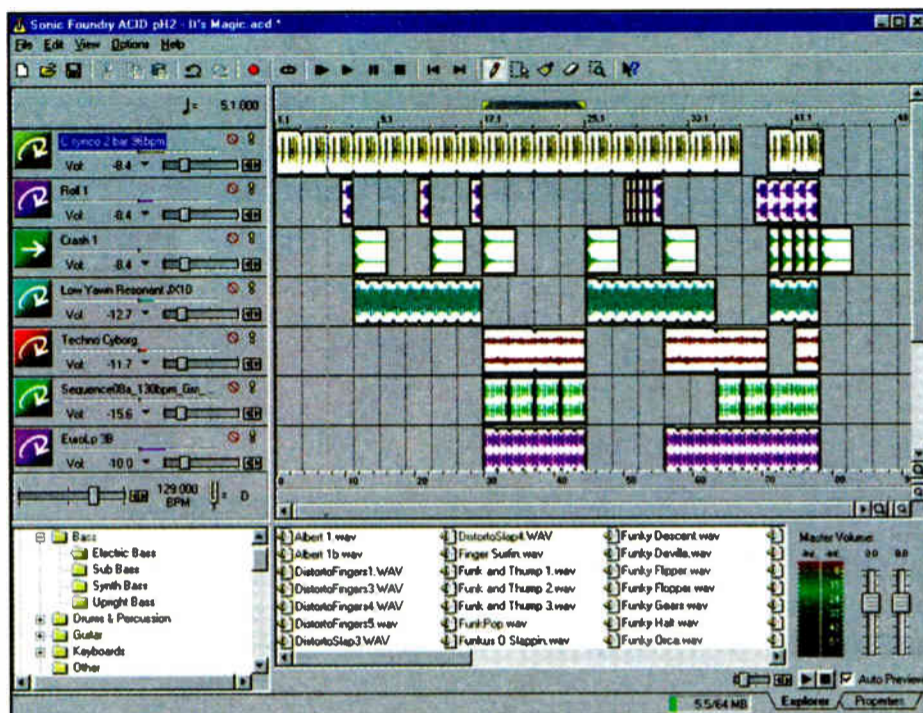
Well, can't you do that with any audio editor? Not exactly. Putting sound together is not the same as making music. As long as the samples are of the same tempo and pitch, a conventional sound editor works quite satisfactorily.

Typically, this means pulling samples from the same piece of music, which often produces repetitive, monotonous

a keyboard riff at yet another tempo and in a different key, and make them sound great together."

In the three months that Richards has

The unique capabilities of ACID come from adding different loops into the mix. Despite variations in key and tempo, the system reprocesses the files by altering the pitch and speed of each, then synchronizing them into a coherent piece of music.



Main Screen of Sonic Foundry ACID

been working with ACID, it has become as important as the software tools that made tape and razor obsolete.

What ACID does is allow station production departments access to the kinds of production capabilities once

Beyond mixing sounds sequentially, samples can be layered on top of each other in as many tracks as your computer's RAM will allow. Controls for processing volume, pan effects and fades finish a piece.

The software comes with a basic library of loops, and an ever-growing collection of sample CDs is available. At press time, Sonic Foundry announced three new loop libraries; the techno-pop "Cyclotron Resonator," the global "Ethnicity" collection and the drum-based "Rhythmic Architectural Design Systems."

The closest analogy that can be made here is to consider these CDs a "clip-art library" of sounds, much the same way as a disc can contain images or animations that can be blended.

You do not have to be a graphics designer to add visual effects to documents or Web pages. Likewise, the ACID sound loops let you create your own musical soundscapes without being a trained musician. One of the major selling points here is that the beds created by you are royalty-free.

Make your own ACID

The flexibility of ACID is not limited to the pre-recorded Sonic Foundry library. You can record and add your own loops. For best results, standard WAV files need to be "ACIDized" with additional coding that contains information about the tempo and key of each sample.

The system automatically guesses what is appropriate when synching up a piece, but proper ACIDizing makes sure that added samples will mix correctly.

The real ACID test (ha-ha) is listening to the compositions with the Pitch Control turned off. As the different samples play in their native keys, the mix sounds horrid. But when the audio files are processed to be in the same key and

tempo, the mix becomes listenable.

Note that making changes to the samples is a processor-intensive operation. System requirements stipulate that you need at least a Pentium 133 and 32 MB RAM to make this work at all.

For all practical purposes, you really need a Pentium II to take advantage of what ACID has to offer. In my own instance, I ran ACID on a 300 MHz Pentium II with 64 MB RAM under Windows NT. Going with anything slower means that the operations will not work in real time. You have to create and store a finished file of a project in order to listen to it.

Work in progress

With a fast system, samples can be checked on-the-fly to see if they fit with what you are composing. You can alter pitch and tempo instantly. This ability to quickly swap-out different sounds and arrangements opens up much creative potential.

The latest Sound Forge release (4.5) fully supports ACID as an integrated add-on by including a loop-editing toolbar to its interface. As a stand-alone, it supports DirectX audio plug-ins.

Composing sound beds is easy when using ACID, but composing good sound beds still requires a decent ear. The system does not replace the composer's talent.

Let's say you need to be musically inclined, but not necessarily musically trained, to make this work well in the radio production environment. Any producer who has the knack for matching music beds to voice-overs has probably got enough of an ear here to make this work.

It seems appropriate to coin a new term to describe those who master ACID's music-making abilities. It won't turn everyone into a composer, but it will make you into a "compuser."

"I'm not Sting," said WBEB's Richards. "What ACID lets me do is work with music someone else has done."

The big finish

ACID is amazing, though it has some limits. Making extreme changes in a sample's native pitch or tempo can sometimes sound unnatural. But this is a minor quibble. The bottom line is that if you want music beds tailored to your production — instead of throwing in a canned bed that kinda-sorta fits — this is the way to go.

Of course, this does not mean you will be throwing away your music library anytime soon. Quick-and-dirty spot production using the off-the-shelf beds is fine and fast. What ACID does is extend your production capabilities so that you are not forced to make such compromises all the time. All projects need not sound like rip-and-read work.

ACID is not quite the same as having an in-house orchestra, but a computer certainly does take up less space.

Suggested price of ACID is \$399. Download a demo from www.sonic-foundry.com

■■■

For information, contact Sonic Foundry in Wisconsin at (608) 256-3133 or circle Reader Service 55.

Carl Lindemann produces "CyberScene: The Socially Significant Cyberspace" from North Berwick, Maine. He can be reached at www.cyberscene.com

Samples can be layered on top of each other in as many tracks as your computer's RAM will allow.

sound beds. And if you try adding in samples taken from other sources, you get cacophonous mismatches and a potential copyright problem.

"What is amazing about ACID is that it lets you join separate samples into a single piece of music," said Tom Richards, production director at WBEB(FM) in Philadelphia. According to Richards, "You can take a drum beat, add a bass line in a different key and tempo, and then maybe

limited to jingle houses and other studios dedicated to producing sound beds on demand.

ACID is different from other audio production packages, but it is not entirely alien either.

Getting the hang of the basics of the ACID paradigm is simple. You take soundfiles of samples and paste them on what appears to be a multitrack layout called Track View. You drop in a loop and extend it as long as you like.

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Cooking Up a Little Ferrous Oxide

► **BAKE**, continued from page 59
the old Hotpoint was the answer, as it was for us.

In our case, the faulty tapes in question were old PAMS jingle master multi-track tapes recorded between 1975 and 1977. These were two-inch, 16-track reels; remember *that* format, boys and girls?

When we attempted to play them, we would have to stop every two minutes and un-gunk the heads. The squeal was worse than a Yoko Ono outtake and the audio was totally unusable.

I really needed to salvage these tapes so I talked to some friends in the business. The procedure recommended to me was more of a recipe than a process: remove the tapes from their cardboard boxes and place them in an oven at 130 degrees for about 8 hours.

The squeal was worse than a Yoko Ono outtake and the audio was totally unusable.

I was told this would allow me about a week of playing time before the tape reverted to "goopy mess" status.

See you at the Mensa meeting

When I mentioned this baking procedure to my secretary Brooke, she said "Hey, why don't you leave them in your car in the K-Mart parking lot? It would be the same thing!" Always the voice of wisdom, our Brooke.

With permission from my wife — always a fine plan — I nervously placed the heavy tape in our oven at home and let it bake all night. The next day I allowed it to cool right in the oven with the oven door ajar. My date in the studio was two days hence.

When I arrived at the studio, we strung the tape up (PAMS "WLS 1976 Windy" package, for you jingle fans looking in), and surprise, it worked. It played just fine with nary a speck of messy oxide.

The Numbers Game

► **DOMAIN**, continued from page 60
I say let's not fool ourselves.

Going to 24/96 is a major quantum step forward in system complexity and, inevitably, cost. The design of ultra-precision 24-bit A/D and D/A converters is not for the faint-hearted. Ensuring that degree of accuracy requires a degree of clock stability that borders on high art.

Look upon with great suspicion any firm that claims to be able to perform verifiable 24-bit conversation on a PCI card within one of the most sonically hostile environments known to history: the off-the-shelf PC.

If 24 bits at 44.1/48 kHz was hard enough to perform reliably, upping the stakes to 96 kHz is really sorting the men out from the metaphorical boys. We now have double the data band-

The audio was a bit hissy, but that may be the way it was 22 years ago. Back in those days, the old PAMS engineers used to record at either 15 or 30 ips with no noise reduction. The EQ was mostly fine; we used a small amount of brightening, but not too much.

The only problem we encountered was that the entire drum mix was on Track 1, all mixed to mono. We noticed some dropout, most likely due to the fact that Track 1 is on the edge of the tape. Other than that, that wonderful PAMS magic came through just fine.

Ken the Answer Man

Let me now entertain questions from curious readers.

Q: Doesn't the metal reel itself get awfully hot?

A: Duh, yes! You let it cool for a few hours after baking.

Q: What about the splices attached to the leader? Doesn't the heat melt them and make them goopy?

A: Strangely, no. We have never had a splice fall apart after baking.

Q: Doesn't it smell disagreeable when one cooks a tape in the oven?

A: Only if you stick your head inside.

Q: How many times can you repeat this procedure on a given tape?

A: I suggest only once. Make sure that once the baking procedure is complete, the audio is transferred to another medium right away. If you want to keep a multitrack tape in multitrack form, use a modular multitrack such as an ADAT, DA-88 or compatible. If you just need a two-track reduction, DAT or CD is recommended.

Please understand this is a last-resort method of saving archive material. Once you have taken the extreme measure of baking a tape, you should

width, and even tougher clock tolerances.

Sure, we can lighten up on the anti-aliasing filter parameters, but that is a small dispensation.

Unless there is pressing need to extend the envelope in your station, I wonder if 24/96 is much more than a costly marketing buzz. Let me know if have missed something important, although I doubt it.

■■■
Mel Lambert is the international marketing director at Otari Corporation and has been involved with the production and broadcast industries on both sides of the Atlantic for several decades. He can be reached via e-mail at mediapr@earthlink.net or via telephone at (818) 753-9510.

instantly make a fresh transfer, preferably to a permanent storage medium.

Would I recommend this procedure? Only if you have exhausted all other options. Regarding digital recordings made in the present, who knows what dark problems lie ahead? Digital audio has not existed long enough for us to know what wonderful surprises hidden deep in the tea leaves awaits us.

For analog tapes, an oven can be your friend and can save a session.

■■■
Ken R. runs Ken R. Music, a producer of classic and contemporary radio jingles in Toledo, Ohio. He can be reached at kenr5367@aol.com

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Potomac FIM-71 field strength meter, excel cond, seller will pay shpg C.O.D., \$7400/firm; IFR 1100-S RF spectrum analyzer, goes to 1.2 Ghz, w/built in RF & AF sig-gen, multimeter accessory & manual, excel cond, \$4200. D Kidwell, 512-258-0933.

Powerstat variable transformer type 1266-D, 240 V In/0-280 Out, \$250; Powerstate variable transformer type 1156-D 115 V In/0-135 Out, \$200. M Fitzner, 706-291-9766.

RCA WO-91B oscilloscope, \$50; HP 332A distortion analyzer, \$400. M Fitzner, 706-291-9766.

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Shure M64 T-T pre-amp. \$25. M Fitzner, 706-291-9766.

Sony PSX-800 Biotracer T-T. J Hartt, 206-282-0720.

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Gates BC5P AM xmtr, working when removed from service, some spare parts, some solid-state mods, BO. L Knight, 541-747-5673.

Henry 6000D, 6 kW FM xmtr, no exciter, 4 yrs old, modified for interstage tuning via tuned lines, working on 88.3 when removed, \$4000. T Blankenship, 805-832-2800.

Wilkinson 20,000 FM, spares, manual, new final. J Phillips, 419-782-8591.

Collins 830-D 1 kW FM w/2 exciters, one is original Collins, the other is McMartin B-910, both working, currently used as backup on 104.9, have spare (new) PA tube (4CX1000A) & manuals, u-haul, BO. D Land, 618-842-2159.

Gates BCP5P2, circa 1962, on 1320 kHz until 8/98, spares, manuals, etc, \$2700. C Cook, 931-728-1320.

Harris Gates 1000/250 W tuned to 1550, not working, gd for parts, \$500. D Brandt, 812-738-9622.

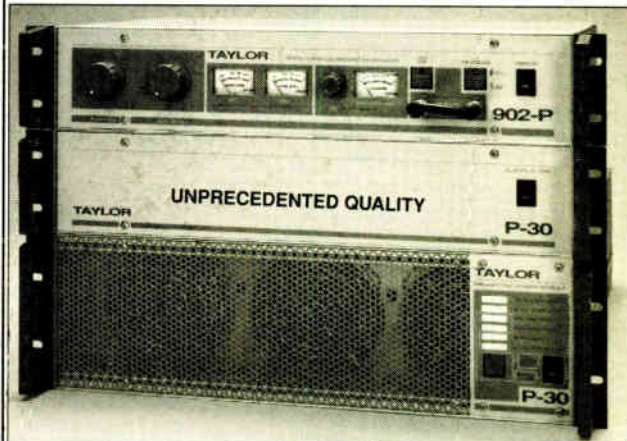
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Table with 6 columns: Page No., Advertiser, Reader Service No., Page No., Advertiser, Reader Service No. Lists various companies and their page numbers.

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Form fields for Job Function: A. Ownership, B. General management, C. Engineering, D. Programming/production, E. News operations, F. Other (specify), G. Sales.

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Broadcast Equipment Exchange PO BOX 1214, Falls Church, VA 22041 • Tel: 800-336-3045 • Fax: 703-998-2966

Table listing staff roles and names: Production Director (Lisa McIntosh), Production Manager (Jeff Fisher), Publication Manager (Jennifer West), Showcase Coordinator (Vicky Baron), Ad Traffic Manager (Kathy Jackson), Marketing Manager (Heather Harris), Production Assistant (Anastacia Stornetta), Ad/Classified Manager (Simone Mullins), Circulation Director (Sheryl Unangst), Circulation Manager (Robert Green), Accounts Receivable (Steve Berto).

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Table listing advertising sales representatives by region: U.S. East, U.S. West, U.S. Midwest, Southwest Sales, Other Regions, Latin America, UK, Ireland, Europe, Africa, Middle East, Asia/Pacific.

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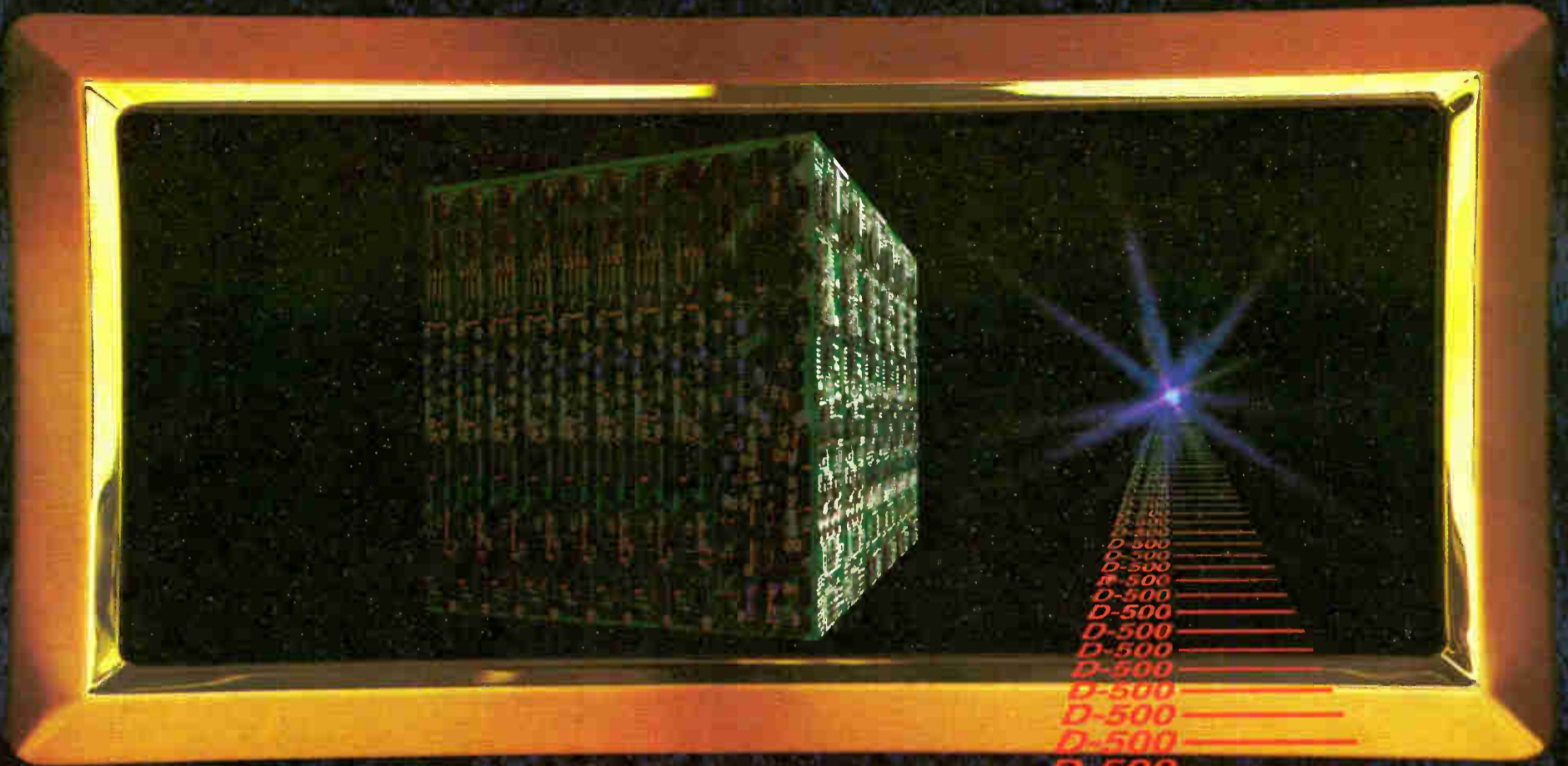
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