**********3-DIGIT 857
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BARRY MISHKIND 367
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TUCSON AZ 85710 7905

NRB in Washington
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Radio World®

Vol 22, No 2 | Radio's Best Read Newspaper | January 21, 1998

What's Next for RFE/RL?

by Lauren Rooney

WASHINGTON Radio Free Europe and Radio Liberty have been broadcasting the message of democracy to listeners behind the Iron Curtain for more than 30 years. Radio Free Europe was designed to broadcast to the Soviet Union, Radio Liberty to Eastern Europe. In 1974, the two combined in an effort to streamline services and to save money. But as the 1990s wear on, the curtain may fall on U.S. government funding of RFE/RL.

RFE/RL is a private, non-profit organization run by the Broadcasting Board of Governors, a nine-member panel appointed by the president of the United States. It is funded through federal grants. In 1994, the Senate passed a resolution introduced by Sen. Russell Feingold, D-Wis., that ends those grants at the close of 1999.

On the floor of the Senate in January 1994, Feingold complained about $300,000 salaries and what he saw as extravagant lifestyles of RFE/RL managers.

"I frankly do not believe it is necessary for the U.S. taxpayers to pay these lavish salaries and benefits to the executives and employees of RFE/RL in order to accomplish the goals of these grants," Feingold said. "As the media develops in Eastern Europe, there is less and less reason to have a U.S. government-funded surrogate radio service."

Sen. Joseph Biden, D-Del., said he will try to get support in Congress to keep funding flowing to RFE/RL as the 1999 deadline approaches. "All you need to do is listen to a radio, or pick up a newspaper or magazine, and read about all the chaos in Eastern Europe and Russia ... It behooves us to continue this program," Biden said.

Belt tightening

RFE/RL Director of Communications Paul Goble said the organization has been tightening its belt for some time. In 1995, its grant shrank from $220 million to the current $55 million.

"We moved our headquarters from Munich, Germany, to Prague, the Czech Republic, to save money," said Goble, who cut staff from 1,600 in Munich to 370 in Prague. The money saved in the move did help RFE/RL upgrade its equipment.

The Prague studios are equipped with Broadcast Electronics MixTrak 100 and

See RFE/RL, page 3 ▶

NEWS MAKER

Surette: Busy Time for Engineers

by Bob Rusk

BRIDGTON, Maine *Robert A. Surette has served as manager of RF Engineering with Shively Labs, a division of Howell Laboratories, since 1981. He is a popular lecturer at SBE meetings and national conventions. Surette spoke about FM Combiners, Theory and Application and FM Antenna Elevation Patterns at the national/Chapter 16 convention in Seattle.*

As part of our series of interviews with prominent radio professionals, Surette spoke to Bob Rusk about the state of radio and its likely future.

***RW:** What are the major issues radio engineers face today, and how do these issues affect the scope of engineering jobs and responsibilities?*

Surette: The last two years have been dominated by two major stories

See BUSY, page 11 ▶

INTERNATIONAL UPDATE

European DAB Data Dispute Settled

by Jeff Cohen

LONDON After months of arguments between German and British researchers, a dispute over DAB-related data has been settled.

The disagreement centered on how data channels for multimedia applications will be carried over Eureka-147 digital audio broadcast signals. Although the dispute had festered privately for months, it did not become public until the International Broadcasting Convention in Amsterdam.

Non-audio multimedia

Concern focused on the way data channels will carry information for non-audio multimedia applications to DAB sets. German researchers, led by the Bosch Group, makers of Blaupunkt receivers, spent considerable time and resources developing the Multimedia Object Transport (MOT) system, which was presented to Eureka for inclusion in the DAB standard.

However, when MOT was evaluated by BBC research engineers, they initially concluded that fundamental limitations in MOT would preclude its use in many future applications.

The BBC researchers expressed concern about the way MOT would immediately be implemented. They issued a counter proposal to Eureka to utilize the data transport system developed for digital TV, which was already accepted as the internationally agreed-to digital video broadcasting specification.

This system is known as the Carousel system, and the BBC team champions it as offering much greater flexibility and

See DISPUTE, page 7 ▶

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World Radio History

NEWSWATCH

FCC Freezes New Station Applications

WASHINGTON The FCC has announced a temporary freeze on filing applications for new stations (because the procedures will likely change).

The freeze precludes the filing of applications for new stations or major changes to existing stations, including translator station applications. The freeze does not prevent the public from filing petitions for rulemaking to change the Table of Allotments, minor change applications and new and major FM noncommercial educational applications.

Also not affected by the freeze are: applications filed in response to an opened FM application filing window, and AM applications or FM translator applications filed in response to an outstanding cutoff list. The commission put the freeze on new applications when the commissioners proposed auctions to clear out a backlog of competing applications for the same broadcast licenses in November.

Another Tower Firm Merger...

BOSTON The tower arm of American Radio Systems Corp., American Tower Systems Corp., plans to merge with Houston-based American Tower Corp. The deal is expected to close in the first half of this year. At that time, ATS would be the surviving corporation and would be renamed American Tower Corp. ATC CEO Fred Lummis and Clear Channel Communications CFO Randall Mays plan to join the ATS board. Clear Channel owns a 31 percent interest in ATC.

Of the merger, Lummis said, "This combination will provide a strategic platform from which to participate in the long-term growth of the wireless industry."

Assuming all announced transactions close, after the ATS/ATC merger, ATS will own or manage more than 1,750 communications sites in the United States.

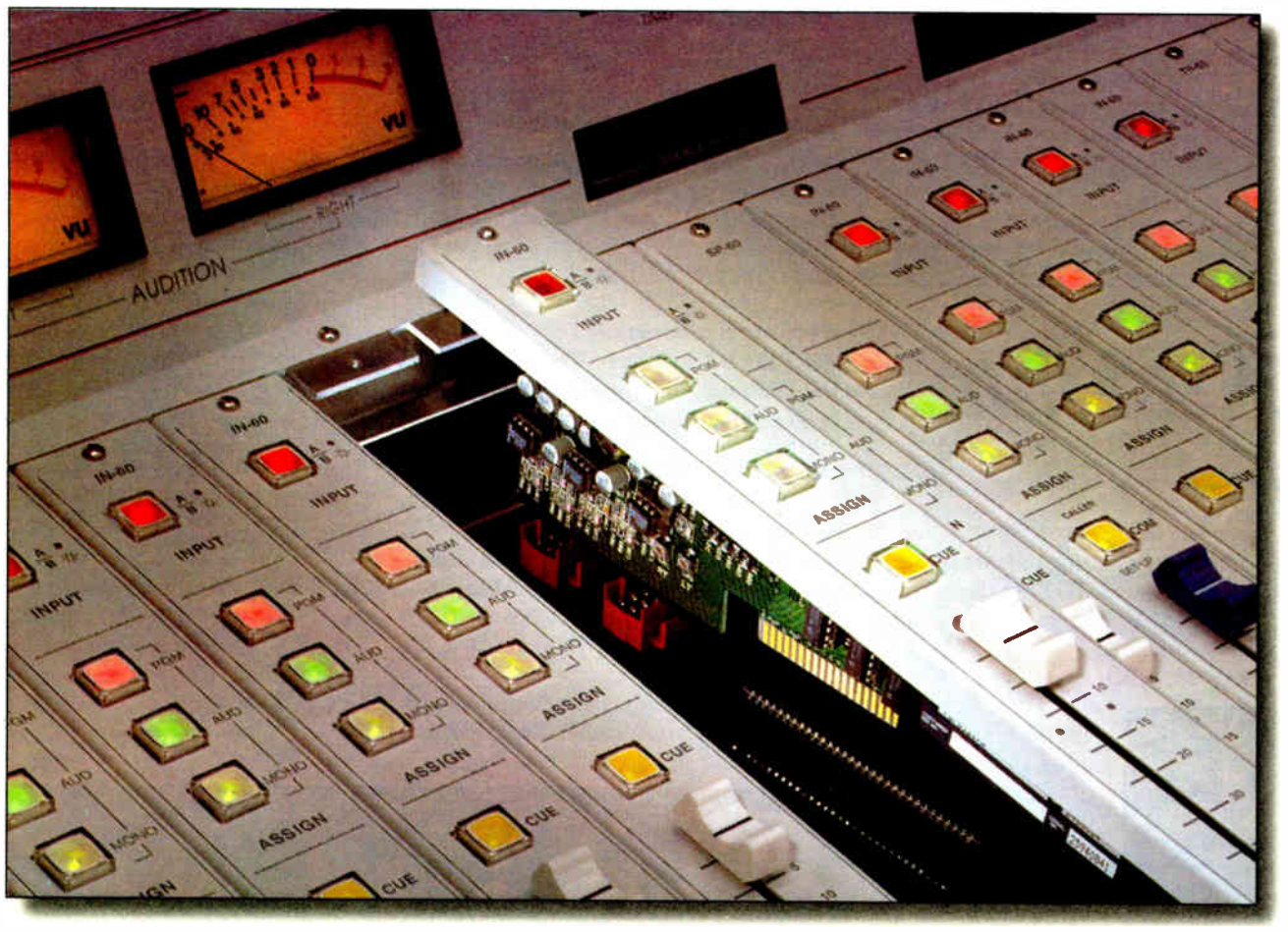
Gammon Fined $18,500

WASHINGTON The FCC has fined Turquoise Broadcasting President Thomas Gammon $18,500 for failing to fully reveal his ownership interests in station assignment applications.

The FCC said it appeared that Gammon had an undisclosed real party interest in the station assignment proposals and that he allegedly violated the multiple ownership rules prohibiting ownership of two FMs in the same community.

Gammon can choose to either pay the fine, or tell the FCC why it should be either reduced or dismissed.

Take a LOOK at THIS:



Then look at our competition.

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THD+N (20Hz-20KHz)	
Line, +4dBu	.005%
Mic & Line, +16dBu	.005%
IMD (SMPTE)	
Mic & Line, +4dBu	.004%
DIM	
Mic & Line, +16dBu	.005%
DYNAMIC RANGE	
Line	114dB
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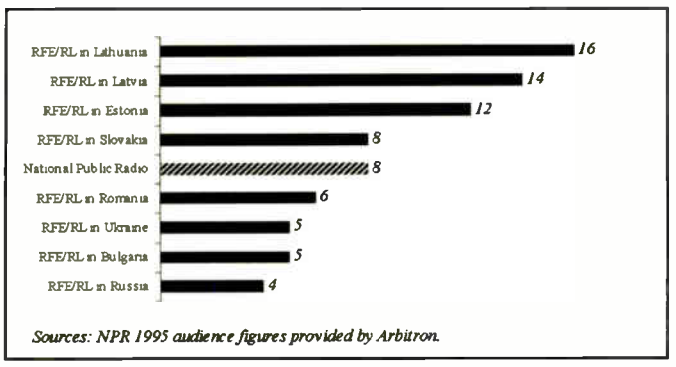
World Radio History

RFE/RL Faces Future Questions

▶ RFE/RL, continued from page 1

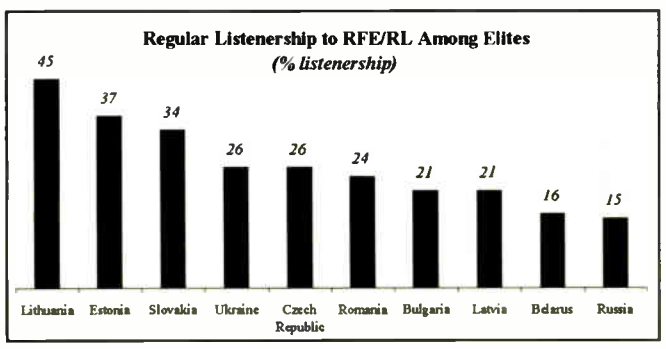
Logitek TR2 consoles. The facility uses 360 Systems DigiCart/II digital audio equipment and Studer A807 and A812 tape machines. The studios also contain Studer D730 and A727 CD players.

"The conversion allowed us to reduce the number of studio technicians used," said Luke Springer, deputy director of engineering and technical operations in Prague. "It has increased the self-sufficiency of the presenters. It also allowed us to easily update repeated programs with new information without re-recording the entire program."

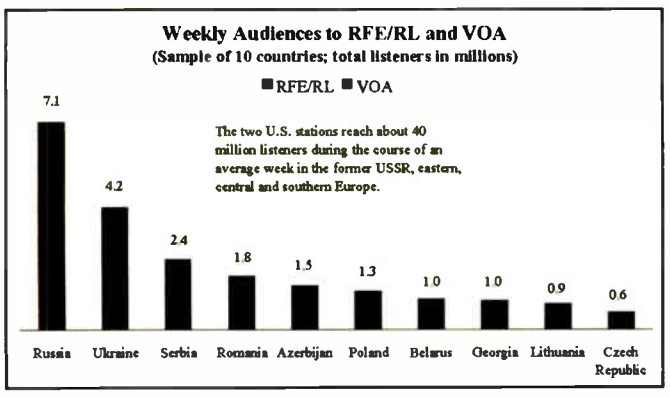


RFE/RL audience figures from 1996/1997 InterMedia nationwide surveys.

Springer said the cost to build and equip the Prague studios was about $2 million. Equipment was chosen for its reliability and cost.



Approximately 1,000 stringers and freelancers in Europe and Washington gather news and information for RFE/RL. Material is phoned, faxed, e-mailed, or in the case of Washington contributions, sent via satellite to Prague. There, the staff assembles programs and sends them by satellite or land line to 18 broadcast bureaus in central Europe and the former Soviet Union. The centers air the programs on shortwave. Some are sent via satellite or land line to local radio stations, where they are broadcast via medium-wave to listeners.



Voice of America

Also serving the Eastern European community is Voice of America. In comparison, VOA received $100 million for operating expenses from Congress in 1997. VOA broadcasts all over the world, not just in Eastern Europe and the former Soviet Union, and has a broader range of programs: world news, music and how-to shows. With a staff of 1,137 worldwide, VOA broadcasts news and information 24 hours a day, 365 days a year. RFE/RL programming is 700 hours per week.

The two work together to save money. "We share broadcasting facilities," Goble said. "We both save because there's no dead time at the facilities."

But the two may be in competition for federal dollars. Whether the United States needs to support two broadcast services in Eastern Europe is an issue expected to be taken up when the Senate returns to Washington this year. Goble said despite financial cutbacks, the quality of the product remains the same.

"We are committed to democracy, free markets and cooperation," he said. "And against ethnic hostility." Programming includes news, analysis, financial information, even book reviews.

"We are the NPR for much of this part of the world," said Goble. "We reach an elite audience: decision makers interested in news about the world."

RFE/RL also airs on the Internet. At Web site *www.rferl.org*, visitors can find out what's new or download audio from various RFE/RL programs.

According to a survey done by InterMedia in Washington for RFE/RL in the spring of last year, 61 percent of the upper-level decision makers in the former Soviet Union and Eastern Europe were RFE/RL listeners. InterMedia surveyed 400 "elites" in each of the countries RFE/RL serves. The survey also found that approximately 40 million listeners tune in to RFE/RL, VOA or both in the course of an average week.

Freedom

Goble said the appeal of RFE/RL is that the programs truly are free.

"In most of these countries, printed media is relatively free of censorship. But very few read papers because they're expensive. The electronic media is much more tightly controlled by the government. That's why we're still needed."

Goble hopes federal funding to RFE/RL will continue after 1999. He said the issues of high salaries and lavish lifestyles about which Sen. Feingold was concerned in 1994 have been addressed and corrected.

"No one on the staff makes more than $125,000 a year. Were we living on the fat end in Munich? Yes. Is it right that we're living under much greater discipline now? Yes."

Not enough

But that may not be enough. Feingold is aware of the cuts and changes RFE/RL has undergone, but vows to continue his fight to eliminate federal funding.

"I will continue to monitor the progress of RFE/RL towards privatization," Feingold told **RW**. "In this post-Cold War era, I believe the United States should be encouraging the development of independent media in new democracies such as Poland and the Czech Republic, not subsidizing its competition."

Gobel said RFE/RL isn't expecting any more money from the federal government in 1998, but not expecting less, either. However, because the cost of doing business always goes up, Gobel said, cuts in services may be needed in 1998.

■■■

*This is one in a series of articles about broadcasting operations funded by the United States government. We reported on the move of Radio Marti to Miami in our Oct. 29 issue. In an upcoming story, **RW** visits the new studios of Radio Free Asia.*

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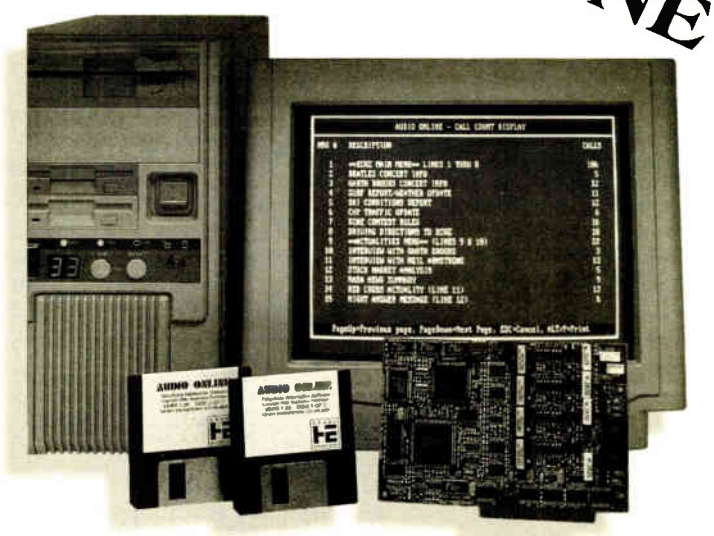

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World Radio History

Look to Details to Cement Radio's Hold

WASHINGTON By the time you read this, the NAB board will have met and adjourned along the southern beaches of California.

Due to our deadlines, I am writing this a couple of weeks before that very board meeting. I'm sure that topics of discussion for the NAB board will include: Free broadcast time or deep political discounts for candidates; the issue of daytime AM stations seeking the use of FM translators for nighttime operation, and of course, IBOC DAB and the continuing effects of consolidation, etc.

And though these are all weighty and portentous issues, there is plenty of work to do on the home front to help shore up radio and its role in the life of the average American. On Dec. 30, 1997, for example, The Washington Post ran an article on the front page of its Style section about digital cable radio. At first I thought, "Here goes another radio-bashing fest," but in truth, Marc Fisher, the staff writer at the newspaper who authored the piece and specializes in covering radio, did an excellent job with the article.

Mostly he posed some very interesting challenges for radio.

I usually shy away from quoting other newspapers, but I believe that Marc's comments are interesting and thought-provoking. After having subscribed to DMX for a month, Marc was full of praise for the variety and quality of music. Yes, you hear many things which you cannot hear on the radio. But then, Marc writes:

"After a while, I began to miss real radio — badly. Not the ads, of course, but the creative possibilities, the chance that a deejay (sic) might amuse or inform me, the opportunity for great segues. There's no sense of continuity on DMX, no feeling that there's a human intelligence lining up the music."

Take that, DARS, and take that, DMX. That paragraph encapsulates that tenuous something that radio stations try to deliver to their listeners — and that once they do deliver, cements the bonds of loyalty and passion for the station unparalleled in other media.

Unfortunately for the radio business, as the '90s roll to a close, that ability of a radio station to be individualistic or unique seems to be diminished. You know what I mean. The Classic Rocks that are indistinguishable from city to

city, the Young Country's, the Urban Contemporary's, etc. More often than not, if you travel on a regular basis you know what I mean about the homogenous sound of radio across the United States. For the most part. Marc adds:

"To be sure, the great art of deejaying (sic) is largely lost to the corporate belief that focus groups and listener surveys are better at choosing music than a single passionate person who knows the music and has an artistic vision. But live radio still has that possibility and, here and there, even the reality."

I take this last paragraph to be a challenge to everyone running radio stations. You still have the resources and the ability to make radio a great creative medium, with which you can take both business and programming chances. When digital audio broadcasting arrives, the technology will further enhance that. Look sharp; the cable and satellite guys don't have the home turf advantage that every one of you do.

Oh, and by the way, even in affluent Washington with more per capita Volvos than any city in the country, DMX has not yet made serious inroads into the audience. But then again, DMX has been relying solely on word-of-mouth advertising.

★ ★ ★

And in a stroke of fortuitous timing for my deadline, the NAB released the Radio Board Nominees. Ballots were to be mailed to member stations on Jan. 9. Completed ballots are due back to NAB by Jan. 30.

Below are NAB members who have been nominated to the Radio board in the even-numbered districts where seats are open. An asterisk indicates an incumbent.

District 2

David S. Gingold, president/COO, Barnstable Broadcasting, Newton, Mass.

*William O'Shaughnessy, president, WVOX(AM)/WRTN(FM), New Rochelle, N.Y.

District 4

*J. William Poole, general manager, WFLS-FM, Fredericksburg, Va.

District 6

*William L. McElveen, president, WTCB(FM)/WOMG(FM)/WISW(AM), Columbia, S.C.

District 8

*Stephen C. Davenport, president, Telesouth Communications, Jackson, Miss.

District 10

John Dille, president/owner, WTRC(AM), Federated Media, Elkhart, Ind.

Mike McDaniel, president/general manager, WQTY(FM), Linton, Ind.

James L. Zix, general manager/chief engineer, WLAB(FM), Ft. Wayne, Ind.

District 12

Karen A. Carroll, senior vice president/general manager, American Radio, St. Louis

Gary L. Hawke, general manager, KJHK(FM), Lawrence, Kan.

Deborah M. Hoeflicker, president/general manager, KREP(FM), First Republic Broadcasting, Belleville, Kan.

Martin K. Melia, president/general manager, Melia Communications, Inc., Goodland, Kan.

Richard Thomas Wartell, vice president/general manager, The Seaton Group, Manhattan, Kan.

Dick Williams, president/general manager, Heritage Media Corporation, St. Louis

Jerry Zimmer, president, Zimmer Radio Group, Cape Girardeau, Mo.

District 14

*Mark Hedberg, general manager, Hedberg Broadcasting, Mason City, Iowa

District 16

*Dick Maynard, owner, KSLF-AM-FM, KEKB(FM)/KBKL(FM), Grand Junction, Colo.

District 18

Charlie Cohn, president, KLAQ(FM), New Wave Broadcasting, El Paso, Texas

Danny C. Fletcher, vice president/general manager Sunburst Media, Weslaco, Texas

District 20

Ron J. Davis, owner/general manager, Butte Broadcasting Inc, Butte, Mont.

Jim McBride, manager, KGLE(AM), Friends of Christian Radio, Glendive, Mont.

District 22

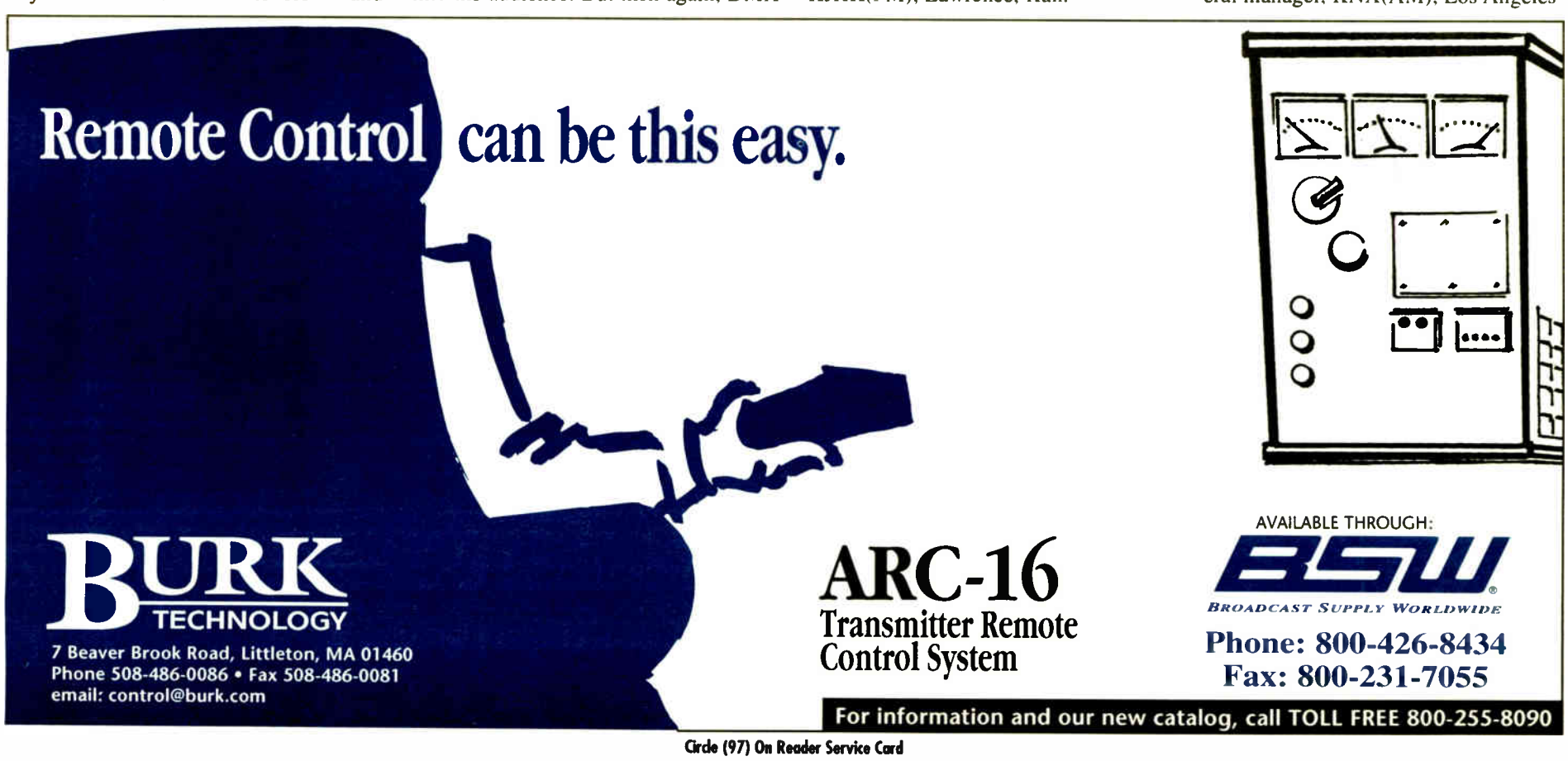
*Jerry Ryan, general manager, KESZ(FM)/KOAZ-FM, Phoenix

W. Russell Withers, Jr., owner, Withers Broadcasting Companies, Santa Fe, N.M.

District 24

Christopher S. Leonard, vice president/general manager, New West Broadcasting Corp., Hilo, Hawaii

George Nicholaw, vice president/general manager, KNX(AM), Los Angeles



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

In touch with ASCAP

Dear **RW**,

In your Nov. 26, 1997 issue I read the review of the Electronic Media Expo '97, during which the Washington State Association of Broadcasters also met. Writer Bob Rusk reviewed a session headed by an industry consultant, in which several ways for radio stations to save on their license fees were mentioned.

I am concerned about the criticism that ASCAP, BMI and SESAC are "out of touch" with the needs of radio stations. ASCAP is not out of touch. The savings stations can make on their license fees to ASCAP, that were only partially explained at the session, are a direct result of the new ASCAP blanket and per-program license agreements negotiated with the Radio Music License Committee. Under the new blanket and per-program licenses, there are many different ways for stations to save money. ASCAP agreed to these changes even though they resulted in reducing the fees paid to our writer/publisher members, because we listened to the needs of the radio industry as expressed by the RMLC.

ASCAP

In 1996, we conducted a survey of the radio industry in which, remarkably, nearly 40 percent of all stations responded. Based on that survey, we have developed features at our website (*www.ascap.com*) to be more interactive for all our licensees. From the site, stations can download license agreements and report forms, and even use our site to calculate their annual reports and submit them electronically. We have also developed free software (called PARIS) to assist per-program stations with their monthly reports.

ASCAP is also a major sponsor at *all* of the state broadcast associations, including the Washington State Association of Broadcasters, and at all national conventions. ASCAP was the sole sponsor of the Marconi Awards at the recent NAB, of which WFBQ(FM) was a recipient as noted in your Nov. 26, 1997, issue. Most importantly, ASCAP's radio staff is dedicated not only to serving ASCAP writer members but our customers.

Can we do better? Of course we can, and if a radio station has questions or wants to save money on fees, the best way to find out how is to call (800) 99-ASCAP.

David Bander
Director Radio Licensing
ASCAP
New York

In another light

Dear **RW**,

I have read numerous articles regarding trends in unlicensed radio broadcasting in this country. Most coverage represents these operators in a negative light, characterizing them as troublemakers intent on breaking laws. The term "pirate" is unfairly used to conjure up a negative image, similar to an ethnic slur. There are numerous, often questionable claims made that low-power operators cause interference with licensed stations and compromise other forms of communications, such as that used for aircraft. The themes of these allegations often become the rallying cries to report and squelch unlicensed operators.

As a licensed ham, an accredited Volunteer Exam Coordinator and electronic engineer, I am often approached by people interested in starting low-power community FM stations. My curiosity has led me to look at the low-power issue from a different perspective. I have found individuals and groups developing alternate radio broadcast services on a community level. Why are they being locked out? The government directives to serve the public interest are no longer basic to broadcasting. A few corporations monopolize most of the airwaves, and even public radio has most conspicuously become a corporate misnomer. Regulated community broadcasting could serve the public interest mandate, offering polyphonous voices of the local communities served, rather than the homogenous filler between sponsorship announcements and commercials.

With the Communications Act of 1934, Congress ordered the FCC to "explore" and "exploit" all forms of radio communications. This would lead one to believe that the FCC should be required to offer a suitable (and affordable) licensing mechanism for this form of broadcasting, if the public interest is to be truly served.

Rick Perrotta
Los Angeles

Lots of Talk, But Few Comments

When the EAS National Advisory Committee meets next week, its members can look back on a remarkable year. Radio and TV stations in the United States have adopted the new Emergency Alert System with surprisingly few major problems.

Yes, we've had bumps in the road; every radio station has its share of stories to tell about the horrors of implementing EAS, and many broadcasters are learning more than they cared to know about how the National Weather Service works.

But in truth, radio has put EAS into place without too much trouble. It just goes to show that no problem is too big, when the radio engineering community puts its mind to it.

But where stations *have* experienced problems, passions about EAS run high. That's why we find it surprising that the industry has not responded more vocally to the list of proposed changes to EAS, submitted by the Society of Broadcast Engineers to the Federal Communications Commission.

As we report in this issue, only three organizations submitted comments about the proposals contained in the SBE proposals to fine-tune EAS; one came from the NAB, one from an equipment maker and one from the SBE. None were from individual broadcasters.

True, we may hear more from stations and ownership groups, once the FCC gets around to proposing actual changes in the rules. But the response to date is underwhelming, from an industry that has generated plenty of heated words about EAS over the past two years — many of those words right here on this page.

The SBE has disseminated information about the proposed changes to its members. **RW** has reported on them. The information is available readily by calling the SBE or visiting Web site *www.sbe.org/eas_pet.html*

Do you know what the SBE has proposed, to make EAS better? Do you have your own opinions about how the system should be changed? The comment window has passed, but when and if the FCC formalizes these proposals, radio managers should be prepared to make their opinions about EAS clear.

— **RW**

Special delivery

Dear **RW**,

I was indeed pleased to see your section on audio delivery in your Dec. 10, 1997 issue. It is clear that radio delivery is changing on almost a daily basis. As the technology changes, it is essential to stress the importance of stations following the installation instructions of any network. Experience with one type of system does not necessarily transfer to another.

In "Dishes and the Band War," Bob Donnelly said "good smooth parabolic reflectors" are desirable. All satellite antennas are not created equal. Money saved by installation of a poor TVRO-grade antenna for home use is a poor investment if the station must endure audio anomalies.

I must also point out that "Music of Your Life" is distributed by Jones Radio Network on Satcom C5, using Wegener digital technology, rather than the Vertex Communications Corp. receivers as stated in "The Upgrade: All in the Details."

Eric M. Wiler
Director of Engineering
Jones Radio Network

Correction

An error occurred which erased the names of individual satellites in the Dec. 10, 1997, *Buyer's Guide* article "Hitch a Ride on a New Satellite." We have reprinted that article on page 57 and apologize for any inconvenience.

Write to Us

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READERS FORUM
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Next Issue of Radio World
February 4, 1998

World Radio History

EAS Changes in the Slow Lane

by Leslie Stimson

WASHINGTON The comment period has long gone for the Society of Broadcast Engineer petition to change Part 11 of the FCC Emergency Alert System rules. The question is, what will the FCC do about the requested changes.

Only three comments were filed on RM-9156: by the SBE, NAB and Multi-Technical Services, an EAS manufacturer of decoder-encoders. Such a limited response is not entirely unusual, said the SBE, as the proposals are not yet at the rule-making stage.

Insiders at the FCC agree EAS fine-tuning is not exactly on a fast-track, because new commissioners are getting up to speed on broadcast issues and have begun the process of reviewing regulations that have come out of the Telecommunications Act, as well as focusing on deregulating the long-distance and local telephone industries.

Those filing comments looked at 11 proposed changes to fine-tune the EAS rules (RW, Oct. 1, 1997). One of the most important changes the SBE proposed was an extension of the test relay window from the current 15 minutes to 60 minutes. SBE contended, and NAB agreed, the change would give broadcasters more flexibility to participate in local EAS programs.

"NAB members have expressed their view that it is nearly impossible for state and local EAS committees to find time slots every month that will enable a monthly alert to be retransmitted within 15 minutes by all stations in the area without disrupting at least one or several stations' programming," stated NAB. "The odds are very high that at least one station in the area will be in the middle of a sporting event, a music sweep, live coverage of a news event or some other form of programming that will be greatly disrupted by the monthly test."

MTS said the relay window change should be implemented "only when EAS is completely operational."

The SBE response was that the weekly tests, those that actually verify the equipment ability to encode or decode an alert, would remain unchanged. Only tests that have mandated relay time frames are proposed for change to give stations more flexibility.

Further, the SBE stated with 1997 ended, the shakedown year for EAS, monthly testing could give way to quarterly testing, at the discretion of the State Emergency Communication Committee.

MTS supported the SBE proposal to cut the required modulation level of the EAS tones from 80 percent to 50 percent, and make the two-tone attention signal optional, instead of mandatory. NAB did not address these changes.

NAB and MTS agreed that additional events should be added to the EAS system to serve as cancellation codes.

"When EAS warnings need to be canceled before they expire, they cannot be canceled because the individual events have no cancellation codes," said NAB. "Where a warning code is reissued to cancel the event, the automated EAS reissues the warning itself, not the cancellation."

SBE proposed enforcement of EAN location code verification to reduce the chances of accidental activation. MTS and SBE differed over this. SBE said location code verification is needed to allow for specific area EAN alerting from a national control point. MTS suggested the creation of one or more new event codes, subject to location validation, to solve the problem.

Both NAB and MTS opposed asking broadcasters to document local EAS transmissions on their applications for license renewal, stating that the FCC can get the information it needs from station logs.

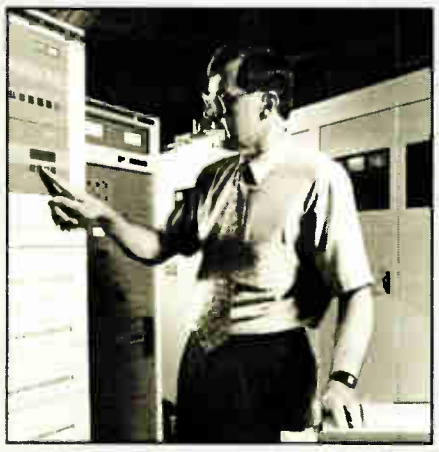
When asked specifically about the status of the petition, FCC officials didn't return phone calls by press time. However, the petition was due to be discussed as part of a meeting on several EAS issues by the EAS National Advisory Committee on Jan. 27.

Both NAB and MTS opposed asking broadcasters to document local EAS transmissions on their applications for license renewal.

Harris Corp. Balances Radio and Digital TV

by Lynn Meadows and Paul J. McLane

CINCINNATI Digital television is big news at Harris Corp. these days. The corporation expects to complete its "Digital Television Center of Excellence," just north of Cincinnati in Deerfield Township, before the end of 1998. The new facility also will serve as the headquarters for Harris Broadcast Division, although many of the Broadcast Division general administrative functions and radio product management will remain in Quincy, Ill. The manufacturing facility for television and radio transmission equipment also will remain in Quincy.



Vice President of Engineering, Geoff Mendenhall, With Harris Digital Radio Products

What do these developments mean for the radio side of Harris? Due to the very scope of its DTV project, radio executives at this closely watched manufacturer and dealer have felt it necessary to reaffirm their commitment to radio.

The problem is a case study for other manufacturers and suppliers that traditionally serve the radio industry but also recognize the vast opportunities offered by the pending nationwide conversion to DTV.

Still proud

Harris spokeswoman Martha Rapp said, "I am concerned that there have been some perceptions that we're not interested in radio. That's totally false. ... We're in radio. We're proud to be in radio."

The attention to television certainly has been felt at Harris, as the company devotes engineering talent and resources to the medium. At last year's spring NAB convention, Harris, which in the past had a strong booth presence among radio exhibitors, concentrated its efforts in a large booth in the main hall, designed to serve both radio and TV. Some radio-only competitors saw that as an opening, but Harris said its commitment to radio remains strong. Indeed, numerous companies with business in radio have faced the question of booth location, and chose to exhibit in the main convention hall.

In an interview published in December in RW, Jim Woods, Harris vice president of radio and studio lines, took pains to reaffirm the company's position. He called DTV "probably the largest opportunity for equipment and service providers in the history of our industry." Nevertheless, he said, none of that focus had diluted the company's commitment to radio.

About 50,000 square feet of the new 130,000-square-foot building in Ohio will house the systems integration part of the Harris Broadcast operation, currently located in Florence, Ky. Rapp said 250 people ultimately will work in the Ohio facility, including 200 new employees. Harris expects about 100 employees will work there by the end of 1998.

In addition to the employees from Florence, Rapp said a "very small number of employees" would transfer from Quincy. Most of the people scheduled to transfer were involved in the television side of Harris, she said, but the details of who would move were not revealed.

Rapp said Harris would be doing a "huge amount of digital engineering" at the Ohio facility, with efforts focusing on digital television products.

"It's projected that by the end of 1999, more than 50 percent of all United States households will have access to at least three digital television channels," Rapp said. "Harris intends to be a key player in providing both equipment and integrated systems for digital television in the U.S. and worldwide."

Harris is investing about $10 million in the new facility.

Rapp, like Woods, said the investment in digital television did not lessen the importance of radio to Harris. They cited the new Z line of FM transmitters, the introduction of the CD Link, the acquisition of Northeast Broadcast Labs and other developments as evidence of that commitment.

"Actually, what we're really doing with all of this is basically further developing our ability to deliver the digital technology that the broadcast market is rapidly transitioning to," Rapp said. "We're making a considerable investment in this."

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World Radio History

DAB Data Dispute Is Settled

▶ DISPUTE, continued from page 1

future-proofing. Carousel-type systems send sequential data in a similar way to conventional TV teletext.

For some months the technical arguments between the two teams took place in private at Eureka-147 and WorldDAB meetings, but, when the BBC felt its view was not getting across, the British broadcaster nearly went public in early summer with its complaints.

However, the official launch of DAB on Sept. 1 was looming, and BBC executives felt a public split among Eureka members might cast an unnecessary gloom over the event.

Those who attended the Internationale Funkausstellung in Berlin, where the launch look place, were relieved that the dispute remained private, as it would have added to disappointment in some quarters that DAB receivers were not as prominent at the event as had been hoped.

Truce broken

But just days later, at the IBC convention in Amsterdam, Glyn Jones, project director and managing editor for DAB at the BBC, broke the voluntary truce. In a keynote address to the convention, Jones spoke of the BBC concerns about the MOT system.

Engineers working on DAB have stressed ... trying to reduce the number ... of receivers consumers will need to have.

Once the issue became public knowledge, matters developed quickly as the participants rallied to find a solution. Within a relatively short time, a proposal was drawn up to allow for a two-stage standardization of MOT. MOT Part 1 includes the original Bosch specification and will be adopted shortly by the European Telecommunications Standards Institute (ETSI) for ratification.

But a MOT Part 2 will be developed, too. MOT Part 2 will be backwards compatible with Part 1, but will add functions that BBC engineers deemed necessary for DAB data channels to cope with future demands.

MOT Part 2 will employ the Carousel principle and will allow for data streams designed for digital video multiplexes to be carried via DAB, too.

In keeping with BBC policy, statements from engineers working on DAB have stressed the importance of trying to reduce the number of different types of receivers consumers will need to have in their homes.

Great relief

Sources at WorldDAB expressed great relief at the ending of the spat, saying that it allowed both sets of engineers to claim victory and that no one lost face.

The solution also satisfied developers of DAB data applications, who have suffered from a lack of standardization and who felt great frustration at different implementations by different manufacturers in encoders and receivers.

Mark Woodhouse, chief engineer of the British station Classic FM, has worked on a number of DAB-related data projects using both independent data channels and program-associated data.

Woodhouse said that, as a supporter of DAB, he found it extremely frustrating not to be able to demonstrate the technology to its full potential because of a lack of clear standards for data transmission and the failure to secure interoperability among the various receiver and encoder manufacturers.

After successfully demonstrating some 10 innovative data services at the U.K. Radio Academy Festival, Woodhouse obtained several new radio sets to demonstrate DAB to the Classic FM board at its annual meeting.

"For program associated data (the receivers) are all supposed to be adhering to the MOT protocol," he said, "but, due to variations in interpretation of the standard, we cannot send out signals that all receivers correctly display."

Multimedia has taken on increasing importance among proponents of DAB here, and it is now viewed as a major factor in driving consumer acceptance of the technology.

WorldDAB has organized a series of workshops on DAB in London, focusing on how DAB fits into the pattern of converging media and showing what progress has been made in some specific areas, such as the challenge of presenting information to drivers in automobiles.

■■■

Jeff Cohen, director of development for World Radio Network (WRN), reports on the industry for RW from London.

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World Radio History

Shively Shared-Use Antenna

by W.C. Alexander

DALLAS Using the same FM antenna as both a directional and omni-directional radiator, although technically possible, has not been permitted by the FCC in the past. That has changed, thanks to the efforts of consulting engineer Jim Sorensen and antenna manufacturer Shively Labs.

The radiation pattern of a typical "omni-directional" FM antenna is anything but omni-directional. Even if such an antenna is mounted in the clear on a pole, with no guy wires or structural members to distort the pattern, there is still some irregularity to the horizontal and vertical plane patterns.

"Directional" FM antennas, utilized by some stations to protect the contours of other stations, usually are nothing more than omni-directional antennas to which parasitic elements have been added to distort the pattern further into the desired shape. Modeling is done on an antenna range utilizing one bay of the antenna, and parasitic elements are added and moved around until the desired pattern shape is obtained.

There would seem to be little difference, on the surface, between a directional and omni-directional FM antenna — and that is true. The difference mostly comes in what the FCC defines as employing "techniques or means" to obtain a directional pattern. If a particular omni-directional antenna has an inherent radiation pattern shape, it is assumed to be an omni-directional antenna as long as no "techniques or means" have been employed to deliberately make the radiation pattern have a particular shape. Add a parasitic element or two, and the same antenna becomes directional.

What changed the long-standing FCC policy against directional and omni-directional use of the same antenna (as stated in policy statement 84-435) was a case in which two North Carolina FM stations had the need to share the same antenna. WKML(FM), licensed to Lumberton, N.C., needed a directional antenna for contour protection while WFLB(FM), licensed to Laurinburg, N.C., did not. The stations were spaced 800 kHz apart in frequency, making shared use of a common, "off-the-shelf" antenna possible.

Engineering a solution

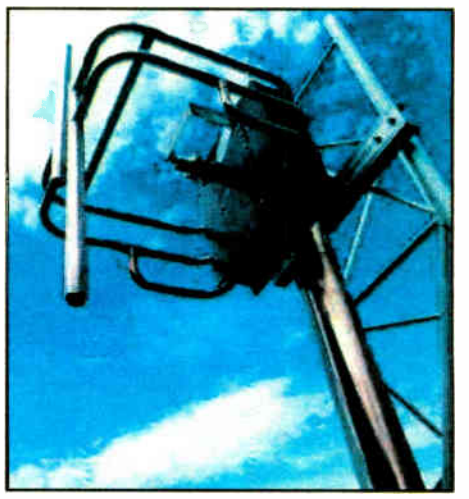
Consulting Engineer Jim Sorensen of Cottrill & Holland Inc. was retained to find a solution. Sorensen teamed up with Bob Surette of Shively Labs to create an antenna that would meet both definitions in the same package.

"Looking at the directional requirement, we only had to push the horizontal component 2 dB, so the stock 6810 was well-suited to the application," said Surette, referring to WKML.

Thus, very little in the way of shaping with parasitic elements was required to achieve the desired WKML pattern. Only one horizontal parasitic element was needed to create the desired horizontal plane pattern.

To meet FCC requirements vis-à-vis the vertical plane pattern, it was necessary to reduce the RMS in the vertical plane so that the radiation in the vertical plane would not exceed the radiation in the horizontal plane on any azimuth. This was achieved by changing the ratio of the size of the horizontal box to the length of the vertical arm in each bay. The resulting radiation pattern thus exhibited elliptical polarization.

In order to meet the requirements for omni-directional operation of the antenna for WFLB, the single parasitic element was constructed to be frequency-selective. In that way, it was effective on the WKML frequency but invisible on that of WFLB.



Shively 6810 Antenna

Setting a precedent

Sorensen then made a technical showing and presented it to the FCC. He demonstrated that the measured pattern of the antenna on the WKML frequency met the FCC requirements for WKML's specific contour protection and for directional antennas in general. He also demonstrated that there was absolutely no difference between the pattern of a "stock" Shively 6810 and this particular antenna operating on WFLB's frequency. After careful analysis and considerable debate, the FCC approved the antenna for this specific use. In doing so, it set a precedent that opens the door for other stations to combine shared directional and omni-directional use of antennas.

"We successfully made a case for using these frequency-selective parasitics," said Sorensen.

Such shared use of a directional/omni-directional antenna is not possible in every case, however, because of technical considerations. The frequency separation between stations must not be too small or too great, and the desired directional pattern must be such that it can be achieved on the "stock" antenna without a great number of parasitic radiators. Stations contemplating such shared antenna use should employ a consulting engineer to determine if this is possible.

Even though sharing the same antenna for directional and omni-directional applications is not for everyone, the door on M Street has opened a crack. If the situation presents itself in other cases, the answer will not automatically be "no."

■■■

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas.

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NEWSWATCH

SFX Picks Up the PACE

NEW YORK SFX Broadcasting is expanding its new entertainment unit. SFX has agreed to buy PACE Entertainment Corp. for about $130 million. PACE controls an extensive distribution network for theatrical, music and motor sports events. As part of the acquisition, SFX would also purchase 11 amphitheaters owned by Pavilion Partners. Pavilion is jointly owned by PACE, Blockbuster Entertainment and Sony Music Entertainment. PACE also manages and owns interests in two additional theaters, which SFX would acquire. PACE President and CEO Brian Becker would continue to manage PACE for SFX.

Rush to Enter NAB Hall of Fame

WASHINGTON Rush Limbaugh is this year's radio inductee into the NAB's Broadcasting Hall of Fame. Limbaugh will be honored at the radio luncheon in Las Vegas on Tuesday, April 7 at NAB '98. Recognized twice as Syndicated Radio Personality of the Year with the NAB Marconi Award, Limbaugh has hosted his national talk show since 1988.

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World Radio History

Gentner Founder Steps Aside

by Sharon Rae

SALT LAKE CITY After 17 years at the helm, Russell Gentner is stepping down as president and CEO of Gentner Communications Corp. Frances M. Flood has been named president.

Gentner, who founded the company in his basement in 1981, spoke to **RW** after the announcement. He pointed with pride to the growth of the company from its early days.

"Today we're a company with $16 million in annual revenue, traded on NASDAQ," Gentner said. "The company has never done as well as it's doing now."

Gentner said the company has grown into four areas of business: broadcast, focused on telephone interface and remote control products; assistive listening; high-end teleconferencing products; and a conference-calling service.

Flood, who steps into her new position after joining the company in 1996 as vice president of sales and marketing, said the future of the company is both in technology and in its fast-growing teleconferencing segment, called 1-800-LETSMEET.

"We see that growing by leaps and bounds," she said. "We are looking at both leveraging the technology that we have and continuing to develop new technology. ... We have a large pool of talented engineers."

Gentner sounded regretful about stepping down as president of the company that bears his name, but spoke of his successors in supportive terms.

"I'm an entrepreneur," he said. "That's what I do: I'm a builder of businesses. That's not what Gentner needs anymore. They need people to *run* the business. I turned the company over to a management team that is doing a phenomenal job."

"Russ is a true inventor," said Flood. "That's his first love. The company is moving up to the next level and is becoming more of a corporate culture."

Gentner did not offer details about the reasons for the change, or who brought it about. He said the decision to leave was a difficult one, but, he said, "This is the very best thing for Russ Gentner and for the company."

Russ Gentner

According to Flood, Gentner had been planning his departure for at least a year.

"I think he had started to plant the seeds for succession planning and was recruiting in the back of his mind," she said. "He was looking to get into new products and entrepreneurial plans."

Gentner said he was proud of the company's successes to date.

"It just goes to show what you can do if you focus," he said. "Listen to what customers want and stay absolutely focused on it."

Both Gentner and Flood said the company would remain dedicated to its niche in the broadcast market.

What next?

Gentner, who will remain as chairman of the board of directors, said he is not sure what he will do for his next full-time endeavor. The Gentner board meets at least quarterly, and he retains about 10 percent of the company stock, which he said makes him its largest shareholder. He said he will continue to give the management team input.

Gentner

Headquarters: Salt Lake City

Business: Development and manufacture of audio solutions for the broadcast, teleconferencing and assistive listening markets

Sales: Closed 1997 at $13.5 million, projected fiscal 1998 $15.4 million

NASDAQ Symbol: GTNR

Stock: $0.59 to $1.62 per share (52-week range)

"I will do everything in my power" to help the company, he said. "But I'm proud that it doesn't really need me."

Flood said she expects her biggest challenge to be keeping up the bottom line.

"We need to keep growth going and ... consistent earnings quarter over quarter," she said. "We are very much committed to that. Gentner is a company to watch."

The company maintains the right of first refusal on any new Russ Gentner technology.

■■■

RW Editor Paul J. McLane contributed to this story.

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World Radio History

Robert Surette a Radio Professional

Surette, 51, has been involved with the design and development of broadcast antennas, filter systems and RF transmission components at Shively since 1974. He left the company briefly, when he worked for Dielectric Communications in 1979 and 1980.

Surette became interested in radio as a child, when he dabbled in ham radio. After high school, he served in the U.S. Navy. Surette graduated from Lowell Technological Institute in 1973, with a Bachelor of Science Degree in Electrical Engineering.

He is an associate member of the Association of Federal Communications Consulting Engineers and a member of the Institute of Electrical and Electronics Engineers. He has been a lecturer at National Public Radio seminars and has presented papers at NAB national conventions. He has authored a chapter on filters and combining systems for the latest edition of the CRC Electronics Handbook and for the Ninth Edition of the NAB Handbook, to be published in the spring.

Shively Labs was founded by Ed Shively in 1964. The firm serves two broadcast antenna markets: FM, in both sidemount and panel designs, and UHF. Shively also makes FM and UHF translators.

— Bob Rusk

▶ BUSY, continued from page 1

in the United States. The first is consolidation and the second is preparation for DTV.

Consolidation affects everything about the business, from staffing and budgeting to purchasing and equipment selection. On top of this, as ownership changes, jobs are constantly being realigned and, in some cases, consolidated. This constant uncertainty is preoccupying people at a time when there are a lot of important decisions being made and a lot of new technology to deal with.

In the past, it wasn't uncommon for major projects to take years to plan and execute. Now, if the project isn't planned for the immediate future, say the next 90 days, the chances are that it will change substantially before it ever gets built.

The second major change, DTV, has had the effect of dramatically increasing everyone's workload. Not only is there a whole new technology to learn about, but the crunch in tower space has everyone considering ever more complex broadcast sites. At a time when experience is more important than ever, we have found that several of the most experienced corporate engineers have been taken off day-to-day projects, and derailed into evaluating potential acquisition.

All of these forces have converged to make radio engineers very busy. A lot of engineers are working in areas that are new to them and they don't have a lot of time to get their bearings. More than ever, it is important to seek out reliable equipment vendors ... Over the last year, our sales, engineering and technical service staffs have doubled in size to address what we see as an increasing need in the business for "more information, faster."

RW: What trends will we see in antenna design in the next five years?

Surette: In the United States, we see an increasing demand for both directional and combined systems, even at the lower power levels where they used to be cost-prohibitive. Every day we see an increase in use of "less desirable" sites by broadcasters at a time when small improvements in signal contours can translate into large differences in station valuation.

This all means that good pattern work will no longer be a luxury, but rather the most important element of an antenna design. We also see a trend toward more complex antenna sites like "farms" and candelabras, and these will require that pattern work not only include a study of the station's own mounting structure, but also the structures in the near field that will affect the signal.

Scale modeling is still the only cost-effective way to detail these complex sites with the accuracy that is required for an effective study. We have recognized this for years and continue to pioneer new modeling techniques.

DTV and buying patterns

RW: We may see 2,000-foot digital TV towers going up. What will this mean for the radio broadcasters whose contour would be affected by such a structure?

Surette: It's all about contours, of course, and 2,000-foot TV towers will be both a boon and a curse to FM broadcasters. As more vertical real estate becomes available, there will obviously be more site options. However, 2,000-foot TV towers are generally very broad structures, and anyone who has ever mounted an FM on the side of a 10-foot tower knows just how bad it can get. It will become increasingly more important to select antennas that react to towers predictably, and pattern work will be mandatory.

RW: Are station equipment buyers today qualified to buy sophisticated antenna systems?

Surette: Yes and no. There are a host of very competent engineers who have the experience and understand what is involved with designing sophisticated antenna systems. Unfortunately, many of the most senior and experienced engineers are being utilized to evaluate acquisitions or manage engineering staffs scattered across the country. ...

RW: How are these equipment buying decisions being made — i.e., by engineers or non-technical managers at the local or group level?

Surette: Decision-making rests in different places in each organization. There appears to be no single accepted "model" for how decisions get made. One trend that we have recognized, however, is that with the increase in multiuser sites has come an increase in the involvement of third parties such as site management companies.

DAB and submarines

RW: What is your prediction for an IBOC/DAB timetable in the U.S.?

Surette: We have been part of the IBOC and IBAC tests from the beginning. Shively antennas have been ready from day one for in-band digital, so we have concentrated our efforts elsewhere. The truth is that we haven't been involved enough with the politics to guess at the timetable.

RW: What is Shively's business mission? Describe the company and its number of employees.

Surette: Shively Labs is a division of Howell Laboratories Inc. Howell Laboratories has approximately 60 employees, who in 1995 bought the company from the previous owners and formed an ESOP (Employee Stock Ownership Plan). This gives us a unique position in the industry in that our customers can be assured that the antenna they buy from us today will be serviced by Shively Labs tomorrow, not some company whose new focus is on the latest "hot" industry.

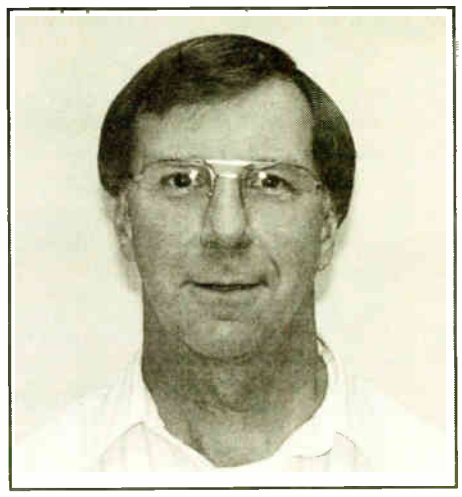
RW: Is Howell Labs in the submarine business? If so, is there an engineering cross-over?

Surette: Howell Laboratories is the leading supplier of shipboard air dehydration and distribution (equipment) to the U.S. Navy, including a number of products used aboard submarines. With the exception of our sales staff, electrical engineers and RF technicians, virtually every employee works for both divisions.

Our entire facility, including the Shively Labs production facility, conforms to (military specifications) MIL-Q-9858, MIL-I-45208 and SUB-Safe Level I. We haven't gone ISO 9000 because we are already operating at a more stringent level.

This may not seem important to Shively customers, but it is, in fact, one of the primary cornerstones of our corporate philosophy on quality. There is something very sobering about seeing a 700-pound piece of equipment designed to handle 3,500 psi put on a shock table and struck in three axes at 100 g's, then shaken at 50 Hz. To do this, you have to have a passion about quality and design that serve us very well when we design an antenna to withstand 200-plus mph winds and five feet of radial ice.

RW: Would you recommend that young people who are interested in engineering as a career take the same path that you have taken?



Robert Surette

Surette: Part of my education was done in the U.S. Navy. I made this recommendation to my son and he's following in his father's footsteps, although he wants to be a lawyer. You can't have too much education, but experience is still as important today as it was when I was just out of college.

I had the good fortune to work as a principal assistant to (company founder) Ed Shively, one of the true pioneers in the field, and he taught me a great deal about the subtleties of RF that were never covered in any of the textbooks.

RW: What is the main purpose of your technical sessions, such as the ones at the recent SBE convention in Seattle?

Surette: In my sessions, I try to present very technical issues in a form that will be understood by an audience with a radio background, but not necessarily a technical background. I feel it is very important that the non-engineers involved in station management have a minimum level of understanding about ... their antenna system. No manufacturing talk, no sales talk, just basic antenna engineering principles. My format seems to work because I keep getting asked back!

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World Radio History

NEWS ANALYSIS

Be Careful of What You Use on Line

by Peter M. Zollman

ALTAMONTE SPRINGS, Fla. Quick: What part of your broadcast can you also Webcast? Don't know?

Quick: Do you want free content from the Internet for broadcast? There's plenty available for you to use.

Knowing the difference between these two answers could keep you out of court, or, at the very least, out of trouble.

Say you carry your radio station signal on the Internet 24 hours a day. Which of the following can you safely Webcast?

- Local talk shows
- National talk shows
- That hot new song by the Spice Girls
- Local commercials
- National commercials
- News from the Associated Press
- Charles Osgood and his CBS Radio commentaries
- Your Miami Dolphins coverage

The answer to the first four is "it depends" in a sense, on the answer to the question of rights to Webcast anything you carry on-air. Just like music licenses, Webcasting licenses or rights are a major challenge to consider before you put your signal on the Internet. Most stations probably deal with the issue now by ignoring it. For now they probably get away with it. But be careful: One day, it could come back to haunt you.

Easy does it

Let's get to the easy ones first:

Can you Webcast your Miami Dolphins games?

Absolutely not. Professional sports leagues only grant broadcasters the rights to over-the-air use of their games and almost certainly do not expressly grant you the rights to use the broadcast on the Internet.

Can you use your AP news material on the Internet?

Yes, and for free, at least for now. The Associated Press licenses anything your radio station buys for use on the Internet at no charge, as long as you fill out some paperwork.

Can you use Charles Osgood on the Internet?

No. Westwood One, the syndicator of CBS Radio programming, says it is not aggressively policing Internet rights, although if it hears about a station Webcasting something that isn't permitted, the station will get a call or a letter suggesting they stop.

It depends

Now let's get to the "it depends" answers about rights, which covers most of them.

Have you ever stopped to think that you might get sued by a "voice" from a national commercial because you were Webcasting his commercials? It could happen. Voice talent is signed for certain parameters and that's how the talent is paid. The rights typically include only over-the-air broadcast. If you use a national spot on your Webcast, you could wind up in court. It's unlikely, but it could happen.

Local talent? That question is somewhat easier, if the talent works for you directly. Check your contracts. If they work for your station and you haven't included rights to use their voices or programs or whatever on your Webcast, you're probably not allowed. Again, you're not likely to get sued, at least while they continue to work for you. But once they leave the station, look out!

Internet rights

What do the radio networks say about all of this?

"Many of the things we provide to affiliates in terms of programming may or may not come along with Internet rights," said Nick Kiernan, senior vice president of affiliate relations for Westwood One.

"In some cases, stations are streaming their audio onto their Web sites, and that includes some of our content. We have to be sure that neither they nor we include programming for which neither they nor we have the right to Webcast."

What, specifically, can stations use from Westwood One programming? And will those rights change in the future?

"You're asking for definitive answers on a medium that's growing and changing," said Kiernan. "These are kind of policy questions on an industry that's too immature to have policies yet."

Despite the policy against Webcasting announced by CBS Radio Network, which is syndicated by Westwood One, Kiernan said, "We have not stopped stations from using it." He said Westwood "has sent some letters, (but) I don't want it to sound like a confrontational thing."

One organization with an easy Web-use policy is The Associated Press. Anything you buy from the AP for use on-air is fair game for the Internet at no charge for the next year, said Christine Gabor, AP Broadcast Services marketing director.

For record-keeping and to make it legal, stations have to apply to AP for Webcasting licensing paperwork. Gabor said few radio stations had done so, although the number of radio inquiries is picking up. She also said AP radio station subscribers can buy rights to The Wire, the AP multimedia Web news site that is regularly updated with audio, video, graphics, photos and text news. She said at least one AP radio station has signed to use The Wire.

New year, new fees?

What happens after 1998 with AP content on the Web? Should stations be worried about getting socked with big fees?

"We're looking at all the different options," Gabor said. "The thing to remember is, it's free for now, so take advantage of it."

For music stations, the question of music licensing is easy. ASCAP and BMI both require a separate Webcast license.

So while some Webcasting content is free, some absolutely is forbidden and a lot of it falls into the wide range of "maybe." Should your station follow the "Don't ask, don't tell" policy? Only if you don't mind being sued. Otherwise, follow this advice from Westwood One's Nick Kiernan, regardless of who your syndicator or network or talent is: "We ask the stations, when they are in doubt, to call us." And call your lawyer, too, while you're at it.

■■■

Peter M. Zollman is a consultant in interactive services based in Altamonte Springs, Fla. He is author of "Interactive News: State of the Art," published by the Radio and Television News Directors Foundation. Reach him via e-mail at pzollman@aol.com

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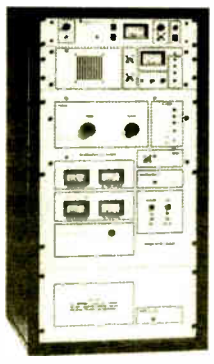

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Benjamin Wolfe Remembered

by S.D. Yana Davis

BALTIMORE Benjamin Wolfe began his broadcasting career in the days when radio receivers were crystal sets and transmitters were amalgams of huge vacuum tubes and transmitting arcs. During the course of a 60-year career, he saw the industry grow from infancy to full adulthood, and he played a key role in advancing the technology of broadcasting.

Benjamin Wolfe, who died Sept. 17, 1997, left an impressive legacy of professional and personal accomplishments rarely achieved in any industry.

Benjamin Wolfe

"He was a great, great friend of mine," said Morris Blum, until recently the owner and chief executive officer of WANN(AM), Annapolis, Md. Wolfe and Blum, friends from boyhood whose careers also took parallel paths in broadcasting, put the station on the air in 1947, after which Wolfe served briefly as its chief engineer.

"We grew up together in Baltimore," Blum said, "and neither of us were born with silver spoons in our mouths. Like me, Ben studied and worked and made his way in the world."

Wolfe got his first radio license at age 14, a combination amateur-commercial license from the U.S. Department of Commerce. From there, he launched a career as a Maritime radio operator.

"Ben and I were pioneers," Blum said. "We went to sea in the 1930s when the war clouds were gathering. We ran those old arc and spark transmitters aboard merchant ships."

Wolfe also took time in the 1930s to study engineering mathematics at The College of William & Mary in Williamsburg, Va., and to work as a technician at WCBM(AM), Baltimore. He met and married his lifelong partner, Phyllis Jaffe Wolfe, in 1936.

The war effort

When America entered World War II, Wolfe and other radio engineers and technicians were taken virtually wholesale into the military to help the war effort. Blum said that he and Wolfe were among a handful of

See WOLFE, page 13 ▶

World Radio History

▶ WOLFE, continued from page 12

broadcast engineers who trained virtually all wartime radio operators for the U.S. Navy. During the latter part of the war, Wolfe joined the FCC as an engineer where he helped develop commission engineering examination standards.

But Wolfe wanted the challenge of building and operating stations, so he left the FCC in 1947. That same year, he designed and helped Blum build WANN. In 1948, Wolfe helped design and build the former WSID(AM) in Baltimore. He moved into television as director of engineering at WJZ(TV) in Baltimore in 1949, a position he held until 1962. From then until 1964, Wolfe was engineering manager at KPIX(TV) San Francisco, Calif. Both were Westinghouse stations. In 1964, he became vice president of engineering for the Westinghouse Broadcasting Co. in New York, responsible for seven AM radio stations and five television stations, a large broadcast group at the time.

Wolfe moved to Post Newsweek Stations, Capitol Area. Inc., as vice president of engineering in 1969, which included radio and television stations in Washington, D.C., and television stations in Miami, Jacksonville, Fla., and Hartford, Conn. He retired in 1979, remaining as a consultant until 1989.

During his career, Wolfe was an innovator and leader among broadcast engineers.

Raising the bar

"Ben Wolfe was the 'grandfather' of engineering certification. He basically started the plan that became the Society of Broadcast Engineers' certification process," said Jim Wulliman, retired chief engineer with WTMJ, Inc., now the Journal Broadcasting Group. Wulliman worked with Wolfe at the former WTOP-TV, Washington.

"The FCC exam (for engineers) had been watered down so much that Ben, and others, felt there had to be something more."

Wulliman said that Wolfe's participation in development of SBE certification was cut short by a heart attack in 1975, but following his recovery, Wolfe continued as a major influence. "Every year, for many years, he contributed a lot of questions (for the exam)."

"Ben helped start SBE (as we know it)," said Glen Lahman, a retired engineer who worked with Wolfe at WANN and at WJZ. "And he was an excellent teacher," Lahman said, noting that Wolfe mentored other broadcasting engineers.

"Not only with SBE, but with the broadcasting industry as a whole, he was right up there with the major thought leaders," said Richard Rudman, chief engineer at KFWB(AM) in Los Angeles, who worked with Wolfe as a member of several SBE panels. "He developed a number of broadcast engineering innovations."

Audio innovator

Among those innovations was a U.S. patent awarded Wolfe in the late 1950s for an audio system design that permitted live studio broadcasts of dance concerts without microphone feedback on the air. He also developed the first wide-band transistorized video distribution amplifier in 1961, and pioneered the unique engineering of a "candelabra" tower for three separate television transmitters in the Baltimore area in 1959.

RCA credited Wolfe in 1971 with the new conceptual design of a dual, high-power television transmitting system, mostly transistorized, permitting automated switching when one channel failed. The system also included color specifications, which exceeded industry standards of the time.

"Ben was a true innovator," Lahman said. "He didn't take 'no' for an answer. Up until two years ago he was still doing some consulting work, matching miniature transmitters to medical monitors for the health care industry."

Wolfe is survived by his wife, Phyllis Jaffe Wolfe, two daughters, a son, a grandson and granddaughter.

■■■

S. D. Yana Davis is a freelance writer and marketing consultant in Knoxville, Tenn. E-mail him at yanajune@aol.com.

Michigan Broadcasters Converge in Lansing

by Michael A. Couchman

LANSING, Mich. Is your tower ready for the additional loads required when you go digital? Are you ready to go digital? Will you have to build a new tower?

Those are among the topics to be discussed at the 1998 Great Lakes Broadcasting Conference and EXPO coming to Michigan's capital city in late February. Every year, thousands of TV and radio professionals from across the Great Lakes region converge to rub elbows with colleagues, hobnob with lawmakers and CEOs and learn more about the latest developments and trends in the world of broadcasting.

The focus of the conference is "Challenges in the New Millennium." A variety of sessions will be available, from "Ethics and the First Amendment" to "Promotions That Make Everyone Happy." One of the

See MAB, page 17 ▶

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World Radio History

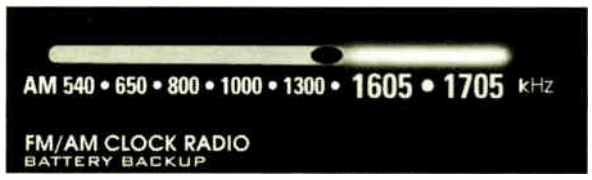
FEED LINE

Build on a Good Ground System

W.C. Alexander

This is the fourth in a series of articles about constructing an expanded-band AM facility. The previous installment appeared in RW Jan. 7.

The ground system is as important to the performance of the station as the tower itself. A lossy ground system will result in low signal and seasonal instability. It is of utmost importance to install the ground system properly and to be sure it is protected from the elements.



A typical ground system for a nondirectional antenna consists of 120 radials, each 90 electrical degrees long, about the base of the tower, buried 6 to 8 inches. In the vicinity of the tower base, additional short radials may be interspersed with the full-length radials. A better choice is a 50-foot square of copper-clad steel mesh laid on top of the ground at the tower base, bonded to the ground ring at the tower base but not to the radials themselves. This mesh or "ground screen" then is covered with a couple of inches of large gravel to protect it from damage. The ground screen provides a low loss return path for the higher amplitude ground currents that occur close-in to the tower base, and because it is on top of the ground, it tends to stabilize the base impedance in all kinds of ground conditions.

The contractor typically will install a ground system by laying a ring of copper tubing or copper strap-covered wood around the tower base on which to anchor all the radials. He then will use a transit and tape measure to position 120 stakes 90 electrical degrees from the tower base at three-degree spacing. With all this done, he will use a tractor to plow in the radials.

The plow usually is a simple affair, with a single tooth behind which the bare copper wire feeds through a pipe stub into the furrow. Each radial is laid by tying the loose end of the wire to the ring or strap, then lowering the plow into the ground and driving out from the tower base to each stake in turn. When the tractor runs over the stake the plow is raised and the wire cut. This is repeated for all 120 radials. In good soil, all 120 radials can be laid in a day or so.

While most contractors are reputable and honest, there have been some cases of cheating on ground system installation. It is easy to run the tractor and plow without actually spooling off any wire. Copper is expensive, no doubt about it. Do yourself a favor and watch to be sure the spool is turning as the tractor plows in each radial. In addition, locate the wire at the end of each furrow as a means of double-checking.

If a ground screen is used, it usually is laid out in 4- or 8-foot strips. The individual strips then are silver-soldered together. It is not necessary to solder every point of the mesh of one strip to every point of the mesh of the adjoining strips, but a joint should be made every 6 to 8 inches. The center of the screen should be silver-soldered to the ring or strap at the tower base at every point of the mesh. Ground currents will be significant at this point, and a low resistance connection is important.

Be sure that the entire ground screen is covered with at least 2 inches of gravel of a size large enough that the individual rocks cannot pass through the holes in the mesh. If the gravel used is too small it will disappear through the mesh into the ground in a few years, leaving the screen unprotected.

Fencing

You will need to fence your tower at the proper radius. Consult the new OET (Office of Engineering and Technology) Bulletin No. 65 for the proper radius based on the height of your tower. For a 90-degree radiator, a fence radius of 2 meters is specified. You have several choices of fence material, and all have advantages and disadvantages. Chain link fence is the most durable, but it has a couple of disadvantages: It must be grounded, and climbing vegetation tends to grow into the fence. A wood- (stockade-) type fence is not as durable, but has the advantage of being less expensive, with no requirement for grounding.

There are a couple of variations on these two basic types of fence, both of which are good compromises. For the chain link fence, a non-conductive plastic fence fabric is available. If you use this, there is no need for grounding. The plastic fence fabric does nothing to prevent climbing vegetation from taking the fence over, but a lot of short-term expense and long-term problems are avoided by not having to ground the fence. A wooden fence with galvanized steel posts is more durable than one with treated wood posts. Also, because the goal is security and not privacy, you can omit every other picket.

If you elect to go with a wooden fence, purchase a supply of replacement pickets and keep them stored inside, away from the elements. The pickets on the fence will deteriorate and break, and with a ready supply on hand, you can quickly replace damaged or broken ones.

Do yourself a favor and watch to be sure the spool is turning as the tractor plows in each radial. In addition, locate the wire at the end of each furrow.

Proper grounding

The last step in AM tower construction is one that is often overlooked: proper grounding. Most people would think that all the screen and radials in the ground system would provide an adequate lightning ground for a tower. This may be true in highly conductive soils, but in most cases, the antenna ground system is woefully inadequate as a lightning ground. A low-resistance ground connection capable of momentarily conducting thousands of amperes is needed.

The best means of achieving an adequate lightning ground is to drive an array of four 8-foot copper-clad steel rods into the ground around the tower base. Each rod is then connected to the bottom spark-gap ball with 1/0 wire or bigger. Cad-welding is the best means of connection, although a clamp will suffice in most circumstances.

Most of us who have pounded in a ground rod or two cringe at the thought of hammering an 8-footer in. Here is an easier way: Use a half-inch chuck hammer drill. Insert the end of the rod into the drill chuck just as if it were a bit. Then, using a ladder to position yourself, "drill" the rod right into the ground! Unless you hit a rock, you can run an 8-foot rod in all the way in just a couple of minutes. Another advantage of this method is that the top of the rod is nice and clean, not smashed to smithereens.

In the next part of this series, we will look at diplexing. For many stations migrating to the expanded band, sharing an existing antenna makes good economic sense. We will take an in-depth look at diplexer design, construction and installation.

■■■

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. Contact him at (972) 445-1713.

1998 Shows & Conventions

JANUARY

National Association of Religious Broadcasters
Annual Convention
Jan. 31-Feb. 3
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Information: (703) 330-7000

FEBRUARY

Radio Advertising Bureau
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Information: (800) 917-4269

National Association of Broadcasters
NAB Radio Group Head Fly-in
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Washington
Information: (202) 775-3527

Broadcast Cable Financial Management Association
Board of Directors Meeting
Feb. 19
Las Vegas
Information: (847) 296-0200

Michigan Association of Broadcasters
Great Lakes Broadcasting Conference & Expo
Feb. 23-25
Lansing, Mich.
Information: (800) 968-7622

Country Radio Broadcasters
CRS 29 (Country Radio Seminar)
Feb. 25-28
Nashville, Tenn.
Information: (615) 327-4487

National Association of Broadcasters
State Leadership Conference
Feb. 28-March 2
Washington
Information: (202) 429-3521

MARCH

National Association of Black Owned Broadcasters
14th Annual Communications Awards Dinner
March 12
Washington
Information: (202) 463-8970

National Federation of Community Broadcasters
Annual Community Radio Conference
March 12-15
Bethesda, Md.
Information: (415) 771-1160

The National Broadcasting Society
NBS Annual Convention
March 18-21
Nashville, Tenn.
Information: (314) 949-4835

APRIL

NAB (National Association of Broadcasters)
Spring Convention
April 4-9
Las Vegas
Information: (202) 429-5350

MAY

National Public Radio
Public Radio Conference
May 29-June 2
San Francisco
Information: (202) 414-3234

SEPTEMBER

American Women in Radio & TV
(AWRT)
Annual Convention
Sept. 10-12
Washington
Information: (703) 506-3290

OCTOBER

NAB
Fall Radio Show
Oct. 14-17
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World Radio History

WIRED FOR SOUND

Who Put the X in the XLR?

Steve Lampen

Originally a connector intended for military applications, the XLR has become a generic term applied to connectors made by dozens of manufacturers. The original was made by Cannon (now ITT Cannon). Its previous connector, in the 1940s, was the "P" series, a huge monster that easily could handle a dozen amps at 110 V. However, if you have ever seen a "P," you can see how it led to the XLR, which also is a 3-pin connector.

The XLR, and most other versions by other manufacturers, are available with more than three pins, but we will concentrate on three pins, which is the standard for microphone wiring. Both the "P" and "XLR" were locking connectors, with excellent reliability. The cast-metal shell made them both very rugged. It was no surprise that, by the end of the 1950s, the Cannon XLR "owned" the microphone connector market.

The one thing I cannot tell you with any certainty is what the initials XLR stand for (if anything!). I have read a dozen interpretations on Internet newsgroups. Perhaps nobody really knows. Do you? Drop me a line!

Set apart

The key advantages to the XLR are a built-in strain relief and floating sockets in the female connector. The strain relief is a neoprene tube, inserted into the body of the connector, and held in place by a metal bar and two small screws. These screws, and the bar, must be removed so that the cable can be inserted into the shell.

To remove the innards, remove the small third screw on the body of the connector. The male or female insert can then be removed. This insert has three "cups" at the back where the wires will be soldered. The male connector insert is a small phenolic tube with three pins on the other side.

The female has three sockets. In the original Cannon version, these were in a Neoprene housing. Since neoprene is a soft "thermoset" rubber-like compound, it allows the female sockets to "float."

Neutrik features the latest in XLR technology with the EaZyCon connectors, originally introduced as the 'Z' series.

When mating male to female, the sockets self-align to the incoming pins. I am unaware of any other connector manufacturer that has made this "floating" arrangement. (If you do know of others, let me know.)

Around the three cups to be soldered is a cardboard tube. When soldering is completed, this slides back up the cable and helps prevent any stray strands from shorting to the shell. This helps to prevent ground loops and other noise from coming in via the shell. Many engineers still believe the XLR to be the best, most reliable 3-pin microphone connector system ever made.

Not perfect

But the XLR has two drawbacks. One is all the small screws, which are easy to lose and cannot be found in your local hardware store. When you are working on an XLR, Rule No. 1 is to keep a cup, tray or other parts holder nearby. In a pinch, just use the lid from a can of spray paint, an old ice-cube tray, or an egg carton. I know of at least one distributor (Pacific Electronics, Hollywood, Calif.) that stocks the replacement screws for Cannon connectors.

The second drawback is availability. I heard a story that, in the mid-1960s, when ITT bought Cannon, they were not enamored of the Cannon distribution scheme. Every mom-and-pop electronics store carried XLRs, so ITT made a change. To carry any of its connectors, a distributor had to stock at least $50,000 worth. This effectively removed Cannon from all but the largest distributors. And those behemoths had never heard of a radio or TV customer. They often required a $250 minimum per order. So, even if you found a distributor, you could not order enough connectors to place an order, much less open an account. In this way, the original XLR, which might still be the best microphone connector around, disappeared overnight from the broadcast market.

Void filled

Waiting in the wings was Switchcraft, with its A3F (female) and A3M (male). The neoprene insert and floating sockets were replaced by hard plastic. The "boot-and-collar" arrangement was replaced by two screws, one on each side at the back, which pushed down on two internal metal slats. These pushed down on a strain relief. While adequate, this offered much less strain relief than the "boot and collar" of the XLR.

On the other hand, the Switchcraft A3 is a sleek and beautiful connector. Its smooth lines were perfect for the look of the 1960s and '70s. By comparison, the XLR looked like a 1940s Packard. Top-of-the-line for its time, but lumpy and old-fashioned.

The real reason the A3 took over was *availability*. Switchcraft was available in every electronics store. The price was reasonable, and the A3 was compatible with all the original XLR connectors still in the field.

The drawbacks of the A3 were the less-than-ideal strain relief and, again, those little screws. Like the XLR, there was a third screw that held the insert with the pins or sockets. And to make matters even more complicated, this screw was reverse threaded: clockwise it comes out, counterclockwise, it goes in. Lose that screw and you might as well toss the connector! Still, Switchcraft sold millions of these connectors. And then came Neutrik.

New from Neutrik

Neutrik is a small Swiss company (actually, it's in Liechtenstein!). Neutrik took a look at the A3F, the A3M and the XLR, and asked a simple question: "Can we build a better connector, without those annoying screws and with a good strain relief?"

The key advantages to the XLR are a built-in strain relief and floating sockets in the female connector.

In the late 1980s, Neutrik came up with a unique design, using no screws. With the NC3, one simply unscrews the back off the connector, which includes the "boot." Out pops a strain relief. The pin/socket insert can then be pushed from the front out the back. The strain relief consists of three grooved feet that hold on to the cable. The tighter you turn the back, the tighter the strain relief will hold.

Neutrik has cleverly put a slot into the strain relief. If you forget to put the strain relief on and have already soldered your wires, you can push the cable through the slot. The great advantage to the NC3 was that you could check a cable in the field for shorts or opens without any tools at all; just unscrew it and take a look.

However, with such a great idea, Neutrik proceeded to have a near-disaster. First, they made the connector to metric equivalents. This meant the dimensions were only *approximately* the same dimensions as the A3 or XLR, so they often did not fit or were intermittent. Luckily, Neutrik realized its problem and fixed it.

Neutrik also started with plastic boots that were easily broken if stepped on. And, without that boot, the whole connector fell apart in your hand. This too has been fixed to a much more rugged plastic. Still, there were a few customers who took quite a while before they were ready to try those European things again! And Neutrik still does not have the floating sockets of the original XLR!

In our next column, we'll finally get to soldering one of these babies.

■ ■ ■

Steve Lampen is a technology development manager for Belden Wire & Cable Co. in Richmond, Ind. His book, "Wire, Cable, and Fiber Optics for Video and Audio Engineers" recently was published by McGraw-Hill. He can be reached at steve.lampen@belden.com

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World Radio History

Lansing Hosts MAB Conference

▶ MAB, continued from page 13

hottest seminars is sure to be "Preparing Your Tower for Additional Loads." Tony Fonseca of Kline Towers is set to be the featured speaker.

In the dark

With the year 2006 as the FCC target for the transition of television to digital rapidly approaching, many broadcasters are in the dark about how to get there.

"It's now wait and see," said Larry Estlack, chairman of the Michigan Association of Broadcasters (MAB) Engineering Committee. "We're talking about this at the conference because the time to decide and plan is now. The sooner you start, the better chance you have of making the 2006 deadline."

Though the tower business is growing fast, nationally, there are still less than 20 tower consultants. As the deadline gets nearer, the demand for help will skyrocket. That is because the majority of towers in the country were built only to suit their current needs without planning for the future. What this means for a radio station that rents space on a TV station tower is expected to be discussed.

On track

Mike Steger, MAB director of communications and education, said other engineering-track items of interest at the conference include sessions on digital audio processing, the latest in hard disk storage, WAN, digital and wireless STLs and power conditioning.

"The buzz words we're hearing are consolidation, emerging technology and the Internet," said Steger. "One session focuses on a radio station Web site. Now that you have a Web site, what is working? What are other stations doing? What do people on the Internet want to see?"

There will be an array of speakers, from the NAB Senior Vice President, TV, Chuck Sherman, to John FX Browne, who will provide a status report on new FCC RF guidelines and other relevant industry developments.

"We're taking a look at radio now and in the years ahead," said Steger. "This is Michigan's premier broadcast conference."

The conference is set for Feb. 24 and 25. For more information call MAB at (800) 968-7622 or visit the Web site *www.michmab.com*

■■■

Mike Couchman is the evening jock at WXIK(FM) in Lansing, Mich. He also works part time in Grand Rapids, Mich. at WBCT(FM).

You Read It Here

One Year Ago

The chairman of the Federal Communications Commission waited until the day after Christmas to give broadcasters a present that they did not want: a threat of government intervention if radio and TV stations refuse to 'Just Say No' to hard liquor advertising.

"FCC May Enter Liquor Battle"
Jan. 22, 1997

Three Years Ago

"There's a changing role of the broadcast engineer in stations today. ... He's not just the person somebody calls when something breaks. He's got a broader perspective. He's involved in more areas of station operation, and he's more a part of the management team. ... Because of competitive pressures, we've seen downsizing in both television and radio.

"Staff sizes are smaller and there are a lot more, for instance, contract engineers."

Former SBE President Chuck Kelly
"SBE's Kelly Reveals Philosophy, Plans"
Jan. 11, 1995

Five Years Ago

FCC Chairman Al Sikes has announced that he will resign as chairman of the five-member FCC the day before President-elect Bill Clinton is sworn into office.

"FCC Chairman to Resign January 19"
Jan. 6, 1993

Ten Years Ago

AM stations can expect to see receivers incorporating the NRSC standard by the end of next year at the earliest.

Some manufacturers are working on such a receiver design, but many are taking a "wait and see" attitude to determine if enough stations will implement the standard before committing themselves.

"NRSC Radios: Are They Coming?"
Jan. 1, 1988

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World Radio History

Radio Applications for The Wireless WAN

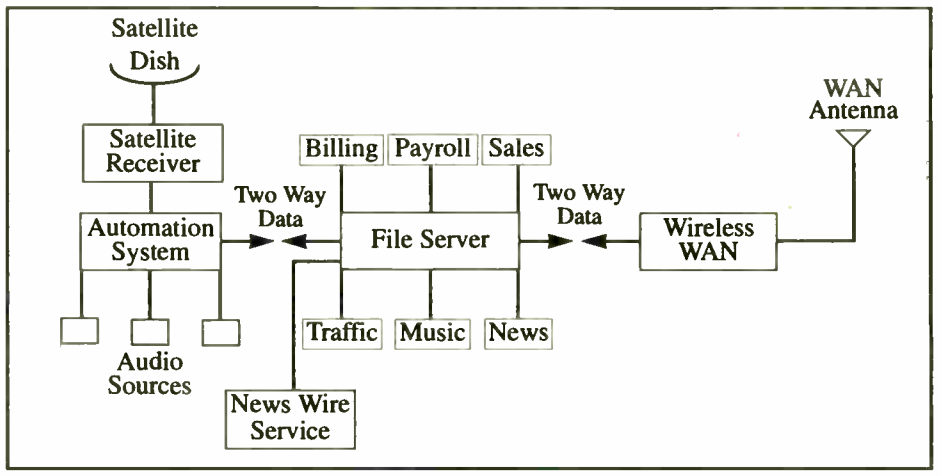
Thomas G. Osenkowsky

In an article Dec. 24, we defined the wireless WAN as a network transmission system consisting of unlicensed FCC Part 15 spread-spectrum devices. In this installment, we will examine two actual operations where a wireless WAN was put to the test.

Early WAN systems were mostly hard-wired designs employed by banks, financial institutions and chain retail outlets. Today's WAN systems employed by broadcasters not only carry data but digitized audio as well.

Consolidation is a key factor in broadcasting today. Many groups own multiple stations in the same or nearby markets, or operate LMA or JSA arrangements. Most broadcast stations are computerized and/or automated. Newsrooms are paperless; traffic, billing and music scheduling tasks are handled by computers.

There are two methods of networking computer systems: wired and wireless. Wire-based networks often require leasing the facilities of a telephone company. Installation costs can be high; usage charges recur monthly. Wireless systems require a line-of-sight transmission path and employ *spread-spectrum* technology. Unlike conventional broadcast channels, which use one specific frequency, spread-spectrum is relatively immune from interference, offers inherent security and requires no FCC license because it is classified as a Part 15 service. Most wireless WAN operations occur in the 2.4 to 2.4835 GHz band.



A wireless wide-area network can move audio and data files for every department at your station.

Case study No. 1

The first case we will examine is Gulf Coast Radio Network, based in Mobile, Ala. When Gulf Coast purchased two additional stations, managers were faced with operating two studio complexes several miles apart. A new "super studio" complex was under construction; it ultimately would accommodate all area stations. Two options were available: leased land wire, or wireless. Leased T1 installation costs were quoted at $4,200 plus monthly usage fees of approximately $1,700. A wireless WAN system was priced near $6,500. The wireless WAN could exchange digital audio (MPEG II compression) and computer/automation data between the two sites.

GULF COAST RADIO NETWORK

The latter was chosen and operated seamlessly for a year and a half, until the new studio complex was placed on air. The system chosen was a Transformations Technologies Inc. (TTI) 2 Mbps model. The only occasional problem noted Gulf Coast Director of Engineering Tim Camp was traffic overload, which caused a data transfer slowdown.

The next challenge for Gulf Coast will be a two hop system to consolidate the Mobile complex with its acquisitions in Pensacola, Fla. The first hop will be from Mobile to a tower site, and from there to Pensacola. The total path will be approximately 60 miles. This permanent operation was scheduled to be running by the end of 1997.

Case study No. 2

Our next example is Paxson Communications, which wanted to link a new station to its existing multistation facility. In this case it was necessary to link not only the production audio, air material and computer data, but a statewide news network operation as

See WAN, page 19 ▶

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World Radio History

KEYBOARD CONNECTION

COMDEX: The Best New Products

Barry Mishkind

If the NAB show is the Mecca where the latest and greatest products for radio and television are displayed, then COMDEX is the place where the world's computer geeks gather to gawk at the newest, fastest, cutting-edge gadgets. Yes, it is a toy store for techno-nerds.

Applications concerning the Internet were among the most visible at the recent COMDEX show. But hardware and software combinations to assist the mobile professional also were well represented.

Hardware wars

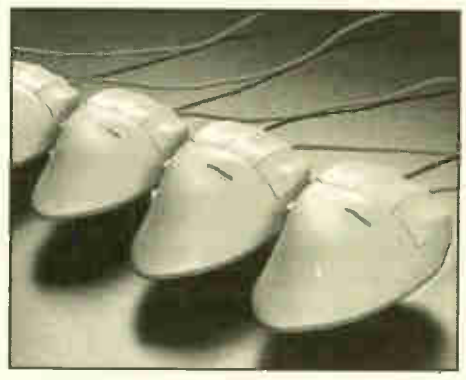
Companies demonstrated new motherboards and chips that bring higher and higher clock speeds. Many were pushing 300 MHz, with promises of even higher speeds in the next few months; but the promise carries a price. Sales of these chips are not keeping up with the trends for the past half-dozen years, leading some analysts to conclude the average user now has enough computer power to do what he needs.

Of special interest to broadcasters are new models of CD-ROM recorders. Suppliers displayed at least 50 models, with prices well under $1,000; users now can find blank CDs for $1 to $3. Stations will find it easy and economical to accomplish all sorts of tasks: archiving data from different departments, creating special CDs for control room use or making copies of advertisements and station presentations to give to clients. Professional-quality printers are available to print labels on the CD.

While not entirely replacing professional video production, several new audio and video composition products allow you to buy what is essentially a very good looking production-studio-on-a-computer for $5,000 to $6,000.

Darim Vision Co. used video in a new application. Using algorithms to detect motion, PC Snoop can activate a message to someone approaching your computer, or it can record the action on the hard drive. The unit on display had some real footage: The night before I visited the booth, it caught two employees of the convention center in the act of stealing things!

Some uses for PC Snoop that leap to mind include monitoring who or what approaches the transmitter site, and interior security at studio and transmitter. Soon, the software should enable a remote site to notice intruders and send a picture down the Internet to a monitoring location.



These mouse devices from Contour Design are designed to fit different hand sizes.

Because you can spend a good deal of the broadcast day away from the station, mobile computing and communication are important. The computer industry has been trying to make smaller, more compact computers and has come up with some pretty units. The new Mitsubishi Pedion is only 0.7 inches thick and 3.1 pounds. Unfortunately, the best mini-notebooks from IBM, Toshiba and Mitsubishi remain quite expensive, ranging from $2,000 to $6,000.

Small packages

A half-dozen manufacturers displayed so-called "palmtop" computers, able to fit in your hand, yet powerful enough to run a slimmed-down version of Windows. Sales of these units generally have been disappointing so far, because the tiny keyboards can be frustrating to use.

The Casio Cassiopia, the Hewlett-Packard 360LX and the Psion 5 are among the better implementations; the Casio even allows wireless RF reception of e-mail and pages. However, with a price level not far below notebooks, the appeal is limited to those who need to view WORD or Excel documents or presentations away from the office but who cannot, or will not, carry a regular notebook computer.

In contrast to the 200,000 palmtops sold last year, Personal Digital Assistants such as the 3Com PalmPilot or the new Avigo from Texas Instruments have done much better, passing the . mark this year. Focusing on and contact databases, these h.. units will give you the basic informa..on you need in the field, allowing input via a special "pointer."

As always, ergonomics was a major theme. How to reduce physical discomfort or injury is a major concern to many companies. A range of products from screen filters to comfort chairs were displayed. But the big push this year was to improve the pointing device, also known as the mouse.

There were mice of different sizes, to fit your hand size, from Contour Design Inc. There were mice of different colors, with three buttons, four buttons, side buttons, wheels, a wireless unit, even a mouse attached to an adjustable wrist pad and another that was able to give tactile feedback.

Other companies want you to get rid of your mouse. Some keyboards now are equipped with glide pads; you just use your finger. The Cross Pen Co. displayed a pen-type pointing device, complete with handwriting recognition software.

Software side

What would COMDEX be without software introductions? From Microsoft to tiny one-man companies, software suppliers were everywhere.

Many of the new products were based around mobile computing or the Internet, with Internet commerce (also called e-commerce) a driving force. Surveys indicate more and more goods and services are being sold over the Internet. Some companies, like Dell Computers, have been deluged with profitable orders via the Internet. A good deal of the software tackled the problems of how to collect money on line, as well as how to tend to the security of the transactions.

COMDEX exhibitors showed several custom search engines. If you have tried

See COMDEX, page 21 ▶

▶ WAN, continued from page 18

well. The news resources of the main group had to be shared with the new acquisition. A TTI system was used here as well.

A temporary server was located at the new station and linked to the main facility with a wireless WAN. As in the Gulf Coast operation, 2 Mbps WANs were employed. The WAN facilitated all broadcast, news, production, data, e-mail and printer signals. The path in this case was four miles. Managers say the operation has been virtually problem-free in its 13 months of service.

Most of today's wireless WANs are 10 Mbps models. This is in keeping with Ethernet hard-wired WANs. Ethernet WAN technology is expected to be operating routinely in the 100 Mbps range shortly.

For some users, wireless WAN is an excellent method of bi-directional data transfer. Consider the cost to purchase an STL system and lease land-based data wire lines. Now compare that with wireless WAN. In the two cases above, the WAN made technical and business sense.

Both the Gulf Coast and Paxson facilities cited here were using the Broadcast Electronics AudioVault digital storage/automation system. Ask your digital audio management supplier about wireless WAN options.

Expect to see more of such technology as consolidation continues. Any system capable of network operation can be placed on a wireless WAN. Recent FCC proceedings on main studio location may also help accelerate the use of wireless WAN.

■ ■ ■

Tom Osenkowsky is a consulting engineer based in Brookfield, Conn.

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World Radio History

IBOC Interleaver Design and Simulation Results

Brian Kroeger and Denise Cammarata

The authors are working for Westinghouse Wireless Solutions on the development of USA Digital Radio In-Band, On-Channel Digital Audio Broadcasting, or IBOC DAB. Westinghouse Wireless Solutions is leading the development and is working with joint development partner Lucent Technologies.

This is the last in a three-part RW series on the IBOC FM system, reprinted from a technical paper presented at Countdown 2000, a session of The NAB Radio Show. The first two parts appeared Dec. 24 and Jan. 7.

Interleaver Design for OFDM FM IBOC

Interleaving is performed both over the subcarriers (frequency) and time. Wesel and Cioffi addressed interleaving in frequency such that the erasure of a subcarrier would result in periodic erasures at the input to the Viterbi decoder (see reference 6). The period of erasures was made sufficiently large (i.e., 8) such that it did not reduce the periodic effective code length (PECL), which is also bounded by the constraint span of the code.

Their technique maps adjacent subchannel gains to codewords with indexes separated by the period. However, Wesel and Cioffi's paper did not exploit interleaving over time to mitigate the effects of flat (or wideband) fades over multiple symbol times, nor did they exploit the *a priori* knowledge of nonuniform subchannel interference statistics. The latter has resulted in careful placement of the code bits over the subcarriers, and the selection of the CPC codes for the FM hybrid IBOC DAB application.

Simulation confirmed expectations that, with CSI and weighting in both cases, random interleaving performed poorly compared to interleaving that results in periodic erasures for affected subcarriers. Furthermore, careful placement of the coded bits using *a priori* knowledge of interference statistics improves performance. The use of CPC code techniques as well as interleaving over time further improves performance.

A 255 row by 456 column interleaver array is established to hold the bits produced by the convolutional encoder. Each row of the interleaver array holds the code bits to be modulated in a parallel OFDM symbol. The 256th row is reserved for the modem frame sync word. Each pair of columns is assigned to the inphase and quadrature QPSK modulation of one of the 228 subcarriers. Additional subcarriers outside the interleaver may be used for transmission of the pilot or other data applications. Code bits are written into the interleaver array in a particular pattern. The array is read, row by row, providing the data source for the parallel OFDM symbols. A pictorial diagram of the interleaver array is presented in Figure 9.

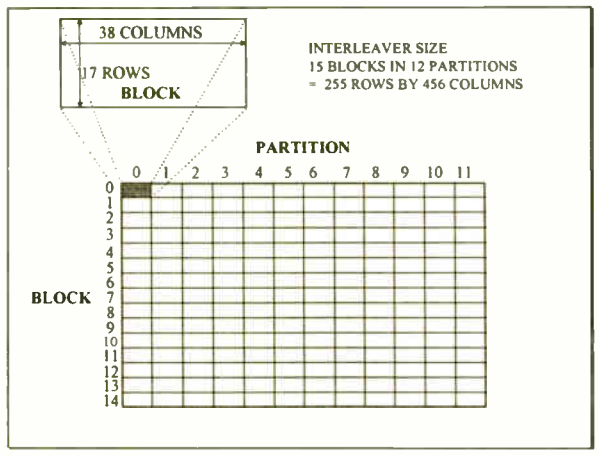

Figure 9 — Interleaver array.

The interleaver can be implemented by first assigning the code bits (modulo 12 index) of the puncture pattern to the 12 subcarrier column partitions. This is illustrated in Figure 10 using the partition index to identify the interleaver partitions corresponding to puncture pattern bits. The ordering ranges from 0 through 11 over the lower frequency subcarriers to the higher frequency subcarriers to represent the 12 subcarrier partitions.

$$\text{partition_assignment} = \begin{pmatrix} 7 & 3 & 4 & 8 \\ 1 & 9 & 10 & 2 \\ 11 & 6 & 0 & 5 \end{pmatrix}$$

$$\text{partitions} = (0\ 1\ 2\ 3\ 4\ 5\ \text{FM}\ 6\ 7\ 8\ 9\ 10\ 11)$$

Figure 10 — Interleaver partition index assignments.

Each partition is comprised of 38 columns and carries code bits intended for 19 subcarriers, where the real and imaginary components of a particular subcarrier are identified as separate adjacent columns. The entire interleaver consisting of 12 partitions has 456 columns. The outermost subcarriers are identified as columns 0,1 and 454,455. Columns 190 through 265 carry the optional punctured bits closest to the FM host spectrum.

Each partition is further divided into 15 blocks of 17 rows each. These blocks facilitate the interleaving over time by separating code bits, corresponding to adjacent coded information bits, by the number of rows in a block.

The interleaver array row and column indexes, *row* and *col*, respectively, are calculated using the following expressions.

$$\begin{bmatrix} 0 & 15 & 30 & 45 & 60 & 75 & 90 & 105 & 120 \\ 570 & 585 & 600 & 615 & 630 & 645 & 660 & 675 & 690 \\ 1140 & 1155 & 1170 & 1185 & 1200 & 1215 & 1230 & 1245 & 1260 \\ 1710 & 1725 & 1740 & 1755 & 1770 & 1785 & 1800 & 1815 & 1830 \\ 2280 & 2295 & 2310 & 2325 & 2340 & 2355 & 2370 & 2385 & 2400 \\ 2850 & 2865 & 2880 & 2895 & 2910 & 2925 & 2940 & 2955 & 2970 \\ 3420 & 3435 & 3450 & 3465 & 3480 & 3495 & 3510 & 3525 & 3540 \\ 3990 & 4005 & 4020 & 4035 & 4050 & 4065 & 4080 & 4095 & 4110 \\ 4560 & 4575 & 4590 & 4605 & 4620 & 4635 & 4650 & 4665 & 4680 \\ 5130 & 5145 & 5160 & 5175 & 5190 & 5205 & 5220 & 5235 & 5250 \\ 5700 & 5715 & 5730 & 5745 & 5760 & 5775 & 5790 & 5805 & 5820 \\ 6270 & 6285 & 6300 & 6315 & 6330 & 6345 & 6360 & 6375 & 6390 \\ 6840 & 6855 & 6870 & 6885 & 6900 & 6915 & 6930 & 6945 & 6960 \\ 7410 & 7425 & 7440 & 7455 & 7470 & 7485 & 7500 & 7515 & 7530 \\ 7980 & 7995 & 8010 & 8025 & 8040 & 8055 & 8070 & 8085 & 8100 \\ 8550 & 8565 & 8580 & 8595 & 8610 & 8625 & 8640 & 8655 & 8670 \\ 9120 & 9135 & 9150 & 9165 & 9180 & 9195 & 9210 & 9225 & 9240 \\ 1 & 16 & 31 & 46 & 61 & 76 & 91 & 106 & 121 \end{bmatrix}$$

Figure 11 — A portion of the interleaver array (rows 0 through 17, and columns 0 through 8) showing the spacings of the k^{th} partition index.

$$(17)\quad col = \left[\text{int}\left(\frac{k}{BLOCKS}\right)\right] \bmod COLS + 38 \cdot part,$$

$$(18)\quad row = \left[\begin{array}{l} \dfrac{ROWS}{BLOCKS} \cdot k \\ +\ \text{int}\left(\dfrac{k}{COLS \cdot BLOCKS}\right) \\ +\ \left[(4 \cdot part) \bmod BLOCKS\right] \end{array}\right] \bmod ROWS,$$

Where the interleaver size constants are *rows* = 255, *cols* = 38, *blocks* = 15, and *part* is the partition (*part* = 0,1...11) of the k^{th} puncture pattern. A portion of the interleaver array (Figure 11) shows that consecutive values of the puncture pattern index *k* are spaced apart in both time and frequency.

Simulation results

Some assumptions and simulation conditions are noteworthy in interpreting the simulation results. The truncation path length of the Viterbi decoder is chosen as 96 because significant degradation results from shorter path memories when code symbols are erased. In addition, there is a small amount of gain realized in a Rayleigh fading channel in choosing the 31-level metrics over the 7-level metrics. The simulation durations encompassed 6 million information bits. Signal-to-noise ratio is represented as E_S/N_O which is the ratio of the energy of one channel code bit to the noise in a 1 Hz bandwidth.

For scenarios involving multipath, the sum of the individual powers of the delayed Raleigh flat fading paths, which create the frequency selective Rayleigh signal, contribute to the calibration of E_S. The receiver design incorporates a First Adjacent Canceller (FAC) algorithm which effectively reduces the interference impact of a strong first adjacent FM signal.

The proposed hybrid IBOC system was modeled and tested against various channel impairments including AWGN, selective fading, and FM first adjacent interferers. The resulting BER versus E_S/N_O performance under seven channel scenarios is shown in Figures 12 and 13. Edge of normal FM coverage at the 54 dBu contour roughly equates to an E_S/N_O range of 11 dB to 21 dB, assuming equivalent thermal noise temperature range (due to local interference) of 100,000 to 10,000 degrees K,

See DAB, page 21 ▶

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World Radio History

▶ DAB, continued from page 20

respectively. Virtual-CD sound quality can be expected at a BER 10^{-5}. Audio impairments become noticeable at around 10^{-4}, and the point of failure is in the vicinity of 10^{-3}.

Figure 12 shows IBOC DAB receiver performance for propagation environments applicable to a home (stationary) receiver where the antenna is positioned to avoid selective fading. The first curve represents performance for a DAB receiver which is not subject to adjacent channel interference. This graph is indicative of the BER performance of differentially detected QPSK with rate 2/5 convolutional coding. Under this scenario virtual-CD quality is easily achieved at an E_S/N_O of 3 dB.

The second curve subjects the DAB receiver to an FM first adjacent interferer at a power of -6 dB relative to the host FM. This equates to an FM interferer 19 dB above the DAB signal of interest in that sideband. Virtual-CD quality is at an E_S/N_O of 5 dB with the impact of one first adjacent FM interferer. It is interesting to note that the strong first adjacent interferer impacted the overall DAB performance by only 2 dB. This diminutive impact is achieved by the effectiveness of the FAC, the symbol weighting, the interleaving and especially the ability of a DAB sideband to stand on its own, attributable to the CPC code design.

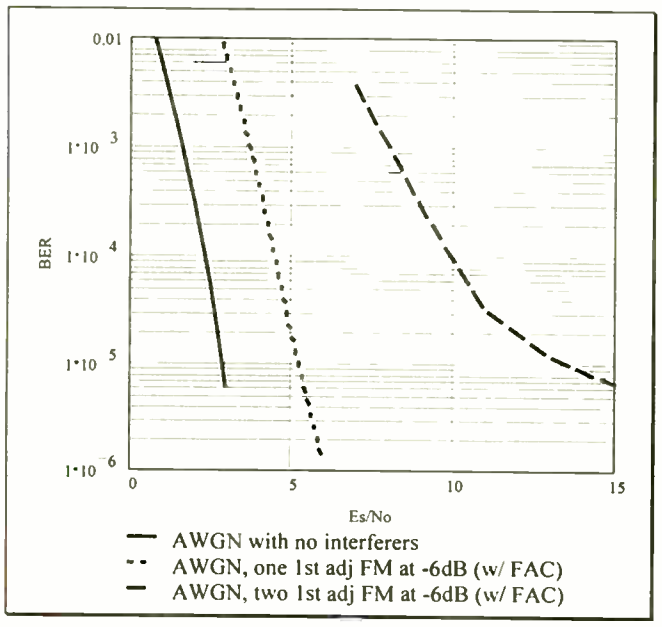


Figure 12 — BER performance in AWGN without selective fading under various interference conditions.

The third curve of Figure 12 is an assumed worst case scenario involving two -6 dB first adjacent interferers at the same receiver location. This curve is much flatter than the other two because both DAB sidebands are impacted. Virtual CD quality is still achievable at 13 dB which is the SNR at the edge of coverage given a equivalent thermal noise temperature of 60,000 degrees K.

The second series of performance curves shown in Figure 13 represent performance in the mobile environment. Two different multipath models were used. The parameters of the 9-ray model are from the EIA "Urban Fast Rayleigh" scenario (see reference 7). Delays range from 0 to 3 microseconds and attenuations are from 2 to 10 dB; the fading bandwidth is 5 Hz. The second model places more nulls across the DAB bandwidth and has faster fades (10 Hz). Three rays are used with delays of 0, 5, and 20 microseconds and no relative attenuation.

Two scenarios were run with each selective fading model — one with a -6 dB FM first adjacent and one without adjacent interference. The slower fading offered the greater challenge to DAB performance, but results were still excellent. Virtual-CD quality was again achieved in all cases assuming an equivalent noise temperature of 40,000 degrees K, generally leaving ample margin in the coverage area.

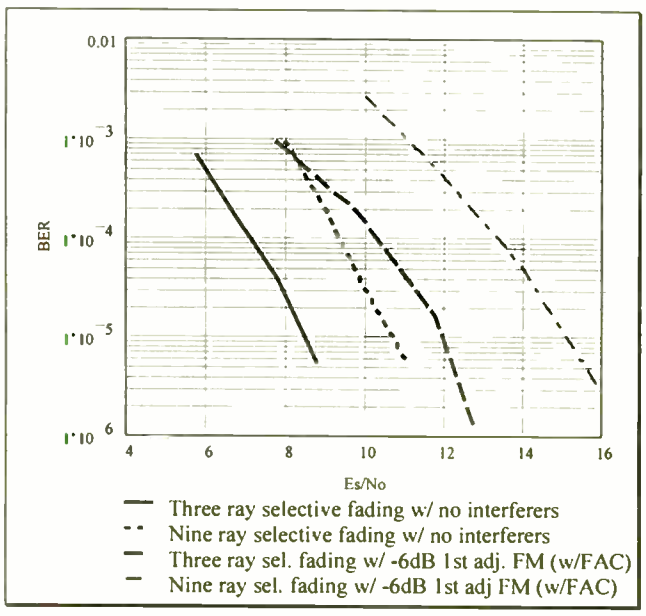


Figure 13 — BER performance with selective fading under various interference conditions.

Conclusions

The FEC code and corresponding interleaver design for an FM IBOC system using OFDM was presented here. The existence of a good-performing pair of rate 4/5 CPC codes has been proven. Analysis and simulation has shown that careful mapping of the modulated code bits chosen from a puncture pattern to the OFDM subcarriers can mitigate the effects of potential first-adjacent interferers.

Techniques for estimating the optimum soft-decision weight for QPSK symbols prior to Viterbi decoding were described. These techniques apply to differential detection of multicarrier (OFDM) QPSK, with and without multipath fading of the signal of interest or the interferer. The fading cases can necessitate a compromise between accurate CSI estimation and agility of the CSI to track the fading signal or noise components. Robust approximate estimation techniques were found for estimation of the weight in the presence of independently faded signal and noise. This robust technique is a result of the compromise between accurate CSI estimation and agility in fading.

Simulation results presented here confirm the robust performance of the FM hybrid IBOC system, even in the presence of a strong first-adjacent interferer. Virtual-CD audio quality should be generally achievable within and beyond the normal FM coverage area.

Acknowledgments

The authors gratefully acknowledge the expert assistance of Dr. Carl-Erik Sundberg of Lucent Technologies and Brian Chen of MIT (on summer assignment to Lucent) for identifying the optimal puncture patterns and their corresponding free distances and weights for our CPC code design.

References:

[6] Wesel, J. Cioffi, "Fundamentals of Coding for Broadcast OFDM," Proceedings of the 29th Asilomar Conf. on Signals and Systems, 1995.

[7] T. Keller et. al., Digital Audio Radio Laboratory Tests Transmission Quality Failure Characterization and Analog Compatibility Vol. I, Section E, pg. 2, EIA, Consumer Electronics Group, Aug. 11, 1995.

New Products

▶ COMDEX, continued from page 19

typing a word in one of the search engines, you may have been stunned to see it report back something like "47,250 matches found." Without doubt, the material available on the Internet has grown exponentially; finding things is getting harder.

SearchPad is of interest. It allows you to customize and refine your searches and send out to dozens of search engines so you can get what you want more rapidly without those thousands of sites you don't want to see.

Among other items of interest to the broadcast industry are the various audio and video compression packages, which will be of use in Webcasting, and general utilities to diagnose and fix problems on the computer.

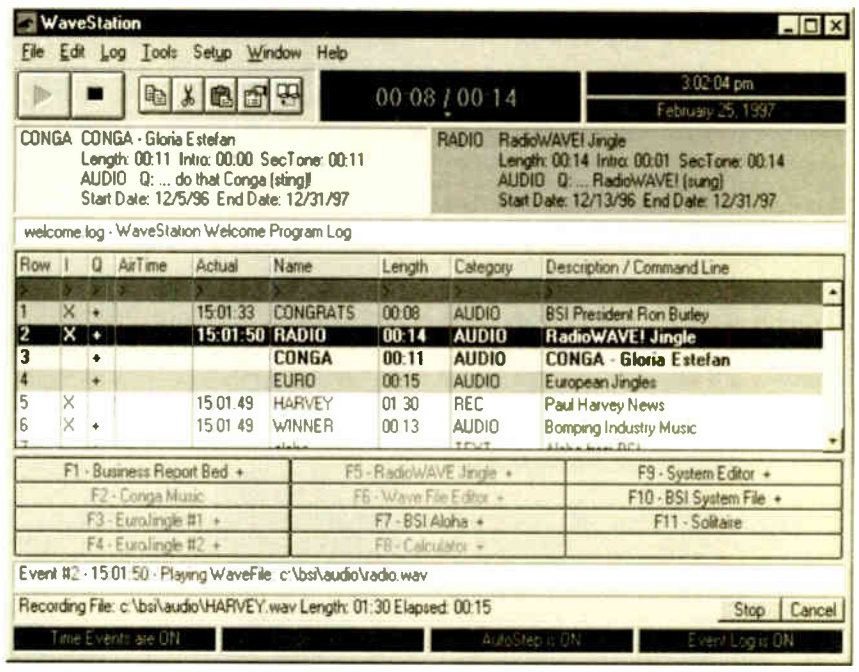
CyberMedia has released FirstAid98, which helps protect you from crashes and walks you through problems, helping to figure out what needs fixing. A new product, GuardDog, protects your computer during interaction on the Internet. For example, it watches for viruses, "cookie" requests and other non-standard activities, such as someone trying to access your hard drive without you knowing about it.

Can you hear me?

Several companies demonstrated voice recognition systems that are now becoming sophisticated enough to be useful, including voice control of e-mail, Web browsers and dictation.

See COMDEX, page 22 ▶

Affordable Digital Automation



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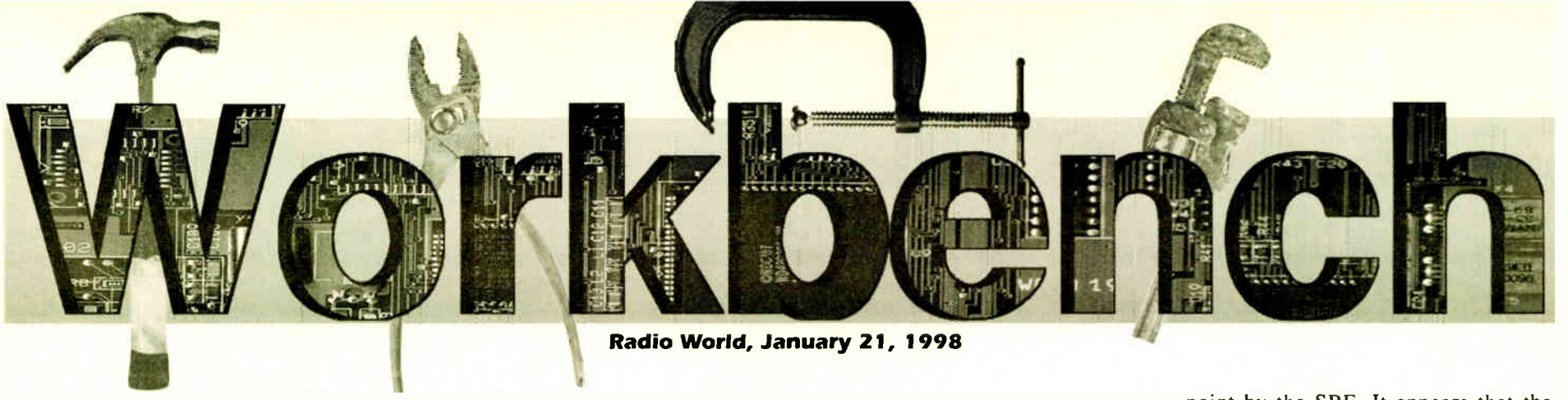

Radio World, January 21, 1998

Bright Idea for the New Year

John Bisset

Start out the new year by preparing a light bulb inventory. If you can, convert over to LED-equivalent bulbs for longer life. Most of us have come to know the #387 equivalent T1-3/4 type LED bulb, but next time you visit Graybar, take a look at its new exit sign bulbs. Exit sign bulbs are the same type of bulbs used in many on-air lights. Graybar is now stocking Standard Enterprises Inc. WATTMAN and SUPER WATTMAN LED equivalents.

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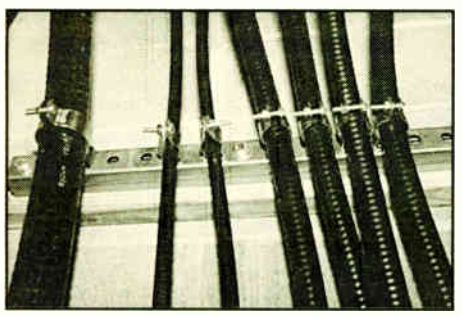
★ ★ ★

Tired of paying high prices for cable mounting brackets? Try a piece of Kindorf strut and conduit clamps (see photo).



The clamps mount to the strut using a nut and bolt assembly. After the cable is in place, the clamp can be tightened. A little foam rubber between the clamp shell and the cable will avoid crimping the coax. The total cost is less than $5. Thanks to John Diamantis, WBQB(FM), Fredericksburg, Va., for sharing this idea.

★ ★ ★

If you had one wish that could be granted concerning your job, what would it be? (Nasty thoughts about the PD do not count!) For former C.E. Jon Banks, it was to be able to combine his avid love of skiing with engineering. John used to chief classic rock station WARW(FM) in Washington and was a frequent contributor to this column. Nearly two years ago, he left Washington for full-time work in Colorado. As engineering manager for Moss Entertainment stations, he now skis to his transmitter sites.

I received an e-mail from Jon the other day, with his usual supply of tips. We will get to the tips in a moment, but first, he wanted to let readers of this column know he has not been buried in some snow bank, just buried with work (like all of us). Jon can be reached at KSPN-FM/KRKE(AM) in Aspen.

Mike Bode, the PD that works with Jon, suggested the first tip, which is a good one; it is in keeping with recent discussions about silence sense alarms elsewhere in the pages of **RW**. Jon was hooking up a silence sense alarm to the automation system. Bode suggested connecting the contact closures not only to an audible alarm, but also to the "advance" button on the automation. This way, if the station ever goes "silent," the sensor would advance the automation to the next event, possibly fixing it. This system also lets you start a long program on tape and walk away to do something else. When the taped program ends, the silence will trigger the paused automation back to life.

You often will be reminded of how I encourage you to "show your usefulness" to your general manager. Far too often the engineer is forgotten and seen as just an expense. If you have not wired up your silence sensors like this, try it. Then tell your GM what you did, and how this modification will keep listeners tuned in. Toot your own horn for a change. Let him see the active role you are taking in the operation of the station, and that you do not just fix things when they break.

Jon also posed a question I would like to share. Has anyone come up with a way to keep a remote control (in Jon's case, it is a Burk ARC-16) from calling you on insignificant nuisance faults that correct themselves?

Jon has a five-second power failure at 3 a.m. Yes, the power does drop below the 90 percent lower limit threshold, but the transmitter automatically restores itself in a few seconds. The remote control senses an alarm condition, and the calls begin.

Jon thought of using capacitors to hold up the sampling voltages, but leakage is a problem, the voltages are very low and the hold time just is not long enough.

My first thought is for Burk, Sine Systems and Gentner to modify the alarm triggering software to permit user-activated "ignoring" of brief alarm triggers, perhaps between the hours of 10 p.m. and 6 a.m. This could be a feature the engineer could elect to turn on or off. Short of software revisions, what have you used to prevent these problems?

If you have a fix or suggestion, fax it to me at (703) 764-0751, or send an e-mail to *wrwbench@aol.com*

★ ★ ★

Tom Lange, manager of engineering for the Sheboygan Area School District, sent a note that I want to pass on. It seems that his *Workbench* tip about adding muting to a Mackie mixer was awarded only one recertification point by the SBE. It appears that the SBE certification chairman thought Tom had supplied only the schematic to *Workbench*, and that I had written the accompanying article.

I am taking steps to clear up the misunderstanding. Tips that do not have a name or station affiliation associated with them are mine, but the column survives because you take the time to write and contribute your tips. Other than some minor editing, the tips provided by engineers are their own submissions and have always been identified as such.

SBE has been very cooperative in the past in offering recertification credit for *Workbench* submissions. I fully expect this matter to be resolved in Tom's favor but wanted readers of this column to be aware of a potential problem. Let me know if you encounter any difficulties, and keep your suggestions and tips coming!

■ ■ ■

John Bisset is a principal with Multiphase, a technical services company. Reach him at (703) 323-7180. Printed submissions qualify for SBE recertification credit. Fax submissions to (703) 764-0751, or send them via e-mail to wrwbench@aol.com

New PC Products

▶ COMDEX, continued from page 21

For the engineering community, GPS mapping programs are available from ETAK and DeLorme. Also, a new series of map programs offering topographic maps on CD-ROM has been released. This software even allows checking of potential STL paths. The first offerings are only for the western United States, but the company plans to roll out to the rest of the country soon.

Another topic of conversation on the floor was e-mail, including unwanted e-mail or spam. The newer e-mail programs are going to do some good things for us, including a new language translation plug-in for Eudora Pro version 4, so you can read e-mail from another country in English. Other programs promise to filter out unwanted e-mail. Also, a growing list of services provide free e-mail service, with an advertisement or two to pay the freight.

There were hundreds of other products, and we invite you to keep an eye on *Keyboard Connection* in upcoming months for more information on these and other products that you will find useful in accomplishing your tasks.

■ ■ ■

Barry Mishkind is still recovering from walking the 20-odd miles of booths at COMDEX. You can reach him with e-mail at barry@broadcast.net; *check out his home page at* www.broadcast.net/~barry/

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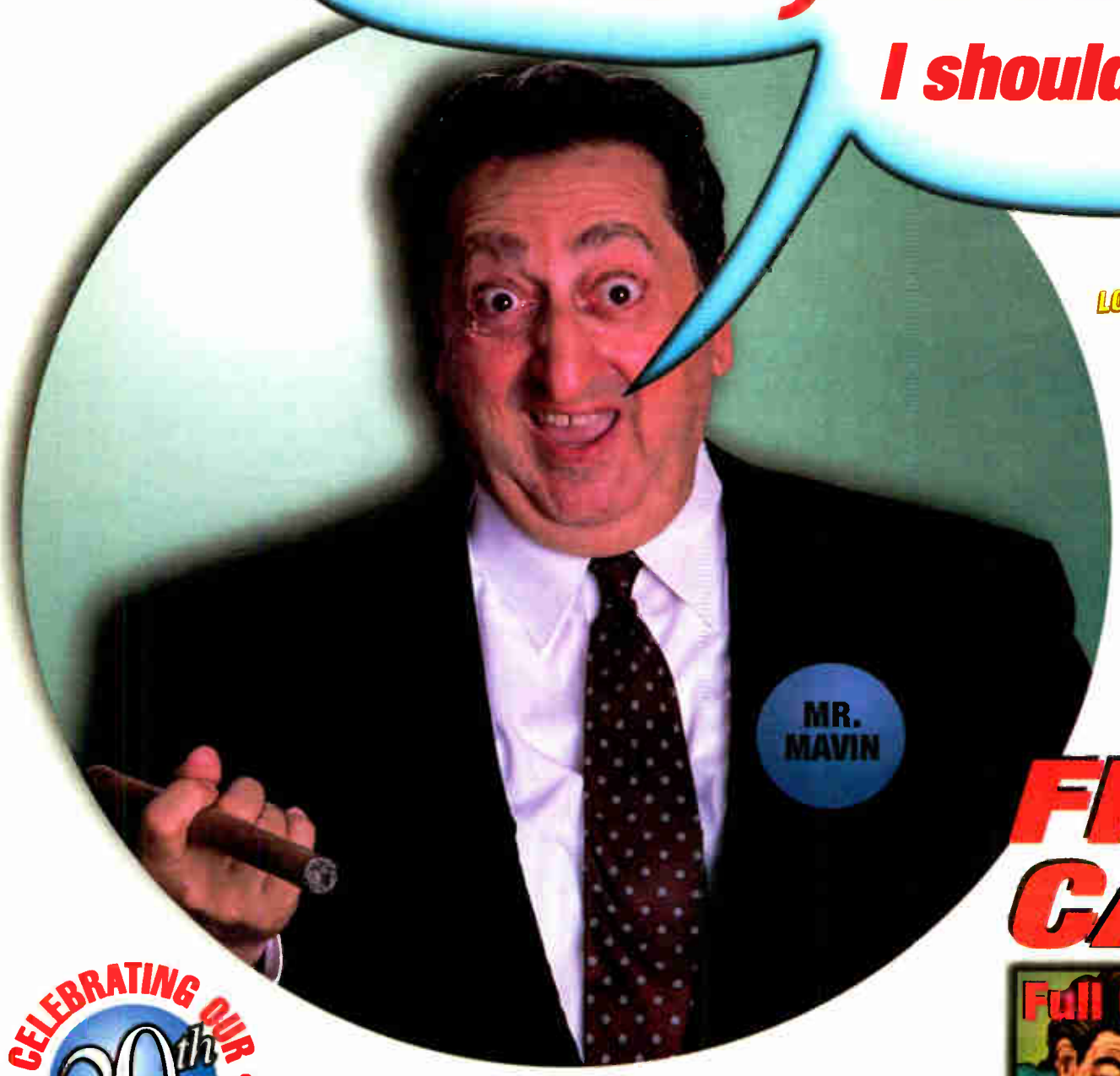

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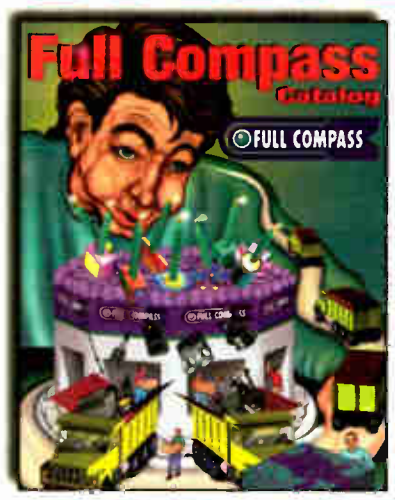

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NATIONAL RELIGIOUS BROADCASTERS SHOW
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DECLARING CHRIST

NRB Returns to the Capital

Chris Hamaker

NRB'98, the 55th gathering of exhibitors and broadcasters serving the evangelical Christian community, returns to the Sheraton Washington Hotel in the nation's capital, Jan. 31 to Feb. 3. The National Religious Broadcasters show has traveled to different cities around the United States in the past several years.

Well-known speakers, three new workshops and several interesting radio sessions highlight NRB'98, which carries the theme "Declaring Christ."

Organizers say broadcasters look to the people, sessions and exhibits they encounter at the NRB for encouragement. "A lot of people are out there at their ... stations or their program and ... sometimes they might forget that there are a whole bunch of people out there doing the same thing and having the same kind of struggles," said Sarah E. Smith, NRB associate director, media relations. "That's why they enjoy coming to our convention."

Although members of the NRB are required to sign an evangelical (doctrinally conservative) statement of faith, the annual convention is open to all.

"Our convention attracts a lot more than just our membership. We average about 4,500 attendees," said Smith. "We have secular companies that exhibit. We welcome anyone."

Predominantly radio

Approximately 220 exhibitors will display their products and services at the convention. The conference serves both television and radio broadcasters, but Smith said the exhibits and sessions are slanted toward radio, which Smith said accounts for roughly 70 percent of all religious broadcasters.

Among the exhibiting companies will be Audioarts Engineering, Harris Corp., Broadcast Electronics Inc., Superior Broadcast Products, USA Radio Network, Salem Radio Network, Dielectric Communications, Circuit Research Labs, Network Music, Propagation Systems, Shively Labs and Radio Systems.

"We'll be showing our new Millenium line of products," said Jo-Ann Dunn, operations manger with Radio Systems. The product line includes Millenium consoles, the di-2000 digital telephone hybrid and ct-6-timers.

Dunn said the show has been a good one in the past for Radio Systems. "A lot of the smaller broadcasters who buy our equipment are in attendance at the show. We usually get a lot of leads and every year generate a lot of sales."

Don Taylor, domestic sales manager, radio, for Harris Corp., said the company plans to show its DIGIT Exciter and CD Link STL, along with some distribution equipment. "We have some customers who attend this convention and are particularly interested in supporting this side of the industry," Taylor said.

Exhibitor interest has been on the upswing in recent years, according to Smith. "In the '80s, all the big names were always at our conventions," Smith said. "Then we had that trouble with the ... tele-evangelism people. A lot of people kind of dropped away from religious broadcasting. I'm not saying that's a direct correlation, but it was what happened around the same time. Especially in the '90s, we've seen a revitalization of people getting excited about the convention again."

New workshops

Two radio workshops, one for commercial broadcasters and one for noncommercial broadcasters, will debut at NRB'98, as will a "TV Boot Camp."

Roger Dodson, senior vice president, training, Radio Advertising Bureau, will moderate the "RAB Radio Boot Camp" Saturday, Jan. 31, from 8 a.m. to 2:30 p.m. Dodson said many NRB attendees no longer see a conflict between proclaiming Christianity over the radio airwaves and selling commercial time. "Consequently," Dodson said, "they are saying, 'If that's the case, how do we more professionally present our format to advertisers, from a marketing perspective?'"

Dodson said the workshop will focus on several topics: prospecting, marketing, determining clients' needs, writing better presentations and understanding different personalities.

Beyond the bookstore

Many Christian broadcasters, Dodson said, may not think beyond the local Christian bookstore when looking for advertisers. His workshop will address how to find new clients. "You may want to go out and find other kinds of clients who may or may not be listeners to your radio station," Dodson said. "They may not even have been aware of it."

How can noncommercial stations raise more money? Attendees who take part in the "Noncommercial Radio Boot Camp" can find out. The noncommercial boot camp takes place during the same time as the "RAB Boot Camp." Todd Isberner, president and owner of Share Media Services, plans to share fund-raising strategies.

"I'm trying so hard to teach stations how to (raise more money)," Isberner said. "Unlike public radio, we keep it fun!"

Part of the "Noncommercial Radio Boot Camp" workshop will be a

See NRB, page 25 ▶

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Arthur C. Clarke, The Lost Worlds of 2001

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World Radio History

▶ NRB, continued from page 24

hands-on demonstration of how to produce a better fund raiser. The rest of the workshop will address how to project a financial goal, develop a one-year financial plan, explore major donor underwriting and other money-raising techniques.

The workshops fill a conference programming void. In years past, attendees arriving early had little to do, because NRB activities were not open to all attendees until the second day of the conference. The workshops, which Smith said will address the "most requested topics" from past convention attendees, are open to all attendees.

Session highlights

The opening general session, Saturday at 7 p.m., includes several award presentations, such as Radio Station of the Year and Radio Program of the Year. Charles Stanley, pastor and teacher featured on the "In Touch Ministries" broadcast, is the main speaker. Musical highlights will include performances by Amy Morris and Michael Card.

Sunday opens with a worship service at 9:30 a.m. The "Intercollegiate Religious Broadcasters Industry/Student Panel" begins at 2 p.m., as does the Black National Religious Broadcasters concert, with groups such as Take Six and Kirk Franklin and Family.

Dallas Theological Seminary President, Pastor Chuck Swindoll has a daily radio show, "Insight for Living." Swindoll is the featured speaker during the "World Fellowship Luncheon" at noon on Monday, Feb. 2.

FCC issues

Monday sessions of interest to radio attendees include "Guidelines for Your Radio Station's Focus Groups," moderated by Jim East, general manager, WOLC(FM), Princess Anne, Md. The session begins at 10 a.m. East moderates "Radio Stationality" at 3 p.m. Monday, the same time "FCC Radio Management Issues" begins, moderated by Sue Bahner, president of Crossway Consulting. Roy Stewart, chief, Mass Media Bureau, FCC, will be on hand, along with Linda Blair, chief, FCC Audio Services Division, and Doug Webbick, chief, FCC Policy and Rules Division. Also at 3 p.m. is "How to Make Money for Your Radio Station on the Internet," moderated by Jim Sanders, vice president, Ambassador Advertising Agency.

The conference finishes up on Tuesday, Feb. 3. The 7:30 a.m. "Public Policy Breakfast" features former Secretary of Education William Bennett. Wayne Pederson of Northwestern University plans to moderate a session on the challenges of programming Christian music, "Music — Why Can't We All Work Together?" at 10 a.m.

Sue Bahner, Crossway Consulting, moderates a concurrent session, "Radio Station Responsibility and Public Policy."

"Improving Your Radio Station's Coverage," which NRB calls an engineering session "for the lay person," begins at 3 p.m. Also at that time, Jeff Nickel, director of Strategic Planning & Marketing at The Domain Group, provides case studies in "Maximum Growth Fund Raising for Radio."

Christian Radio Mixes in Music

As consolidation rocks the radio industry, religious radio is experiencing a renaissance, and the NRB forecasts a healthy future for its member stations and programs.

The very nature of the message communicated by NRB member stations makes those stations visionary, according to NRB Vice President Mike Glenn. And that message increasingly is communicated through more than just talk programming.

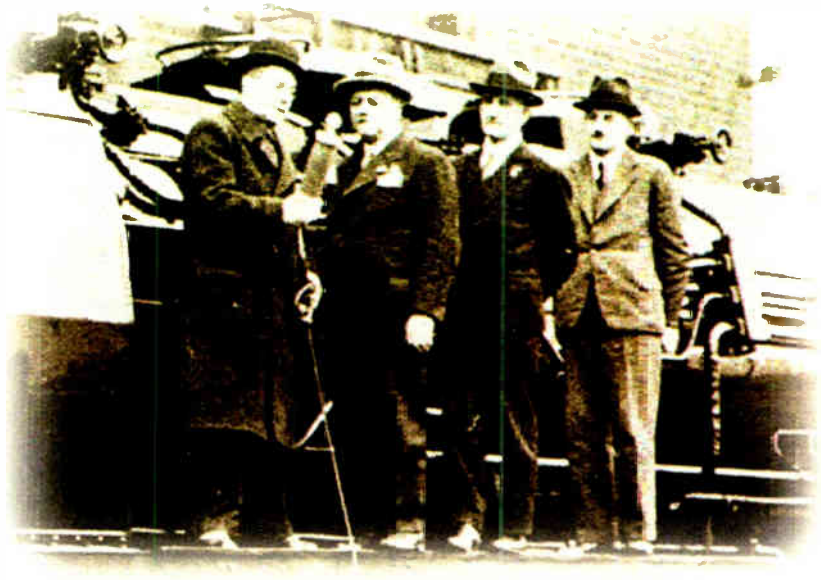
"Christian music is coming on strong," Glenn said, referring to the healthy sales numbers Christian artists and record labels have generated in recent years. Consequently, several Christian record labels have been purchased by companies looking to share in the revenue.

The result has been slicker marketing of Christian artists and strong crossover appeal in 1996. Bob Carlisle's "Shades of Grace," which featured the No. 1 song "Butterfly Kisses," was the first Christian album to top the national album sales chart, and the self-titled debut album from Jars of Clay sold more than 1 million copies, thanks to the mainstream acceptance of the band's single "Flood."

Gospel group God's Property received airplay on CHR stations.

Glenn said consolidation has not had a significant impact on NRB membership, but he said the organization has faced several challenges and is ready for whatever may come. "(Religious broadcasting) is in good shape," Glenn said. "It's not just talking heads anymore. Perception is improving."

— Chris Hamaker



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World Radio History

ATM: A Data Transmission Solution?

Elaine Jones

Imagine a data transmission system that gives you T1 (and higher) data rates, *on demand,* without the constraints of point-to-point connections. In the future, you say? No, it is available now and it is called ATM.

Asynchronous Transfer Mode is a high-speed packet switching system available through your telco provider. The minimum speed provided by an ATM port is equivalent to T1, with DS3 speeds in the mid-range and a maximum data rate of OC3 over "wide area networks" (in local area network applications, speeds are even higher). Within ATM ports, all kinds of data speeds are available, ranging from 4 kbps on the low end to 155 Mbps at the top.

Four service options

The service has been described in the industry as "broadband ISDN." According to David Cross and Bruce Tanzi, high speed packet services product managers for AT&T, that description is not quite correct.

"It has its roots in ISDN, and in the technical sense, it's a broadband ISDN service, but ATM has a personality unto itself," Cross said. "ISDN has only one class of service. ATM has four classes of service, which can be selected as you need them."

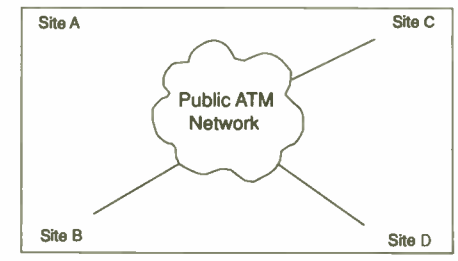
The business theory behind ATM is that not all transmissions are of equal priority or duration. ATM permits you to select the class of service case-by-case, thus proving more cost-effective than dedicated lines.

The four classes of service offered via ATM are:

CBR: constant bit rate. You get exactly what you specify when ordering service. This is the highest-quality connection and is used for "real-time" high-speed applications.

VBR: variable bit rate. Similar to frame relay in performance, it still permits high-speed connections, but the data rate may vary. Slight delays are possible but tolerable for the applications.

ABR: available bit rate. You get the minimum data rate specified for your application, but the network will grab available space for transmission "up to the ceiling." This is the recommended method of downloading files for later use.



Similar to ISDN, the ATM network can be thought of as a 'cloud.' Users pay for a single connection to the 'cloud,' which takes care of routing the signal to the designated recipient.

UBR: unspecified bit rate. You get whatever is available on the network. This class is recommended for non-delay sensitive data.

In addition to the four classes of ATM service, AT&T provides two types of ATM connections: "PVC," or Permanent Virtual Connection, and "SVC," or Switched Virtual Connection.

"SVC is an 'on-demand' service, just like placing a call," Tanzi said, "and it provides a cost-effective method of high data rate transmission for broadcasters who don't need the service on a regular or continuous basis."

If your ATM requirements vary in terms of volume of traffic, connection speeds or the number or length of calls, SVC may be more appropriate for you. While PVC is billed at a flat rate, SVC is priced according to the data rate used and duration of the connection.

Make the connection

The ATM network resides in the central offices of the telephone company. To connect to the ATM network, users must buy the appropriate ATM interface for their application and obtain a leased line that connects their facility to the nearest ATM office (point of presence). From that point, connections are handled through the network by the telephone company. (See diagram.)

"With AT&T, you only need to go to the nearest point of presence," Cross said. "Although not all AT&T POPs have physical active switches in them, AT&T's service covers transporting the signal from the switch to that point."

ATM offers broadcasters a great deal of flexibility in handling point-to-point feeds. For example, on a coast-to-coast feed between New York and Los Angeles, live feeds requiring the tightest control could be sent at the CBR data rate, but information that is simply being downloaded for later use could use a less costly data rate, such as VBR or ABR, from the same ATM port. The station could then use the same ATM port to connect to a station in another city for the next feed.

"You don't need a port for each connection," Cross said. "Just pay for the one link and the network takes care of the individual connections."

Temporary links to other cities could be handled, again from the same ATM port at your facility, via a Switched Virtual Connection. "Place the call, transfer the information, take the call down," Tanzi said. "There's no need to have a dedicated circuit in place for those

See ATM, page 27 ▶

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World Radio History

BOOK REVIEW

Book Reveals Complex Life of Fred Waring

Read G. Burgan

Virginia Morely and Livingston Gearhart sat on a bench outside a large rehearsal room at 1697 Broadway. An hour passed. Inside, Fred Waring rehearsed his Pennsylvanians. A second hour passed. Morely and Gearhart continued waiting to rehearse their first-ever number on Waring's coast-to-coast network radio show.

Finally, the angry voice of Waring bellowed through the open door, "Where's that two-piano team? God damn it!"

Furious, Virginia Morely jumped to her feet and indignantly shouted that she had been waiting outside for hours. She returned the Waring profanity with some of her own. Dead silence reigned as the astounded musicians looked on with mouths agape. Then, to their utter amazement, Fred burst out laughing.

Ten years later Morely would marry Fred Waring. More than 40 years later she has done a wonderful service by writing the definitive biography, "Fred Waring And The Pennsylvanians."

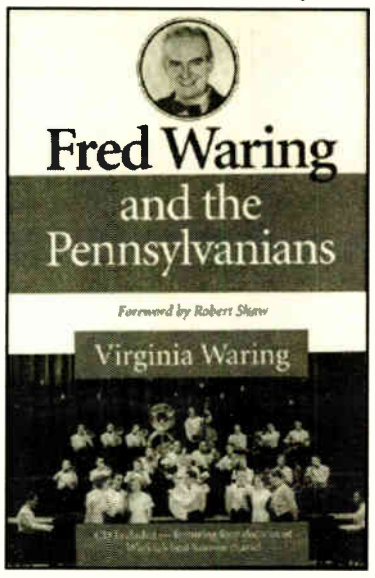
She writes with respect for and admiration of the man who was both her employer and husband, but she also writes with candor, showing us the whole man, warts and all.

Waring is a study in contradictions. Even as a youth he was headstrong, a born leader. When 13-year-old Fred refused to play his violin in the high school orchestra because they played so badly, his dad gave him an ultimatum: "Either you play in the high school orchestra or you give up the violin." Fred put the violin on the shelf and never played again.

It was his brother Tom, who, while still in his teens, formed the musical group that would later become the Pennsylvanians. Older brother Fred soon muscled in and took control of the group. For the rest of his life Tom resented the success of his brother.

With a lot of hard work and talent, Fred Waring developed a jazz group that quickly conquered the Vaudeville circuit.

At the peak of his career, Waring employed more than 50 musicians, five arrangers, a business staff and his own music publishing company. For more than 50 years his Pennsylvanians toured every state and some of the most obscure towns in America.



But it was in radio that Waring would really shine. Ironically, he first eschewed radio, telling one reporter in 1931 that he believed radio "had harmed more orchestras than it has helped."

Ever the perfectionist, when Waring decided to break into radio he rented a sound studio and recorded nearly 200 16-inch transcriptions until he felt he had the right sound. At first no one wanted to sponsor his choral singing.

Waring broke into network radio in 1932 with a weekly Wednesday night program for Old Gold Cigarettes, and his show soon became one of the most popular programs on the radio. Ironically, Waring forbade smoking at both his rehearsals and performances.

In 1934, the Ford Motor Co. agreed to pay Fred Waring and the Pennsylvanians $12,500 per week and buy a theater for his radio program. It was the highest amount paid for a radio program up to that time.

When Amos and Andy left NBC for CBS in 1939, Waring persuaded the Liggett & Myers Tobacco Co. to sponsor his Pennsylvanians in the open time slot five days a week for $2.5 million annually. It was the first time in radio that a musical show was presented every weekday night.

When the Chesterfield contract ended in 1944, Waring sold NBC on another innovative concept: a morning musical show aimed at housewives. Along with a Thursday evening program, Waring had six network radio shows a week. His radio career came to an end in 1949 when General Electric persuaded him to tackle network television on CBS.

The Virginia Waring book is much more than an accumulation of Fred Waring accomplishments. It paints a fascinating picture of a complex individual who had a genius for choral music but was a study in contradictions. He had an intuitive ability to spot talent, and instinctively brought out the best in an individual. He was loyal to a fault, a crisis manager and a born procrastinator.

He drove his musicians relentlessly, yet treated them like one large family. He was generous to down-and-out musicians but neglected the emotional needs of his own family.

His principles sometimes cost him dearly. When Waring learned that local radio stations were using his records to produce their own Fred Waring shows, he was furious. Why should those stations get Waring music for nothing when Ford Motor Co. paid $12,500 per program?

For 10 years Waring spearheaded an unpopular campaign to amend the copyright act to provide performance royalties for artists. He spent thousands of dollars of his own money, attended a myriad of conferences and court sessions, and gave up untold income by refusing to record any phonograph records for the 10-year period he carried on his battle.

In the end he lost not only the battle but much more: Even 30 years later most radio stations would not play Waring records because of his stand on the royalty issue. Nor would jukebox owners put his records in their machines. And from the mid-1950s to the end of his life in 1984, no commercial network would consider Waring for a regular series.

He championed racial equality long before it was popular. On tours in the south in the 1950s, Fred and the Pennsylvanians often encountered discrimination. Virginia Waring describes an incident when the Pennsylvanians were invited to dinner with prominent local officials. When they entered the hotel dining room, the manager said that black singer Frank Davis would have to eat in the kitchen with the hotel employees.

Waring responded, "Well, that's fine. That's where Daisy and I will eat." When the manager replied, "Oh, no, you don't have to," Waring said, "I know I don't have to. I don't have to come in at all. But I was invited, so I'm coming in, and if that's where one of my people has to go, then I will go there."

Virginia Waring also documents the personal tragedies of her husband's family life. His first two marriages ended in divorce, and for many years his first three children despised him. Virginia Waring also openly discusses affairs her husband had with other women.

The book provides a wealth of stories and documentation on radio and television from the perspective of a pioneer who developed many of the techniques we now take for granted.

In addition, the book includes a CD with 28 examples of Waring music, beginning with a 1925 performance of "Collegiate" and ending with a 1957 recording of "Sleep." The CD nicely chronicles the evolution of the music from his beginning as a college jazz band leader to his mature years as the foremost proponent of popular choral music.

"Fred Waring And The Pennsylvanians" by Virginia Waring, is published by the University of Illinois Press, Urbana and Chicago, 1997.

■■■

Read Burgan is a freelance writer and a former public radio station manager. Reach him at (906) 296-0652 or via e-mail at rgb@up.net

▶ ATM, continued from page 26

occasional feeds ... it's like having your own T1 on demand."

You always will need the dedicated link (access) into the network, but both PVCs and SVCs can use the same link and port.

Too much of a good thing?

Radio stations may consider the high data rates of ATM overkill for most applications. Most broadcast applications involve video feeds or linking classrooms for distance learning networks. However, the high data speeds would permit transfer of *uncompressed* audio (a big advantage in preventing transcoding problems), plus real-time synchronization of media files. Unfortunately, point to multipoint service is not yet available, so feeds must be handled individually at present.

Manufacturers of equipment for radio stations watch developments like ATM closely. MUSICAM USA, which makes digital codecs, is well aware of ATM, according to Art Constantine, vice president of business development.

"The open architecture of MUSICAM USA's codec line was planned to accommodate future technologies rather than have a built-in interface to the outside data line. We have plug-in slots (which accommodate cards for the network interface). Currently, most people are using ISDN terminal adapters with built-in NT-1s in North America. Future technologies such as ATM will be available when demand warrants it."

For more information on ATM services and rates from AT&T, contact Victoria Wright at (908) 234-4865, or visit Web site *www.att.com*

■■■

Elaine Jones is a media and marketing consultant in Salt Lake City. Reach her via e-mail at ejones@inquo.net *or through RW.*

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World Radio History

PRODUCT EVALUATION

Shocking Pink Production Music

Sallie Schneider Sauber

Say you are looking for that near-perfect mix of music beds from the "1812 Overture" all the way to new country. And, just for giggles, a bunch of sound effects to go with it, too.

Let me introduce you to The Mix IV Broadcast Music Library from Sound Ideas. This hot little package — which comes in a hot-pink carrying case — contains more than 1,200 tracks of music and sound effects. You may be familiar with earlier Mix collections; they are also available from Sound Ideas and from Dave Dworkin's "Ghostwriters" Radio Mall (*www.radio-mall.com*).

This is a library for any format. The tracks on these discs are suitable for commercials, promos, PSAs or even sports themes.

Make a selection

Each disc contains music in different genres. For example, the first disc in The Mix IV library is Mix No. 26, Easy Listening and Soft A/C. The arrangements are pretty simple but never redundant or boring. The sound is very full but not overbearing when used behind a voice-over.

My favorite track from this disc is "Laura's Song," which the cutsheet describes as, "Warm, soothing, enchanting." In three-quarter waltz time, this medium tempo cut is mellow yet uplifting, without being overly dramatic.

Instrumentation includes everything from sax and harpsichord to oboe and acoustic guitar. Quite an odd mix of sounds, but it works very well. This track might be well-suited for a public service announcement for the United Way.

"Lazy Susan" is another one of my A/C favorites. This would work perfectly on a home improvement spot urging you to "let the pros handle it." This cut is light-hearted and fun enough to poke fun at one's lack of tool knowledge and skill, instead of coming across as an insult.

Mix No. 30 is a country disc offering every country style you could want, from old twangy country-&-western sounds to modern country crossover.

Go for the laughs

Most libraries I am familiar with dedicate only a couple of tracks strictly to the Humor category. More often than not, these tracks are crowded with nonsensical sound effects that do little more than clutter up the music bed. The advertiser's message has a difficult time swimming upstream against all the muck.

This is not the case with this library. The Mix IV dedicates an entire disc to Fun and Humor. These music beds are fun, fast-paced and whimsical without being overbearing. Lots of styles are

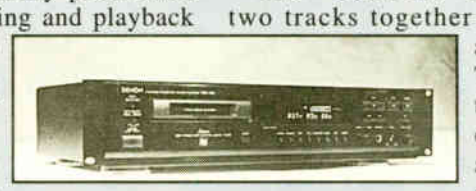
See MIX, page 30 ▶

SHORT TAKE

Denon Introduces Pro MD Recorder/Player

New Jersey-based Denon Electronics has already delved into MD technology with innovations such as the DN-M2000R DJ-style MiniDisc player and the DN-1100 rackmount player/recorder with hot keys.

The company recently unveiled the DMD-1300P Professional MD Recorder; a basic, yet full-featured rackmount device that may find a welcome place in many production rooms as an archiving and playback device. The MD recorder has a suggested price of $799.95.



The DMD-1300P lacks the pitch change, tempo controls and big rubber buttons of its DJ counterparts, yet boasts a number of powerful features. Because sample frequencies vary according to the digital sound source, the sample rate converter in the DMD-1300P automatically detects the frequency and shifts to accommodate it. A new super linear converter assures a precise D/A conversion process for smooth audio playback. Even extremely low-level signals reproduce accurately.

Track numbers and text can be entered in both upper- and lower-case characters. Each track can receive up to 100 characters.

Comprehensive editing functions are included in the DMD-1300P. The Divide function splits a single track into sections for precise and efficient searching. This allows instantaneous and snug cueing. A Rehearsal function allows fine adjustments to be made to the cue point.

The Combine feature joins two tracks together to be read as a single cut. The Move feature changes the order of tracks and the Erase mode quickly removes any specified track, with succeeding tracks automatically revised.

Analog input and output on the DMD-1300P is on a cluster of RCA jacks. Digital I/O is handled by a pair of optical ports. A remote control is included with the recorder and the entire device weighs in at 8.8 pounds.

For information on the new DMD-1300P Professional MiniDisc Recorder, contact Denon Electronics in New Jersey at (973) 575-7810 or circle **Reader Service 56**.

— Alan R. Peterson

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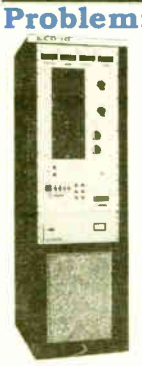

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Circle (195) On Reader Service Card

Attack of The NPR Killer Bees

Rich Rarey

We begin the new year with a remembrance of some remarkable tape that was a part of a National Geographic/National Public Radio "Radio Expeditions" series, which aired on "NPR Morning Edition."

The aural scene begins with the sound of footsteps on gravel. A wide, rich stereo ambiance of a remote country field at the Carl Hayden Bee Research Center near Tucson, Ariz., greets us. We can hear the wind whistle across the

mic Zeppelin and the clothes of NPR recording engineer Charles Thompson and bee researcher Dr. Steve Buchmon.

What's the buzz?

We hear the sound of a locked gate being opened and Buchmon remarking on tape, "Confronted by the gate ... the 'Danger, Keep Out, Do Not Disturb Honey Bee' sign."

This is where the center maintains colonies of Africanized Honey Bees, and Thompson is there to capture the sound of these killer bees for NPR. Both men are protected in beekeeper uniforms.

A distant drone begins in the background. Offhandedly, Buchmon remarks, "I've got two or three guard bees circling my head, so we're getting their attention. We're going to tap on their hive now. This is something you should *never* do with Africanized bees."

We hear a tapping on a wooden box; the pitch of the drone rises, and becomes more pronounced. The clarity of recording is remarkable; the individual wings of close-by bees is discernible from the angry mass. Occasionally a bee flies directly toward the listener at the panoramic center, and striking the Zeppelin, makes a typical listener flinch.

Buchmon continues. "Here they come, the bees are boiling out, the bottom part of the hive is black with them now. I've got 30 bees

See BEES, page 29 ▶

World Radio History

▶ BEES, continued from page 28

trying to sting my veil. I hope everything holds ... ugh, there's venom spraying into my face from the bees."

The drone now sounds like a sustained note on a violin. Bees smack into the Zeppelin like a steady rain, hitting, bouncing, renewing their attack on the two men.

"It's still a full-force attack," Buchmon remarks, the pitch of his voice rising slightly. "Each of us has at least 100 to 200 bees on the front of our veils trying to get in. You can smell that alarm pheromone — that scent of bananas — as they hit my veil. The carbon dioxide in my breath is really exciting them, increasing the attack. The bees are probing, trying to get in everywhere. Oh God, this is really unbelievable, this is really bad. I can barely see out of the front of my veil, there are so many bees."

By now the wide aural landscape is filled with bees, swarming, attacking, crawling — a bee audio version of "The Birds." It is what you don't see that makes you shudder.

Make a beeline out of there

Buchmon's voice betrays the strain of the attack. "They're hitting with such force. We're all being pummeled ... hitting us with a lot of force on the shoulders, on the arms, on the veils. I think we're about ready to call it quits, I've about had enough."

Thompson and Buchmon beat a retreat from the hive, and are followed for 50 yards by very, very angry bees. We hear the sound of their truck doors opening, and then the truck interior, driving away, with the sound of a hundred angry bees riding with them.

We caught up with Chuck Thompson to ask about this remarkable tape. How does one dress for a formal meeting with killer bees?

"Just a standard white beekeeper's uniform," he said, "but with a double veil. We had the standard pith helmet with a veil and a sturdy veil over that. But even with all that we still got stung about eight times."

Thompson said he recorded in encoded Mid-Side (M-S) using a Sennheiser MKH40 cardioid for the mono Mid and a MKH30 figure-8 for the Side, connected to a battery powered Sonosax SX-M2 mic preamp. A short stereo-mini cable ran the preamp output into the line input of a Sony D-3.

He said the Sonosax and this model Sony recorder made a functional match. "The Sony's physical profile matched the Sonosax exactly. The D-3 remained in its case, gaffer-taped to the Sonosax and Velcro'd to my photog's vest, all inside the bee suit. The only thing outside the bee suit were the cables, exiting by a zipper opening near the neckline."

Bee Researcher Dr. Steve Buchmon (top). Mean bees leave behind numerous stingers in Thompson's shoes (right).

His Banana Republic Photo Vest is his preferred carrier. "It vents well in both hot and cold climates, is lightweight and makes no acoustic noise."

He mounted a plain, fur-less Zeppelin on a monopole, plugged the mics together and was ready. Well, almost.

Earlier in the day, a kind of bee recording rehearsal was conducted at the research center colonies of milder, friendlier European Honey Bees. The D-3 was set into Record mode and secured with the Hold lock to lock out the transport controls.

Because the MKH30 and MKH40 have relatively high output, the Sonosax gain trims were gaffer-taped into minimal gain settings. The swarms of European bees gave Thompson the chance to check levels as well as the security of his beekeeper's suit.

When it came time to meet and greet the Africanized Honey Bees, the preparation began a mile away from the hives. Buchmon was fully dressed in his beekeeper's uniform, sans gloves. Thompson's uniform was still open, but he had headphones on and the equipment was Velcro'd into place.

"At this point, Dr. Buchmon started my D-3 for a record check," he said. "A full record-rewind-playback cycle to make sure we had working gear."

Satisfied, they gaffer-taped around ankles, wrists, veils and the opening where the mic cables snaked out to the Zeppelin, then double-checked all openings again. A short drive took them to the first gate, designed to stop vehicles, and only 100 yards from the killer bee colonies.

A second locked gate prevented humans from approaching the 13 plain-white box hives. Here, they were 25 yards from the hives, and where the recording fun really began. This was where Thompson said the first guard bees came to greet them.

Hi 'honey,' we're here

"When we opened up the gate," he recounted, "I was behind Steve, who approached the first hive. I have a rule when I work in the field: I never talk and I never make a sound. You get *one* chance to get the sound and you're done. Any piece of that sound may be 'The Important Piece of Audio.'"

When Buchmon rapped on the hive — an action an animal might take to get at the honey — Thompson was 3 feet from the bees' entrance, and noted that even the flight path of the Africanized bees differs from their European cousins.

"European bees glide in and out of their hive," he said, "and when the hive is threatened, perhaps 60 percent of the bees leave to defend it. These Africanized bees send *80 pe*, colony to defend their hive. They out of the hive like a huge wate, then immediately flew directly at us. They attacked aggressively and repeatedly. They completely ignored the Zeppelin, and keyed on our dark veil and our eyes."

The bees emit a scent that communicates an alarm to the rest of the hive. "A smell of bananas so thick you get nauseous, and then at once you get used to it and it seems to disappear."

The part that never made it to tape was when Buchmon walked to the remaining 12 hives and rapped on them. Thirteen colonies of killer bees became very upset and attacked to defend their hives.

Don't Worry, Bee Happy

With such apparent danger getting the sound, Thompson was satisfied that the finished piece conveyed anticipation, participation and relief — essential elements for really fine radio.

"The clarity of the unchaining the gate tied with the arrival of the guard bees makes the anticipation. The participation begins when Dr. Buchmon said, 'Here they come.' The sound intensity increased so much the listener could *feel* the bees," Thompson said. "The final moment when Dr. Buchmon said 'Let's get out of here' provided a sense of relief that you're not the only one who feels that.

"It makes our listeners a part of the expedition, as opposed to just listening. ... What the 'Radio Expedition' series and NPR tries to do with sound, is to use a sonic palette to make programming more vivid for our listeners," said Thompson.

Chuck Thompson did have one regret, which he delivered with a rueful grin. "I have made world-class recordings all over the Earth, of fabulous musicians and singers, and all anyone remembers of my work is 'The Killer Bee Recordings.'"

Until next month, I remain,

Your ob'n't eng'r

■■■

Rich Rarey is technical director of NPR's "Talk of the Nation," based in Washington.

Circle (219) On Reader Service Card

World Radio History

Mix IV Music Is Pretty in Pink

▶ MIX, continued from page 28

represented here; from the earliest black-and-white cartoons to all the weird stuff kids watch today.

As I scanned through the Industrial stuff, I was pretty impressed. Much of the music I regularly come across in this genre is too busy to use behind anything with a message. The Mix IV Industrials are very assertive and driving without being cluttered.

There are a lot of weird instrument mixes throughout the tracks on these discs but it all works really well. For instance, one of the A/C tracks mixes a hard-edged electric guitar against a flute. Strangely enough, it sounds great. Another track called "Magic Trunk" mixes calypso drums with a clarinet for a fun theme that would be great for anything kid-related.

My overall favorite sound is the strings. As far as I can tell they are synthesized strings, but wow! The sound is incredible.

Aside from the many stand-alone music beds in this library, my favorite aspect of the music is having the genuine article and not simply a poor rendition. I can have the actual "1812 Overture" and even the real "Wedding March."

I get a kick out of the way other music libraries title their wannabe tracks. Labels are no help when trying to locate something that sounds like something else.

I remember a track in one library called, "Dancing in the Street." You have heard the song, right? Well surprise, because the track was *supposed* to sound like Lionel Richie's mid-'80s "Dancing on the Ceiling," but didn't come close to either one. Go figure.

We have a music library at my station with a track called "Peanuts." This sounds nothing like the familiar Linus and Lucy theme from television. On the other hand, one track from The Mix IV collection called "Walnuts" sounds hauntingly familiar.

Insert effect here

The Mix IV also offers some cool sound effects, like a growling dinosaur thundering through the woods, 19th century city ambiance complete with horses and carriages, and lightning striking close by.

Recently I was searching for the sound of a frog jumping into an algae-filled pool. We did not have that sound effect available so I slowed down a single water drip 10 times to sound thick. It worked okay but it would have been nice to have had The Mix IV sound effect of "Thick, gloppy mud bubbles."

The Mix IV collection has an actual cellular phone ring, unlike the stock telephone sound effect I am used to, the old black rotary phone I had in my bedroom as a teenager.

When Halloween rolls around again, you can bet I will be ready with The Mix IV grosser-than-gross sound effects "Ax chop into body," "Head crunch" and "Slimy slither."

The effect of the F-15 jet flyby is not from the conventional "mile away" perspective either: it sounded so close-up, the sound engineer may as well have been sitting on the wing with a mic.

Waiting in the wings

Keep in mind that there is much more to Sound Ideas' catalog of libraries. The Mix I through V is the complete set in this series, with other collections waiting in the wings.

Sound Ideas offers the Sound Effects Superstore featuring everything from "Great Speeches of the 20th Century" to the soon-to-be-released original sound effects used in "The Bullwinkle Show."

Sound Ideas makes all its packages available royalty-free. Good; I don't know anybody who enjoys filling out "needle drop" logs that sometimes come with other libraries.

After working with this collection for a few weeks, I think it is safe to say whatever you may be looking for is likely to be found somewhere in The Mix.

■■■

For information, contact Sound Ideas in Ontario, Canada at (905) 886-5000 or circle Reader Service 177.

Sallie Schneider Sauber handles production at WATH/WXTQ, Athens, Ohio. Her profile of Oink Ink Radio was seen in the Dec. 10 RW.

Low-Cost, High-Quality Mic Preamp From dbx

When a smooth-sounding voice track is needed, nothing tops a dedicated mic processor to shape and sweeten the sound. The new 1086 mic preamp and processor from dbx does everything expected of a mic processor, and a little more.

The 1086 uses the proprietary dbx V2 VCA (voltage controlled amplifier), which has a wide dynamic range, very low distortion characteristics and almost immeasurable noise figures.

The preamp section includes +48 V phantom power for professional condenser mics, a variable frequency low-cut filter, phase reversal and a 20 dB pad.

Low and High Detail potentiometers provide two-band EQ to the signal, compensating for any weakness in the mic's response and adding extra depth to the voice talent.

Mic levels are visible on a backlit VU meter; the preamplifier stage can be used independently of the rest of the device via quarter-inch and XLR output jacks.

Classic dbx "OverEasy" compression is evident in the dynamics processing section of the 1086. The compressor can be switched to a hard-knee setting from the front panel. A built-in de-esser minimizes sibilance and is variable from 800 Hz to 10 kHz.

The expander/gate section is a carry-over from the dbx 1066 processor. This modifier has threshold and ratio controls, coupled to a two-part meter that shows the signal compared to the threshold level.

The special PeakStopPlus limiter is meant for overall speaker protection. The new design prevent unwanted transients from blowing drivers while minimizing the sine wave distortion often experienced in other "hard" limiters.

A notable option for the dbx 1086 mic preamp and processor is the Type IV digital output section, which was ported over from the company's Blue Series 704 model. This circuit offers the equivalent performance of 27-bit digital conversion for wide dynamic range and an analog sound. The output of the 1086 can be brought directly out into the digital domain and sent right into workstations or modular digital multitrack recorders.

Because the Type IV digital circuit is optional, the Dither and Shape switches visible in this picture are disabled and become active only when the option is installed.

Suggested pricing for the dbx 1086 is $749.95.

For information, contact dbx Professional Products in Utah at (801) 568-7660; fax (801) 568-7662; or circle **Reader Service 108**.

— Alan R. Peterson

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World Radio History

HE DARED TO GO THERE.

World Radio History

Home Improvement in the Studio

Alan R. Peterson

I am almost hesitant to give away this dark secret of my life. My favorite place to purchase home studio equipment has become the local home improvement center. The folks there have gotten to know me and wonder just what mad creation I am working on from one week to the next.

These are not simple run-of-the-mill shopping trips to buy track lights and RF-immune dimmers. I end up buying totally unrelated items which get glued, nailed, screwed and clamped together to form some mutant device that looks uglier than Medusa's kid brother but gets the job done. Even the "hardware professionals" at the local emporium get a good laugh out of my sculptures, but they can't deny the things actually work.

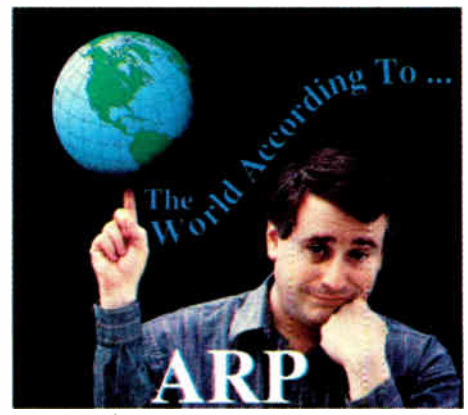
Inspiration

It is reassuring to know I'm not alone. Years ago, guitar wizard Les Paul built a disc recording lathe with a Cadillac flywheel as the turntable. Veterans returning home from World War II furnished their new houses with orange crates and cinder blocks. And John Bisset always has some great "make-do" stories in **RW**'s *Workbench* series.

Add to this equation that I am — how should I say this politely — "frugal" and find I have more time than money at my disposal, giving me the incentive to be inventive.

How frugal is "frugal?" One time, when my production library lacked a needed doorbell effect, I sneaked a cassette machine into the store to sample every doorbell on display. That may sound pathetic, but I got the sound I wanted.

There is nothing I would like more in the home rig than some nice studio furniture. I look at the ads we run and wish "if only ... " But because my studio is in my apartment dining room, I need something that can come down fast and be mobile if necessary.



Maybe I couldn't foot the cost of that polished oak trim and removable kick panels, but I *was* able to swing a 5-foot length of kitchen countertop and a pair of throw-together cabinets to support it. Total cost: maybe $70.

When my local music emporium couldn't get me a mic boom for two months, I dropped five bucks on PVC plumbing and a couple of brackets. It drooped from the weight of my Sennheiser 421, but it worked.

Soundproofing my small "studio" space could have been done with carpeting or heavy drapes. Some folks have used "eggcrate" foam rubber meant for bedding, claiming it works as well as the pricey stuff, which I don't agree with. However, I did find a dozen fiberglass ceiling tiles at a good price.

When the glued-on decorative vinyl surface is peeled away from the tile, a perfectly good fiberglass sound absorber is the result. Two peeled tiles, stacked face-to-face in a wooden frame and covered with some fine-weave decorative fabric (to look pretty and keep glass fibers inside) make an effective broadband absorber.

One time I sneaked a cassette machine into the store to sample every doorbell on display.

Manufactured tiles from acoustic specialty companies are far superior to my crude creation. I would buy the real ones in a second, but what the heck; I'm cheap, these were fun to make and they work.

Smile for the camera

I do a considerable amount of photography for **RW**, so weekly trips up and down the plumbing and electrical aisles are not uncommon. If I weren't so busy trying out impossible ideas on the floor, I'd stop and explain to the man next to me why I was force-fitting a toilet flange onto a flashgun.

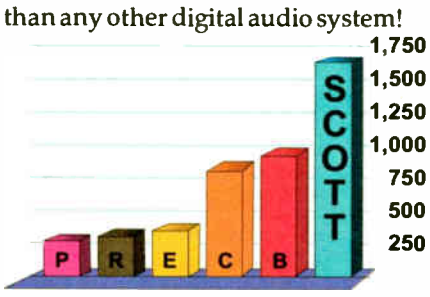
A two-inch PVC coupling can be bought for about $1.75. With a drop of alpha glue and some black paint, one became a $119 *macro tube*, used for ultra-close-up pictures of circuit boards. More plastic plumbing came together to make a frame for backdrops and a gold vinyl picnic tablecloth became a shiny surface to take product pictures against.

When we get to the Las Vegas NAB Show in a few more months, you will see my latest mad creation: a handheld crane for taking high overhead pictures. It is being made out of the same metal tubing

See ARP, page 36 ▶

The Best Digital Systems

More radio stations *choose Scott's* than any other digital audio system!



It's a fact: 1,600 radio stations use 3,600 Scott digital workstations, including *major* groups like CBS, Chancellor, Disney/ABC, Clear Channel, Emmis, Jacor and Citadel. More *Scott* stations win Air Personality of the Year Marconis and are Arbitron's highest rated in their formats!

Scott is the only U.S. supplier with:

- 47 *digital* employees, with
- 600 years Radio experience,
- 367 years Digital experience and
- 3 systems: Good, Better and Best!

Here's the user-friendly new Scott NT System, with 30 sets of 30 hot keys, phone editor, and all songs and spots on line for instant play! It delivers uncompressed digital audio at compressed prices!

Good Spot Box

Scott's new digital Spot Box triple-deck "cart" replacement delivers *true* CD quality sound. And Spot Box is the *easiest* digital system to use! There's only one screen, so jocks always know what's happening. At left, three players count down and flash End-of-Spot signals. Even though Scott uses Windows® 95 and NT, Spot Box works like carts, *not* a computer. At right, there's a "Wall of Carts" that lets you pick and play any recording by number or name. Or, number keys at the bottom load your cut quickly.

Starting at $5,000, Scott's Spot Box includes a recorder and touchscreen. Options include easy log imports from traffic computers.

Better AXS®

AXS® (pronounced ax'-cess) is radio's premier digital audio system for satellite or news/talk formats and CD automation. AXS® gives you instant play Hot Keys, log editing, Power Fill, satellite jock substitution, link to NPR's SOSS, an easy Real Time Scheduler, unattended net catching and an optional production or phone recorder and editor in the air studio.

Scott Studios offers AXS® satellite systems as low as $7,500 complete.

All Scott digital systems can send any voice tracks, spots, promos and songs to sister stations! Our Remote Recording Router automatically transfers via modem, Internet FTP, ISDN, WAN or Frame Relay Cloud.

Best Scott NT System

The Scott System is the first with a true 32-bit PCI digital audio card that plays *four uncompressed* stereo channels *with overlap* from one card *while recording!* It's radio's top-of-the-line system for digital music on hard drive. Scott's ROM deck digitally transfers 4-5 minute songs from audio CDs in only one minute!

Scott also offers an *Invincible* seamless redundancy option and other exclusive self-healing fail-safes. Regardless what happens, your spots and songs just keep on comin'!

Good, Better, Best. Scott Studios' three digital systems can be tailored to *your* needs and budget. Call or E-Mail info@scottstudios.com for details.

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Circle (52) On Reader Service Card

World Radio History

We're the #1 FM music station in Philly, probably because the Omnia completes our all-digital studio. Now, our sound is so loud, so clear... very well-defined with absolutely no grunge. And the Omnia is the one thing that my PD and I agree on. It's definitely a keeper."

Russ Mundschenk, Chief Engineer,
WBEB 101.1 FM, Philadelphia, PA

Russ dared to go where his competition isn't. Yet.

The all-digital Omnia.fm processor from Cutting Edge delivers all the clarity and precision of digital, with the fullness and depth of analog. Positively no grunge. And loudness that blows the suits right out of their... well, suits.

Demo the Omnia in your station for 60 days*. We think everyone will agree that the Omnia makes your station sound better than ever. If not, you have a money-back guarantee from Cutting Edge. Call 216.241.3343 or your Omnia dealer. Because this is where you want to go. Just ask Russ.

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delivered.

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E-MAIL: INFO@NOGRUNGE.COM
WWW.NOGRUNGE.COM

*Demo requests must be submitted as a purchase order. Terms are available from your Omnia dealer.

Circle (55) On Reader Service Card

World Radio History

PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to:
Radio World, c/o Studio Sessions Editor, P.O. Box 1214, Falls Church, VA. 22041

Aardvark Sync DA

The Aardvark Sync DA is a distribution amplifier designed to distribute low-jitter master clock signals to digital devices around an entire facility.

The Sync DA commonly is used with the Aardvark AardSync II master clock generator, but is flexible enough to distribute word clock and 256 Superclock signals from any digital device.

Word clock cable must remain under 15 feet to avoid jitter, so Aardvark added an AES/EBU input to distribute master clock signals to all rooms inside a facility. The Sync DA can resolve both word clock and Superclock from any AES/EBU signal source, and outputs six word clock lines to DAWs, DATs and digital mixers.

The Sync AD has a suggested price of $795.

*For information, contact Aardvark in Michigan at (313) 665-8899 or circle **Reader Service 151**.*

DigiTech Audio Processor

The new DigiTech Studio division of the Harman Music Group introduced the S100 full-featured multi-effects processor.

The S100 is a dual effect processor that can be configured in seven combinations of series or parallel patching for true stereo effects. A complement of reverbs, multi-tap delays, flanging, detuning and parametric EQ is included, and the S100 is MIDI-controllable for effect changes on-the-fly. There are 99 factory programs included and 99 memory locations for user-defined programs.

Signal-to-noise ratio is a quiet -96 dB and the S100 features 20-bit A/D and D/A converters. Connections are on quarter-inch jacks and a single MIDI IN jack connects to sequencers or digital mixers.

Suggested price of the DigiTech Studio S100 is $199.95.

*For information, contact DigiTech in Utah at (801) 566-8800 or circle **Reader Service 175**.*

GEPCO Speaker Cable

The new GSC132 high-definition speaker cable from GEPCO International is an expansion from the company's existing line of 13-gauge wire, and is designed for both pro and home use.

The GSC132 cable has high strand 52 x 30 bare copper conductors, insulated by a black and white PVC compound. Both conductors are surrounded by a round black jacket. Gepco says the flexible cable is tough enough for on-stage uses and is suitable for in-studio wiring of monitors and speaker cabinets.

*For information, contact GEPCO in Chicago at (312) 733-9555 or circle **Reader Service 199**.*

Maxell Audio Cassettes

Maxell Corp. has the MS Studio series of audio cassettes, available in several lengths.

The MS series has a Chromium

Dioxide (CrO_2) formulation which offers high-fidelity sound, low noise and low print-through and dropout properties. A high-endurance binder compound helps improve tape strength and offers improved heat resistance.

The cassette shell includes a resonance damping mechanism, a constant-height dual damping sheet and low-distortion screening shield.

Maxell MS cassettes are available in 20-, 30-, 60- and 90-minute lengths.

*For information, contact Maxell in New Jersey at (201) 794-5900 or circle **Reader Service 223**.*

dbx Mini-Compressor

Classic dbx compression is now in a much smaller enclosure with the

See PRODUCT GUIDE, page 35 ▶

A Console is a console is a console is a console is a console is a console... NOT

Logitek investigated the latest in digital technology, toured the world, spoke with countless people to develop the radio console for the digital age.

Logitek built a line of consoles that is truly different. Consoles ready for radio's digital age.

Logitek's digital consoles offer state of the art 32-bit internal processing with 20-bit A/D, D/A converters, along with sample rate converters making it easy to connect and mix all your analog & digital sources.

Logitek's consoles' unique ergonomic profile was conceived with hard disk storage systems in mind allowing for closer, easier to read monitors & line of sight for guests.

Logitek consoles are the affordable digital consoles you want. Find out why. Call today for your information kit.

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Visit our home page at www.logitekaudio.com for more information

Circle (76) On Reader Service Card

World Radio History

▶ PRODUCT GUIDE, continued from page 34

introduction of the MC6 Mini-Comp tabletop compressor.

The device, resembling a portable CD player, delivers the same compression as the dbx 160 line, but with several new features. The Dual-Mode Auto feature optimizes settings for vocals and music levels. True RMS power summing allows accurate phase tracking through the entire audio spectrum and dynamic range. The MC6 is a true stereo compressor.

Inputs and outputs are on balanced TRS jacks. A footswitch bypass jack parallels the front-panel Bypass button, allowing hands-free use. Rubber feet and a metal spring clip let the MC6 be mounted anywhere.

The palm-sized MC6 Mini-Comp compressor has a suggested price of $139.95.

For information, contact dbx in Utah at (801) 568-7660 or circle ***Reader Service 80.***

SONEX Sound Panels

At 6 inches thick, SONEXsuper panels from illbruck deliver more than twice the sound absorption of conventional foam surfaces.

SONEXsuper panels are sculpted from polyurethane with offset banks of 6-inch-deep anechoic wedges. The reference frequency of SONEXsuper is 250 Hz.

For Class I flammability compliance, the panels are also available in Willtec, a fiber-free melamine foam surface. The rated sound absorption coefficient ranges from .86 at 250 Hz to 1.20 at 4 kHz. Noise reduction coefficient (NRC) is 1.10.

Standard panel size is 1 square foot (12 by 12), with custom sizes manufactured on request.

Available colors are natural white and painted charcoal, beige, brown and light gray.

For information, contact illbruck in Minnesota at (612) 588-8396 or circle ***Reader Service 104.***

SHORT TAKE

Lexicon Effects Inside New Spirit Folio Mixer

In the past, Spirit by Soundcraft has turned out some impressive mixers, including the diminutive Folio with its distinctive purple case. Spirit has now released the Folio FX16: a 16-channel multipurpose mixer with built-in Lexicon effects processor.

The FX16 is a four-bus mixer with 16 mic/line inputs and 26 total inputs. All mic/line inputs have a Spirit UltraMic preamplifier with 60 dB of gain and +22 dBu headroom. Three-band "British" EQ with sweepable mids is available on each input.

Each input strip also features 100mm faders and four Auxiliary feeds. There are four stereo Returns with level controls, and a four-bus structure with two Subgroups out. An external power supply connects to the Folio FX16 via a four-pin XLR connector.

What makes the Spirit FX16 notable is the specially designed Lexicon digital processor in the upper right portion of the work surface. Sixteen programs include chorusing, reverb and delay, some with dual-effect capability. Parameters of each effect are variable and can be stored and recalled by the user.

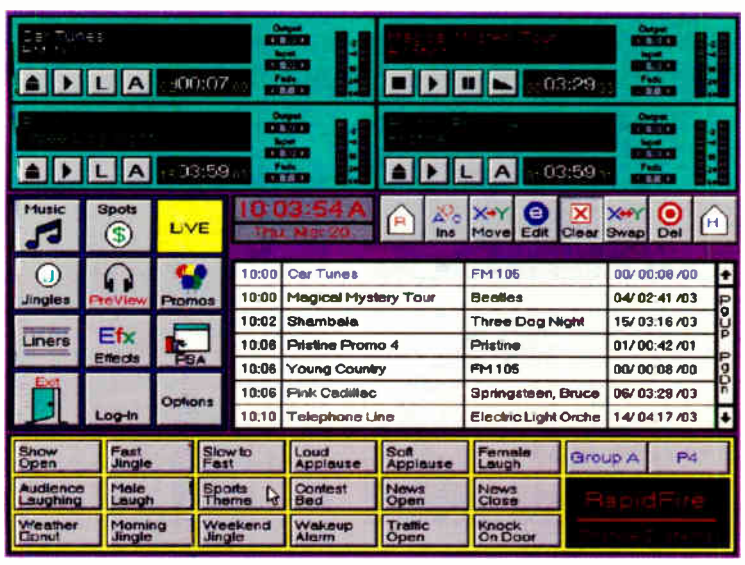
Mechanically, a rotating connector pod realigns the jacks for mounting the FX16 in a rack. An optional rack kit is needed and the FX16 takes up a 10U space.

The Spirit Folio FX16 is manufactured in the U.K. by Soundcraft and distributed in the U.S. by Spirit by Soundcraft. For information on the FX16, contact the company in California at (916) 630-3960 or circle **Reader Service 128.**

—Alan R. Peterson

Pristine
RAPIDFIRE "...it's fun to use!"

Satisfaction Guaranteed!



Pristine RapidFire is the industry's most powerful, fun to use, Digital Studio System! RapidFire will save you thousands of dollars over other high-end digital systems, while offering superior features and bulletproof reliability. RapidFire's *Quick Picks* make it easy to add or change music, commercials, promos, and last minute insertions simply by *point and shoot*. RapidFire masters live assist, walkaway, and satellite operations. Playback three audio sources simultaneously while recording a phone bit or timeshifting a network feed. Call us to find out how easy and affordable it is to harness the power of Pristine RapidFire for your station!

"**Pristine RapidFire** is great, it's fun to use! It's got everything a station would want in a digital system. We use RapidFire in both Live Assist and Auto modes, all day long and it never gives us any trouble."
Matt Sedota, WNMB, North Myrtle Beach, SC

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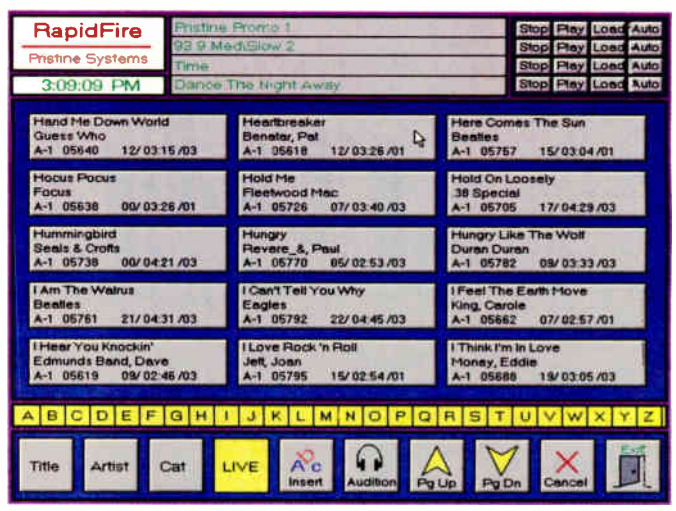
TECHNICAL SUPPORT 24 Hours



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Circle (100) On Reader Service Card

How Much Drive Space Is Enough?

When planning a computer-driven production room, you need also to plan how much hard drive storage is needed. A good rule of thumb: calculate the maximum time requirements you need for storing music and effects and enough space to accomplish all the projects you need to do in one week. Then *double* it to allow a little breathing room.

How much of a drive is needed? To figure out the capacity of a hard drive, multiply the sample rate by 2 (16-bit audio requires two bytes per sample), then again by 60 (to determine minutes). For stereo audio, multiply the product again by 2.

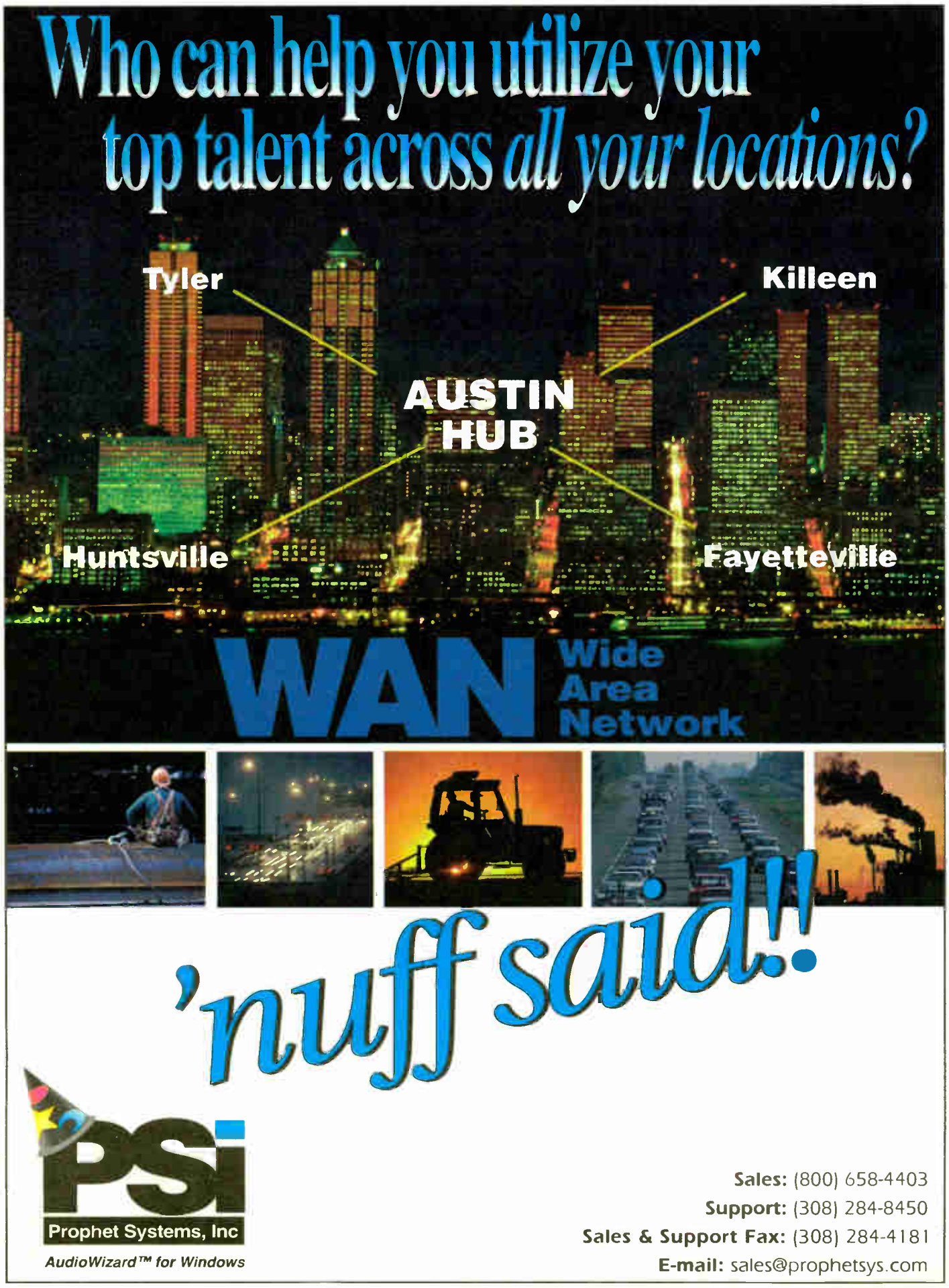
For example, a one-minute 44.1 kHz stereo WAV file takes up 44,100 x 2 x 2 x 60, or 10.584 MB. To calculate hours of storage, multiply this product again by 60. See how one hour of 44.1 kHz stereo audio occupies 635.04 MB of drive space.

Drive Size	32 kHz Mono	32 kHz Stereo	44.1 kHz Mono	44.1 kHz Stereo
1.6GB	6.94	3.47	5.04	2.52
2.1GB	9.11	4.55	6.61	3.30
3.2GB	13.88	6.94	10.08	5.04
4.3GB	18.66	9.33	13.54	6.77
5.25GB	22.78	11.39	16.53	8.26
6.4GB	27.77	13.88	20.15	10.07
9.1GB	39.50	19.75	28.66	14.33

To save on space, radio production is often sampled at 32 kHz. Voice tracks should be recorded in mono to likewise reduce storage requirements.

All times shown are for uncompressed audio. Data compression alters these figures in a manner consistent with the reduction ratio. Note too that some audio programs will "steal" additional space for ancillary data needed to draw the waveform; and "alias" files, which are 16-bit files generated from incompatible files sampled at another frequency and bit rate.

The table shown here displays several popular IDE drive sizes and the approximate linear 16-bit audio storage capacity of each, expressed in hours. Save this chart and refer to it when planning your storage needs in the production room.



Circle (124) On Reader Service Card

Fake It by Making It!

▶ ARP, continued from page 32

used to run underground wires to electric birdbaths and garden mood lighting.

I am not the only one having a good time doing this. For years, radio engineers have been finding inexpensive and creative ways of doing the impossible. I have admired and applauded their creativity on more than one occasion.

Sure it's their job, but I could tell that a few of them were secretly very pleased with themselves for their ingenuity.

One of the more elegant improvisations was a portable vocal booth, made out of three hollow-core lauan plywood doors (those cheap lightweight doors used on closets). All had heavy carpet remnants glued to them to deaden the surfaces and increase the mass.

When the doors were assembled in an open square shape, it was possible to record clean voice tracks even in the station's acoustically bright lunchroom. Total cost, including hinges, was maybe $65.

Pipe dreams

My PVC plumbing trick has not been lost on others. I know one fellow who has six feet of the wide-diameter stuff, which he uses as a *mic filter*. He talks down the tube with a mic at the other end and it sounds as if his voice is severely passband-filtered. Neat trick.

Admittedly, a number of my mad inventions have been dismal failures or were just lame to begin with. But I came up with them in the true radio spirit of "make do or do without" and with readily available parts meant for other purposes. In spite of my kooky handiwork, my pictures come out clean and sharp while the home studio looks silly but sounds good.

After two years of this, if I were to go back to the store and buy some PVC pipe to actually do some plumbing, they would probably think I was kidding them.

World Radio History

PRODUCER'S FILE

Fridge Is Tamed With Sorbothane

Ty Ford

Shaping a new audio environment can be a great problem-solving exercise. As I continue to develop the acoustics of my own new space, I have been challenged to come up with solutions to acoustical problems. Although the space is amazingly quiet already, there are a few areas that still need attention.

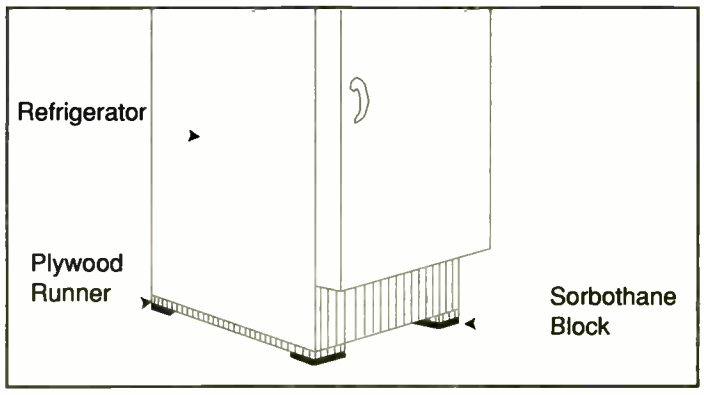
The most noticeable of these is noise from a refrigerator situated one floor above the studio. The compressor kicks in and the vibrations travel down through the floor joists to the supports that are part of a stairwell. The sound travels down the supports and radiates from the paneling covering the supports, much the way a piano soundboard would. The result: noise in the studio.

A friend mentioned Sorbothane, a product used to absorb vibrations for everything from industrial equipment to turntables.

Sorbo-what?

Sorbothane is a synthetic rubbery substance that comes in various sizes and shapes. I punched "sorbothane" into my Web search engine and found *www.sorbothane.com*. I got the phone number and called them.

I explained my application and the telephone representative suggested that four pads — each sized 4 by 4 by 1/2 inches — be obtained; one pad placed under each of the four legs of the fridge. I asked them about just getting one big sheet of Sorbothane the size of the refrigerator's footprint, but the rep said too much Sorbothane would not work as well because it needs a certain amount of vibration per volume to work properly. He also said the vibrating Sorbothane dissipates motion as heat, but that in this case the heat would be negligible.



Refrigerator is supported by plywood runners and half-inch-thick squares of Sorbothane.

Sorbothane uses a wholesale distributor retail chain. I spent the next half-hour finding out that the local retailer had a $50-60 minimum, and that it would take a few weeks because the retailer did not have it in stock. I called the distributor and pleaded my case. They had a $35 minimum (I wonder why the retailer had a higher minimum). Each sheet cost $7, so I bought five. They showed up within the week.

Hoist that icebox, matey

Now came the tricky part: getting the refrigerator up on the squares.

The easiest way was to cut two runners from 3/4-inch plywood. The runners were 5 to 6 inches wide and cut to the same dimension as the depth of the fridge. I used contact cement to bond the Sorbothane to each end of the plywood runners.

I also cut two small spacers to place between the baseboard and the rear edge of the runners. The spacers keep the runners on which the refrigerator sits from touching the wood baseboard, and kept the runners from shifting when the whole thing was pushed back.

I slid the refrigerator out, retrieved the almost empty bottle of Gilbey's 80 proof Vodka presumably lost by the property's previous owner, cleaned up a bit, the spacers and runners and slid the fridge into place.

Ba-da-boom, ba-da-bing. The job was done.

Did it work?

I repaired to the studio and opened the new Neumann TLM 103 that was in for evaluation (see **RW**, Dec. 24, 1997). I chose the TLM 103 because it is exceptionally quiet and sensitive, and I had used it to establish a noise baseline — a "before" picture, if you will.

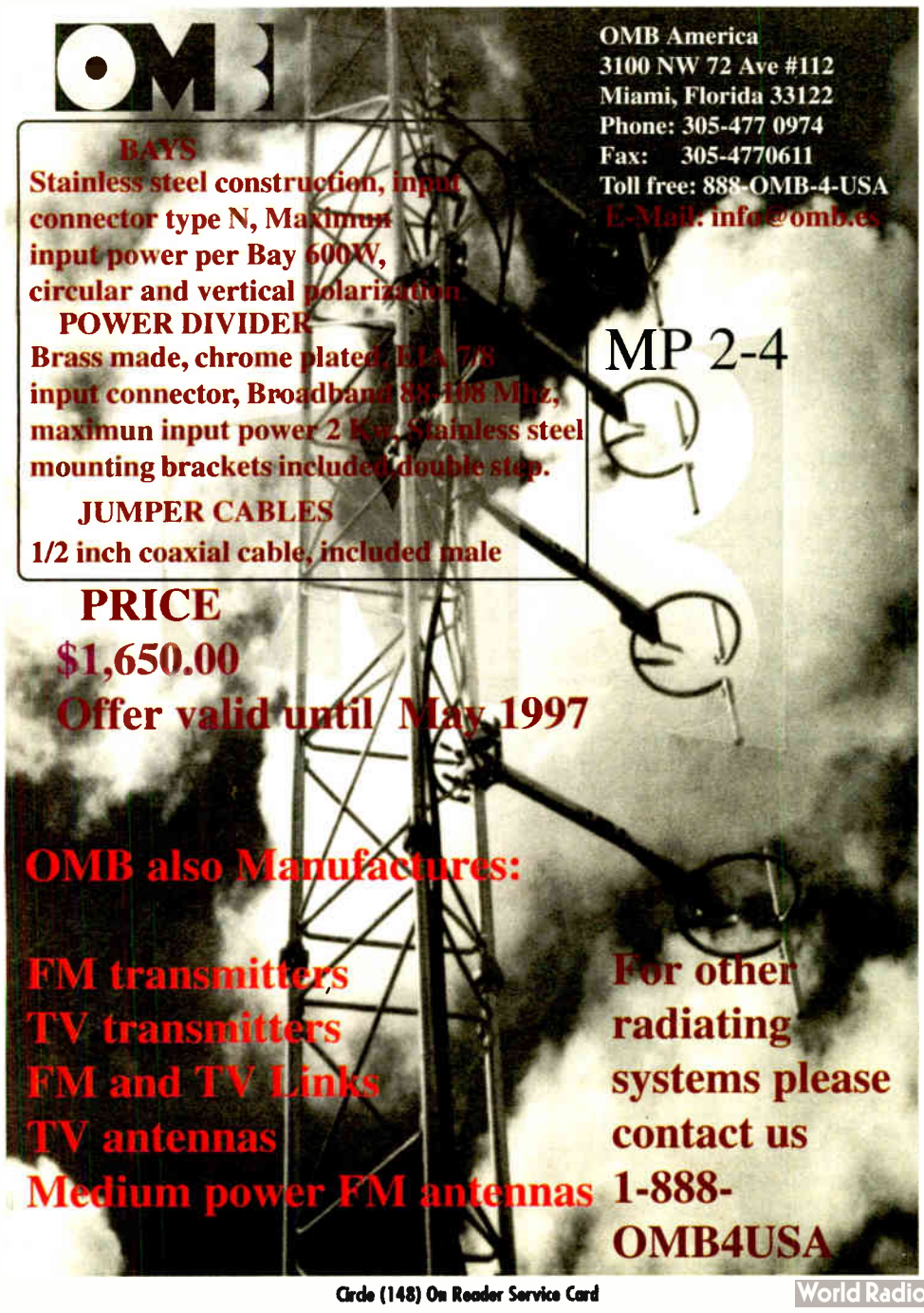
When the compressor on the refrigerator kicked in, I raised the mic gain and heard *almost* nothing.

Before Sorbothane, the noise had been low enough not to register on any of my meters, but it was audible under bare voice tracks. Before, I could hear the difference between voice tracks recorded with and without the compressor on. Now the fridge noise was low enough to get lost in the dithering noise of the workstation. Problem solved.

Now, the noisiest thing in the studio is the power transformer in my 23-year-old Crown D60 power amp. Because it had also developed some other quirks, I sent it back to Crown for an overhaul, but that's another story.

■ ■ ■

Ty Ford's new Web page has a TLM 103 mic demo sample, plus audio and video article archives. Check it out at www.jagunet.com/~tford



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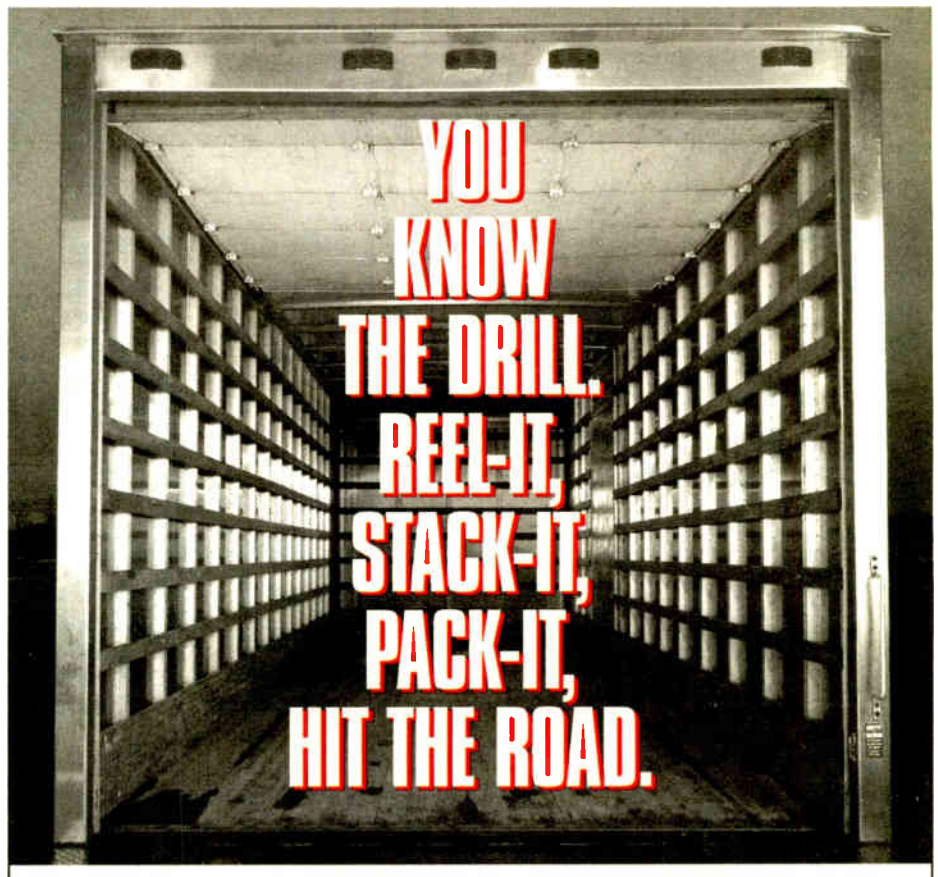

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World Radio History

DIGITAL DOMAIN

Why Is This Control Over Here?

Mel Lambert

While sitting in on a recent dubbing session for a well-known TV drama, it occurred to me how the tools we have available can impact the way we work.

Of course, I could just as easily have reached such conclusions during a jingle session or, for that matter, while watching a jock handle a complex phone-in sequence while preparing for the next stopset. But that is not my point.

The point of my stopping was to consider the elegance of what these two dubbing engineers were achieving at their digitally controlled analog mixer, linked to high-speed random-access digital audio workstation and non-linear video playback. They were able to interrogate and control a large number of complex functions from their centralized locations at the multi-input console.

Instincts

They had achieved a remarkably high degree of hand/eye coordination. Each knew confidently and instinctively where to find the proper transport controls for rewinding the master video source and where each signal source appeared on the control surface.

Now keep in mind these are the fellows who mix the CBS program "Brooklyn South" in a couple of days, and then move onto another high-impact production with a similar compliment of multi-channel dialog, effects and music tracks. There is no time for a missed control or a compromised mix balance.

But is radio production or on-air sound mixing really any different in its requirements? We have a multitude of sources, physical controls to which they must be allocate, meters and signal lights to watch, and a mono/stereo/surround mix that requires our critical attention.

However, watch an engineer working at even the best ergonomically designed production or air console and you immediately notice one thing (aside, that is, from a permanently harassed look on his/her face): There are perhaps a dozen controls that will be commanded on a regular basis and a larger number that are really just there for the ride.

Mine is not a plea for assignable designs, where different signal control functions can be laid onto a common set of faders, knobs, switches and similar apparatus. That is just half the equation, I would hazard. Instead, I am asking us to consider a more organic solution.

speed at DAWs, many stations have opted for dedicated hardware controllers that offer assignable faders, switches and other controls that make for more ergonomic sense than being forced to follow a mono-directional point-and-click paradigm.

Everything in its place

The possibilities of such a combination of electronic assignability coupled with customized physical construction are exciting, to say the least. Left- and right-handed board-ops would no longer have to compromise into working with a forced orientation.

Instead, a work surface could be designed for an individual engineer, with controls located in exactly the physical position that allows maximum speed in accessing the primary functions of the on-air or production system.

This assumes, of course, that the degree of customization does not totally preclude anybody else from using the same equipment, if that is the station requirement.

Why such a fastidious requirement for precise location of controls and indicators? I find that few hardware manufacturers fully understand the way in which operators function. Instead, we often see controls that are located — with all the best intentions, I assume — in compromised locations.

If there are controls that are accessed on a regular basis, they should be located within easy reach of our central monitoring and communications position.

If there are controls that are required to be accessed on a regular basis, they should be located close to our hands, within easy reach of our central monitoring and communications position. All of which can be achieved with a degree of assignability.

Foaming over

What I would like console and workstation manufacturers to consider, however, is a way of forming a customized relationship between the location of controls and our prehensile digits.

Consider for a moment a console that is constructed in *situ*, using some form of quick-setting, expandable foam — such as we now use to protect delicate electronic equipment — that is laid around pre-sited faders, buttons, switches and rotary controls spaced according to our reach, and which are nested in a way that suits their immediate purpose.

Such customized ergonomics are not unheard of in other sectors of the radio market. You are already quite familiar with the new generation of wraparound format keyboards for computer workstations. These can dramatically reduce wrist fatigue and more serious health hazards simply by allowing our hands to form a splayed rather than side-by-side orientation.

Likewise, there are many occasions when a mouse just gets in the way — no convenient flat surface, for example — for which a trackball to tracker-pad might be more appropriate. And for enhanced

Perhaps the metal work precluded the controls being placed anywhere else, or perhaps they always have been positioned there by the CAD/CAM operator.

Let me cite the example of tape machine and workstation transport controls that are placed in the middle of a panel, rather than where I think 99 percent of operators would like them — very close to the lower edge of the console, so that you never need to reach over other controls to operate the Play, Stop, FFW and RWD keys.

What about the location of shuttle and scrub knobs? They always seem too far away from us. And why are EQ, Aux, Cue, Sends and dynamics controls often located so far up a module strip or central assignment area?

There are plenty more instances of "If only the designers had paid attention I could get the job done faster" compromises. Maybe such a "work surface Erector Set" would streamline a large number of radio operations.

Let me know what you think of the idea.

■ ■ ■

Mel Lambert has been involved with production and broadcast for several decades. Now principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry, he can be reached via mediapr@earthlink.net *or (818) 753-9510.*

***RW** welcomes dialog and opposing viewpoints on this issue.*

Circle (156) On Reader Service Card

World Radio History

Running Radio

Radio World | Resource for Business, Programming & Sales | January 21, 1998

Top 40 Still Plays the Hits

Bob Rusk

There is so much pop music being produced today that it sometimes seems there are 40 different kinds of top 40 radio.

Almost none of it, interestingly, is categorized as top 40 music. There's urban, rhythmic, rock, contemporary hits, adult contemporary, adult alternative, and the beat goes on. Somewhere in there you'll find adult top 40 — a distant cousin of the format that ruled AM radio throughout the 1960s and '70s.

Musically speaking, top 40 was all things to all people. In 1978, for example, easy listening crooner Johnny Mathis and "bad boy" rockers The Rolling Stones each scored No. 1 million-sellers on top 40 radio.

"Years ago you could look at the top 40 chart and expect to hear those 40 songs on any station that called itself top 40," said Jerry Wise, program director at WKXA-FM in Findlay, Ohio. "It was truly a mass appeal format."

But with increased competition and more stations nationwide, there was a major splintering of the format in the 1980s, forcing program directors to tighten their playlists and focus on a very specific genre of music.

"The most defined of the top 40 splinter formats are rhythmic CHR, pop/alternative top 40, and pop CHR," said Wise. "Rhythmic would consist of dance and urban core artists like Blackstreet and Somethin' for the People. The pop/alternative stations focus on artists like the Wallflowers, Blues Traveler and the Dave Matthews Band."

Pop CHR stations are the closest thing to what used to be top 40, playing the hits regardless of genre, by such diverse acts as LeAnn Rimes, Alanis Morissette, and Will Smith.

With so many styles of music, which often times cross format lines, it is nearly impossible to pigeonhole stations.

"It's hard for me to label WKXA, but I'd call (us) either adult top 40 or hot AC — maybe even pop/alternative," said Wise. "We really don't sound like any one specific chart. That doesn't bother me. We do what we do, and have been extremely successful at it — and that's what really matters."

According to BIA Research, today just 46 radio stations in the United States have a format that can be called top 40. By comparison, BIA studies show there are 224 CHR-formatted stations. One of the stations BIA puts into the latter category, however, WWZZ(FM) in Washington, considers itself "rhythmic-leaning" top 40; but according to program director Dale O'Brian, CHR and top 40 are synonymous.

"Depending on what you use the label for, top 40 is a pretty generic term for CHR stations," said O'Brian. "A lot of people don't like to use the term 'top 40' because it denotes a teen-sounding product, which may or may not be the case.

"In our case, we target 18 to 34-year olds, but mostly 18 to 24. We're a young sounding, adult station. Kids are always going to listen to a top 40 station. That's the kind of music that they like. You don't want to do anything to run them off, but don't want to do anything to overtly play to them, either."

Many radio station programmers use the term 'top 40' to describe the format to peers in the industry, but use CHR when they position it to advertising agencies, which covet young adults with spendable income.

"The agencies are accustomed to seeing the three letters, CHR, and know at a glance what that means," said O'Brian.

One of the greatest strengths of top 40 radio is the ability to attract a large cume — the number of listeners counted during an entire week — as opposed to the number of listeners in an average quarter hour.

"Top 40 was built on cume," said O'Brian. "Cume is what top 40 radio is all about. It's hard to tell sales people that and it's hard to teach advertisers that. With top 40, we have thousands and thousands of repeat customers who come to us again and again. The whole thing about TSL (time spent listening) and average quarter hour (share) is old. People need to rethink the way they sell it. In today's world there are so many choices. It's not practical to expect listeners to stay with one radio station for an inordinate amount of time."

Bonneville International-owned WWZZ, which previously played '70s oldies, switched to top 40 about two years ago, and has quickly built one of the strongest cumes in the Washington market.

Musical chairs

The consolidation of the radio industry, with single groups owning up to eight stations in one market, has played a key role in the fragmentation of the top 40 format. In order not to program the same kind of music, and not compete against themselves, there was a huge demand for a variety of new formats.

People need to rethink the way they sell (top 40).

— Dale O'Brian

"When you have so many radio stations under one roof, you can say, 'let's own this market,'" said former top 40 program director Jan Jeffries, now vice president/programming of Atlanta-based consulting firm B/D & A.

But the changes are also a reflection of how much all areas of our lives have changed in recent years.

"Just go to the grocery store," said independent record promoter Don Anti. "There's non-fat, sugarless, diet this, diet that. Like everything else, music has grown. There's top 40 AC, top 40 mainstream, top 40 rhythm. In order to get a real view of it, you have to divide up the charts. There's so much more music now."

With groups like Hanson and the Spice Girls bolting up the charts, 1997 was a very good year for top 40 radio and the trend should continue in 1998, said consultant Randy Lane. He called top 40 "songs from a variety of music styles that are accepted by the mainstream."

WKXA program director Wise perhaps offered the best suggestion when he said people should enjoy the music without worrying too much about categorizing it.

"Top 40 is like art," he said. "You can recognize it when you hear it, but if you're asked to describe it, it's next to impossible. I don't really think there is a consensus on what the format should sound like. There are many great stations doing their own versions of top 40, and I think there is room for all of them."

Circle (196) On Reader Service Card

World Radio History

NBG Radio Network Hires Barbara Oshiro

Barbara Oshiro joins **NBG Radio Network** in the affiliate relations division. Oshiro's duties will include expanding the number of affiliates airing NBG programming, plus taking responsibility for HTML computer programming. She is a former employee of The Starlight Foundation, London.

NBG Radio Network is a division of Nostalgia Broadcasting Corp. and syndicates 20 national radio programs heard on more than 1,500 U.S. radio stations.

Andrew Appoints Group President

The Antenna Systems group of **Andrew Corp.** has a new president. **Debra Buck Huttenburg** was appointed to manage worldwide sales and distribution of Andrew products.

Huttenburg has been with Andrew since 1988 and has held various positions, including vice president, Antenna Systems, her most recent position prior to the promotion.

Andrew is a global supplier of communications systems equipment and services, including broadcast, cellular, personal communications services, land mobile radio and common carrier.

ABC Radio in L.A.

John Hare, group president, **ABC Radio Stations**, announced that **Bill Sommers** has been named president and general manager of KABC(AM), KTZN(AM) and KLOS(FM) in Los Angeles. Sommers succeeds Maureen Lesourd.

Sommers was with ABC and KLOS(FM) from 1973 to 1996, when he retired and relocated to Idaho. During his tenure with KLOS(FM), the station won three Marconi Awards and the Crystal Award, both presented by the National Association of Broadcasters for outstanding achievement in radio.

B-E Appoints Production Manager

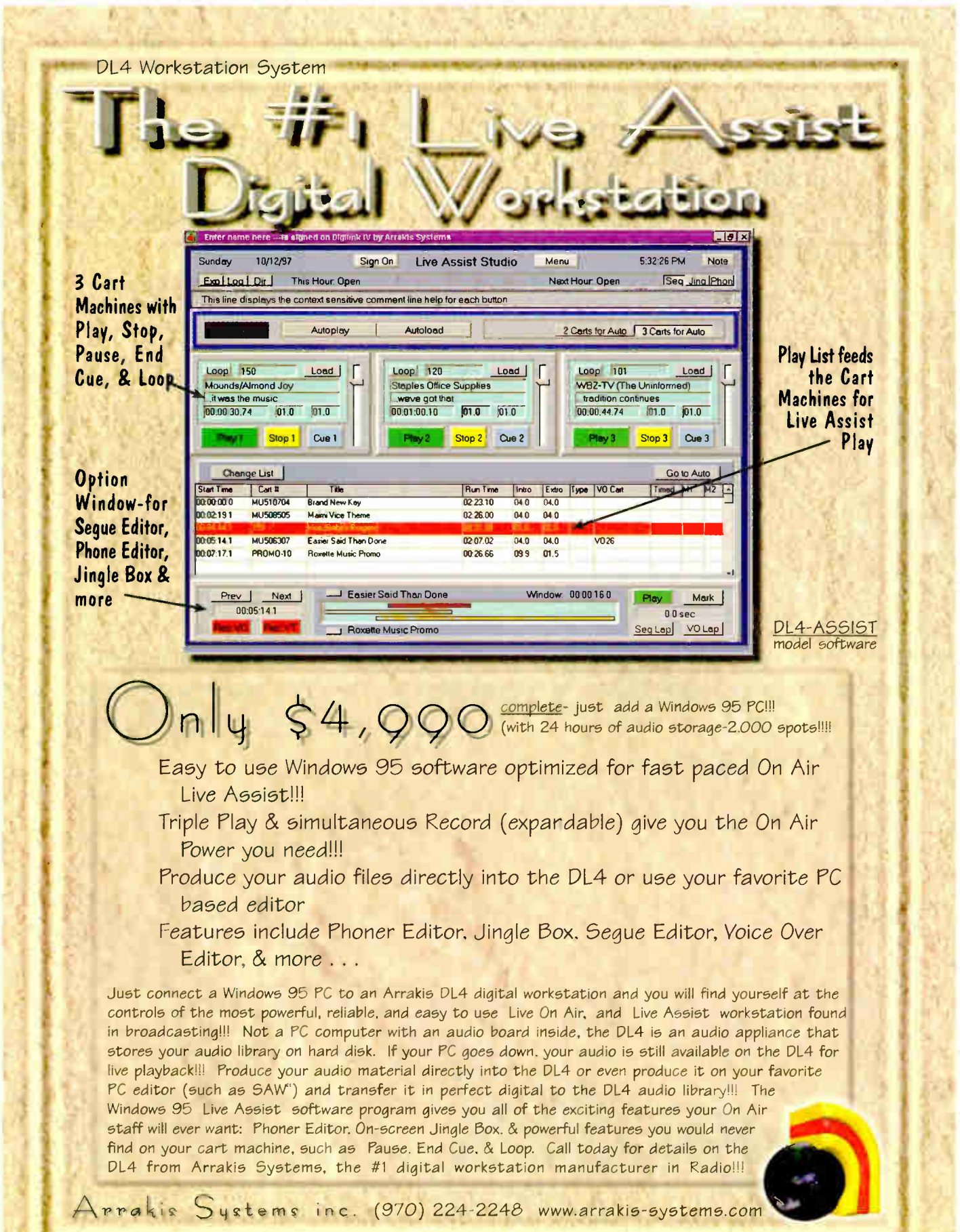
The Quincy, Ill., facility appointed **Sam Bartley** production manager for **Broadcast Electronics.** Bartley will plan, direct and maintain all production operations within the Quincy facility while meeting goals in efficiency, profit and quality.

B-E manufactures transmitters, digital audio management systems and other products for radio.

Sommers Returns to One-On-One Ups Snyder

One-On-One Sports Inc. named former Paxson Sports President **Bob Snyder** as interim general manager.

Snyder supervised the start-up phase of WCMQ(AM), the fifth station owned and operated by One-On-One Sports. Other One-On-One Sports properties are WHEN(AM) in New York, KXMG(AM) in Los Angeles, WEJM(AM) in Chicago and WNRB(AM) in Boston.



Positive Signs for Kids' Radio?

Although there have been some setbacks, the market for children's radio could be on the upswing (see "Kids Radio Not All Fun And Games," **RW**, Nov. 26, 1997). Until recently, children were not given much consideration as radio consumers, but a number of factors, compiled in a recent Interep survey, are changing that perception.

According to a 1995 report from the U.S. Department of Agriculture, children are responsible for spending about $27.1 billion each year, as well as influencing about $117.1 billion in spending among adults.

In families with two working parents, children are becoming independent earlier and as a result, are more involved with household and purchasing decisions. Advertisers are left with the important decision of which medium they should use to pitch their products to children.

The formerly coveted Saturday morning television slot is no longer the most desirable option for advertisers, with large declines in ratings over the last few years. Like many adults, children are not spending as much time at home, and unlike television, radio is mobile. According to Michele Skettino of Interep, "Radio is one of the only targeted media that still has this type of growth opportunity available. We are looking into an entire untapped demo that will pull in almost $1 billion in ad dollars this year."

Unlike other ill-fated attempts at kids' radio such as the "Rabbit Ears Radio" program and the 24-hour "Radio Aahs" format, Radio Disney actually may be successful in gaining the advertising sponsorship needed to break through this previously impenetrable market. Companies such as Hershey's, McDonald's and Quaker have made major ad buys on the network.

— Stephanie Muller

Circle (220) On Reader Service Card

World Radio History

Nobody Does Decks Like Denon

Let's face it. When it comes to selecting CD and MiniDisc products for studio applications, it doesn't make any sense to work with consumer decks in a +4 dBu environment. Denon, the first name in digital, has developed the DN-C680 CD Player, DN-M1050R MiniDisc Player/Recorder and DN-T620 Combi-Deck specifically for these demanding applications.

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- External Control (Serial RS-232C/ 422A, 9-pin, Parallel 25-pin)

DN-T620 Combi-Deck (CD & Cassette Deck)

- Variable Pitch +/- 12%
- Record CD to Cassette
- XLR Balanced I/O
- Dolby B Noise Reduction
- Wired Remote Control Terminal
- Cue To Music (CD)
- Auto Repeat (Cassette Deck)

DN-C680 CD Player

- AES/EBU, SPDIF, Balanced and Unbalanced Analog Out
- Optional SMPTE Kit and FS Converter Kit
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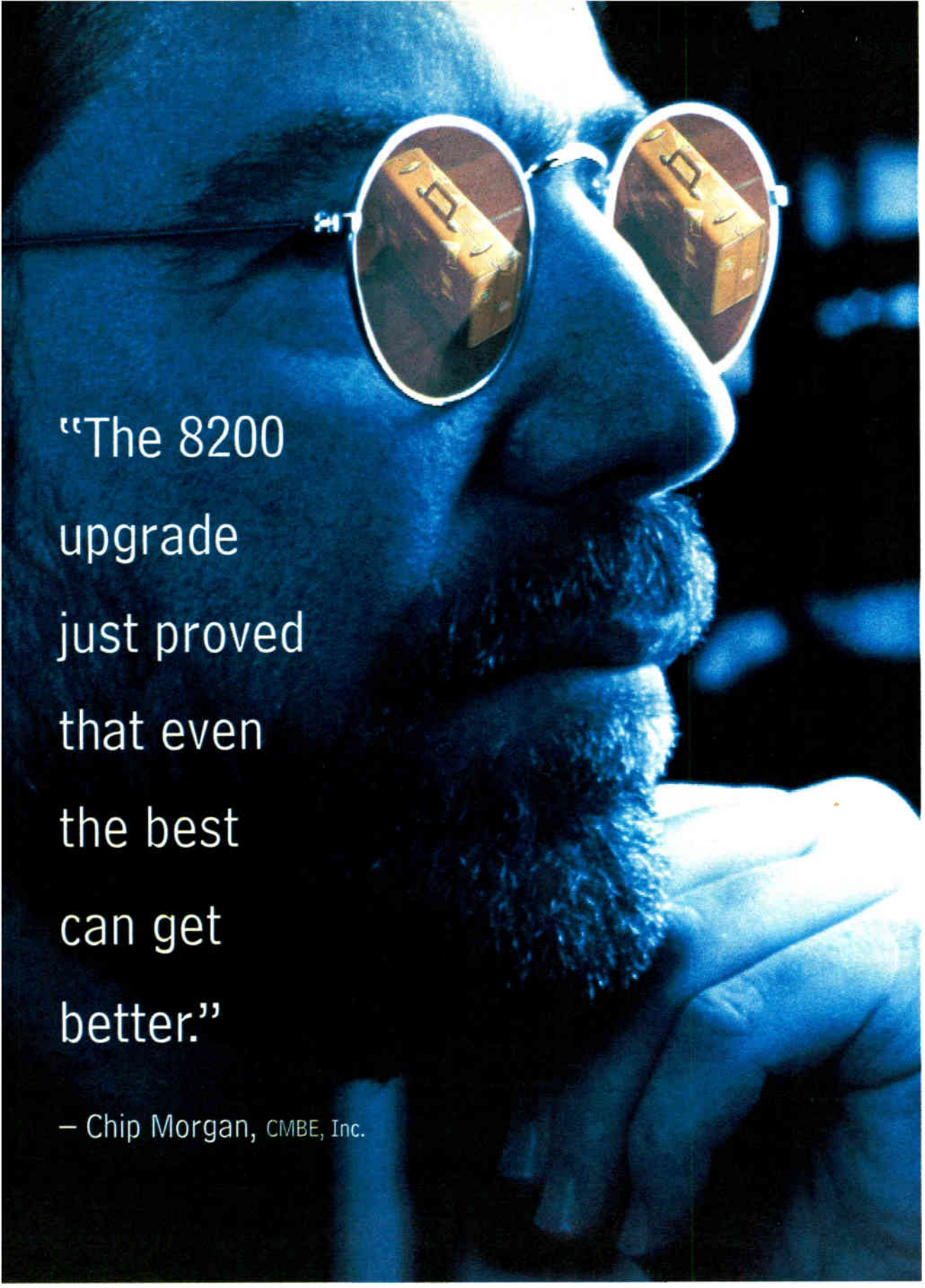
World Radio History



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World Radio History

NEWS ANALYSIS

Radio Takes a Breather During Q4

Lynn Meadows

Despite the shortage of glitzy big group sales announcements in the fourth quarter of 1997, there was plenty to talk about. On the upside, advertising earnings and radio stock prices continued to increase. On the other hand, after sizing up the long-lasting radio success party — and a merger in Long Island — the Department of Justice showed up with its long-awaited, large, wet blanket.

A house in order

As it typically is, fourth quarter was a period for cleaning house. The 75-year-old name of Westinghouse radio was swept right out the door when the historic group became CBS (NYSE:CBS) on Dec. 1. Originally, CEO Michael Jordan had planned to split the company into one manufacturing business and one media business.

That plan was modified: CBS now has to divest only the Westinghouse Electric Company, which is comprised of nuclear related businesses. A spokesman said the intention is to sell that "very vibrant unit" to a U.S. company in the first half of 1998.

Meanwhile, Jacor (NASDAQ:JCOR), which was rumored early in the quarter to be a seller, purchased the 17 Nationwide Communications radio stations in October for $620 million. Triathlon Broadcasting went up for sale. ABC neither bought nor sold.

One relative newcomer, Cumulus Media, ratcheted into spot number 20 on the BIA list in the fourth quarter. One industry observer agreed that the group, backed by a Milwaukee investment firm, had distinguished itself as a buyer, but noted that it now remains to be seen how the group performs as an operator.

No bombshells

All told, there were no shocking announcements like those that ended the third quarter. The big news in consolidation was that the Department of Justice would go head to head with Chancellor over its pending acquisition of SFX. The agency is taking the groups to court to block a merger on Long Island where Chancellor (NASDAQ:AMFM) and SFX (NASDAQ:SFXBA) control more than 65 percent of the market.

"These stations have been locked in daily competitive battle. This deal will end the battle and consumers will lose," said Joel Klein, assistant attorney general in charge of the Antitrust Division. Many see this court battle as an opportunity to prove that radio does not just compete against radio. It is likely to bring a landmark court decision and one that will affect how independent radio operators feel about staying in the business.

For now, said Steven Pruett, senior vice president of the New York-based investment bankers Communications Equity Associates, the case was giving large groups something to think about.

"Anybody that might have had a Justice issue started to look pretty hard at their situation. It's on the tip of everybody's tongue that's in an acquisition and a consolidation mode," he said. "That's where the focus was in fourth quarter."

Peter Bowman, vice president of BIA Research, noted that the drop in sales activity was surprising given the lower interest rates and capital gains taxes.

"The specter of the DOJ may even be behind the ebb in fourth quarter deal flow (see table)."

Bowman said the slowdown could be related to other factors such as a "paucity of stations available for sale" or the "shrinking number of buyers."

Furthermore, he said, some buyers may be resistant to paying multiples in the low to high teens for 1998 cash flow.

"I suspect ... that the explanation is simpler," Bowman said, "and that we may just be enjoying a temporary respite, a break between rounds, with the most aggressive consolidators catching their breath before the next buying spree."

Radio Station Transaction Volume
All Markets, 1997 *(through Dec. 23)*

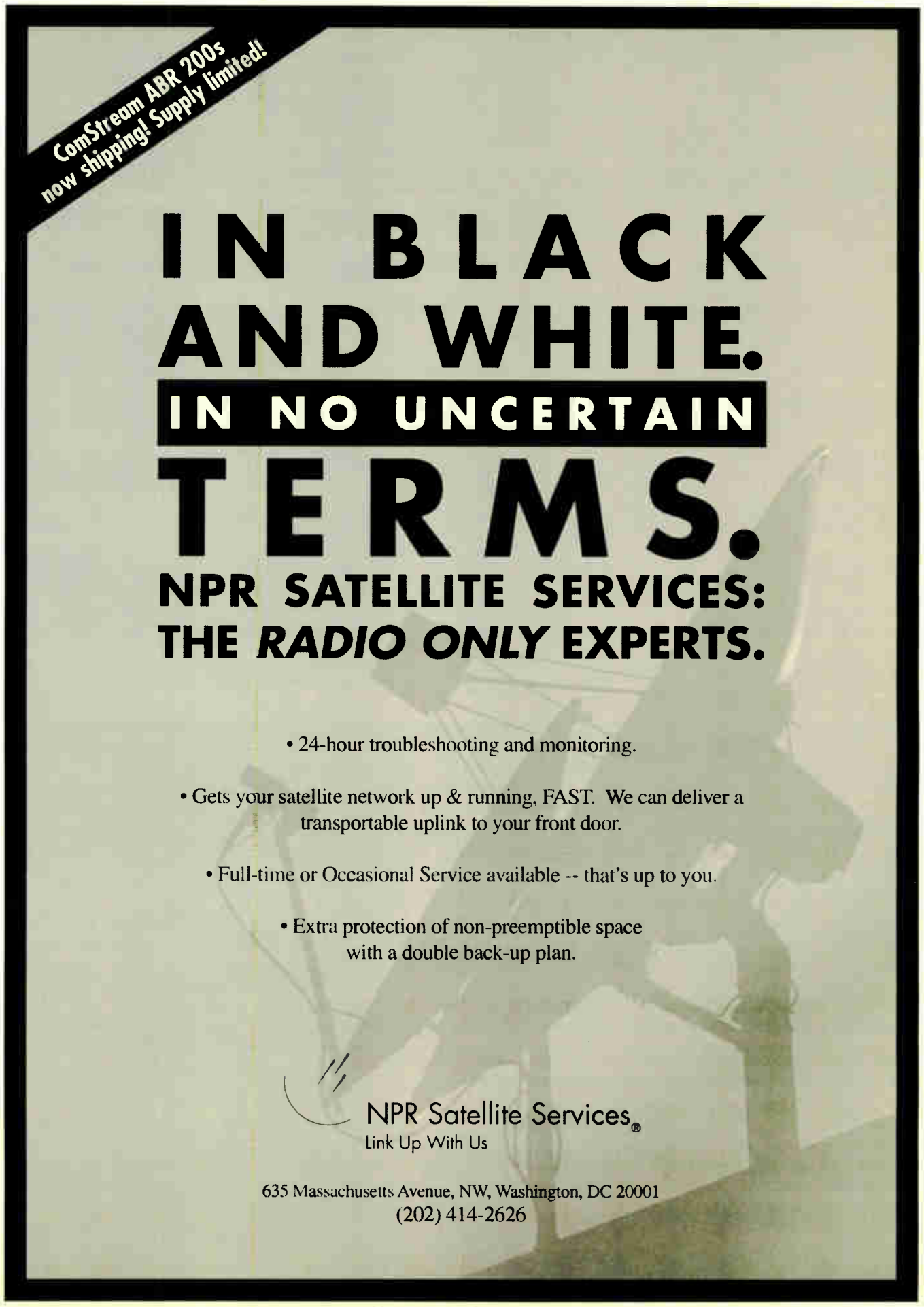
Period	No. Stations Sold	SalesVolume (in mil.)
1st Quarter	638	$7,866
2nd Quarter	594	$2,698
3rd Quarter	621	$5,925
4th Quarter	326	$1,400
Total	2,179	$17,889

Source: BIA Consulting, Inc.

As in the preceding quarters, radio groups continued to look elsewhere for symbiotic business partners. In October, Clear Channel (NYSE:CCU) announced it would buy Universal Outdoor Holdings, a buy that will give the company 88,000 display faces in 31 markets across the United States.

Later in the quarter, American Tower Corp., in which Clear Channel owns a 31 percent interest, announced it would merge with American Tower Systems. That will happen after CBS completes its purchase of American Radio Systems of which ATS is currently a subsidiary.

See Q4, page 45 ▶



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World Radio History

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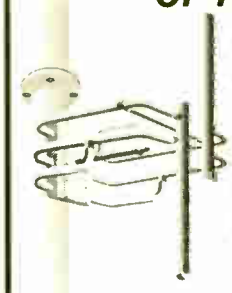

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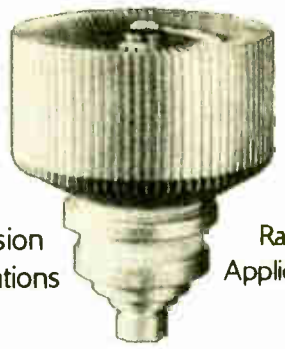

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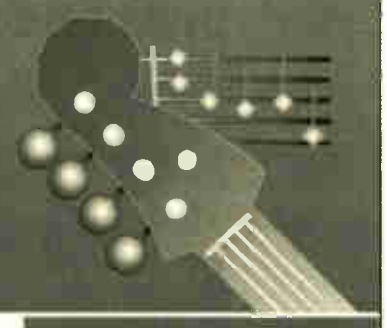

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READER SERVICE NO. 23

World Radio History

Signs of Strength as Year Ends

▶ Q4, continued from page 43

On Wall Street, radio was still a sweetheart. Several groups were removed from the CreditWatch that Standard & Poor's had put them on earlier.

CBS reached its 52-week high this quarter when its price topped $32 per share. The 52-week low was $16. Two days after shedding the Westinghouse name, Morgan Stanley downgraded its CBS rating from "outperform" to "neutral."

Number two Chancellor Media Corp. declared a two-for-one split of its Common Stock on Dec. 18. The dividend was scheduled to be paid Jan. 12. The company "enters 1998 on strong footing," said CEO Scott K. Ginsburg. In 1997, Chancellor Broadcasting merged with Evergreen Media and diversified with the formation of the AMFM Radio Networks in the fourth quarter and the purchase of Katz Media last summer. Standard & Poor's removed the company from its CreditWatch in mid-November.

Heftel Broadcasting Corp. (NASDAQ:HBCCA) also announced a two-for-one stock split on common stock this quarter. The group announced it would exchange WPAT(AM), New York for WNWK(FM), New Jersey and $115 million.

Sinclair Broadcast Group (NASDAQ:SBGI), which grew bigger this quarter with the pending acquisition of radio and television properties from Max Media also was removed from the Standard & Poor's CreditWatch. The group was placed on watch in July after its announcement that it would purchase Heritage Media Corp. from News Corp for $630 million.

Good health

Radio advertising last summer rolled right past the five-year mark of consecutively increasing revenues and followed with more of the same in the fourth quarter.

"We are on our 62nd consecutive month of up revenues. It is unlikely that we will see any lessening of the pace," said Judy Carlough, executive vice president of the RAB. "Fourth quarter is healthy and the fourth quarter, I think, is definitely the shadow of things to come for next year."

Carlough cited the deregulation of the prescription drug industry as big advertising news in the fourth quarter. For

Joel Klein

years, required disclaimers had precluded brand-name drug owners from doing broadcast commercials. The Food and Drug Administration lifted those requirements, prompting drug makers to begin plying their wares on the air.

Trough Keller, senior vice president of sales and marketing for ABC Radio, said that spending was up in a lot of categories in fourth quarter including wine advertising, television tune-in advertising and the lodging business.

Keller also said that packaged goods advertising continues to increase over where it was a couple of years ago. He credited that to how fragmented television becomes at night. Brand managers still need to have a share of voice out there for products, Keller said, and national radio is serving that purpose.

Stewart Yaguda, president of Radio 2000 at Interep, said the rep firm did about $73 million dollars in new business in 1997 and was up about 50 percent over last year in new business.

One area Interep is working to develop is advertising for the Internet on radio, he said.

"Where there's change, radio is there," Yaguda said. "When advertisers want fast action, they do turn to radio. We're starting to see it in some areas like car leasing, like telecommunications."

Liquor continues to be an interesting and prickly area for radio advertising.

"We're getting an awful lot of inquiries from advertisers," Yaguda said. "The issue is that a lot of stations just won't take it." He said major broadcasters in major markets are saying no. Some of the smaller broadcasters are accepting it.

"It's up to the stations. If they don't feel like it's the right thing to do, that's their prerogative."

Maybe next quarter.

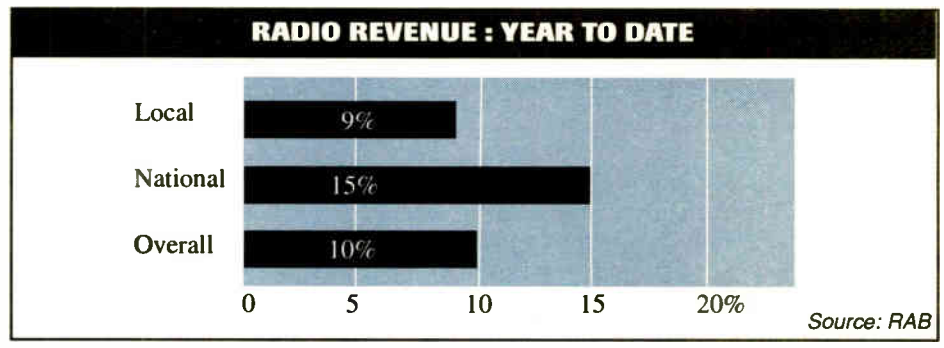
■ ■ ■

Lynn Meadows is a freelance writer based in Chesapeake, Va.

Below are the stock prices for the top 10 owners (at time of publication), showing the price at the beginning of the fourth quarter and ending on Dec. 29.

The group rankings are provided by BIA; stock prices are from other resources.

Group	Oct. 1	Dec. 29
CBS	27 1/16	28 1/16
Chancellor	52 5/8	69 1/2
Capstar		Not traded
Jacor	44 3/16	52 1/2
Clear Channel	64 7/8	77 3/4
ABC (Disney)	80 5/8	97
Cox	27 9/16	39 5/16
Sinclair	40 3/8	45 3/4
Emmis	47 3/4	44
Heftel	75 3/4	44



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World Radio History

STATION FINANCING

The Art of Negotiation Etiquette

Dain Schult

Our discussion to date in this series has focused on the financial side of the deal as it relates to pricing your first station and the various sources of funding you can use in its purchase.

Let's explore another facet of the deal — negotiation etiquette. This isn't something for which Miss Manners will be able to help. In fact, I am unaware of any book or manual in existence that spells out the rules of engagement for negotiating with radio station sellers.

Trial and error is all I know and hopefully I can help you avoid some of the bigger gaffes (or "fox paws" as they would say where I come from) by sharing my personal experiences.

Qualified to buy

Negotiating with smaller market station owners is like trying to convince an adoption agency that you're qualified to raise a child. To the mom and pop owner, that station is the only child in the family that never grew out of diapers, went off to school, got married and left for good. The sales price normally has a layer of sentimental value attached to it that refuses to show up on the financial statements. It is imperative to gently work on reducing that part of the price.

The smaller the market, the slower your moves should be. Come in as a city slicker-type and your chances for romancing the tubes diminish greatly. There is no need to overdress; leave the fancy suits and ties behind. Dress casual but neat when you meet with the seller (and broker, if one is or will be involved).

In most cases, the seller will want to meet with you face-to-face before giving you a tour of the station facility. The station visit has to be handled with the utmost care. The larger the staff, the more likely it will be that problems will arise should anyone discern who you really are. Paranoia and gossip can work against you at every turn and curve. I have been introduced to staffs as a friend of the family, insurance agent checking for smoke detectors and alarms, consultant (all types), broadcaster passing through town who wanted to see the latest computer system installation in the control room, and everything short of long-lost brother or PI looking for Elvis.

I'd love to tell you that all of these ruses work, but nothing works consistently. It is a crap shoot in this business these days for a seller to escort any stranger through his or her station. In an age where every station is in play to be bought, what is the staff to think? What is always haunting to me is that "deer in the headlights" look you will get from some of the staff. It has that "I know why you're here, but I can't bring myself to admit it because I'm in denial" look and feel to it. Unfortunately, it is the nature of our business today. I wish there was some way to eliminate it, but as long as inspections are a part of the negotiating process, (and who would buy a station sight unseen?) it is destined to continue.

It helps to keep direct eye contact with any of the employees to an absolute minimum. Act interested in the equipment but don't ask any questions around the employees which they might feel compelled to answer. Don't scowl or frown — smile gently as you walk through the station. Traditionally, the tour culminates by heading back to the general manager's office, which doubles for the owner's office and initiating the due-diligence process. Try, if you can, to limit the time you are in that office with the door closed.

The longer you are in the office behind closed doors, the greater the possibility that the paranoia level at the station will tip the scale before you leave. Suggest a neutral, off-site, out-of-the-way place to continue the discussion. Of course, if it's a real small town, there probably won't be a restaurant that will ensure complete privacy. In these situations, choose a motel room or hotel lobby.

Due diligence

Earlier I mentioned the phrase "due-diligence." Equity and senior debt sources require reams of due-diligence before funding. What does it really mean? It proposes gathering up every viable scrap of information on the station. This includes station and owner backgrounds, financial performance, ratings, existing staff, the level of existing competition, equipment condition, names of the owner's attorneys (local and communication law), accountant, banker, etc. Keep in mind there are no unimportant facts surrounding a station — it's all due-diligence.

To streamline the process for my own group, I've developed a 300-question Due-Diligence Check List. It's 17 pages long and not designed to zip right through. The fastest I've been able to fill it out was four hours; it can take as long as three days. Some sellers have called me some less-than-flattering names because I sit there while I ask them the questions and fill in the answers. Even as I write this, my ears are burning ... someone in East Texas doesn't like me right now.

Just the same, once I get the answers to all 300 questions, there is nothing I can't answer when my equity partner or my banker calls. Work on designing your own form. It doesn't necessarily require 300 questions although it will take more than 20.

Buyer beware

Please understand that some sellers will be very forthcoming and provide you copies of any and every document they have that relates to their station's operation without you asking. You will be able to get financial records dating five years or more in some cases. Other owners, however, may feel as though they are being audited by the IRS and may take the attitude that they only will answer the questions you ask and provide the documents you request. This is the same kind of owner who, if he sold you a car, would not feel compelled to tell you up front that the motor burns an awful lot of oil. He'd leave that problem for you to discover on your own. It's still *caveat emptor* time in this industry.

Next time, we'll study the Art of the Deal leading to that fateful moment when you move from a handshake to something in writing.

■ ■ ■

Dain Schult is a 30-year broadcast veteran and consultant with experience as a DJ, general manager and group operator. He is based in Austin, Texas.

Got a question or suggestion for Dain to address in an upcoming part of this series? Send an e-mail to **RW** *at* chamaker@imaspub.com *and let us know.*

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

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READER SERVICE NO. 92

World Radio History

Radio Lessons for a Digital Age

Carl Lindemann

Many of the "digerati," the promoters and prophets of the "new media," expect the recent exponential growth of the Internet to continue.

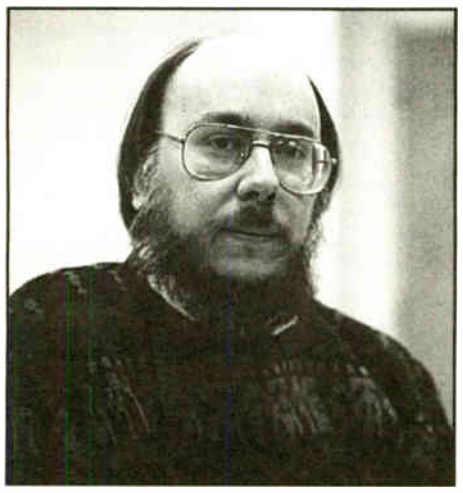
Participatory on-line communications, they say, will make broadcasting and other mass media obsolete. But Henry Jenkins, director of the comparative media studies program at Massachusetts Institute of Technology, disagrees. He believes such speculation about the future overlooks the past. The Internet is more likely to coexist than to conquer. Jenkins thinks radio management should look for synergies with the emerging communications technologies.

Back to the future

For Jenkins, if you want to evaluate the coming "Internet Age," look back to when radio was the "new medium."

In its initial phase, radio was a participatory medium. The idea of having a receiver without a transmitter seemed odd. Proponents of radio proclaimed the medium was inherently democratic, giving voice to everyday people. Centralized media would be swept away. Of course, that is not what happened. The impact of radio was enormous, but not in the anticipated way.

What can today's radio industry learn from its past? Jenkins' comparative analysis puts the present confusion into context.



Henry Jenkins

"There's never been a time in human history when there's only one media in play," he said. "Media have always been used in relation to each other. I envision a world where the Internet doesn't compete or displace (broadcasting), but coexists with it." This makes for what he calls a "cultural convergence."

Radio remains robust

Radio's place in this "convergence" depends on how broadcasters take advantage of the inherent qualities of the medium. While newspapers and television have seen ominous drops in readers and viewers, radio remains robust.

"We engage with radio in an entirely different way," Jenkins said. "My son is often online and listening to radio simultaneously. Also, you drive and listen. Radio is something you do in relation to other activities."

Portability, too, will differentiate radio from Webcasting for some time, though not forever.

"My friends in the (MIT) Media Lab are developing wearable computers," said Jenkins. "But we're not going to be using those anytime soon. We'll keep our pocket radios instead. There's still a lot of value to the airwaves, at least for the foreseeable future."

While newspapers and television have seen ominous drops in readers and viewers, radio remains robust.

Perhaps the most important radio quality is its local connection.

"The crucial thing for radio is thinking through the local/national nexus. I have a Bosnian student who listens to a Bosnian station on the Internet. Because it's local, yet internationally available, those kinds of relationships are possible."

What happens when Webcasters start competing head-to-head? "Do you really need a local top 40 radio station, or can a 'net-based one take its place? The only difference is the local elements injected. I may be better served by some of these CD jukeboxes on the Web. Unless the local station offers a compelling reason, why not?"

That leaves radio programmers with a major problem: how to justify (much less generate a return on) investments in local programming? The answer, according to Jenkins, is twofold. First, "localization" offers something listeners within the transmitter range cannot find elsewhere on the 'net. This defensive strategy fends off intrusions into current market share. But savvy marketers also will use local

See WEB, page 48 ▶

DYNAMAX MX/D
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World Radio History

Radio and the Web

▶ WEB, continued from page 47

programming to go on the offensive, looking for new opportunities via Webcasting. This differs depending on format.

As a news/talk junkie, Jenkins knows firsthand that "becoming the voice of the local community can create an ancillary market on a national level. I find it's interesting to survey talk stations after major new events," he said. "One Web site I connect to has links to some 40 local talk stations nationwide. You can sample across the country to get a taste and create a national picture after looking at the local response."

Music formats, too, can turn regional "flavor" into a national taste. According to Jenkins, the managerial challenge is finding the local/national connections.

"Can you do some of this programming in the local area with a local constituency that's distinctive enough, regionally identifiable enough, so that it's salable on the Web?" he asked. An example would be niche markets for zydeco or polka music. These niche formats cannot support viable, full-time broadcast formats. But a specialty program onair a few hours each week can translate into an attractive Web site.

The shift in programming also impacts sales. "As you move to the Web, it makes sense to look for national advertisers, or local advertisers looking for a national presence. For example, a maple syrup company in Vermont could do very well" with this broadcast/Webcast hybrid, Jenkins said.

Some Internet advocates would argue against the local edge of radio. For them, the 'net is the "ultimate localization." But there is a difference between local and individual. Jenkins pointed out that broadcasting can build consensus and community. "Narrowcasting" tends to serve individual interests and tastes.

"If we keep heading towards a more personalized media, we're creating a Tower of Babel society where no one understands each other because we've destroyed the cement, the social glue that holds communities together," Jenkins said.

With all the speculation and uncertainty, Jenkins said he sees radio's past as proof that there is still a hopeful future ahead.

"Radio has changed its core function, and even its status, multiple times in its history. It's adaptable to survive and readjust to whatever changes. Even when wearable computers are ubiquitous, broadcasting will continue to be important."

■■■

Carl Lindemann is developing "Cyberscene," a daily feature for syndication. He is also the former production director for WCDQ(FM) and WSME(AM) in Maine. He can be reached at (207) 676-8525; e-mail carl@radioshow.net

Circle (149) On Reader Service Card

Orban Audicy a Success

Orban reported sales of its new Audicy digital audio workstation to several prominent users.

Radio Free Asia ordered eight systems for its source facility in Washington, D.C.; AM-FM combo stations **KMJ/KSKS** in Fresno, Calif., ordered five. Other recent purchasers include SJS Entertainment in New York, the Branson Music Company in Branson, Mo., and the Digital Playroom in Boston.

Audicy is the second-generation successor to the Orban DSE line of digital workstations and was designed for radio and audio-for-video production. The company said it had placed more than 75 Audicys in the first few months the product was available.

*For information from Orban, contact Amy Huson in California at (510) 351-3500 or circle **Reader Service 60**.*

BE Awarded VOA Contract

Quincy, Ill.-based **Broadcast Electronics Inc.** was awarded a contract of more than $3 million by the United States Information Agency, parent organization of the **Voice of America**, in conjunction with the Government of the Hellenic Republic of Greece.

A total of 84 transmitters will be supplied over an 18-month period, replacing older models in Greece.

The VOA broadcasts international, regional and United States news in 52 languages to 86 million listeners per week.

*For information from Broadcast Electronics, contact Tracy Peterson in Illinois at (217) 224-9600 or circle **Reader Service 202**.*

Harris Receives Order From ABC Radio in New York

Harris Broadcast Division received an order for seven studios for the **ABC Radio Networks** in New York City, to be delivered and installed by mid-1998. Four are for news, on air, and include custom Wheatstone consoles, Wheatstone furniture, and integration services provided by the Harris installation group.

Also included were two edit studios, including Audioarts consoles, Wheatstone furniture and Harris system integration, and a special events studio for the most complex live news broadcasts, equipped with a Wheatstone A-6000 console. The project is part of a major renovation at ABC Radio. Harris also is providing all peripheral gear for 13 digital news edit workstations, including Soundcraft ProTracker consoles and Denon MD recorders.

*For information from Harris, contact Dave Burns in Indiana at (765) 962-8596 or circle **Reader Service 84**.*

WMXB(FM) Picks SADiE

WMXB(FM), Richmond, Va., recently installed a SADiE digital audio workstation to be used primarily for imaging, song editing and commercial production. SADiE is made by **Studio Audio Digital Equipment Inc.**

Jym Geraci, WMXB imaging director, said he was attracted to the speed of the SADiE system. "I have never worked with a system that does things this fast," he said.

The SADiE System, which includes a jog and fader panel, can be networked and can communicate with digital storage systems.

*For information, contact Jeff Boggs in Nashville at (615) 327-1140 or circle **Reader Service 131**.*

Itelco Awarded DAB Contract

Itelco USA Inc. said it sold the first North American DAB Transmission System to Master FM Limited, a consortium of 15 Toronto Broadcasters and the CBC. The $1 million deal was awarded to supply the first DAB transmission system in North America. Itelco will supply five 800 Watt L band transmitters in a complete turnkey system. The model T702EDAB transmitters will be the highest power solid-state DAB transmitters in the word. Four of the transmitters will broadcast five programs each, along with ancillary data to provide 20 CD quality programs to the entire Toronto market.

The fifth transmitter will be used in a N+1 configuration to provide redundancy in the event of a failure of an operating transmitter.

*For more information on Itelco, contact Howard G. McClure in Colorado at (303) 431-1699 or circle **Reader Service 155**.*

NFL to Use Telex Wireless

The National Football League recently contracted **Telex Communications** to install the Telex Radiocom BTR-600, a new wireless coaches communications system.

Tom Hansen, national dealer sales manager for broadcast products, said the NFL coaching staffs had wanted wireless communications clarity and privacy for some time. The Radiocom BTR-600 will furnish the teams' coaching staffs with wireless communications abilities that are digitally encrypted.

*For information from Telex, contact Tom Hansen in Minneapolis at (612) 887-5567 or circle **Reader Service 179**.*

"Who's Buying What" is printed as a service to our readers who are interested in how their peers choose equipment and services. Information is provided by suppliers.

Companies with news of unusual or prominent sales should send information and photos to: Radio World Managing Editor, P.O. Box 1214, Falls Church, VA 22041.

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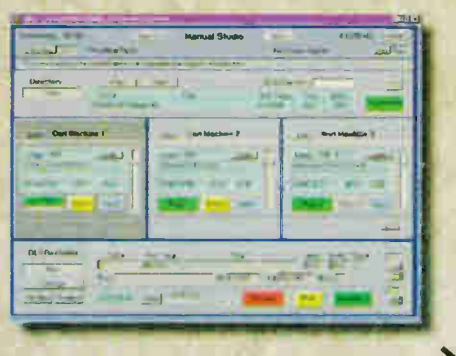

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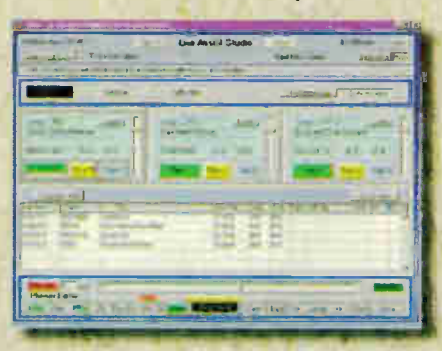

Hard Disk Automation
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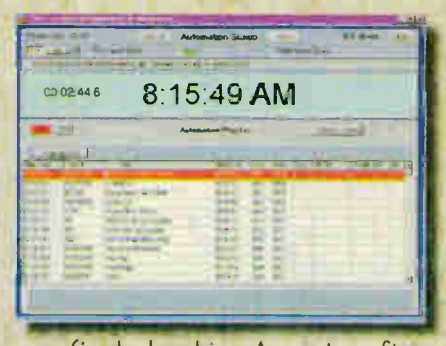

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Optional Front $495

DL4 Digital Audio Engine

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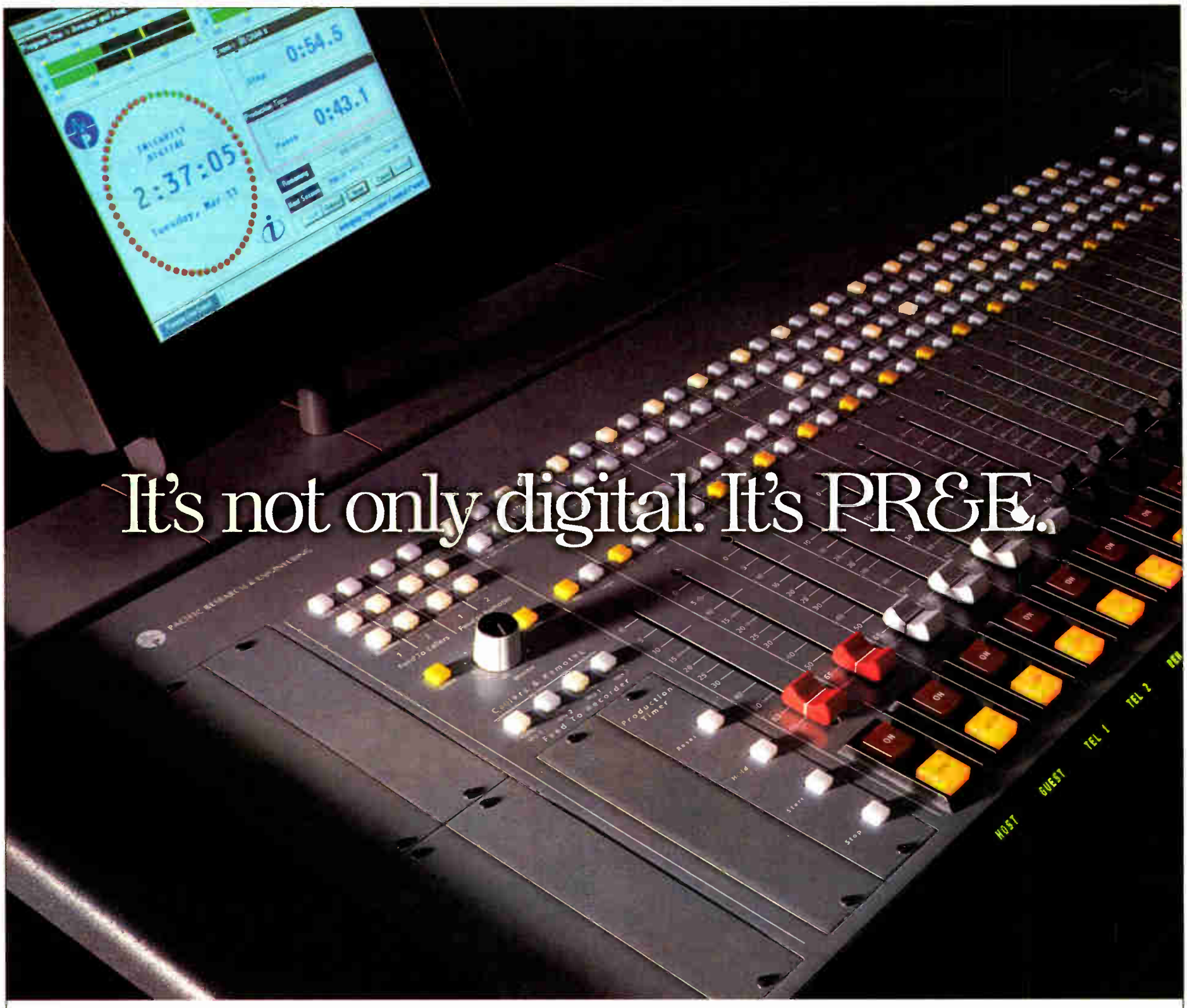
World Radio History



It's not only digital. It's PR&E.

Now you can get digital technology and PR&E reliability in the same console. Integrity.™ It's the first digital on-air board that also speaks fluent analog. All 16 inputs can handle analog signals. Ten can also accept digital inputs at any sample rate. So you can deal with the hodge-podge of equipment in real-world studios. A unique architecture also guarantees a level of reliability other digital consoles can't match. So you can rest assured your signal will stay on the air.

What's more, you get on-board DSP voice processing, remote or local configuration controls, and channel-specific remote control connections. And you can set, save and recall each board configuration at the touch of a button for seamless transitions from show to show.

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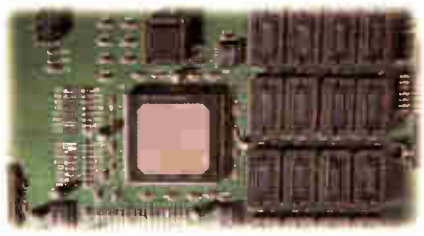
The LCD displays audio levels, time-of-day clocks, session status and event timers with a Windows® interface to powerful configuration management and session-based features.

Integrity's difference is more than just digital. It also offers four special-purpose buses to provide automated mix-minus for telephone and remote feeds, each with IFB.



Integrity uses an array of state-of-the-art floating-point digital signal processors to perform its mixing, routing and other functions.

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

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World Radio History

Buyer's Guide

What Are FCC Rules For Unattended Stations? See page 54

PRODUCT EVALUATION

Checking Lines With the Qbox

Alan R. Peterson

In an arena filled with gee-whiz, flash-and-dazzle products for radio, now and again a "Cool Stuff" winner emerges in the simple form of a handy, practical tool. Such is the case with the Qbox from Whirlwind Professional Products of Rochester, N.Y.

A one-piece mic/line tester with built-in amplifier, speaker and electret mic, the device is housed in a high-impact plastic case with a belt clip and can be tossed into tool boxes or remote kits without complaint.

As simple a device as the Qbox is, it is fully capable of saving a remote or sports broadcast.

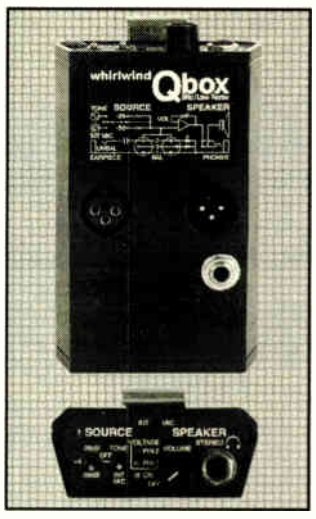
Testing, testing

The Qbox tests microphones, looks for phantom power on cables, sends test tones down a long line and sniffs out signal presence on cables.

To test mics, plug them into the XLR connector on the front. Check unbalanced high-impedance units by plugging them into the paralleled quarter-inch phone jack.

At times, one long cable run must be made by connecting several XLR cables together. Because any one of the cables can go bad, finding the problem can take time. The Qbox sends mic or tone test signals down the line from each connection until the bad cable is located.

Two Qboxes can function as a two-way intercom, much like IFB headsets for TV camera crews. A headphone jack disables the internal speaker, preventing feedback from the internal mic/speaker.



A pair of LEDs show phantom voltage on Pin 2 or Pin 3 of a cable and a third LED indicates Power On. A three-way switchable attenuator directs -50, -20 or +4 dB levels to the output jacks. A separate potentiometer controls the level to the speakers and headphones, leaving the test signals unaffected.

The Qbox is a working engineer's tool. While most test equipment is better left sealed, the fold-out instruction sheet explains how and where to open the case and change a jumper to switch from stereo headphones to a mono earpiece. Also, instead of sending the box back to Whirlwind for repairs to the mic, speaker or battery compartment, the company will send you the part for tacking in yourself. Refreshing.

A good stout battery clip holds the 9 V transistor-style battery in place; the attached wires are built for business and not made out of copper tinsel.

Maybe because I own an older Whirlwind IMP 2 low-to-high impedance box made from cast aluminum, I wish the Qbox came in a full metal jacket. The plastic case is durable, but pop rivets hold the belt clip and XLR jacks in place on the device and I do not know how much pounding and flexing these joints can endure.

Do not stand out in the rain with a Qbox, either. The instruction sheet stresses that the speaker and mic element can be damaged by water. Covering the mic hole with electrical tape offers rain protection and produces little effect on the response.

The gutsy little Qbox is inexpensive and multifaceted. Purchase one and place it in your greasy old toolbox next to the Fluke meter. This "Cool Stuff" winner is ready to go to work when you are.

For information, contact Whirlwind Professional Products in New York at (716) 663-8820 or circle ***Reader Service 32.***

Check Your Equipment

This month, the *Buyer's Guide* looks at Test, Monitoring and Remote Control gear.

Mario Hieb explains why testing and monitoring gear is important to attracting and retaining a radio audience.

Dennis Martin spoke with remote control equipment makers and discovered how radio centralization has increased the need to control several stations through one location.

Alan R. Peterson discovered why the Whirlwind Qbox deserved its 1997 Cool Stuff Award.

Harold Hallikainen explains, in "plain English," the changes in FCC rules for unattended stations. In addition, we excerpt the FCC list of Frequently Asked Questions concerning unattended stations.

Convert your PC into an oscilloscope with new software from PrismSound — the Dscope, reviewed by Alan R. Peterson.

Have a successful 1998. Begin by inspecting your equipment.

— Susan Kreis, Buyer's Guide Editor

SPECIAL REPORT

Is a 'Virtual Person' Coming to Radio Soon?

Dennis J. Martin

"People have the desire to control more transmitter sites from a single location than ever before because of consolidation," said Bill Gould of Burk Technology.

Indeed, a rebirth of broadcasting has occurred, the genesis of which has been consolidation. Every facet of station operation has been affected, including remote control.

David Harry of Potomac Instruments said that, as a result, "We are further consolidating the engineering talent in the industry," making fewer engineers responsible for more stations.

Guy Leishman of Gentner Communications agreed. "In some cases, there's one person ... in control of everything."

Centralization — controlling and monitoring many transmitter sites from a single location — appears to be an important concept today. "I've seen as many as eight to 10 different stations in one building going out to two or three different transmitter sites," said David Chancey of Moseley Associates.

Don Winget of Broadcast Tools said, "With so few engineers taking care of so many facilities, you have to have a central way of monitoring."

Moseley installed a 48-channel remote control system at one site, and Gentner a 120-channel. But this does not mean everyone wants a behemoth system. Stand-alone operations and AM/FM combos do not seem to be driving remote control development and planning. "Those operations still exist; however, consolidation certainly is a very dominant force now," Gould said.

However, consolidation takes many forms. Dave Williams, market chief

See CONTROL, page 58 ▶

SPECIAL REPORT

Analyze Your Test, Monitor Gear Often

Mario Hieb

As advertising revenues continue to rise, the competition for radio listeners is more intense than ever. To attract and retain an audience, many stations are paying more attention to quality in the technical plant.

Radio stations continue to move toward digital signal processing in audio processing, STL and exciters, hoping the improvement in sound will entice listeners and advertisers.

To coincide with those technological advances, there is also a trend toward better DSP-based broadcast test gear used in both analog and digital infrastructures.

Splitting hairs

DSP-based analog infrastructures require test equipment with greater precision than that of previous analog test sets. Serial digital infrastructures require special test equipment and new test techniques.

Automated test systems provide fast, multi-tone testing of the analog audio chain.

"Off-air time is almost impossible to get anymore, unless there is a real emergency," said Andy Laird of Heritage Media. The tones are recorded uncompressed into a hard disk-based commercial storage system, and scheduled for playback in a stopset in the overnight show.

Laird's facility uses the Audio Precision System Two, located at the transmitter site. There, it constantly monitors stereo and monaural program channels, then recognizes and captures a 270-millisecond burst multi-tone signal. The tone burst may be inserted into any pause in program or used as a "time tone."

Frequency and phase response, distortion, noise and stereo separation and channel swap measurements are compared to limits. Unattended remote analyzers sound an alarm if performance is outside limits, or the remote PC can send a facsimile of test results to engineering headquarters. Also, a supervisory computer may dial automatically to download stored test data.

Another analyzer is the SYSid Test and Measurement System, a PC-based system developed for transducer characterization. SYSid

See ANALYZE, page 56 ▶

World Radio History

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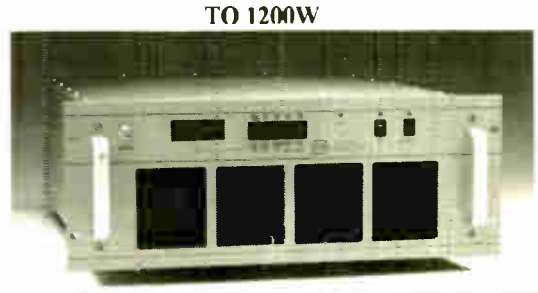

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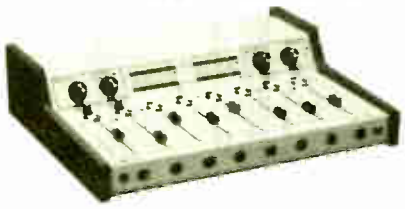

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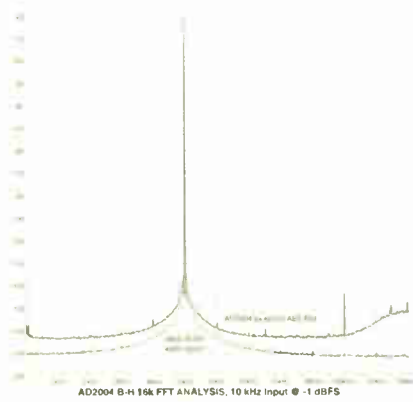

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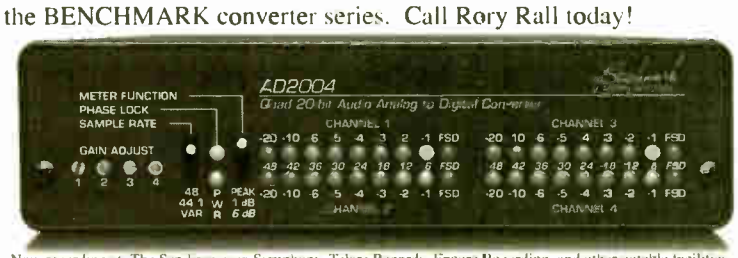

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World Radio History

FCC FAQs — Unattended Stations

The FCC has received many questions about rules covering unattended stations. Dale Bickel, Electronics Engineer in the Audio Services Division, Mass Media Bureau, Federal Communications Commission, assembled a list of Frequently Asked Questions (FAQs) and posted them on the Web site www.fcc.gov/mmb/asd/bickel/noonehome.html

The following contains selected questions and answers taken from the FCC list.

The Audio Services Division Mass Media Bureau, in coordination with the Compliance and Information Bureau, has prepared this question-and-answer sheet to address these inquiries.

Q: Notification to commission: Am I required to notify the commission when a broadcast station begins unattended operation of its transmitter?
A: No. Notification is not required. See 47 CFR Section 73.1300.

Federal Communications Commission

In 1995, the commission adopted a Report and Order in MM Docket 94-130 (10 FCC Rcd 11479), which permitted radio and TV broadcast stations to be operated without a person standing by to monitor the transmitter's operation ("unattended operation"). This action was taken to permit licensed broadcast stations to take advantage of advances in station monitoring equipment and the inherent reliability and stability of today's transmission equipment.

However, questions have arisen as to how the relevant rule sections (See 47 CFR Sections 73.1300, 73.1350, 73.1400, 73.1820, 74.734, and 74.1234) apply in particular circumstances.

Q: Is the station required to have automated equipment in place before unattended operation may commence?
A: No. At the present time, the commission does not require the installation of automatically adjusting monitoring and control equipment (referred to in the commission's rules as an Automatic Transmission System or ATS) before a station employs unattended operation of its broadcast transmitter. If automatically adjusting monitor and control equipment is not employed, suitable equipment must be employed which is expected to operate within assigned tolerances for extended periods of time without constant human monitoring. See 47 CFR Section 73.1400.

Q: Dedicated Telephone Line: If I use a telephone line for transmitter control and notifications or alarms, am I required to employ a dedicated telephone line for that purpose?
A: Yes. A dedicated telephone line (using the public switched telephone network) to the transmitter site is one which is used for the sole purpose of interacting with the broadcast transmitter and monitoring equipment. Pursuant to 47 CFR Section 73.1350, it may not be used for other purposes during periods when it is in use for transmitter monitoring, alarms, or control. However, the telephone line may be used for other purposes during periods when the transmitter is being monitored and controlled by other means, e.g., by a person at the transmitter site.

The chief operator is responsible for weekly inspections of log entries.

Q: Monitoring Procedures: What technical monitoring procedures must be in place for a station employing unattended operation?
A: Station, attended or unattended, must establish suitable monitoring procedures of its equipment and maintenance schedules for the station and indicating instruments to ensure that the equipment is operating properly. See 47 CFR Section 73.1350(c). The FCC does not prescribe any particular procedure or schedule interval for a station to use.

Operating and Maintenance Logs for Broadcast and Broadcast Auxiliary Stations, BC Docket 82-537, 54 RR 2d 805 (1983). We suggest that any procedures established be reduced to writing to provide proof that monitoring procedures exist. Please note that indicating instruments must comply with the requirements of 47 CFR Section 73.1215.

Licensees and permittees should be aware that the chief operator of the station, whether attended or unattended, is responsible for weekly inspections of log entries and the additional information required by 47 CFR Section 73.1870(c).

Additional information about radio broadcast stations may be obtained from the Audio Services Division at (202) 418-2780 or by retrieving the Audio Services Division's Internet Web pages at *http://www.fcc.gov/mmb/asd/welcome.html*

PrismSound Dscope Puts Full Rack in PC

Before the PrismSound Dscope came along, the equivalent amount of audio test and measurement power probably would have needed several large cases. The Dscope converts a plain-vanilla 486DX PC into a powerful oscilloscope, signal generator and FFT analyzer, all inside one box. Especially attractive is the $995 price tag and the DOS-based platform.

The Dscope signal generator creates Sine, Square and Ramp, Noise, Twintone and user-created waveforms. The precise frequency generation of the Dscope permits a range of 1 Hz to half the selected sample frequency. Both frequency and amplitude can be fixed or swept at any desired rate.

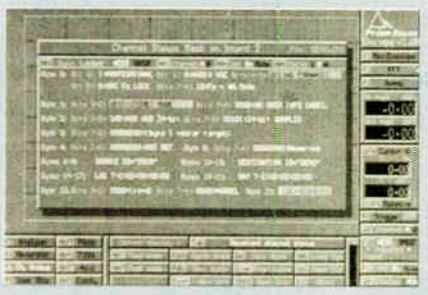
The precision offered by the digital analyzer section allows as much as 32,000-point FFT analysis, with an average climaxing at 1,000 FFT passes. The Dscope can test 24-bit audio at full level without the compromises caused by A/D and D/A conversion.

Weighting filters are included — CCIR-468, A-wtg, F-wtg and user-defined weighting. The Dscope also is capable of examining and editing Channel Status bits.

The digital oscilloscope can analyze Peak and RMS amplitude values and is able to measure and display Noise, THD, THD+N and IMD values.

Because the Dscope is hosted in a PC, familiar computer functions are available, including menu panels or "hot key" operation, snapshot files for instant settings recall and printed reports and plots with resolution as good as 300 dpi.

The photo shows the Dscope in a portable computer case. Because PrismSound sells the software and ISA bus cards as a package, the Dscope can be loaded into any 486 or higher computer. Windows compatibility is not an issue; Dscope runs exclusively under DOS.



PrismSound Dscope

The company recommends two ISA cards for more advanced analysis. Available for $1,945, Dscope-D includes the ability to edit Channel Status bits and perform simultaneous generation and measurement.

PrismSound also manufactures the DSA-1 handheld AES/EBU analyzer and the JM-1 Jitter Modulator for AES/EBU or S/PDIF digital audio signals.

For information on the Dscope, contact Prism Media Products in New Jersey at (973) 299-7790 or circle ***Reader Service 33.***

— Alan R. Peterson

MARKET PLACE

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The FieldFone II operates at speeds as much as 20 percent faster than the original and has improved control features, such as the "Sound Shapers" function that enables the user to fine-tune the encoding algorithm quickly, without losing the line. The FieldFone II also offers three mic inputs, two headphone jacks, balanced line output, individual volume controls on each input and a switch that allows users to connect a mixer.

In addition, the FieldFone has four relay contact closures, allowing compatibility with the MUSICAM USA StudioFone.

For more information, contact MUSICAM USA in New Jersey at (908) 739-5600; fax: (908) 739-1818; or circle Reader Service 107.

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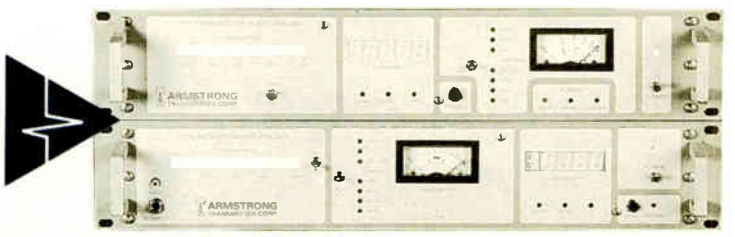

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SPECIAL REPORT

What Are 'Unattended Stations'?

Harold Hallikainen

The rules that cover unattended operation of radio stations are important. Changes in those rules have played a major part in the development of new strategies for managing radio stations in the 1990s. As part of this *Buyers Guide*, let's consider these rules.

In November 1994, the FCC adopted a Notice of Proposed Rulemaking under the Mass Media Docket. After considering comments, the FCC released a Report and Order establishing the current rules authorizing unattended operation of broadcast transmitters and changing the requirements for attended operation.

The rules currently allow for several modes of transmitter operation. These can be summarized as:

Attended

Direct Control — Operator at transmitter site.

Remote Control — Operator at control point "polls" transmitter to ensure correct operation, and manually makes adjustments or mode changes.

Automatic Transmission System — ATS monitors and adjusts transmitter. ATS notifies operator of out-of-tolerance alarm conditions. ATS need not automatically shut down transmitter.

Unattended

Automatic Transmission System — ATS monitors and adjusts transmitter. ATS shuts down transmitter within three hours in the event of an interference-causing condition. The shutdown is reduced to three minutes if the transmitter is operating in an unauthorized mode for the time of day (such as an AM that does not switch pattern or reduce power). There is no ATS alarm requirement with unattended ATS, as there is no operator to receive the alarm.

Stable Equipment — The FCC does *not* require ATS for a station to operate unattended. If the station determines that the transmission equipment can operate for long periods of time without human supervision, the equipment can operate unattended without an ATS.

Defining terms

For simplicity in this article, the traditional term "operator" refers to the person in control of the transmitter. The current rules allow transmitters to be controlled by employees of the licensee or others designated by the licensee. No operator license is required.

While the FCC has eliminated the term "transmitter operator," it still requires stations to have a "chief operator," who is responsible for the completion and/or delegation of various duties. Among these are equipment inspection and calibration, AM monitor point field strength measurements, AM and FM equipment performance measurements — occupied bandwidth— and a weekly review of the station log.

The chief operator of an AM directional station or an AM non-directional station with authorized power greater than 10 kW must be an *employee* of the *station*. The chief operator of other radio stations may be an employee or a contractor. While the new rules do not require *operators*, they do require *chief* operators.

Aim a cannon

Prior to adoption of the current rules, many stations used dial-up circuits — public switched telephone network, or PTSN — for transmitter control. An FCC staff member advised stations to have some alternate means of shutting down the transmitter should the PSTN circuit fail. He suggested using an STL carrier sense relay, program silence sense, a dedicated Part 74 radio link or a well-aimed cannon.

Broadcasters must provide some way to shut down the transmitter. The FCC declared that the PSTN is reliable enough for transmitter control. No backup circuit is required *provided* the PSTN circuit is available full time for use of the transmitter control or ATS system.

However, the FCC points out that the PSTN lines should not be shared. Based on this reasoning, it appears that under remote control you *could* share a PSTN line at the control point, because the remote control is not *required* to initiate alarms. The operator must be able to hang up on the person requesting a song to call the transmitter site.

At the transmitter site, a PSTN line can easily be dedicated to transmitter operation *unless* the chief operator is there and wants to order a pizza. The FCC states in Question 4 that the line may be used for other purposes when the transmitter is being controlled by someone at the transmitter site.

In Paragraph 33 of the Report and Order, the commission decided against establishing a contact person database.

In Paragraph 34 they decided against requiring stations to post contact person information — as is required for translators.

Indeed, it appears that unattended stations may be truly unattended, with no contact person nor on-call person. It is left to the station licensee to determine the amount of human supervision the transmission system requires. However, this does not excuse a licensee from keeping transmitter parameters within tolerance.

FCC comments

Four FCC staff members responded to inquiries from **RW** on the topic for this article. One representative from the St. Paul field office said he has seen very few stations running unattended, especially because they normally inspect the stations during the day.

An inspector who is part of the FCC alternate broadcast inspection program said stations are required to have "absolute control," and that the PSTN was not enough without some alternate means of shutting down the station.

Comments from the FCC in Washington indicated the PSTN line used for no other purpose than remote control is sufficient *without* an alternate means of shutting down the transmitter.

The FCC also stated, quoting from the FAQ, that an "unattended station is fully automated such that the transmitter will be shut down if an out of tolerance condition arises." The definition implies an ATS requirement for unattended operation, which conflicts with Report and Order Paragraph 8 of the Report and Order.

Pointing out that unattended operation does not prevent station inspections during any time the station is on the air, the FCC *suggested* that it be notified by letter of contact persons and telephone numbers. This, however, conflicts with Paragraph 33 of the Report and Order. There, the commission decided against a contact person database, relying instead upon "existing informal procedures" to contact station personnel.

In their comments, the FCC points to a section that requires the station licensee to notify the FCC in Washington within three days of the initial use of a control point. While this appears to apply to *attended* remote control stations, it does not appear to apply to unattended stations, because they are not required to have a control point nor an operator.

For additional information, several sources are available. The NAB Guide to Unattended Station Operation, written by the author of this article, is available through the NAB at (800) 368-5644 or website *www.nab.org*.

The FCC has released a Frequently Asked Questions list on the topic of unattended operation. It is available at *www.fcc.gov/mmb/asd/bickel/noonehome.html*

For those without Web access, the FCC FAQ is available at Fax On Demand at (805) 541-0201.

■■■

Harold Hallikainen is president of Hallikainen & Friends, a firm specializing in electronic design and technical writing. Reach him at (805) 541-0201,or via e-mail to harold@hallikainen.com

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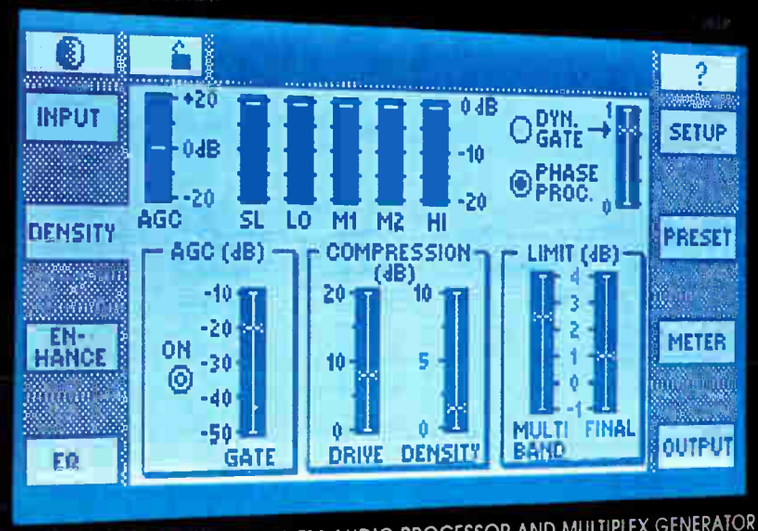

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Routine Testing Protects Gear

▶ ANALYZE, continued from page 51

provides the user with an ensemble of FFT-based stimulus-response measurements, including frequency response, transient response, phase and group delay and 1/3- through 1/2-octave frequency response.

Engineers routinely should perform the necessary tests with appropriate equipment.

SYSid can also measure harmonic and intermodulation distortion and "spectral contamination," a realistic self-noise non-linear distortion test using as many as 50 intermodulated tones. With the spectral contamination feature, the user can quantify the transparency of an audio system.

'New medium, new problems'

Digital audio technology is recognized widely for error-free transmission and copies that are indistinguishable from the original. As digital techniques have become widespread, audio professionals learn the new problems the new medium brings.

At times, digital recorders refuse to record from certain digital sources. Other times, digital signals that sound clean via a short digital cable begin to show some grit when a longer cable is used.

These and other digitally related problems cannot be tracked down with a voltmeter or oscilloscope. They require a test system with highly specific analytical capabilities for both analog and digital domain audio, for the physical digital interface signal itself, and for additional information such as channel status bytes carried within the interface signal.

Belar Wizard

Many stations have replaced their aging analog audio processors, STLs and exciters with modern DSP-based units. Because test gear should be of higher precision than the equipment being tested, more sophisticated modulation monitors are needed.

Systems such as the DSP-based Wizard from Belar perform the signal processing in software rather than analog circuitry. The result is a modulation monitor with better performance and less temperature-induced component drift.

"The recalibration cycles of being digital ... they're almost nonexistent," said Arno Meyer of Belar Electronic Laboratories.

Precise measurements require a clean RF sample, which means locating the modulation monitor at the transmitter site. The Wizard system allows the user to dial up via modem from anywhere in the world and receive a display of all system parameters.

Belar will introduce a digital SCA monitor during early 1998 and will also release version 3.0 of the software by the end of the year. Improvements to presentation abilities have been made, and compatibility with new Belar products have been increased.

Routine performance

Engineers routinely should perform the necessary tests with appropriate equipment. "There are those who want the best possible performance, and there are those that don't give a damn. Good measurement equipment is an investment," Meyer said.

Engineering managers for large groups find themselves with more stations, but they still need to watch every one. Dial-up modulation monitors allow the corporate chief to interrogate the station from a remote location via phone lines. They can observe parameters in real time or look at historical and statistical analysis of performance parameters.

With consolidation, many transmitters are being co-located with a single modulation monitor shared between several stations, including AM.

Audio Precision System Two Dual Domain

"What has affected us the most is the trend toward diplexing AM antenna arrays," said David Harry of Potomac Instruments. Antenna monitors for diplexed AM arrays require special customized filters.

Expensive test gear such as spectrum analyzers and automated test sets can be shared among stations within a group. "Our plan calls for an Audio Precision System II with fast, multi-tone testing capability being shipped around from city to city. Standardized on-air tests performed ... will be archived and serve as a reference for the next go-around," said Laird of Heritage Media.

Gary Peterson, chief engineer for five stations in Rapid City, S.D., said, "I'd love to have a spectrum analyzer, but that's basically unaffordable in this market. Money's getting tighter with consolidation, not looser."

The forces driving test and measurement equipment advances are changes in the marketplace, with DSP-based test equipment and the advent of digital infrastructures dominating the technology. Station consolidation also controls trends in test measurement as broadcasters pay more attention to audio and RF signal quality.

■■■

Mario Hieb is the chief engineer for KXRK(FM) in Salt Lake City and consults for various clients. He holds a Bachelor of Science degree in electrical engineering and is a Certified Professional Broadcast Engineer. Reach him through RW.

Handy Measurement Book From the SBE Bookstore

Don't like the new tie you received for Christmas? Buy yourself something you can really use and get it from the Society of Broadcast Engineers Bookstore. Costing SBE members $10.35, the "Audio Measurement Handbook," written by Audio Precision President Bob Metzler, was designed to provide "hands-on assistance" for people in the audio industry.

The book "is practical as opposed to theoretical," Metzler said. "It's a general handbook, regardless of the equipment you use. It's not just a user's manual for Audio Precision equipment."

The book covers several topics and involves some mathematics and simple algebra. According to Metzler, "It starts with basic topics such as frequency response and noise, and moves into FFT and multitone. It covers both digital and analog testing."

For this and any other book purchase, call the SBE office in Indiana at (317) 253-1640 for a brochure and order form, visit Web site *www.sbe.org* or fax the order to (317) 253-0418. You also may mail the completed order form with payment to SBE Bookstore, 8445 Keystone Crossing, Suite 140, Indianapolis, IN 46240-2454.

The SBE requires prepayment on all orders; make checks payable to SBE Bookstore, and include a street address for ground delivery service.

— Susan Kreis

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World Radio History

Hitch Your Show to a Satellite

Editor's Note: Due to a printing error, the following list did not appear correctly in our Dec. 10 Buyer's Guide on Delivery and Broadcast Services. We reprint it here.

The following list, compiled for **RW** by James E. Hollansworth of NASA Lewis Research Center, shows some of the many satellites in use by radio networks and stations for programming to affiliates, or for re-sale.

To arrange the list, Hollansworth consulted the North American Satellite Guide, published by GlobeCast; NASA satellite databases; FCC filing data on satellites; FCC satellite monitoring data; and other sources.

C-Band

Alascom Aurora2/GE Satcom C5
139 degrees W Long
ABC Network Feeds; GlobeCast Audio Services; Audio S.C.P.C.; RFD Illinois Radio Network; Kansas Info Network/Kansas Agnet; Nebraska Ag and Sports networks; Missouri Net/Cardinals Baseball; Radio Iowa; Capital Radio Network; United Broadcasting Network; Virginia News Network; Unistar Radio; CNN Radio Network

GE Satcom C1
137 degrees W Long
People Radio; Talk Radio Network; Reading-Rockies Blind Bookreading; LDS Radio; Fox Sports; NBC East

GE Satcom C4
135 degrees W Long
Business Radio; WUSF(FM); WQXR-FM; WSM(AM); In touch Network

Hughes Galaxy 1R
133 degrees W Long
Z-Music; Worldwide Catholic; EWTN Spanish; EWTN S.A.P.; Inspirational Network; WMAQ(FM)

GE Satcom C3
131 degrees W Long
BBC World Service; C-SPAN Music; N.E. Sports Net; Cable Radio Net

Hughes Galaxy 5
125 degrees W Long
KLON(FM); Trinity Broadcasting; CNN Radio; World Radio Net. 2; World Radio Net.; WFMT(FM); Y-USA Radio Net.; MOR Music; ESPN; Virginia News Svc.; CBN; WWTN(FM)

GE GE-1
103 degrees W Long
Radio Tropical; WCNJ(FM); USA Patriot; Christian Music Radio

GE Spacenet 4
101 degrees W Long
Antenna Satellite; Calif State

Hughes Galaxy 4
99 degrees W Long
KBVA(FM); WHME(FM); Pulse 96.9 FM; World Harvest; KWHR; Audio S.C.P.C.; KBLA(AM) Santa Monica/Radio Korea; WWRV(AM); West Virginia Metro News; KGIL(AM); Illinois News Network; KTLK(AM); Tribune Radio Networks/Wisconsin Radio Network; Minnesota Talking Book Network; Clemson Sports Network; Michigan News Network; Talk America Radio Network; Minnesota Public Radio; WJR(AM) Tigers Baseball/Michigan News Network; Motor Racing Network; United Broadcasting Network; Soldiers Radio Network; Georgia News Network; Tennessee Radio Network; United Broadcast Network

Hughes Galaxy 7
91 degrees W Long
Action PPV; RAI-UNO; WTSO(AM); CBS-West; WCBS(AM); FXM

GE Spacenet 3
87 degrees W. Long
WROL(AM); Talk America; CNN Radio Atlanta; Unistar Country; American Urban; CNNSI; USA Radio Network; USA Radio News; Ambassador Net. 2; Ambassador Radio; Salem Radio; Salem Radio 2; Prime Sports Radio; MBC; WOKI-FM; Much Music Radio; WCCO(AM); Audio S.C.P.C.; WVCY(FM); VCY America; Good News Radio Network

GE Spacenet 2
69 degrees W Long
Audio S.C.P.C.; Radio Marti

KU-Band

Hughes SBS 5
123 degrees W Long
Audio S.C.P.C.; Wal-Mart In-store Network; Sam's Club In-store Network; Russian-American Radio Network

GE GE-1
103 degrees W Long
Cyclesat; KAZN(AM)

AT&T Telstar 4
89 degrees W. Long
PBS Programming; Digital Music

Smart Site

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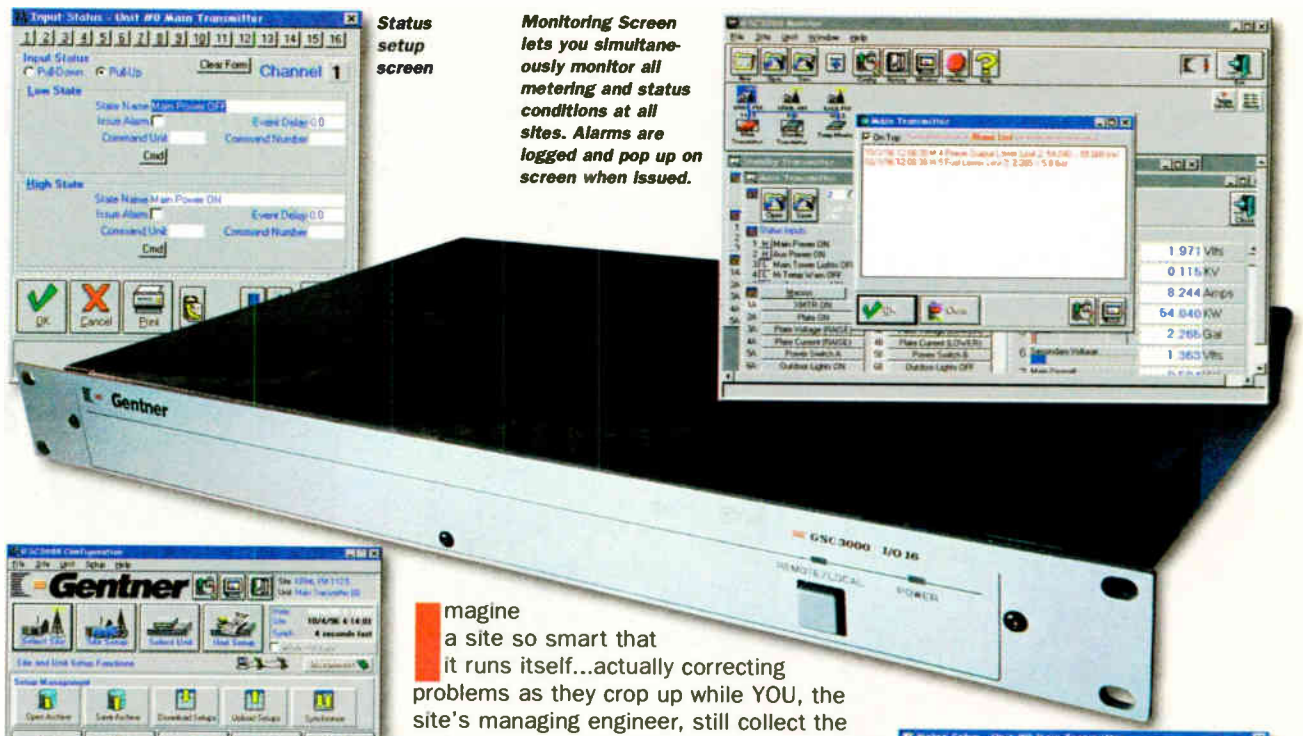

Status setup screen

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World Radio History

Advanced Control

▶ CONTROL, continued from page 51

engineer for American Radio Systems, built a single transmitter site for two stations sharing a common remote control system. Two months ago, he learned the stations would be split.

Now, he plans to install separate remote controls, but use software to manage multiple systems, thereby avoiding rewiring the transmitter site. "The ability to use multiple remote controls from the same desktop is really the direction I think we want to go," he said.

Equipment adaptability is an important consideration.

According to Winget, "Combining facilities forces remote control manufacturers to come up with boxes that can be placed at either combined sites or non-combined sites, and monitored at a central location to give someone the liability of control. I think more examination really needs to be done."

The interconnectability of remote control is changing as well. At one time, remote control required a dedicated link, either a telco pair or an STL/TSL. Today, alternative choices are gaining popularity.

Data now appear on a WAN or on T1s with program audio. Less expensive part-time circuits also are common. Harold Hallikainen of Dove Systems said, "Dial-up, even if you have a large number of transmitter sites, is a good way of moving data around," partly because the phone company handles all of the data routing.

"Transmit it over existing station private networks using Internet protocol or ... upload it to the Internet with appropriate security," he said.

A group may want to monitor and control its stations via the Web through networking protocols like TCP/IP, Leishman said.

For real-time telemetry and control, dedicated Internet connections can be costly, especially at remote transmitter sites. Minimize costs by using lower-speed circuits, like subcarriers or digital STL subchannels, between the studio — where a connection may already exist — and the transmitter site.

Broadcasters expect manufacturers to build smarter remote control systems that automatically handle a wider range of duties. Leishman described the forthcoming level of intelligence as a "virtual person" that will be capable of making decisions by using software.

"Mixed" is a good way to describe broadcaster opinions as to whether accumulated data analysis is beneficial. Some say meaningful results are impossible because sufficient information taken from enough parameters does not exist.

Others disagree. Howard McLure of Itelco USA said he thinks the diagnostics provided with the remote control system are going to be required.

"People ... want to know more than (whether) it is operating correctly or not," he said. Diagnostics, according to McLure, will allow engineers to troubleshoot from a distance and improve the planning of maintenance visits.

Using database and spreadsheet software to analyze and present data, engineers can often "spot trends at the transmitter site that could lead to downtime, and, at the same time ... be more organized," Chancey said. "Instead of being in a reactive mode, you could be in a preventive mode," thanks to the analytic power available now.

Engineers disagree as to what should be logged and when. "People have preferences as to how they conduct their logging — the interval, the detail, how they prefer their operators to control their transmitters ... it's all individual," Gould said.

Although the basics — voltage, current and power output — are still listed, engineers keep a watchful eye on other parameters. "We look at signal strength from many different RPU receivers, we look at pressure in the transmission line, at fuel in the propane tank (and) at building entryways," said Williams.

"Security is starting to become a bigger issue," Chancey said. From floor mats containing contacts, to doors and fire alarms, remote control systems monitor more today than in the past.

Remote access still remains important.

"The engineer needs to be able to do as much as he can from his home, his car or from a pay phone," Williams said.

Chris Murray, director of engineering for McKenzie River Broadcasting, also explores new forays — he monitors transmitter stack and room temperatures and his generator from afar.

Are remote control systems becoming *too* complicated? It depends.

The simpler the installation and configuration, Murray said, "the easier it will be for the operator to respond when you're off the air." At his six-station, 11-transmitter facility, Murray created his own maintenance program for operators. "If the alarm goes off, the printer prints out step-by-step instructions."

Murray uses software and graphical user interfaces to guide the operator through the resolution of a problem and to make operators feel more comfortable with potentially intimidating equipment.

"I'd like to pursue, on DTMF and voice systems, storing logged data at the transmitter site and dumping it to a fax machine at midnight so you'd have a printed log," Hallikainen said. "This could handle multiple transmitter sites because each one would send its own fax, and it takes no additional hardware since stations generally have a telephone and a fax."

Gould predicted no immediate departure from current trends in remote control. "I see it continuing for the short run the way it's going. In the long run, who knows?"

■■■

The author is chief engineer of KZLA-FM in Los Angeles.

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TARGET: TEST GEAR

Cover Yourself With Good Test Gear

You have it in the first leg of your mile-long list of things to do: "test equipment." So why does it always seem to be put off? Considering the other million and one things going on, not to mention the emergencies that come up, it is no wonder that often, the schedule for testing station equipment is pushed farther and farther back until you notice that another few pages have dropped off the calendar.

Manufacturers of testing equipment have heard your pleas for more time and money and have produced more accurate, faster and less expensive test equipment. Here's an overview.

AudioControl Industrial

The AudioControl SA-3051 is a microprocessor-controlled, 1/3-octave, real-time spectrum analyzer from AudioControl Industrial. It comes with a range of features, including pink noise generator, a calibrated reference microphone, six memories and an SPL numeric display. The unit features the ability to average memories and uses fourth-order filters that conform to ANSI standards.

The six internal memories are backed up by a lithium battery. Four display speeds offer a look at the frequency response of the signal. In addition, there is a phantom-powered microphone input, pink noise output and a balanced/unbalanced RCA connector for hard-wire testing through equipment. The unit is housed in an all-metal chassis.

The SA-3052 comes with an additional battery pack, soft carrying case and printer port for hard-copy archiving of stored results.

For more information, contact AudioControl Industrial at (425) 775-8461; fax: (425) 778-3166; or circle ***Reader Service 34.***

Broadcast Richmond

Broadcast Richmond has a solution for preventative audio maintenance and emergency, on-the-spot troubleshooting: Pie Input Equipment (PIE) racks.

PIE racks are custom-designed audio processing/monitoring/test systems that can be installed between the studio or studio-to-transmitter link (STL) output and the transmitter input.

The basic purpose of a PIE System is to provide processing control of the audio signal with comparative A/B monitoring pre- and post-transmission. It also facilitates immediate emergency bypass when a problem arises with audio reinsertion after the problem is identified.

Broadcast Richmond racks feature 110 V or 220 V AC mains power distribution with terminal block input, 20 amp breaker protection and a front-panel master on/off switch.

Broadcast Richmond works with virtually all manufacturers of processing and monitoring equipment to provide specific PIE systems that match specific budget and technical requirements.

For information from Broadcast Richmond, contact Joe Ziemer in Indiana at telephone (765)966-6468; FAX: (765)966-5505; e-mail: broadcast@infocom.com*; or circle* ***Reader Service 132.***

Fluke Corp.

Integrating oscilloscope, multimeter and "paperless" recorder functions, the ScopeMeter 123 test tool from Fluke provides answers for troubleshooting machinery, instrumentation and control and power systems. According to Fluke, the tool weighs 2-1/2 pounds and provides the user with a stable waveform on the display. "No matter what the signal looks like," the company promises, "all signal detail will be revealed, including spikes, noise and complex waveforms used in motor drives."

The ScopeMeter 123 uses proprietary circuitry to analyze input signals while the microprocessor uses this information to control the instrument settings. Also, a new shielded test lead takes multiple meter readings, capacitance and resistance measurements and continuity checks while shielding the incoming signal from noise pickup. The test lead also functions as an oscilloscope probe for wide bandwidth displays.

For more information, contact Fluke Corp. in Washington at (206) 347-6100; fax: (206) 356-5116, via e-mail: fluke-info@tc.fluke.com *or circle* ***Reader Service 58.***

Hewlett Packard

Designed to minimize automated test equipment costs and production test-times, the two series of automatic measuring systems from Hewlett-Packard have a graphical interface that runs in a WindowsNT 4.0 environment.

Called the A-systems and the B-systems, both include a low-noise modular measurement system baseband test set that measures the single sideband phase noise of high-frequency oscillators. Several factory-configured systems are available.

Both systems have a typical system noise response of -180 dBc/Hz for offsets greater than 10 kHz. They also provide a wide offset-frequency range of 0.01 Hz to 100 MHz for the B-systems and 0.01 Hz to 4 MHz, which can be extended to 8 MHz, 10 MHz or 100 MHz, for the A-systems.

For more information, contact Hewlett-Packard in California at (800) 452-4844, ext. 5616 or circle ***Reader Service 105.***

Neutrik

Two pocket-sized products from **Neutrik** called "Minstruments" are available to troubleshoot and measure broadcast audio equipment.

The Minirator is a low distortion 20 Hz-20 kHz tone generator. Its partner, the Minilyzer, measures and displays level, frequency response, polarity and impedance.

The Minirator is a frequency-adjustable signal generator with readout. Available outputs include low-distortion sinusoidal, square wave with high slew rate and white noise.

The Minilyzer features a low-noise amplifier and jack that allows headphone monitoring of the test signal.

Designed to fit in the palm of your hand, the two products provide a direct connection to the input or output of a console, amplifier or other test subject.

For more information, contact Neutrik in Montreal at (514) 344-5220 or circle ***Reader Service 36.***

Dorrough Electronics

A 2RU instrument, the Stereo Signal Test Set Model 1200 from Dorrough allows dynamic monitoring of audio levels, balance, cross-talk, system gain, signal-to-noise ratios and program "center-channel build-up." A primary application of the set includes verifying polarity and balance of stereo broadcast lines.

Dorrough provides two loudness meters; each features backlit scales, a "dB" scale, with 1 dB increments from -36 to +3 dB and a separate scale for modulation, from 0 percent to 125 percent.

Average signals are determined from the value of the leading LED in the row of consecutively lit color-keyed LEDs. Peaks simultaneously are indicated as a single LED that rides the crest of the waveform.

Function, Range and Attenuation controls are set in tandem with the meters to achieve all measurements. Left and right channels are input via loop-through XLR connectors or a parallel barrier strip. A front-mounted, amplified stereo headphone jack also is provided for monitoring.

For more information, contact Dorrough in California at (818) 998-2824; fax: (818) 998-1507; or circle ***Reader Service 81.***

MARKET PLACE

Harris Second-Generation Digital Audio Console

Harris recently introduced a second-generation digital audio console, the DRC2000, that "emulates the look, feel and operation of an analog console ... (and) also provides all of the advantages of a field-proven DSP architecture and software."

The DRC2000 provides 16 fader/11 AES3 (22 mono) inputs and a dedicated "dump" button for use with a delay option. Other features include a user-definable fader layout that allows an input to be assigned to a fader via DSP routing; EQ, gating, pan and compression functions that can be assigned by channel and set-up; and built-in mix-minus.

For more information, contact Harris in Indiana at (765) 935-1704; fax: (765) 966-0623; or circle ***Reader Service 201.***

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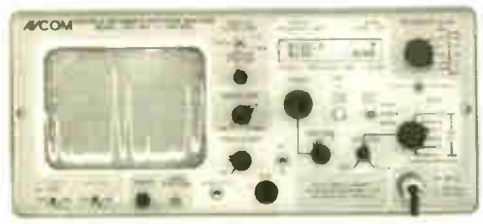
AVCOM's PSA-65C is a low cost general purpose spectrum analyzer that's loaded with standard features including FM audio demodulator and AM detector. The PSA-65C incorporates microprocessor controlled functions with digital frequency lock. The PSA-65C is ideally suited for 2-way radio, cellular, cable, satellite, LAN, surveillance, educational, production and R&D work. Options include 1250 MHz frequency extenders, BNG-1000A tracking (noise) generator, log periodic antennas, carrying case (AVSAC), and more.



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The CircuitWerkes DR-10 Dial-up controller is perfect for studio & automation control. With useful features found nowhere else, the DR-10's list price of only $439.00 might just amaze you.

- 10 Dry relay contacts out (2 are DPDT for audio, etc.).
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- Up to 8 digit user set password prevents pirating.
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READER SERVICE NO. 117

World Radio History

TARGET: REMOTE CONTROL

Station Control for All Seasons

With more stations under one roof these days, transmitter sites often are scattered throughout the area ... and you are responsible for all of them. Remote control devices enable you to control and monitor the transmitter without actually having to travel to the site. Most offer security passwords and controlling/monitoring capabilities through touch-tone phone commands. Well-designed units also save you time and aggravation.

Broadcast Tools

The DC-8A Dial-Up Remote Control from Broadcast Tools Inc. allows the user to control and monitor external devices from a touch-tone telephone. The DC-8A will answer the phone after the programmed number of rings, accept an access code and allow the control of eight form A relays and the monitoring of eight logic-level status inputs.

The DC-8A is housed in a single rack chassis and is equipped with a basic audio hybrid, allowing the user to send and/or receive external audio while controlling the unit. In addition, the unit can activate as many as three digital pagers. It may be configured for stand-alone DTMF tone decoding.

Each relay may be configured to close for as long as the associated key is pressed, latching and interlocking mode and each input and relay may be individually polled by the user.

For more information, contact Broadcast Tools Inc. in Washington at (360) 428-6099; fax: (360) 428-6719, via e-mail: btibroadcasttools.com; *visit Web site* www.broadcasttools.com *or circle* ***Reader Service 57.***

Burk Technology

The ARC-16 Remote Control System from Burk Technology offers the choice of full-time transmitter control, dial-up telephone control or both. The modular design of the ARC-16 allows the user to configure a system for the needs of the station and provides new features that were, according to Burk, "never before available in a 16-channel remote control."

With a full-time system, the studio controller gives operators a constant link to the transmitter for instant response. In the single unit Stand Alone configuration, the Enhanced Speech Interface allows control using the keypad of any touch-tone phone. Digitally recorded human voice guides operators through transmitter readings and adjustments.

The ARC-16 includes 16 channels of analog metering, 16 status channels and 32 command outputs. Subcarrier generators, demodulators and communication modems are built in. The system is expandable to include multiple transmitter sites or multiple studios within a single system.

Other accessories are available.

For more information, contact Burk Technology in Massachusetts at (508) 486-0086; fax: (508) 486-0081; or circle ***Reader Service 82.***

Dove Systems

Monitoring as many as 254 sites, the DRC200 from Dove Systems contains 48 analog inputs and 48 status inputs per site, and offers 48 open-collector control outputs per site. With an unlimited number of user-defined, security-protected screens, each one may show data from multiple sites and can be

controlled through keyboard and/or mouse commands.

A user-defined log format allows multiple sites to be printed on the same log. All user screens may review historic data and sites may be linked using two-wire voice-grade dedicated circuit, UHF packet radio links, ESM spread-spectrum links or user-supplied RS232 digital data link.

The system requires a 486 processor, 4 megabyte RAM, 500 megabyte hard drive; the software runs under DOS or a DOS window in Windows.

A demonstration disk is available.

For more information, contact Dove Systems in California at (805) 541-8292; fax: (805) 541-8293, via e-mail: dove@dovesystems.com; *visit the Web site* www.dovesystems.com/dove *or circle* ***Reader Service 129.***

Gentner

A stand-alone remote control system, the VRC2000 from Gentner is for broadcast transmitters and other equipment. It provides 16 inputs for metering and 16 inputs for status, 16 command outputs with two closures per output. Each metering channel has two upper and two lower tolerance limits, providing flexibility in reporting or automatically correcting alarm conditions.

The unit contains a built-in synthesized voice that reports conditions to the operator via telephone or two-way link, or access the unit through a PC and modem.

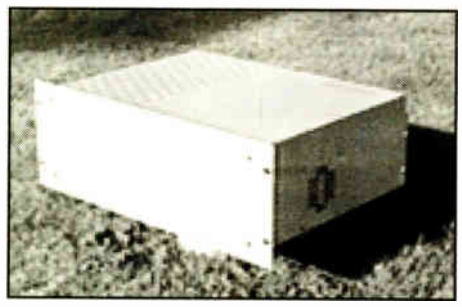
The VRC2000 is an ATS system and can correct conditions automatically at the transmitter site. Built-in time-of-day functions also provide for automatic event triggering.

For more information, contact Gentner in Utah at (800) 945-7730 or (801) 975-7200; fax: (801) 977-0087, via e-mail: gcrowder@gentner.com; *visit Web site* www.gentner.com *or circle* ***Reader Service 130.***

Itelco

According to LPTV and FM Sales Manager Dennis P. Pereira, "All Itelco products offer two levels of remote control." Using an OEM remote control system, the operator can command the transmitter to power on and off and place the unit on standby or transmit. Monitoring includes on/off status, fault detection and remote/local selection.

The Itelco Supervisory System uses a Windows-based interface4 with



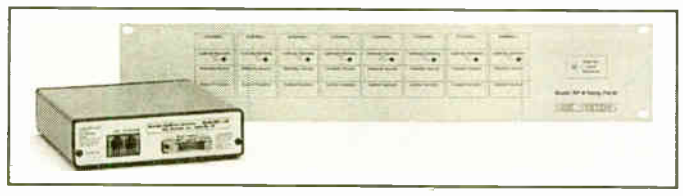
password protection and can control and monitor one or more transmitters. The system utilizes tables, schematics and block diagrams to provide current and historical transmitter status. All commands available at the transmitter front panel are available through the ISS.

Products from Dolp, a subsidiary of Itelco, use an RS232 port to provide remote command and monitoring. The remote software resides in the transmitter's password-protected microprocessor. The operator accesses the Windows terminal mode to command and monitor the transmitter. Command capacity includes frequency selection, voltage and current adjustments and transmitter on/off.

For more information, contact Itelco in Colorado at (303) 464-8000; fax: (303) 464-8770; or circle ***Reader Service 106.***

Sine Systems

The RFC-1 from Sine Systems is a dial-up remote control device installed at the transmitter and controlled and monitored from anywhere the user can find an ordinary telephone. To access the device, call the transmitter telephone number; after the RFC-1 answers, enter a security code. The transmitter can be controlled and monitored using the keypad on the telephone. The RFC-1 reports equipment telemetry and status with a digitally recorded human voice.

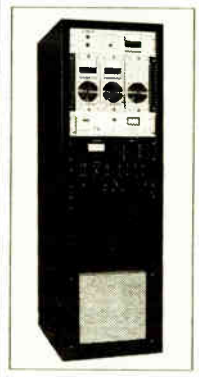


In addition to manual control and monitoring, the RFC-1 can be programmed to restart a transmitter automatically or switch transmitters in the event of a failure. Failing this, an operator can be called and notified. Automatic time-programmed functions such as AM pattern or power changes also can be programmed using the internal clock/calendar.

For more information, contact Sine Systems in Tennessee at (615) 228-3500; fax: (615) 227-2367, via e-mail: john@sinesys.com; *or circle* ***Reader Service 152.***

Next Buyer's Guide: Microphones & Headphones

Problem:



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World Radio History

SPECIAL REPORT

Engineers Want Improvements

Engineers Say Most Radio Equipment Is Better Than Ever, but Improvements in Metering Are Still Needed.

S.D. Yana Davis

Monitoring equipment has never been better, according to some radio engineers, although several said improvements in metering still need to be made. Overall, monitoring equipment is evolving into more computerized, multi-channel systems, with enhanced remote capabilities.

A major drawback with computerized systems, however, is accuracy of onscreen monitoring of audio levels. As monitoring loudness becomes more prevalent with the adoption of a standard, the issue of apparent loudness versus VU level will become one for management in the near future, leaving some uncertainty for manufacturers and radio engineers.

"Broadcasters aren't sure about their near term needs," said Edward Mullin of ATI, a manufacturer of monitoring equipment. "But, I think it will always be necessary to have something across the room wiggling up and down to give you sight of what audio is going by." Mullin said that most stations seem to be using a combination of analog VU, digital or LED readout and onscreen monitoring, and engineers are leery of the latter.

The accuracy of the instruments doing the wiggling is a concern of Tony Masiello, vice president of technical operations for CBS Radio.

"The biggest change has been with digital audio," Masiello said. "We use computer-based digital editing stations with virtual meters on screen. And what you see on screen is not always really the level you're getting. We've found it necessary to have 'real metering' somewhere in the chain."

Changes mean upgrades

The kind of equipment broadcasters want has changed in recent years. "People want more sophisticated equipment," said Dave Burns, studio product manager for Harris, Broadcast Division, which sells equipment to stations.

"Broadcasters are asking a lot for monitoring in conjunction with switchers with meters," said Tag Borland, president of Logitek, a manufacturer of broad LED-based audio bar graph meters. Borland said that many broadcasters want test positions, either meters or audio or both, at multiple locations.

Monitoring alarm systems manufacturer Patrick Hayes, vice president for Wohler, took it one step further. "Many engineers want to use the audio monitoring process as a conversion point. We make a unit that takes in SDI (digital signal) and converts it to analog. Why? Because you don't put out SDI, you put out analog sound."

The chief concern and fervent hope of station engineers is the future development of more accurate standardized metering.

Among the big changes resulting from station consolidation is the need for engineers and technicians to be able to monitor several air signals simultaneously. "Rather than having a roomful of meters," said Borland, "our company produces a device that monitors a whole bank of channels." An alarm is activated when a channel is down or otherwise impaired.

Cleve Hayes, chief engineer for Dick Broadcasting of Knoxville, Tenn., uses a similar system to monitor the six Dick Broadcasting stations in East Tennessee. "Without remote monitoring, it would be impossible" with stations separated by as much as 50 miles.

Hayes said he uses software systems from three companies — Eagle, Optimod and Mosley — to monitor transmitter audio parameters from his office and from home.

Upgrading equipment has been another necessity resulting from consolidation, according to Burns. "It means that some marginal stations, which hadn't even bought new cart machines in 15 years, are now buying new equipment. You have to upgrade when you're trying to impress investors."

Whether engineers are in a standalone situation or running multiple stations, ease of monitoring is also important.

"We use ENCO equipment," said Malloy Farley, chief engineer at WDET-FM, Detroit, Mich., "making use of a Micosoft NT system to multitask," resulting in the elimination of all but one computer screen from each studio and production room. Farley said that the system never buries audio levels and appears on any screen the board operator, technician or engineer is using in a studio or production room.

But some systems do not offer this advantage, said Patrick Hayes. "Some systems allow you to bury the onscreen monitors. A board op will go to a different screen and never come back. Engineers tend not to like this." One method of compensating includes tying in separate analog or LED meters at appropriate processing points.

He named loudness versus VU level as a coming issue for radio engineers and managers. Research shows that many radio listeners are annoyed by perceived differences in the loudness of commercials and other program elements on most stations. But as a standard develops, the issue will move from the technical side to management, he said.

"There's no standard yet for accurate monitoring of loudness after compression," Patrick Hayes said. He added that Wohler has decided to use the EBU loudness standard, already accepted in some countries. "Loudness is strictly a mental perception. There are sophisticated algorithms to use, which are supposed to mimic what the ear actually hears."

Calling for a standard

One change needed for the future is standardization of audio meter levels, according to Jim Scholefield, chief engineer at WAMC(FM) in Albany, N.Y. "Some meters are peak, some are average. The manufacturers need to standardize at one or the other, probably with an LED display." He said that different standards for meters create problems especially in training producers and board operators.

The chief concern and fervent hope of station engineers is the future development of more accurate, standardized metering, as other improvements, including computerized, remote monitoring and higher levels of sophistication have made most monitoring equipment system components "meet or exceed" expectations for the present.

■ ■ ■

S.D. Yana Davis is a freelance writer and marketing consultant in Knoxville, Tenn. Reach him via e-mail: yanajune@aol.com

TARGET: MONITORING GEAR

Take Time to Watch the Monitor

Radio offers a fascinating sequence of events from the time a word is spoken until it is heard. Part of the wonder of radio is that you also can "see" the audio and its transmission whether you are in the studio or at the transmitter site, through the monitoring devices. There are several kinds of monitoring devices used in radio stations. In this issue we survey transmission and metering devices; speakers will be covered in a later issue.

Audio Technologies Inc.

Featuring remoteable digital input selection which can mute all audio during the scan, the VU1000 from Audio Technologies Inc. has a meter accuracy of ±5 dB at 0 VU on all ranges. The unit has eight balanced bridging inputs; a

three color, 12-segment LED bargraph meter; VU, Average and PPM ballistics; and 0 VU calibrations for -10, 0, +4, +8 and +18 dBm inputs.

The line-level, active balanced output provides constant output at 0 VU on each scale. Internal jumper selects 0, +4 or +8 dBm nominal output to a 600 ohm line.

The VU1000-1 monitor drives 10 Vrms through 150 ohms and 600-ohm headphones and external amplifier.

Housed in a 8-1/2-inch by 1-3/4-inch case, the VU1000 weighs five pounds and can be mounted individually or in pairs.

For more information, contact ATI in Pennsylvania at (215) 443-0330; fax: (215) 443-0394; visit the Web site www.atiguys.com or circle ***Reader Service 176.***

AVCOM of Virginia

Covering frequencies from less than 1 MHz to 1250 MHz, the Portable Microwave Spectrum Analyzer, model PSA-65C from AVCOM of Virginia Inc. has a sensitivity of greater than -95 dBm. The PSA-65C incorporates microprocessor-controlled functions with digital frequency lock and a multifunction backlit LCD display which shows center frequency, start and stop frequencies and span.

FM audio demodulator and AM detector are standard on the lightweight, battery- or line-operated Spectrum Analyzer.

Accessories, such as the BNG-1000A tracking (noise) generator, 1250 MHz wide frequency extenders and a preamplifier to increase sensitivity to less than 1 microvolt also are available. Internal options include a 10 kHz resolution bandwidth and oscilloscope interface.

For more information, contact AVCOM of Virginia Inc. in Richmond at (804) 794-2500; fax: (804) 794-8284; or circle ***Reader Service 200.***

Benchmark Media Systems

The "on-line" SPM-220/320 meter systems from Benchmark Media Systems Inc. are switchable from VU meters to a PPM mode. Peak mode calibration uses the normal 8 dB peak-to-average ratio found in most program material. Peak Hold can capture and hold the highest peaks for later review, including while monitoring in VU.

System references of 0, +4 and +8 dBu are switch-selectable, and custom or 150-ohm references are available. Peak-indicating LEDs

trip beyond the meter scale in a range of +16 to +26 dBu, with a normal setting of +20 dBu. Matrix stereo is included and is available in VU and Peak modes; the matrix feature detects polarity inversions and protects the mono sum.

Audio may loop through or matrix audio may be decoded

See MONITOR, page 64 ▶

World Radio History

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Make Sure to Mind Your Monitors

▶ MONITOR, continued from page 62

for actual use.

*For more information, contact Benchmark Media Systems Inc. in New York at (315) 437-6300; fax: (315) 437-8119 or circle **Reader Service 154**.*

Belar

Operating with an existing modulation monitor, or for use as a replacement modulation monitor, the Wizard from Belar measures peak modulation, peaks per minute, average peak modulation and modulation density. The Wizard is packaged with Wizard Software and, coupled with an IBM-compatible personal computer, enables real-time graphing, logging and remote operation.

The Wizard features user-defined parameters and settings for flexibility. Two Composite Loop-thru functions permit the user to "touch up" modulation remotely through the RS-232 port. A built-in Audio Sentry audio failure alarm raises awareness of loss of modulation.

When installed at the transmitter, Option 02 measures RF level, AM Noise, and Synchronous AM noise, eliminating the need for a separate AM Noise monitor.

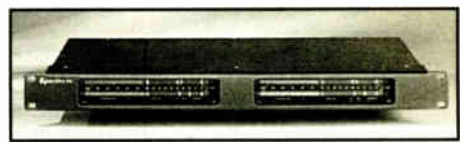
*For more information, contact Belar in Pennsylvania at (610) 687-5550; fax: (610) 687-2686 or circle **Reader Service 35**.*

Logitek

The MON-10 multi-source meter/monitor from Logitek feeds any of 10 stereo inputs to a single output and also feeds the selected input to a multi-range meter, a 6-watt speaker and a front-panel stereo headphone jack. Line output switching is passive so the output level impedance and balancing is the same as that of the selected input.

The MON-10 features wire-capturing terminal blocks and measures 1RU.

Logitek also offers the Ultra-VU Precision Audio Meter, shown here, which displays VU and peak levels on the same bargraph. Tri-color LEDs allow the VU level to be shown as a green bar and the peak level to be shown as a red dot, reducing confusion. The unit features a switchable loudness filter referenced to 50 dB SPL and a stereo image display that shows width and location of the stereo sound field and phasing problems.



*For more information, contact Logitek in Texas at (800) 231-5870 or (713) 782-4592; fax: (713) 782-7597; or circle **Reader Service 59**.*

Modulation Sciences

By using an 80C88 microprocessor, the ModMinder from Modulation Sciences digitally processes modulation information and measures, displays and analyzes peak FM deviation. The ModMinder can work with any wideband demodulator and provides a front-panel display of information, plus remote control and data transfer capabilities.

The response time is user-selectable. The ModMinder delivers ±1.0 percent

accuracy and 0.5 percent digital resolution.

The highest modulation peak attained during the previous second is shown on a three-digit numerical display, updated each second. The number of overmodulation occurrences in the past 60 seconds is displayed on a two-digit numerical readout. If program audio fails, a red LED will illuminate.

*For more information, contact Modulation Sciences in New Jersey at (800) 826-2603, (732) 302-3090; fax: (732) 302-0206, visit the Web site www.modsci.com or circle **Reader Service 153**.*

Tektronix

Designed with a familiar user interface to encourage analog users to move to digital oscilloscopes, the 60 MHz Digital Real-Time Oscilloscopes TDS 210 and TDS 220 from Tektronix sample at 10 and 16 times their bandwidths on both channels.

Digital storage technology supports features such as automatic measurements, peak detect, storage of two reference waveforms and five instrument setups and autoset. Peak detect and high sample rates minimize aliasing while capturing waveform details that remain unseen on analog oscilloscopes.

The units contain productivity enhancing features such as the Hardcopy Extension Module, which allows printing of screen shots; the Communications Extension Module, which provides the same printer port plus RS-232 and GPIB programmability; and the Measurement Extension Module, which combines the features of the Communications Module plus Fast Fourier Transform analysis and four additional measurements.

*For more information, contact Tektronix in Oregon at (503) 627-4697 or circle **Reader Service 83**.*

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Fostex PH-5 headphone amp, excel cond, $95; Gates M6244 phono preamp, $20; Sparta TEP 35 phono preamp, $10. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

HH Scott 299B amp, 335 multiplexer, 310D FM, $400; Harmon Kardon Citation 12 pwr amp, like new, $250; Sansui 500A w/wood case needs output tubes, $50. C Collins, Crunert Sound, 1977 S 74th St, West Allis WI 53219. 414-327-4141.

Marti MA-10 monitor amp; Stanton 310 stereo preamps (4), all worked when removed from service. G Manning, WARK, 880 Commonwealth Ave, Hagerstown MD 21740. 301-733-4500.

McIntosh MAC-1900 solid state stereophonic FM/AM rcvr w/papers, superb cond, $575 +shpg; HH Scott 350-B tube stereo FM multiplex tuner, dial has small fractures, w/knobs of later vintage prod, $100. R Links, Links Sound, 1656 California St, Berkeley CA 94703. 510-845-5557 aft 7PM PST.

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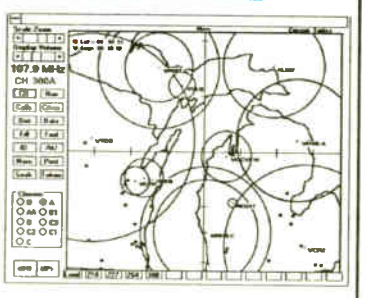

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Allen Dick 6 bay, 99.5 MHz, 10 kW, $400; RCA/Dielectric 6 bay, 99.3 MHz, 20 kW, $1000. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

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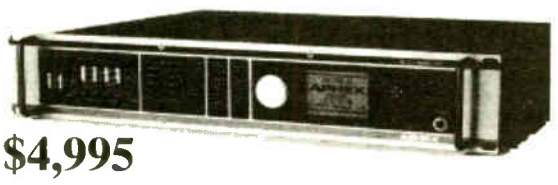

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World Radio History

AUDIO PRODUCTION continued...

Koss/Optimus Pro-90 stereo headphones, new in box, will trade for an older pair of working AKG K-240 or K-141 headphones. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 812-877-2663.

MRL 1/2", 30 ips, 250 nWb/m, calibration tape as new, $150; Aphex Compellor, mint, $500; dbx 760X stereo mic preamp w/phantom, new, $150; AEA MS-38, dual mode, active matrix MS to stereo & stereo to MS converter, as new, $200; Stanton 310 record (TT) preamp, w/input load & power line matching switches, mint, $150; ATI M-1000-2 precision dual mic preamp, as new, $200. M Shea, Precision Recording, POB 1651, NYNY 10276-1651.

Roland SE50 stereo effects processor, excel cond, $200 ea; Lexicon PCM 41 digital delay processor, excel cond, $300; JBL 4312 field studio monitors, gd cond, $300; EV Sentry 100 field studio monitors, gd cond, $300; Yamaha REV 7 digital reverberator, excel cond, $400; BBE 862 +4 unit, brand new, $250/BO; Aphex 107 mic pre, brand new, $200. R Pearson, Transparent Sounds, 226-21 129th Ave, Laurelton NY 11413. 718-978-6262.

Studer 2706 monitor speakers, ported 3 way w/built-in protection, $750 +shpg for pair. M Halleck, KSTP, 2792 Maplewood Dr, Maplewood MN 55109. 612-481-9333.

Symetrix 511 NR system, rack mounted ready, $200 +shpg. G Kolarcik, Jesuit Prod, 3900 Westminster Pl, St Louis MO 63108. 314-533-0320.

Telco 19" dual-plug patch panel, gd cond, quick connect panel on 6' cord, w/5 patch cords, incl shpg, $80. R Burgan, RR1 Box 43, Hancock MI 49930. 906-482-2403.

Yamaha F1030 3 way electronic crossover, $200; Yamaha 6681B 2" horn w/driver, $100. T Beck, WWVA, 1015 Main St, Wheeling WV 26003. 304-234-0065.

Dolby 363 2 chnl A/SR NR w/cat 330 card, $850; Dolby 361 frames w/cat 22 cards, $300. F Lanzer, Underground Sound, 77-74 76 St, Glendale NY 11385. 718-821-1427.

Harris CB-1200 TT's w/tone arms (4), fair cond. G Manning, WARK, 880 Commonwealth Ave, Hagerstown MD 21740. 301-733-4500.

SAE 5000-A click & pop device, $150 +shpg. R Links, Links Sound, 1656 California St, Berkeley CA 94703. 510-845-5557 after 7PM PST.

Valley Micro FX Series NR units (6), vgc w/rack adapters, $40 ea. C Yengst, WAWZ, Weston Canal Rd, Zarephath NJ 08890. 732-469-0991.

Want to Buy

Used audio gear of all ages & varieties. Dan, Coast, 665 Harrison, San Francisco CA 94107. 415-546-0200.

Neve, API, Gates, Langevin, Collins, Lexicon & other mic preamps, EQs, reverbs, delays. T Coffman, Rolltop Studio, POB 17203, San Diego CA 92177. 619-571-5031.

AUTOMATION EQUIPMENT

Want to Sell

ITC 12 slot Digicenter On-Air server w/(2) 2.1G drives w/Digicenter production workstation, equipped w/vari-time editing, (3) DSP/AIO uncompressed audio cards & SAC/PAC automation software, BO. C Wilk, WFLS, 616 Amelia St, Fredericksburg VA 22401. 540-373-1500.

Air Century automation controller, $700. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Arrakis Digilink GEM-600 Gemini System w/1.2 gig + network board & software w/cart wall; Arrakis TS-8C Trak Star workstation w/270 MG w/network board & software, units are 1 yr old, currently on air & working, $8,500/BO. L Zeve, WHYL, Box WHYL, Carlisle PA 17013. 717-249-1717.

Digilink CD multiplay controller w/3 used PD-TM3 18 CD players, new PD—TM3 18 CD player; (4) PDM-501 6 CD players w/magazines, no manual, $1500 FOB here. B Dixon, WAWC, 219-457-8181.

Revox A-77 r-r (3-4) in fair to poor cond, some for parts; Circuit Werkes DTMF-16 tone decoder, new cond; MEI 100MP programmer, may need work; Spotmaster TP-1B cart winder w/counter, fair cond; Tapecaster 700P cart decks, one could work, the other for parts. G Manning, WARK, 880 Commonwealth Ave, Hagerstown MD 21740. 301-733-4500.

Want to Buy

Systemation Super Switch, working or not, for use w/SMN/AUSC 24 hr formats. P Bossart, KSPK, 516 Main St, Walsenburg CO 81089. 719-738-3636.

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BE 5300B mono triple deck, complete except for motor, needs work, BO. P Bossart, KSPK, 516 Main St, Walsenburg CO 81089. 719-738-3636.

Audi-Cord E Series cart players (3) in rack mount; ITC 3D stereo reproducer; ITC SP stereo reproducers (3); ITC 99 mono R/R, all worked when removed from service; ITC SP-RP R/R, stereo, needs work; over 300 Audiopak carts in various cond; wire cart rack, holds 200 carts. G Manning, WARK, 880 Commonwealth Ave, Hagerstown MD 21740. 301-733-4500.

IGM monaural, $75 +shpg. R Links, Links Sound, 1656 California St, Berkeley CA 94703. 510-845-5557 after 7PM PST.

ITC triple deck, $900; ITC Delta, $875; (3) SMC 712, $200 ea. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Want to Buy

BE Disk Trak. G McClintock, WNQM/WWCR. 615-255-1300.

CD PLAYERS

Want to Sell

Sharp 3510 6 disc player, $50. C Kendall, CK Broadcasting Inc, 317 Delta Ave, Clarksdale MS 38614. 601-627-7343.

Denon 950FA (3), $500 ea; (18) Technics SL-PG-300, $50 ea. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

COMPUTERS

Want to Sell

Motorola 5208-R Codex (2) for leased line applications, 4800 BPS, $25 ea +shpg. R Links, Links Sound, 1656 California St, Berkeley CA 94703. 510-845-5557 aft 7PM PST.

CONSOLES

Want to Sell

Arrakis Systems 1200-10S, new, complete w/pwr supply & manual, unused, we ship prepaid to you, $2495. B Mauldin, Wm Mauldin Prod, 1010 Canonero Dr, Greensboro NC 27410. 910-632-9801.

Cetec Sparta A5-305 complete w/internal amps, 5 pots, 1 mic & 4 stereo, one has 5 selectable inputs, excel cond, we ship prepaid to you, $850. B Mauldin, Wm Mauldin Prod, 1010 Canonero Dr, Greensboro NC 27410. 910-632-9801.

Collins Mark 8 stereo, 8 pot rotary, gd cond w/manual & spare.parts, working when removed, $800; CCA Ultimate 10, 10 pot rotary, stereo, gd cond w/manual, working when removed, $1000. E Cunnar, WYKT, 195 Overton Rd, Diamond IL 60416. 815-458-2141.

Yamaha MC2404 24x4 mixing console, fair cond, $450. T Beck, WWVA, 1015 Main St, Wheeling WV 26003. 304-234-0065.

Gately 16x8 w/EQ on every chnl, 4 effects buss, quad monitoring, Canon connectors, in a custom console. A Baker, Bdct Productions of America, 804 E 38th St, Indianapolis IN 46205. 317-925-7371.

MCI/Sony 618, 24x24, $6.5K; Quantum 24x24, $4.5K; Soundcraft 600, 32x16, $5.5K, like new; Model 30, $295; 512, $950; 520, $1450. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

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UREI 1176/1178 or other gd compressor. M Hughes, Fresh

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Gates SA-39 tube compressor, great cond, $500; Gates tube compressor, in service, $350. C Kendall, CK Broadcasting Inc, 317 Delta Ave, Clarksdale MS 38614. 601-627-7343.

Audimax 4440A AGC; Audimax 111 level controller; Volumax 4000A peak controller; Gates M6631 Solid Statesman FM limiter. G Manning, WARK, 880 Commonwealth Ave, Hagerstown MD 21740. 301-733-4500.

Orban 8000A stereo gen $1000; Microcon Flexmod composite processor, $750; (2) Dorrough 610 3 band processors, $300 ea. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Want to Buy

Teletronics or UREI (LA 2, 3, 4, 1176) Gates, RCA, dbx (160-165), Altec, Collins. T Coffman, Rolltop Studio, POB 17203, San Diego CA 92177. 619-571-5031.

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 972-271-7625.

MICROPHONES

Want to Sell

AKG C3000 (2) capsule large diaphram condenser mics, like new, manuals, clips, etc, $750/pr. M Schackow, Mark Schackow Recd, 307 4th Ave E, Lemmon SD 57638. 605-374-3424.

Microtech Gefell UM92 tube mic, w/cables, pwr supply, shockmount & extra EF86 tube, $1850. T O'Toole, Tom O'Toole Comm, 115 W 79th St, Burk Ridge IL 60521. 630-789-8666.

EV RE20, perfect, $295; EV 309A mic shockmount, perfect, $65; Telex V220 sportscaster headset w/cord, XLR plug, excel, $145; OC White M2MDUR mic arm/R, excel cond, $65; RCA BK53, $50; (2) mic crane light duty, $20 ea. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Luxo LM-1 41" mic arm, mint cond w/clamp & mount, oyster color, $50 +shpg; Conquest (Belden) 2-B mic cables, (4) 25' lengths, factory m/f XLR ends, low-Z, brand new, $15 ea or $50/all +shpg. R Wertime, 207 Leitersburg, Greencastle PA 17225. 717-597-2213.

Neumann U47, $3900; U67, $3300; U87, $1800; KM83 or 84 pairs, $1400; KM88s, $950 ea; RCA 77DX, $1200; BK5, $700; BK1A, $300. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

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Broken EV mics, RE-20, PL-20 for parts, any cond. D Rumble, 2918 N 47th Dr, Phoenix AZ 85031. 602-272-4724.

RCA 77 & 44 or other ribbon mics, dynamics & tube mics. T Coffman, Rolltop Studio, POB 17203, San Diego CA 92177. 619-571-5031.

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 972-271-7625.

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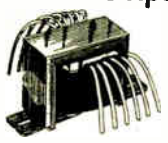

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Elmac 250th, 450th, 4-1000, 4 PR-1000, air variable capacitors, Barker-Williamson 850 pi-output coils, band switches; German Grundig S0290/US stereo console radio, no cabinet, multisonic w/echo, 4 bands, TM45 r-r, GW-11 4 speed changer, six cabinet speakers, 2 heavy chassis, tube type. F Yonker, Penn State Univ, 1229 Inverary Pl, State College PA 16801. 814-867-1400.

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Onan 30EK & LTD emergency pwr gen & transfer switch, 30 kW, 3-phase, fully automatic, $4000. S Johnston, WSBA, POB 910, York PA 17402. 717-764-1155.

SL Waber pwr conditioner, voltage regulator w/surge & noise suppressor, like new, 15 amp, 138 VAC, $499. R Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 530-257-2121.

Yamaha Rev5 reverb, Moog Prodigy keyboard, $500. C Kendall, CK Broadcasting Inc, 317 Delta Ave, Clarksdale MS 38614. 601-627-7343.

Eventide BD500, perfect, $1795; Gentner TS612 6 line/exp, w/screenware pkg, excel, $200; Gentner TS 612 network interface, excel, $275; Gentner TS612 control surface, excel, $275; Telos One 120-1 hybrid w/rack mount, excel, $410; Best UPS L1 3KL, $1275. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Mars Radio sound effects, full set & music, 33-1/3 discs; full set Tanner Sound effects & music, 33-1/3 discs, BO +shpg. P Mueller, KUTA, 2575 N RadioHill Rd, Blanding UT 84511. 435-678-2261.

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Phase Linear 1000 dynamic range recovery system, $100; Sony SQ2020 decoder, $50. C Collins, Grunert Sound, 1977 S 74th St, West Allis WI 53219. 414-327-4141.

Phasemaster T-5000-A2 230V rotary phase converter; Moseley TRC-15A remote control, worked when removed from service. G Manning, WARK, 880 Commonwealth Ave, Hagerstown MD 301-733-4500.

RCA rack 7' x 19-1/2" deep brown, tapped equip, $175; Gates rack 78" x 17" deep gray, tapped equip, $150; Gray rack, 28" x 15", deep gray, tapped equip, $50; rack, telephone relay, tapped, gold, $20; Thunder Bay effects library LP's, $50; Gorman Redlich CD EBS decoder, $25; (2) Symetrix SC-203 telephone hybrid, rack mtd, $150 ea. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Sony CDK-3600 Jukebox (auto disc loader), gd cond. J Vobbe, WLEW, 935 South Van Dyke Rd, Bad Axe MI 48413. 517-269-9302.

TC-4 digital delay, $800; Illbruck white acoustical insulation, $1/sq ft; Pelican cases, $50. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

ADC TT (Bantam) Patchbays, $149; TT or 1/4" cords, $10; new short MRL test tapes, $229 for 2", 1/4", $79; Gates dual stereo tube limiter, $1200; Gates top level, $595; Allen & Heath GL2 rack mixer, mint, 14x4, $795; CBS Labs Audimax, $400 ea; tube preamps, $300-400; MX10 mixers, $795. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Want to Buy

Yamaha BP-2 bass pedals. B Meuse, Muse Audio Arts, 191 E El Camino Real #209, Mtn View CA 94040. 650-969-2433.

UTC transformer A, HA, LS Series A 16, 17, 18, 19; HA 100, 101, 104, 105, 106, 107, 137; LS 19, 21, 25, 40, 55, 56, 57, 61. M Hughes, Fresh Start Music, 13500 Vandalia Dr, Rockville MD 20853. 301-962-6823.

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NYNY 10003. 212-674-3060.

MONITORS

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Alesis ADAT XT, like new, less than 50 hrs, latest software version, $1800. M Schackow, Mark Schackow Recd, 307 4th Ave E, Lemmon SD 57638. 605-374-3424.

Ampex ATR-700 r-r tape deck, $200 +shpg. G Kolarcik, Jesuit Prod, 3900 Westminster Pl, St Louis MO 63108. 314-533-0320.

Stellavox rcdrs/parts. C King, King Audio, POB 116, E Berlin CT 06023. 860-665-2881.

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Ampex AG440B 4 trk 1/2" r-r R/P in custom console in gd cond, $1000; Ampex AG350 mono r-r w/Ampex Solid State electr, in custom console, in gd cond, $500. A Baker, Bdct Productions of America, 804-E 38th St, Indianapolis IN 46205. 317-925-7371.

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Marantz PMD-222 pro mono cassette rcdr w/XLR balanced input, new in box, 3 avail, $250 ea. B Petruzzi, A-Z Music, 5132 Pebble Beach Blvd #B, Las Vegas NV 89108. 702-646-2639.

Otari MX5050BII w/manuals, mint cond, plays 15" & 7.5" reels, $800. DeBoal, Sound Productions, 13272 Edwards St, Westminster CA 92683. 714-379-0305.

Studer B67 2 trk in Studer rolling cabinet, 7.5/15/30 remote & varispeed, $1500. F Lanzer, Underground Sound, 77-74 76 St, Glendale NY 11385. 718-821-1427.

Studer B67 2 trk rack mount, 3.75/7.5/15 remote & varispeed, $1000. F Lanzer, Underground Sound, 77-74 76 St, Glendale NY 11385. 718-821-1427.

Tascam 58 OB w/roll around Tascam stand, excel cond, $2500. H Fenster, Universal Rehearsal & Recdg, 17 W 20th, NYNY 10011. 212-929-3277.

Webster wire rcdr w/spools, working, $200. C Collins, Grunert Sound, 1977 S 74th St, West Allis WI 53219. 414-327-4141.

Ampex 4 trk tube deck, $2500; stereo 351 (recond), $1800; Akai Adam, new, digital 12 trk, $3500; MM1000-16 w/new heads, $4500; Otari MTR10-4, $3500; Ampex ATR102s, search to cue, $495; Ampex locator for ATR or 1200, $895; MCI 110C-8, $3.5K; Tascam 85-16 recond w/dbx, rc & loc, $3K. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

New & used Ampex 350 style tape transports, motors & parts, various prices. M Crosby, 408-363-1646.

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Magnecord r-r recorder, one or more. G Humphries, KGND, 415 E III, Venita OK 74301. 918-256-7224.

Technics 1500/1506 dust covers. R Pearson, Transparent Sounds, 226-21 129th Ave, Laurelton NY 11413. 718-978-6262.

Scully 280 8 trk, 4 trk or 2 trk for parts, will buy as is. M Hughes, Fresh Start Music, 13500 Vandalia Dr, Rockville MD 20853. 301-962-6823.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Ampex PR10 tape recorders. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

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Tascam 32 r-r, perfect, $1375; Panasonic DAT SV-3700, excel cond, $600; Telex ACC-4000 duplicator, perfect, $1800. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Tascam 38 r-r 1/2" 8 trk, $1950; Otari MX-5050 r-r 1/4" 2 trk, $700; (2) Ampex 1/2" 499 tape on 10" reel, $30 ea; JVC TDW 201 cassette deck, $50. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Moseley MRC1600, BO. C Kendall, CK Broadcasting Inc, 317 Delta Ave, Clarksdale MS 38614. 601-627-7343.

Adtran ISDN interface ISU2X64-5, new, $945; Ascend ISDN router, new, $10,000; Circuit Werkes AC12 coupler bay w/3 cards, $700. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

Belden 9192, 1000' new 14 awg dbl shield 75 ohm stranded coax; 1000' new 12-4 plus ground pwr cable on spools, BO. Stephen, KWVA, POB 3157, Eugene OR 97463. 541-782-2901.

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Motorola UDS UTA220K ISDN desktop terminal adapter, like new, $450; CDQ 2000 ISDN codec encoder, like new, $1500. D Cowley, KYXS/KJSA, 114 N Main St, Weatherford TX 76086. 817-594-9509 or 817-589-7312.

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Scientific Atlanta 7300 rcvr w/7.5, 15 kHz & Sedat, $2000; Comstream ABR100, $300; California Microwave two program demods & on cue demod, BO. C Kendall, CK Broadcasting Inc, 317 Delta Ave, Clarksdale MS 38614. 601-627-7343.

Scientific Atlanta 7300, (2) Sedat cards dual audio, DATS 7.5 dual radio card, (2) DATS 15 dual audio cards, voice cue card, ABC data card, ABC Net Cue II, vgc, $2000. D Covey, Entertronics, 128 Glen St, Glens Falls NY 12801. 518-761-9890.

Scientific Atlanta Sedat 4228 decoder, never used, $975; Scientific Atlanta DSR 3610 sat rcvr, new, $2500; Sat data rcvr MS1130 DR11 mainstream data, $400. J Coursolle, WPKR, 2040 Waukau Ave, Oshkosh WI 54904. 920-236-4242.

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Microtran table top tape degausser, handles 1"-2" tapes, $150/BO; mechanical tape timers, Lyrec & Seike/Spotmaster, new & used. M Crosby, 408-363-1646.

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Sencor SL750I UHF/VHF/FM signal level meter w/case & charger, excel cond, $600. AJ Anello, WFLA, 1809 E 4th Ave, Tampa FL 33605. 813-241-2217.

Tektronix 475 dual trace oscilloscope 200 MHz, extra clean, $550. C Dollard, LKR Comm, 4608 Radio Tower Rd, Van Buren AR 72956. 501-474-2156, between 3-5PM CST.

Want to Buy

Delta Electronics OIB1 RF impedance bridge, good, used. ML Sawyer, KIGS, 2726 S Dayton St, Visalia CA 93277. 209-732-0993.

Potomac FIM-41 AM field strength meter; Delta RG-3 or RG-4. R Sweatte, Sweatte Bdctg, POB 7172, Kennewick WA 99336. 509-586-8627.

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