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Radio World®

The Newspaper for Radio Managers and Engineers

March 17, 1999

Transition to Digital

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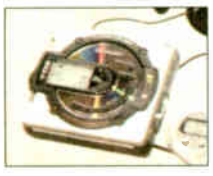

Visit RW Online at www.rwonline.com

FCC Faces LPFM Interference Concerns

by Leslie Stimson

WASHINGTON Of three power levels the FCC is considering for a new class of low-power stations, the LP1000, which calls for 1 kW and a maximum antenna height of 60 meters, is the most notable. Its proposed power level and status as a primary service mean this is the class that could affect existing broadcasters most.

Thanks to those factors, and the already crowded condition of the FM band, broadcast engineering experts say the commission must take care in setting distance separation requirements and making any changes to interference protection standards between new stations and existing facilities.

Alan Gearing, senior engineer at consultants Mullaney Engineering, compared the FM band today to the AM band years ago, describing it as a problem of "saturation."

"No matter how low a power station you add to the mix, especially in 90 percent of the more densely populated areas, you're going to be causing interference to somebody who's already there," Gearing said.

LP1000 — Kilometers from Full-Service Station Needed to Avoid Interference (FCC Calculations)

Class	Co-chan	1st Adj	2nd Adj (non-comm)	2nd/3rd Adj (comm)	IF
A	101	58	33	31	7
B	152	95	71	67	13
B1	128	74	50	46	9
C	212	151	96	94	28
C1	186	119	77	75	20
C2	152	92	57	54	13
C3	128	74	44	41	9
D	56	27	16	15	4

How much?

He and others interviewed by RW said the question then becomes whether or not the interference is going to be enough to be objectionable to the listener.

See LPFM, page 10 ▶

Quad Pumps Up Volume on EAS Dispute

by Lynn Meadows

WASHINGTON While a trio of U.S. government offices scrambled to issue statements regarding the patent on the Emergency Alert System, broadcasters saved their letters requesting royalties on the system and waited for instructions from their state and national associations.

A spokesman for Quad Dimension Inc., the company that sent the royalty requests to 1,500 radio and television stations, said he could not say at press time who had and had not signed their agreements. Prior to the Feb. 24 due date, broadcasters were being told by their state associations to "wait and see" what the government would say.

The FCC, National Weather Service, and Patent and Trademark Office were the three leading governmental players in the patent issue.

In 1992, Quad Dimension Inc. received a patent from the patent office for its "Storm Alert for Emergency" technology. The inventors believe the patent claims cover the Emergency Alert System mandated by the FCC in

See EAS, page 12 ▶

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World Radio History

◆ NEWSWATCH ◆

Kennard Lauds Spin-Offs

WASHINGTON FCC Chairman Bill Kennard said he was "encouraged" to learn that Clear Channel Communications and Jacor Communications have signed letters of intent to divest or swap nine radio stations to three minority-owned companies — Radio One Inc., Blue Chip Broadcasting and Mega Communications Inc. Other buyers are Infinity Broadcasting Corp., Cox Radio Inc. and ABC Radio. The deals are part of approximately $340 million in transactions involving a total of 20 stations that must be sold or swapped to meet ownership limits once Clear Channel and Jacor merge. The merger is expected to close by Sept. 30.

Assuming the announced deals close, the combined Clear Channel and Jacor entity would own or operate 470 radio stations, 22 TV stations and 274,130 billboards.

FCC Reform To Be Pursued

WASHINGTON House Telecommunications Subcommittee Chairman Rep. Billy Tauzin, R-La., and his Senate counterpart, Conrad Burns, R-Mont., plan to introduce bills to reform and reauthorize the FCC later this year. Burns held hearings last year on FCC reform and plans to work with Senate Commerce Committee Chairman John McCain, R-Ariz., on crafting a bill that could recommend combining some FCC bureaus.

Rep. Tauzin told a meeting of radio group heads here that the FCC "is an agency out of control that demands congressional action to straighten it out." Both Tauzin and Burns said the FCC has gone beyond its congressionally mandated authority in implementing the Telecom Act, and that some departments within the FCC are duplicative and could be streamlined.

DG, Cumulus Ink Deal

Digital distribution services provider DG Systems has signed a one-year agreement to provide two-way audio services between Cumulus Media's production facility and the company's

See NEWSWATCH, page 3 ▶

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A Peek Into DRE's DAB Research

by Tom McGinley

*This is one in a series of articles about the technical characteristics of in-band, on-channel digital audio broadcasting systems now in development. A previous article (**RW**, Nov. 25, 1998) described the Lucent Digital Radio system.*

MILPITAS, Calif. Digital Radio Express is the brainchild of Derek Kumar, a digital communications expert who had worked on previous USADR systems as a subcontractor, including FM1 and FM2, which did not perform well in the 1994 and 1995 EIA lab tests.

Kumar left National Semiconductor in 1995 to conduct research for a Ph.D. He continued to monitor IBOC developments and began writing papers and conducting computer simulations after studying the EIA test results. He said the research led to a series of issued and pending patents. DRE, formed in 1997, acquired the intellectual property for the research from Kumar.

"The old USADR systems couldn't support the MPEG-2 bit-rates, so the adjacent channels got blasted with interference. Neither the technology nor the political structure was there to continue working on DAB at the time, so I sat out for almost two years," said Kumar, now the vice president of engineering for DRE.

Meanwhile, USADR contracted with Westinghouse Wireless Solutions in 1996 to redesign its system, while Kumar tracked the development of more advanced compression algorithms. Soon after MPEG AAC was introduced, he decided to break out on his own and form a new company with the help of Silicon Valley-based integrated chip maker TriTech Microelectronics and private investors. TriTech's Norm Miller serves as president and CEO of DRE.

Compared to USADR and Lucent Digital Radio, DRE is a small company, employing about 12 people at any one time.

The design elements of the DRE prototype IBOC FM system were finished and confirmed in lab testing in 1998. Field testing was carried out on KSAN-FM in San Francisco in late summer of 1998, with full simulcasting of the analog and digital signals (**RW**, Sept. 16, 1998).

Like the other DAB systems, DRE first source-codes the digitized audio with a compression algorithm. DRE chose MPEG AAC soon after DRE was formed as a company in January 1998. Thus far, DRE is using the "off-the-shelf" version of MPEG AAC, but Kumar is exploring the possibility of asking Fraunhofer, the primary MPEG developer, to look at further refining "error concealment strategies" within the algorithm. Kumar said the MPEG AAC encoding/decoding process is a "non-exclusive core technology" that anyone can use after obtaining licensing. USADR also uses MPEG AAC compression, but claims to be using customized features adapted to the specific needs of USADR DAB.

The DRE system employs a variation of coded orthogonal frequency division multiplex modulation as well as the Viterbi algorithm and the use of an interleaver, like the other two DAB systems.

When asked what distinguishes DRE FM from the other two FM IBOC DAB systems, Kumar cited the use of 8 phase shift keying modulation with "trellis coding," plus the use of diversity in completely independent upper and lower sidebands.

Kumar prefers to call the DRE approach "multicarrier" modulation.

Derek Kumar

The channel coding and modulation characteristics of the DRE FM system use 8 psk modulation vs. the 4 psk scheme used by USADR and Lucent. The higher number means more data can be transmitted in the channel, allowing more resources for error-correction data and ancillary services.

The trade-off is that the higher order modulation needs smarter error correction to perform well in the presence of multipath and interference. As a result, trellis coding is used to enhance the error correction capabilities.

The interleaver basically scrambles the bits out of order, reducing the chance that adjacent bits can be lost due to interference. The correct order is then reassembled in the decoder, which enables the recovery process to be more robust and fault-tolerant. The characteristics and the amount of introduced delay of the interleaver are different for all three systems.

Another important distinguishing feature of the DRE system is that it employs diversity in how the digital sidebands are handled.

"Both the lower and upper sidebands are fully independent in generation and recovery," Kumar said. "We don't transmit the same information in the upper and lower sidebands at the same time." Therefore, if one sideband is wiped out by interference due to multipath or selective fading, the diversity characteristics of different bit streams in each sideband, including time and frequency diversity, will permit data from the other sideband to remain useful in the reconstruction process.

A significant problem for all three proponents is how to handle the point of failure, or when the digital decoder can no longer provide enough valid data to keep the signal listenable. USADR employs an elaborate blend-to-analog scheme to extend useful listening beyond the digital limits.

Kumar prefers to have DRE "keep the digital going as long as possible" before

See DRE, page 10 ▶

A significant problem for all proponents is how to handle the point of failure, where the digital decoder can no longer keep the signal listenable.

◆ NEWSWATCH ◆

▶ NEWSWATCH, continued from page 2

more than 200 stations. "While we have our own corporate intranet for business information and management communication, we needed a solution for the high-speed distribution of ads, promos and other audio elements to our stations," said Cumulus Media Vice President of Programming John Dickey.

DG Systems Chairman and Chief Executive Officer Scott Ginsburg said the company completed a similar deal with Citadel Communications Corp. last year.

As part of the agreement between DG Systems and Cumulus, both firms will explore the joint development of future distribution systems. That could include integrating the DG Systems technology into Cumulus' Internet-based corporate network.

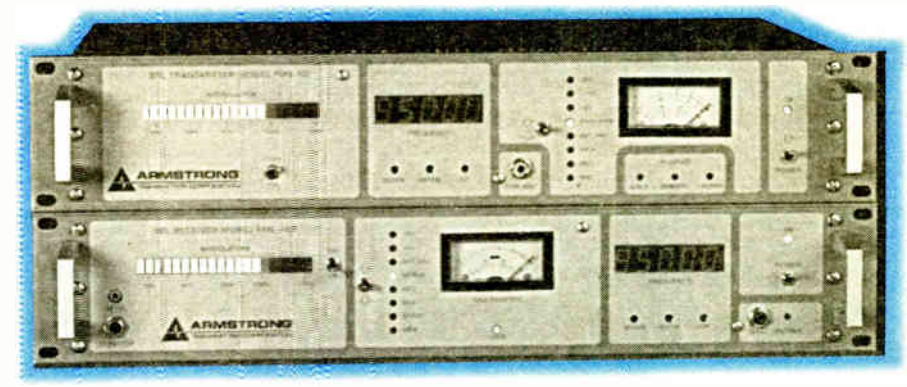
Shut-Downs Continue

The FCC, along with the U.S. Marshals Service and the U.S. Attorney's Office, seized equipment and shut down three unlicensed stations from mid-January through February.

In two cases, Greenwood, S.C., and Milwaukee, the FCC said the operators ignored warnings to shut down.

The agency said those stations were operating on 101.5 MHz and 88.5 MHz respectively. The third equipment seizure involved a station operating on 93.3 MHz in Palm Beach Gardens, Fla., stated the commission.

Frequency Agile STL Systems



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World Radio History

Ups and Downs of Product Reviews

From the Editor

Paul J. McLane

How does **Radio World** evaluate new equipment? Are **RW** product reviews balanced?

These questions come up from time to time. I feel it's important to explain our approach, so you can put your newspaper to the best possible use in your job.

Product stories are an important part of our publication. I would say that they are one of the primary reasons our readers pick up **RW** and read it in the first place.

We have several kinds of product stories. The type most pertinent to this discussion is the Product Evaluation. A writer, usually a radio engineer or technically savvy user, tries a product for a period of time and writes his or her thoughts about it.

Pros and cons

RW sorts through the many new products that come to market each month, and we select those that seem most relevant to radio, or that have found an unexpected use in our industry. Then we seek a real-world user who is willing to put the product to use, and write about the experience.

Here is an excerpt of the instructions we provide to these writers:

"Your story should answer the following questions, plus any other information you feel is relevant:

- What are the full proper names of the supplier and product?
- What is its price?
- How is it sold (Direct? Dealers?)
- Is it new? Is it shipping?
- What is its intended use, and how can radio users benefit?
- What are its most important or interesting features?
- What are its pertinent specifications (published or measured)?
- What are its physical characteristics?
- Describe the installation process.
- Why do you like the product? Does it perform as advertised? How did it sound?
- What did you not like?
- What should the supplier do differently in any future version?
- If the company is not well known, what is its background?
- If the product uses really different concepts or philosophies, what are they?
- If the designer/founder is interesting, what does he/she have to say about the product or the industry?

"Be honest," our instructions read. "If the product has flaws, state them. Call the supplier and give them an opportunity to state their viewpoints. But don't weaken your review. State your opinion."

We never instruct a writer to write a "puff review." That would be no service to our readers.

Product evaluations in **RW** usually include a product capsule with "Thumbs Up/Thumbs Down" information. This allows the writer to assess the most notable good and bad points, in his or her view.

I do not believe I am
in a position to *tell* you what to buy.
Every application is different.

The story in this issue about the Integrity console from Pacific Research & Engineering is an example. Engineer Allen Singer clearly likes the board. But he doesn't shy from telling us about some things that he would like to see done differently.

We encourage writers to include any pertinent comments from the manufacturer. If a maker disagrees with a review, we invite them to tell us why, in writing, so we can share those comments with you.

Occasionally a reader will argue that we should make a flat-out recommendation: "Buy this, don't buy that."

As an editor, I do not believe I should be in a position to instruct our readers in this way. Every application is different.

At one time, I worked for a company that sold an inexpensive line of belt-driven cart machines. A review of that machine by an engineer who was accustomed to top-of-the-line, direct-drive tape technology might not have been favorable. Perhaps the reviewer might have stated, flat out, "Don't buy this."

But such advice would not have been an honest service to the reader. I know that many stations with limited budgets, including school stations, were grateful for that inexpensive tape deck.

One reader wrote to tell me that the most useful information he receives are anecdotal stories told by engineers about field service problems.

"While they often are about a specific quirky unit — we all have lemons occasionally — you get a real look at how a device works or doesn't work, how well or poorly it was designed or built, and how consistent the after-purchase tech support is," he wrote.

I agree.

We should give as much information as possible to help you decide whether the product is suitable for *your* situation. I'm proud that **RW** does that.

Why they buy

There are other kinds of product stories that appear in **RW**.

Buyer's Guide articles cover a specific type of equipment in every other issue. These stories let users explain why they selected one brand in particular. Our readers like these stories.

It says a lot to me, the consumer, that one of my peers is willing to put his or her name on an article that speaks well of a product.

Taken as a section, *Buyer's Guide* articles give an excellent overview of the choices available in a given category.

We also publish short news items about new products, in columns called *Marketplace*, *Product Guide* and *Tech Updates*. We give you as much information as possible about interesting new products, and how to contact those suppliers for more details.

What are your thoughts? Share them with me at *pmclane@imaspub.com*

If you would like to take part in future product reviews, let me know.

★ ★ ★

Oops! In the Feb. 17 issue, the story on page 1 included the docket number of the FCC's Notice of Proposed Rule Making on low-power FM. It was misprinted; it should have read MM Docket 99-25.

The number is worth noting because many readers have a strong interest in the low-power debate, and may wish to contact the FCC with comments.

Let the commissioners know what you think. Comments are due April 12. You can send them as an electronic file via the Internet to *www.fcc.gov/e-file/ecfs.html*

The traditional paper filing is still acceptable; write to Office of the Secretary, FCC, 445 12th St. N.W., Washington, DC 20554.

And don't forget to send **RW** a copy, so we know what you're thinking. Reach us at *radioworld@imaspub.com* or write to the address on page 5.

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World Radio History

◆READERS FORUM◆

Letters received are the property of **RW**, and may be edited for space considerations.

Hazards of radio

Dear **RW**,

Having read Howard Enstrom's article "The Hazardous Side of Radio" in the Feb. 3 issue, I'd like to share a story of my own.

The time was in the late '70s. The station was located in New Jersey. I was hired to adjust the AM station's ATU for improved bandwidth. The new solid-state transmitter they had purchased would randomly wink off during musical selections with considerable high audio frequency content.

I noticed an unusual scorch mark on the front panel of their standby FM transmitter. I asked the chief engineer how this unusual scorch mark got there. He told me that one night some time ago, the former CE was working on the transmitter's PA cavity. The station was shut down and a note informed the morning DJ that the repairs should be complete by 6 a.m. The engineer had bypassed the door interlocks, since some of his work required the bias and screen supplies to be active.

One switch the engineer did not set was the "LOCAL" button on the remote control. It seems that the morning man came in early and decided to see if the transmitter would come on. Unfortunately, it did. That scorch mark was the result of the engineer's belt buckle coming into contact with the front panel as his arms were in contact with the PA plate supply voltage.

After some lost hours of morning drive time, his body was discovered when management personnel became concerned that no one was answering the transmitter site telephone.

It is unfortunate to share such sad stories. Perhaps if used as a lesson, there may be some benefit from them.

Tom Osenkowsky
Consulting Engineer
Brookfield, Conn.

Steve Allen: Stop the sleaze

Dear **RW**,

Thank you for allotting all that space to a story about me written by Bob Rusk in your Jan. 20 edition.

A majority of our nation's radio listeners are thoroughly revolted by some of what is now permitted to be broadcast.

— Steve Allen

Now that you have mentioned the growing tidal wave of the shock-shlock and general sleaze that is so typical of modern entertainment, I'm writing to ask if you have addressed this specific subject before.

If so, I would appreciate receiving copies of whatever news items or editorials you consider relevant to my question.

And if by chance your paper has not previously taken up this issue, may I strongly suggest that you do so. I can assure you that a majority of our nation's radio listeners are thoroughly revolted by some of what is now permitted to be broadcast.

Steve Allen
Van Nuys, Calif.

Marketwatch check

Dear **RW**,

The *Marketwatch* feature on Minneapolis/St. Paul (**RW**, Jan. 20) left out some significant figures and stations, concentrating as it did exclusively on commercial radio, and relying principally on Arbitron data. The chart, published with the article, should have included station frequencies, as well as noncommercial stations.

One would have to be a real troglodyte not to be aware of the significant role of noncommercial radio in the market.

KNOW-FM 91.1 and KSJN(FM) 99.5, Minnesota Public Radio, with an annual budget of $23 million, easily surpasses the revenue figures of either WCCO(AM) 830 AM or KQRS-FM 92.5, the two leading commercial stations shown. Too, MPR and its national syndication arm, Public Radio International, has made Garrison Keillor a national star. (While some of MPR's revenue and budget accrues to and from its out-state stations, it's safe to guess that close to $20 million results from its Twin Cities audience and St. Paul production center/studios.) A few years ago, MPR paid $13 million for the 99.5 frequency, which had been commercial station WLOL.

WCAL(FM) 89.3 Northfield serves the Twin Cities with mostly classical music, and has about a $2 million budget, better than the revenue stream of KZNR(FM) and other stations listed.

KMOJ(FM) 89.9 Minneapolis is the market's leading source of urban music — a peculiar station that skirts the edge of being commercial with its aggressive underwriting announcements.

KTIS-FM 98.5 is a leading religious broadcaster, hosting the Skylight Satellite network, and itself a multi-million dollar earner during its annual three-day Share-a-thons.

KNOF(FM) 95.3 St. Paul is a quaint religious station, monophonic, and signing off at 10 p.m. It, along with KTIS-FM and KSJN(FM), operates on commercially allocated frequencies that one day could be sold for tens of millions of dollars each — if they were to follow the course of 99.5, now KSJN, and 100.3, formerly religious WCTS, now Howard Stern-carrying WRQC(FM).

Author Tim Johnson and future writers of *Marketwatch* should spend time exploring the noncommercial part of the dial — just as a high proportion of the listeners in the various markets do. It is too bad Arbitron doesn't include noncommercial stations on par with the others, as Birch ratings used to do.

Bruce F. Elving, Ph.D.
Publisher
FMedia! and the "FM Atlas"
Esko, Minn.

MP3: Use Wisely

The popular MP3 audio file you hear so much about can be both a blessing and a hindrance for the modern-day radio station.

In a recent **RW**, you read about Jeff Laurence, a voice artist who delivers MP3 files to client stations over the Internet. You may also be familiar with the MP3 process used in "voice tracking" radio automation stations remotely from great distances. Perhaps your production director pulls down a few sound effects now and then for station projects.

These are examples of how the compression scheme aids radio stations in keeping delivery and talent costs in line. However, there is another element involving MP3 files that you should be concerned about.

Hundreds of unauthorized Internet sites allow unlimited free access to MP3 music — music that likely is a key programming element on your station. Net surfers can download these files into portable and automotive players without proper compensation to the artists.

The impact on the music industry is clear, but it is easy to lull yourself into believing it does not affect radio, especially when we may exploit MP3s ourselves. This is not so.

Radio must compete with handheld video games, TV, CDs and the Internet for the consumer's attention. Access to free, CD-quality MP3 music will only further dilute the time consumers spend with radio. Worst case, it could jeopardize future relationships with music providers.

One proposed solution is the Secure Digital Music Initiative, a basis for a future era in which music will be downloaded rather than distributed on prerecorded media. This standard can track music downloads and follow digital copies wherever they go.

MP3 has made life easier, but it has also brought along its own set of complications. Until the music issue is resolved, **RW** urges you to be sure your own MP3 software is licensed and paid for. Report illegal music sites to your record company reps. Discourage unlicensed downloads by your staff.

The music industry is taking action. Because this problem affects radio, we need to be part of the solution as well.

— RW

Corrections

The story on page 1 of the Feb. 17 issue incorrectly identified the docket number for the low-power Notice of Proposed Rule Making. It is MM Docket 99-25.

The Jan. 20 *Buyer's Guide* listing for Freeland Products described certain items as covered by warranty, when in fact they are excluded: mechanical damage, certain open filaments, cracked ceramic or glass, glass punctures and damage from improper operating conditions.

Also, the Econco entry stated that the company will introduce tubes "centered around the Eimac product line." This was based on information from Econco. A spokesman for Communications & Power Industries, Eimac Division, said the Econco tubes will not be Eimac tubes.

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World Radio History

USADR and Its 12-Year IBOC Plan

In October, USA Digital Radio asked the FCC to seek public comment on its petition to implement digital AM and FM broadcasting in the United States. The following are excerpts from its Petition for Rule Making.

This is the fifth in a series. The previous part appeared in RW March 3.

An Acrobat version of the full text of the petition is available online at www.fcc.gov/mmb/ *and the text is also available at* www.fcc.gov/Bureaus/Mass_Media/Filings/rm9395.pdf

Footnotes with source references and other details are omitted here but are available in the online version.

VIII. IBOC DAB EQUIPMENT

A. Receivers

It is anticipated that receivers will be sold to the public through the existing manufacturers and distribution channels. In appearance, the digital capable radios are similar to the analog receivers of today, except that several internal digital processing components are included.

Advances in digital processing and semiconductor technology make digital radio receivers affordable. As described earlier, the design and manufacture of digital receivers is relatively straight-forward. Many components found in today's analog receivers will be used in its digital counterpart. ... Some modifications to the controller software, the RF front end, IF circuit, and demodulator are needed, but overall, radio will enjoy a relatively cost effective upgrade (especially when compared to the new DTV receiver).

Although digital radio receivers require more complex digital processing, a number of components from analog radios can be re-used. Thus, a consumer price for digital will be only marginally more expensive than for analog receivers. ...

B. Transmitters/Exciters

It is expected that the manufacturers of analog transmitters will also produce digital transmitters and make them available to radio stations through the normal distribution channels. A radio station will need an IBOC compatible transmitter and a digital exciter to transmit the digital signal.

In order to transmit a digital AM signal, AM transmitters must be designed to meet low distortion and noise specifications. Some current models of analog transmitters are compatible with IBOC broadcasting. In order to transmit IBOC, the station also needs to add an AM IBOC exciter to an IBOC compatible transmitter.

In order to transmit a digital FM signal, FM transmitters must be designed to pass the IBOC signal. Currently, there are no broadcast transmitters which are IBOC compatible. Manufacturers must design the transmitters to pass the digital waveform. In addition, an exciter must be incorporated into the transmitter, or added externally, to generate the digital signal.

The inclusion of digital processing technology in transmitters and the need to acquire a digital exciter to generate digital waveforms will initially result in somewhat higher costs. However, the cost of this equipment should not be excessive compared to the normal capital cost improvements faced by the industry in general.

IX. REGULATORY ISSUES

USADR has compiled in Appendix A hereto several proposed changes to the existing Part 73 rules to authorize IBOC DAB in the United States. USADR encourages the Commission to expeditiously implement the necessary rule changes to bring the benefits of IBOC DAB to the public as quickly as possible. ... Authorizing DAB and designating IBOC as the appropriate means to implement digital radio will serve the public interest. ...

USADR requests that the Commission take the following regulatory steps ...

A. The Commission Should Designate IBOC DAB as the Appropriate Means to Implement Digital Radio.

USADR has demonstrated herein the benefits to the public that will flow from the enhanced audio quality, increased signal robustness and availability of auxiliary services to be offered by DAB. USADR has also shown the viability and advantages of the IBOC DAB approach. IBOC DAB provides a rational transition from analog to digital and offers immediately enhanced service without disruptions to the existing analog radio service or the need for adjustments in consumer patterns of use. IBOC DAB allows this to be achieved without the need for new frequency allocations, the issuance of new licenses or the creation of a new regulatory structure. Finally, USADR has demonstrated the technical viability of its IBOC DAB technology. ...

B. The Commission Should Develop Interference Protection Criteria

The introduction of IBOC DAB will further complicate the very complex interference environment which exists today in the AM and FM bands. ... The Commission should develop interference criteria for both the interim hybrid period and the all-digital period. Broadcasters will have little incentive to implement DAB if it entails putting their access to the listening public at risk. When broadcasters first upgrade to the hybrid mode, there will be few DAB receivers in use. Broadcasters ... will need some assurance that listeners will be able to use their analog receivers during the transition period. Without interference rules, no such assurances can be given to broadcasters or listeners. ...

Currently, there are no broadcast transmitters which are IBOC compatible. Manufacturers must design the transmitters to pass the digital waveform.

In order to ensure compatibility in an IBOC DAB world, several emission masks will be necessary. First, the current analog emissions mask as defined in Sections 73.317 and 73.44 of the Commission's rules for FM and AM, respectively, would continue to apply to all stations as long as they transmit in an analog-only mode. Second, any FM station that simultaneously transmits analog and digital signals in the hybrid mode will be required to meet a new FM hybrid mask for the combined analog and digital transmissions. Likewise, any AM station that seeks to transmit in the hybrid mode will have to comply with a new AM hybrid emissions mask for the combined analog and digital transmissions. Third, in the all-digital period, a new FM DAB emissions mask will become effective that will allow the broadcaster to increase the power and bandwidth of the digital signal. The new all-digital FM mask will improve the coverage and robustness of the FM DAB signal and increase FM broadcasters' auxiliary service offerings. It is unnecessary to adopt a new AM emissions mask at the end of the interim hybrid period because when the AM analog signal is turned off, the power of the digital signal can be increased, consistent with the AM hybrid emissions mask. Thus, a new all-digital AM mask is not necessary. ...

C. The Commission Should Establish Rules that Facilitate the Efficient Transition to All-Digital Environment.

In order to give consumers, broadcasters, and equipment manufacturers confidence in the development of IBOC DAB, it is important that the Commission establish from the outset a plan for the transition from an analog to an all-digital environment. A transition plan must ensure that the public is not harmed during the transition from analog . At the same time, it must provide incentives for consumers to purchase digital receivers, broadcasters to upgrade to digital, and transmitter manufacturers to produce new transmitters.

USADR has demonstrated herein that its IBOC DAB technology inherently provides the flexibility needed to satisfy these goals. For the listener, the flexibility inherent in the USADR IBOC DAB system design will allow a seamless transition to digital. ...

Likewise, broadcasters will have significant flexibility in determining when to upgrade to digital. IBOC will allow broadcasters to immediately introduce DAB without inpairing existing analog transmissions and without interrupting service to the public. ... Some stations might employ digital radio transmissions early in the transition period from an analog to an all-digital environment, whereas others might do so much later. It is possible that some stations, particularly financially constrained ones, will upgrade to DAB only when there is an independent need to replace the transmitter. ...

USADR anticipates that the unique features of IBOC DAB will facilitate implementation of a transition plan that avoids much of the complexity and controversy the Commission faced in upgrades of other analog services. Specifically, there is no need for the Commission to establish an end of service date for analog radio. An analog "sunset" is unnecessary because the IBOC DAB signal will occupy the existing analog radio frequency, thereby eliminating the need to reclaim unused analog spectrum. ...

The Commission will need to establish a minimum number of guidelines to ensure that listeners can obtain the maximum benefits of DAB and that the transition is effective. Specifically, an excessively long or indeterminate transition period could retard the introduction of DAB technology. This is because listeners or broadcasters might adopt a "wait and see" attitude, moving to purchase DAB

See USADR, page 7 ▶

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World Radio History

▶ USADR, continued from page 6

radios only after a substantial number of others have done so. In anticipation of this problem and to provide a smooth transition, USADR proposes the following rules:

Upon the effective date of the Commission's adoption of DAB rules and designation of a DAB standard, all broadcasters will be authorized to immediately begin simultaneously broadcasting analog and digital radio signals in the interim hybrid mode. The combined analog and digital transmissions will be required to transmit in a manner consistent with the Commission's hybrid emission mask for FM and AM, respectively. Each broadcaster will be required to notify the Commission within five days of the commencement of the digital transmission.

On the twelfth anniversary of the effective date of the new DAB rules, broadcasters will be allowed to increase the power and the bandwidth of the digital carriers in a manner consistent with a new digital mask as specified in proposed Section 73.323 to be incorporated in the Commission's rules.

These rules establish a date when analog radio will no longer be protected from interference from digital radio. At the same time, they ensure the continued viability of analog radio for a limited but reasonable period of time. ...

Listeners will be put on notice that twelve years after DAB rules are adopted, analog signals could be subject to potentially greater interference. This period should provide listeners ample opportunity to upgrade to DAB ...

According to a recent survey ... automobile receivers are replaced or retired in twelve years or less. The mean age of automobiles today is 8.1 years. This indicates that the vast majority of automobile receivers are replaced or retired in 12 years or less. ...

These circumstances, coupled with listeners' familiarity with the advantages of digital audio technology through use of other products and services, such as compact discs, DAT, DVD, digital audio cable and, in the near future, satellite DARS, should expedite the transition.

All the incentives for broadcasters and listeners to migrate to DAB will also encourage consumer electronics equipment manufacturers to produce DAB receivers. ... In a situation involving a modest incremental cost such as this one, manufacturers are likely to incorporate DAB in all receivers as an enhanced feature (such as noise reduction) rather than treating DAB as a new product.

D. The Commission Should Designate a Transmission Standard for IBOC DAB ...

A government-mandated single standard is required by virtue of the ubiquitous nature of radio, the technical characteristics of IBOC DAB systems, as well as the non-integrated structure of the U.S. radio market. It is only through a standard that the public interest in the development of new digital radio services and maintenance of the universally available existing radio service can be achieved. ...

The Commission has mandated standards for broadcast services where two conditions are met: (1) there is a substantial public benefit from a standard, and (2) private industry either will not, or cannot, produce a standard because the costs of standard setting outweigh the private benefits, or a number of different systems have been developed and private industry cannot agree which should become the standard. The circumstances that exist in the incipient U.S. DAB market satisfy both of these conditions.

1. A standard is required to ensure the development of a DAB system in the United States

...because it will foster the necessary coordination between broadcasters' decisions to purchase transmitters and listeners' decisions to purchase receivers. Failure to coordinate these purchasing decisions will cripple the development of DAB and broadcasters' ability to provide the ubiquitous service expected by listeners. The purpose of a transmission standard is to ensure seamless compatibility between transmitters and receivers. ...

In order to obtain this compatibility, broadcasters, consumer electronics equipment manufacturers, retailers and consumers must coordinate their DAB technology decisions. As the CRA Report notes, broadcasters must transmit signals that are compatible with receivers manufacturers are willing to produce, retailers are willing to carry and consumers are willing to purchase. Absent coordination among all of these groups, no one will have an incentive to purchase and install the equipment necessary to establish a DAB system in the United States. ... Coordination among these groups is necessary if a DAB system is to develop in the United States. ...

2. A DAB transmission standard should include necessary technical elements to ensure compatibility.

An IBOC DAB transmission standard is required in order to ensure the necessary universal compatibility between DAB transmitters and receivers. The IBOC DAB standard should therefore include all technical elements to ensure system compatibility. First, the standard must include an audio compression or source coding (the "codec") standard. ... If a broadcaster transmits information that has been encoded, it cannot be received unless the receiver has a decoder based on the same system. Second, the transmission standard should include specifications for forward error correction and interleaving codes. Like the codec, the codes embedded in the transmitter for forward error correction and interleaving must match the codes in the receiver. Finally, a modulation standard is required which will assemble the digital bits on carriers, determine how the carriers relate to each other, and determine how the carriers are placed in the channel. The benefits of IBOC DAB can only be realized if the transmitter modulated signal can be deciphered by the receiver.

3. An IBOC DAB transmission standard will confer substantial public benefits.

The principal public benefit stemming from a single standard is the preservation of the ubiquitous properties of radio; a single standard will ensure compatibility between transmission and reception enabling a listener to travel anywhere in the country and be assured of being able to receive the transmissions of all licensed radio stations. An additional benefit is that a single standard will give direction as well as certainty to all interested parties: equipment manufacturers, broadcasters, content providers, and the public. ...

By ensuring compatibility through a transmission standard, radio broadcasting will remain ubiquitous, which is necessary to preserve the radio system as it currently exists in the United States. ...

The Commission noted in the DTV proceeding that a single standard was important because the vast majority of Americans rely upon TV as their primary source of news and information. Radio broadcasting serves a similar primary function, and is indeed more ubiquitous than television because of its mobility. ...

The Commission has consistently supported standards that promote the rapid development of broadcast technology equipment. ... Consumers are less likely to purchase digital radio receivers if there is no DAB standard.

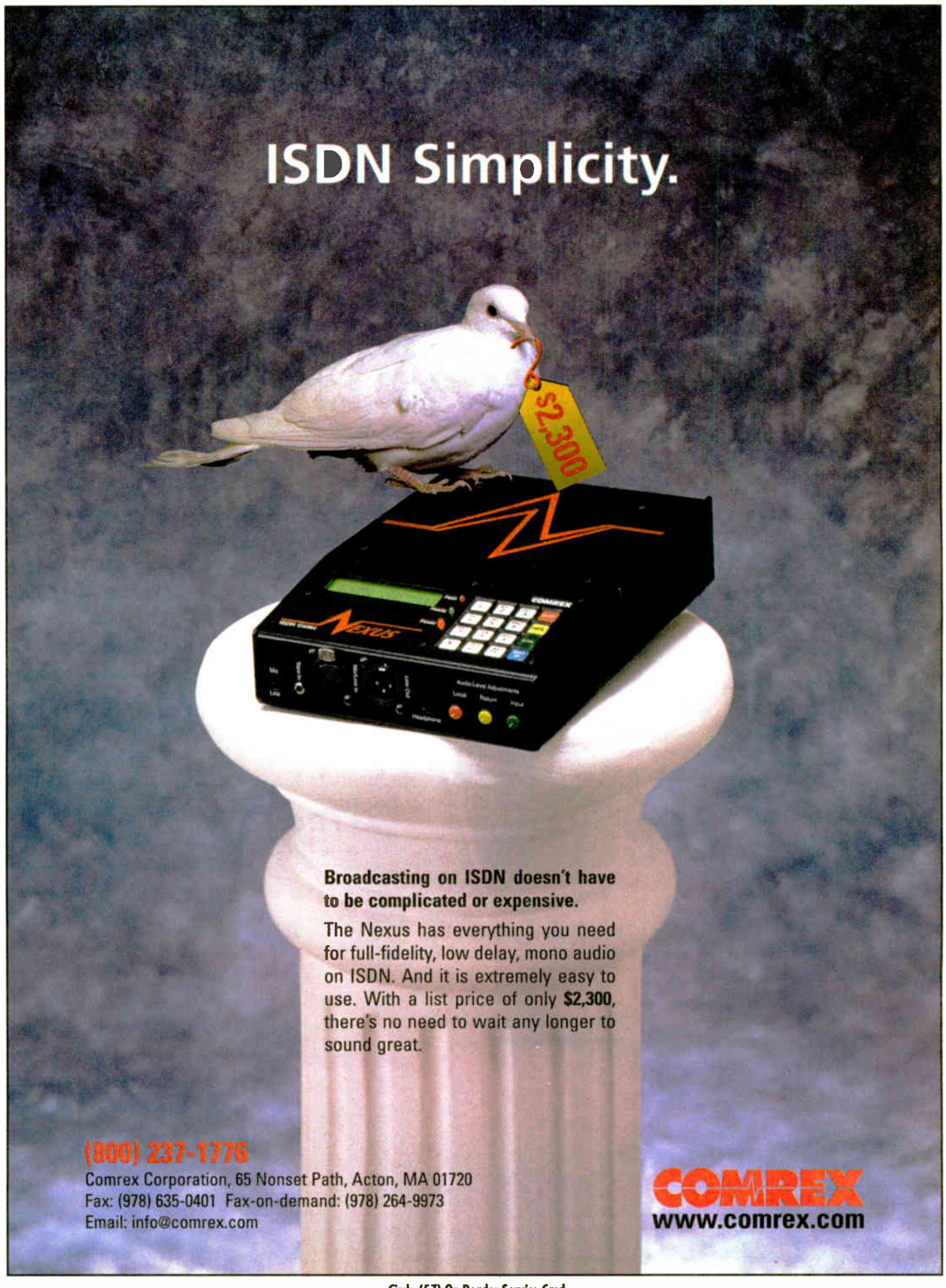
The CRA Report notes that the initial absence of a transmission standard and the resulting lack of universal AM stereo reception likely were instrumental in retarding the growth of AM stereo. The Commission should not permit the same result for DAB.

The Commission noted in the DTV proceeding that a single standard would increase competition in price, service, and product features. This rationale for a standard is also present in this instance. ...

4. The Commission is the proper forum for setting the standard.

Leaving the task of developing a single standard to the market or private standard setting bodies creates unacceptable risks in this case for several reasons. ...

See USADR, page 14 ▶



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World Radio History

Listen: Russ Gentner Unplugged

New Company Will Focus on Wireless Listening; Plans to Begin Shipping Products This Spring

by Brian Galante

SALT LAKE CITY Russ Gentner, the founder and former president of equipment maker Gentner Communications, has launched Listen Technologies, a company geared toward the wireless listening market.

The company, based in Park City, Utah, plans to begin shipping products this spring. Products have been in development since July. Gentner left the broadcast supply company that bears his name in December of 1997.

He said Listen Technologies will focus on three segments of the wireless listening market: auditory assistance, tour groups and language translation.

Unfilled niches

He acknowledges that companies such as Williams, Phonic Ear and Gentner Communications are known for auditory equipment for the hearing-impaired. He hopes also to pursue the tour group and language translation markets, where he sees unfulfilled niches.

"These are products that transmit audio," said Gentner, speaking of his company's products. "They are basically stationary transmitters ... you can put one next to the mixing console at the church, or pick up the sound in a theater or cinema. People who need these, whether they're hearing impaired or in language translation as a student, can carry these hand-held receivers," said Gentner. "In an essence, we're broadcasting." The receivers use the 72 MHz and 216 MHz portions of the band.

Gentner said he plans to be competitive by keeping the infrastructure of Listen Technologies small.

Russ Gentner

"I ran Gentner for 18 years, and it's got a hell of an infrastructure, but it's very expensive to maintain those infrastructures," he said. "It's exciting for me to really focus on keeping the infrastructure down, and certainly trying to keep the politics and anything that (keeps) us from focusing on our customers."

There's a lot of research we need to do before going back to the broadcasting industry.

— Russ Gentner

The staff, for instance, will remain small. Three part-owners of the new company also worked at Gentner Communications in the past: Kelvin Paxman, Corey Schaeffer and Kelly Lundgren.

Up with the times

"One thing that's interesting about this company is that we are really taking advantage of the new technologies," said Gentner, mentioning the Internet, e-mail and improved phone technology. "We're able to operate quite virtually."

The company will operate certain branches from locations outside of Park City, including the sales office, which will be based in Simi Valley, Calif.

Although the company initially will focus on wireless listening, Gentner said Listen Technologies may also look to the broadcasting market, specifically IFB, in the future. But any such ventures could take a while.

"I looked at the markets I was in before, as well as the technologies, and I chose wireless listening," said Gentner, referring to his decision not to re-enter the radio broadcast market right now. "It's a known niche that I've done before."

According to Gentner, the company is not ready to venture into radio just yet. "There's a lot of research we need to do before going back to the broadcasting industry."

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World Radio History

DRE IBOC AM Plans

▶ DRE, continued from page 3

the signal fades to noise and is no longer useable. "We will retreat to analog at that point with a match in volume and delay," he said. At The NAB Radio Show in Seattle, he called the USADR scheme of blending to analog a "crutch."

Kumar is considering using the FM SCA spectrum to support the digital signal when necessary. "It would be our own SCA generator to provide a lower-quality version of the IBOC signal, or it could be used as a pure data vehicle." That would require receivers to incorporate a corresponding SCA decoder to make use of such an approach. "Receiver manufacturers could embellish the utility of the SCA for either purpose," said Kumar.

USADR claims broadcasters would prefer to not touch the FM subcarriers for IBOC, choosing instead to continue leasing them in their present form.

When asked what DRE learned from the KSAN tests, Kumar said there was no interference to the analog host, but was quick to admit that "there is a lot less field strength out there than we thought."

After spending several days getting everything in the test van to work, Kumar said that the field test consisted of about two hours of recording received data in the moving van traveling in a loop of approximately 50 miles from San Bruno, across the city, down along the waterfront and into Daly City. As a result of the tests, Kumar said the interleaver and diversity delays of the system were increased to more effectively handle data errors. He also said that "MPEG AAC could not recover quickly from catastrophic (data loss) errors."

Kumar said Fraunhofer has since corrected that. He closed his discussion of the KSAN tests, saying that "clearly more field testing is needed."

DRE is now concentrating on development of its AM system. Kumar said, "IBOC AM is much more difficult than FM due to the very narrow bandwidth and bit-rate requirements." DRE is building AM IBOC models using 32 and 48 kbps compression rates. Kumar said that MPEG AAC is "not yet fully debugged at data rates below 48 kbps and is not yet fully optimized at 48 kbps." He said there are a lot of stations volunteering to take part in AM tests in the Bay area, and testing should begin by summer.

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Low-Power Interference Concerns

▶ LPFM, continued from page 1

The commission has proposed a primary service status for the LP1000 stations, and secondary status for two other potential classes, the LP100, at 100 watts, and a "micro" class of 1 to 10 watts.

Primary service stations are protected from interference, from each other, through channel separation requirements, and from secondary services. If a secondary service causes interference to a station that enjoys primary status, the secondary must eliminate that interference. This can be accomplished through reducing power, lowering the antenna, changing antenna direction, moving to another site, or going off the air.

Noncommercial Class D, FM translator and FM booster stations are secondary services. Primary stations are not required to protect them from interference.

"The upper limits of 1,000 watts and 60 meters are being proposed because, we believe, they represent a good compromise between achieving a moderate service area and permitting reasonably closely spaced LP1000 stations on the same or adjacent channels," the FCC stated in the low-power Notice of Proposed Rule Making. "We note that a 60 meter antenna height would not require FAA clearance at many locations."

The numbers

The chart on page 1 shows the FCC's proposed minimum distance separations necessary between a low-power station at 1 kW ERP, 60 meter HAAT and existing full-service stations, in order to avoid interference. One kilometer is approximately equal to 0.621 miles.

The chart considers the following interference protections: co-channel, first-adjacent channel, second-adjacent channel for non-coms, second/third-adjacent channel for commercial band frequencies (in the event the FCC were to require these) and intermediate frequencies.

"Interference protection to and from LPFM stations would be entirely based on minimum station separation requirements," the FCC stated, "at least during the initial implementation of the LPFM services."

Unless some interference protection standards are relaxed, few LPFM stations would fit into major markets. According to an FCC staff analysis, two LP1000 stations could be located in Nashville if there were no third-adjacent channel

See LPFM, page 12 ▶

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Channel Protection Trade-Offs

▶ LPFM, continued from page 10

protection requirement; and as many as 10 might be possible if a second-adjacent standard also were not required.

The same study of 60 cities with various population levels showed that at least one LP1000 could be authorized in Los Angeles and Pittsburgh, but only without second- and third-adjacent channel protection standards.

The FCC believes authorizing an LPFM service without a third-adjacent channel protection requirement would entail "little risk of interference" to existing stations. It has proposed eliminating the third-adjacent channel protection requirement and "is inclined" to drop second-adjacent channel protection as well.

Improved receivers

Supporters of low-power radio and some FCC staffers say technology has improved enough so that receivers can reject spurious signals more easily, and that reducing channel protections would not present a big interference risk to existing stations.

Joe Stielper, senior engineer, Moffet, Larson & Johnson, said that is not necessarily the case.

"Receivers can receive signals beyond the normally protected 60 dBu contour. ... If you start dropping in low-power FMs, even if they protect co-channel or first-adjacent, they can still cause interference," he said.

How these new stations might affect a possible future transition by radio to in-band, on-channel digital audio broadcasting is a concern to the FCC and broadcasters. The FCC has asked whether the IBOC signal can be made robust enough against interference from LPFMs without a minimum spacing requirement on the second-adjacent channel, and what design trade-offs would be involved.

The NAB and National Public Radio, among others, have told the FCC in previous comments that current protections should be maintained.

The emission mask ensures that FM broadcast emissions are reasonably confined within the 200 kHz channel width. The center frequency of a second-adjacent channel is 400 kHz removed, and the minimum separation between the channel edges of second-adjacent channels is 200 kHz. The current emission mask requires a minimum attenuation of 35 dB below the level of the unmodulated carrier for emissions extending over the second-adjacent channel. The FCC has asked to what extent tightening the emission mask requirement would reduce the potential for second-adjacent channel interference, assuming no second-adjacent channel spacing requirements.

Bandwidth changes

The commission also proposed decreased bandwidth — less than the current 200 kHz channel — as a way to create additional frequency separation to adjacent channels. The FCC said that change, in combination with a strict emission mask, would offer more protection to existing stations.

A reduced channel bandwidth could mean new transmitters would have to be designed and built to accommodate the change, the FCC said.

The commission has proposed transmitter certification for LPFMs to ensure equipment integrity, and an electronic filing system that would allow applicants to submit their station applications by e-mail. The latter is meant to ease the paperwork burden on the FCC, which said it received more than 13,000 inquiries from individuals or groups about starting low-power stations last year.

Even with electronic filing and computer models to determine how to shoehorn new stations on the FM band, the process will not be easy, Gearing predicted.

"It is not going to be a trivial exercise to determine what frequency is going to work where without causing interference to someone else."

QDI Money Claims Put Stations in a Bind

▶ EAS, continued from page 1

1994. Officials at the NWS believe the "NOAA Weather Radio Specific Area Message Encoder" was developed first.

By press time, the NWS had issued a statement. Assistant Administrator John J. Kelly Jr. responded to concerns raised by the NAB.

In a letter to NAB President and Chief Executive Officer Eddie Fritts, Kelly wrote, "We will again request that the U.S. Patent and Trademark Office reexamine the validity of the patent held by QDI." Kelly wrote that the NWS had found additional information that suggested that the technology patented by QDI was first developed by others "including the U.S. government prior to the filing of the QDI patent in 1991."

Quad Dimension

The decision on whether to re-examine the Quad patent must be made by the patent office. It would be the second re-examination of the patent. In 1997, at the request of the patent commissioner, the patent office re-examined the Quad patent and dismissed all the claims made in it. As part of that process, the inventors had a chance to modify their claims. QDI added wording to make its alert system more specifically targeted to television and AM and FM broadcast stations. In November 1998, the patent office upheld the modified claims.

The FCC had been mum on the patent issue since news of the first license letters began to circulate in January. An FCC spokesman said the commission had drafted a letter in response to NAB concerns, but he was not certain when it would be released.

That draft still had not been finalized by Feb. 19, five days before the Quad deadline. In the letters sent which included a non-exclusive patent license agreement, Quad asked for a license/royalty payment of $240 for calendar year 1999 with an annual royalty payment of $180 due in calendar year 2000 and every year afterwards for the life of the patent.

Asked what would happen to stations that did not sign by the deadline, "We are keeping all options open," said Daric Laughlin, Quad spokesman.

"Regarding a possible second re-examination of the patent, we believe that the patent will come out stronger than ever. It is unfortunate that the NWS is electing to take this action," said Laughlin.

He added, "Also, the government has already presented its best evidence against the patent and failed to make it 'go away.' It is very rare for a second re-examination to eliminate a patent."

Murmurings that the government should buy or license the patent have circulated throughout the broadcast industry. Laughlin said his company has told the government that it is willing to discuss that option, but "so far the government refuses to discuss a realistic solution."

Laughlin said that Quad is receiving positive feedback from the broadcast industry.

We are keeping all options open.
— Daric Laughlin

"Understandably, broadcasters are not happy to be in this situation," Laughlin said. "However, they realize that the government can resolve the matter quickly by either buying the patent or obtaining a license for the broadcast industry. The industry is mindful that QDI has played by the rules and has been open about its patent."

The Quad Web site (*www.quaddimension.com*) contains a link titled "Industry Input." One North Carolina broadcaster wrote:

"I see more than one side to this story. I both see the broadcasters who are now caught in the middle, and this company who has been denied their patent rights since the EAS first came into being."

When contacted by **RW**, the broadcaster would not say if his legal counsel had told him to pay the royalty.

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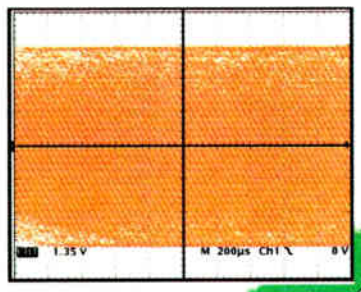
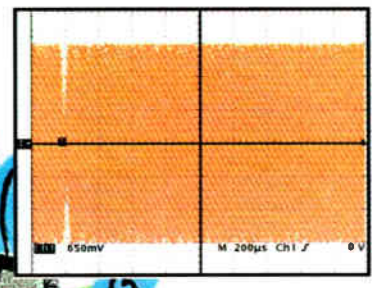
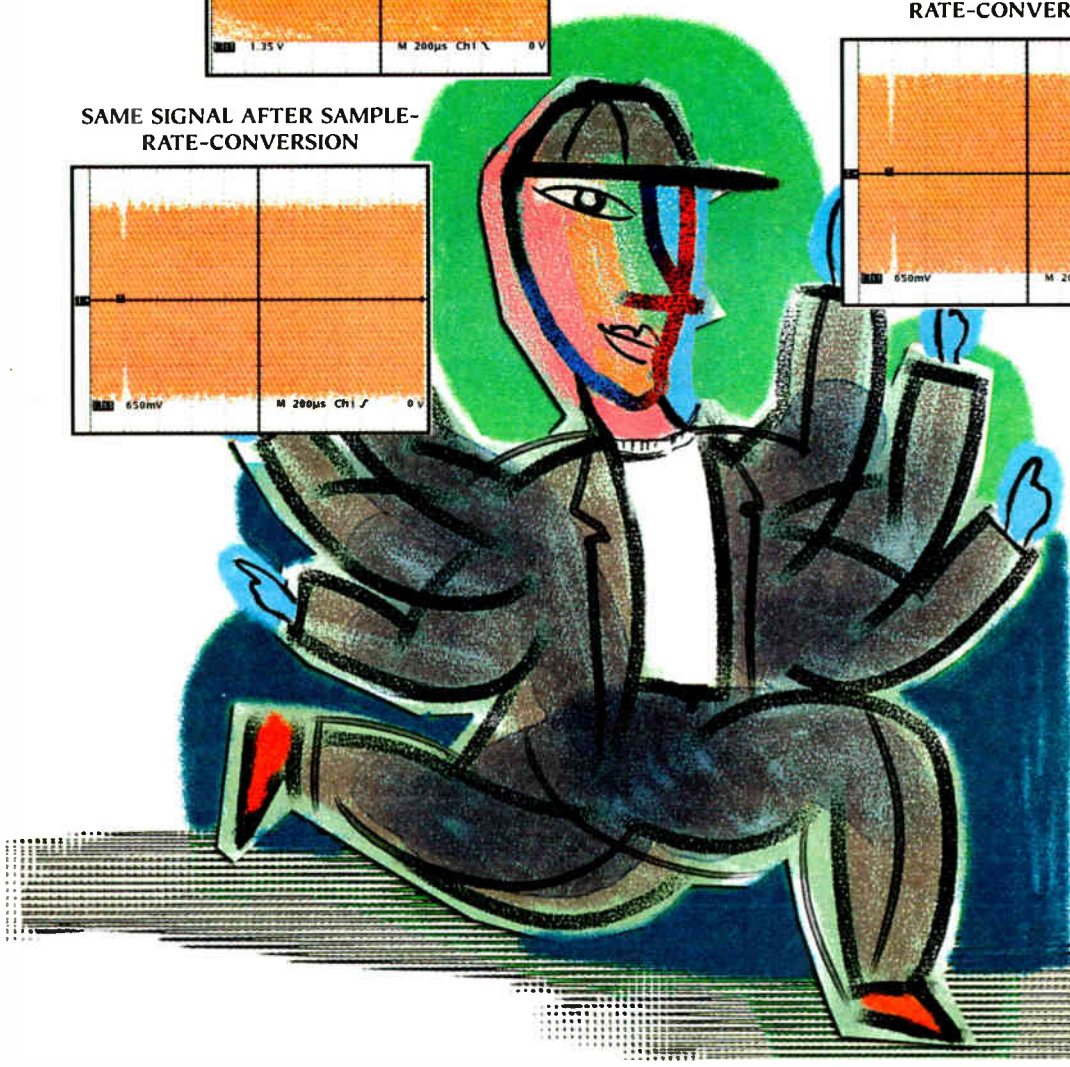
LEFT CHANNEL OUTPUT OF OMNIA.FM



LEFT CHANNEL OUTPUT WITH PREDICTION ANALYSIS CLIPPING AND SAMPLE-RATE-CONVERSION



SAME SIGNAL AFTER SAMPLE-RATE-CONVERSION



But when the Omnia.fm is incorporated into transmission systems sampled at 32kHz, overshoots can result from sample-rate-conversions and their attendant low-pass filtering. Until yesterday's systems catch up to the Omnia.fm, the unit's built-in Prediction Analysis Clipper will predict and eliminate overshoots. The result? All the benefits of the Omnia.fm, without the inevitable flaws of 32kHz systems. Check out the oscilloscope graphs to the left and see the results for yourself.

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Here's how: *Using program material, the Omnia.fm was set to process aggressively. Programming with substantial low frequencies and clean high frequencies was used to provide a good challenge for the control of overshoots. The analog Left Channel output was connected to a Tektronix TDS-744A digital storage oscilloscope, which was set to the infinite persistence mode. Each waveform was stored for at least one minute so that the display "fills in" with traces of audio waveforms.*

The "flat" lines along the top and bottom of the filled in section represent clipper performance. Any "dots" that exceed the reference level of 0.650 volts are overshoots. The lower left graph shows "blips" representing overshoots 15 to 20 percent beyond the reference peak level of ±0.650 volts. The Prediction Analysis Clipper reduces overshoots in the sample-rate-converted signal path to an insignificant three percent.

For more information on the technical background of overshoot mechanisms, call us for a copy of our paper entitled "Omnia.fm: An Engineering Study." Or visit our web site: www.nogrunge.com.

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World Radio History

USADR Excerpts

▶ USADR, continued from page 7

Without government involvement, it is unlikely that a *de facto* or private standard for IBOC DAB could emerge. Even in the unlikely event that such a standard were ultimately generated through market forces, the process would take a very long time and consume a tremendous amount of resources. The Commission's experience with AM stereo is again relevant. In that proceeding, the Commission decided to permit multiple AM stereo standards with the expectation that market forces would generate a *de facto* standard. The presence of multiple incompatible AM stereo systems, however, merely resulted in market confusion. ...

E. The Commission Should Establish a Process to Identify and Evaluate Proposed IBOC DAB Systems.

The Commission must make technical decisions regarding DAB interference criteria and transmission standards. This will require the Commission to evaluate the capabilities of each proposed IBOC DAB system. USADR believes that a rulemaking process is the most appropriate mechanism ... Through this process, the Commission will be able to develop a sufficient record to make decisions on interference criteria and transmission standards for IBOC DAB.

The first critical step in this process is the establishment of evaluative criteria to assess the proposed IBOC DAB systems. USADR proposes that the Commission adopt the following criteria to access the capabilities of each proposed system:

- The DAB system should include both AM and FM transmission.
- The DAB system should improve current FM sound quality to virtual CD-quality and current AM sound quality to be comparable to existing FM-quality.
- The DAB system should provide a rational transition path which affords broadcasters and listeners flexibility regarding when to upgrade to digital and which avoids immediately rendering obsolete the existing base of radio receivers.
- A digital signal must have minimal impact on co- and adjacent analog and digital stations.
- A digital signal must have minimal impact of the host analog station.
- A digital signal must serve an area comparable to a station's current analog coverage.
- The DAB system should provide a rational transition for subcarrier services.
- The DAB system should minimize interference from multipath, adjacent channels, noise and grounded conductive structures.
- Digital receivers and transmitters should be available at commercially reasonable prices.
- The DAB system should be able to accommodate future upgrades and features.

... The second step of the process is the submission of specific information by system proponents. USADR believes that if each proponent provides to the Commission information demonstrating the system's capabilities in each of the above criteria, the Commission will possess a record sufficient to make decisions on technical rules and transmission standards. It is critical that any technical information submitted to demonstrate compliance with this criteria should be based on established scientific data collection methodologies. Information on system performance, therefore, should be based on real-world interference models and confirmed through simulations, laboratory and field tests. Insufficient information on system design and performance should result in that proponent's disqualification from further consideration by the Commission. ...

USADR urges the Commission to establish the following timetable for evaluating DAB systems:

July 1, 1999: Commission publication of IBOC DAB evaluative criteria and system design and performance requirements.

December 15, 1999: Submission of comprehensive design and performance information on all criteria by all system proponents to the Commission.

This timetable will ... ensure that the process of evaluating system capabilities will be concluded in an expeditious fashion so that the public can quickly obtain the benefits of IBOC DAB. Second, all legitimate IBOC DAB proponents will be given an opportunity to have their systems evaluated. ... Thus, USADR urges the Commission to establish evaluative criteria, requirements for the submission of design and performance information, and a schedule for submission of information as the basis for its process to review the capabilities of all proposed DAB systems.

X. THE DESIGNATION OF THE USADR IBOC DAB SYSTEM AS THE DAB TRANSMISSION STANDARD WILL SERVE THE PUBLIC INTEREST.

USADR believes that its IBOC DAB system meets all the criteria discussed above and should be designated as the U.S. DAB transmission standard. A review of the technical material provided herein demonstrates the performance of the USADR IBOC DAB system in a multitude of environments. The USADR DAB hybrid signal will provide the AM and FM broadcast service with increased sound quality, improved robustness, new features and coverage similar to existing analog coverage. The USADR DAB all-digital signal will provide further improvements to the AM and FM broadcast services. In designing its system, USADR took great care to properly balance the technical and market requirements of listeners, broadcasters and consumer electronic manufacturers. For listeners, the USADR DAB system provides an opportunity to upgrade to digital. However, this is not at the expense of listeners who choose to continue to rely on analog radios. Those listeners can continue to use their existing radios for many years in the future. For broadcasters, the USADR design provides the opportunity to offer an improved service in an increasingly competitive marketplace. Finally, for consumer electronics manufacturers, the USADR system establishes an environment that will ensure that there is a efficient migration to DAB. This will provide the assurances necessary to begin to produce DAB radios. USADR believes it has established a rational plan to move radio from the analog to digital world and urges the Commission to expeditiously initiate a proceeding so that the benefits of this transition can be realized by the public.

XI. CONCLUSION

USADR has demonstrated herein the public benefits to be derived from implementing digital AM and FM broadcasting. USADR's development efforts and testing establish the viability and the suitability of IBOC as the means to implement digital radio in the United States. Furthermore, USADR has demonstrated that adoption of the proposed USADR transition plan and the designation of a DAB transmission standard will serve the public interest. It is imperative that, if the public is to reap the benefits of this superior new technology, the Commission should expeditiously establish criteria to evaluate DAB systems and specify a timetable for reviewing each system's capability. USADR believes this system meets all the criteria discussed herein and should be designated by the Commission as the U.S. DAB transmission standard.

Based on the foregoing, USADR respectfully requests the Commission to seek public comment on this Petition and to promptly adopt a Notice of Proposed Rulemaking in order to expedite the introduction of this beneficial enhancement of radio broadcasting.

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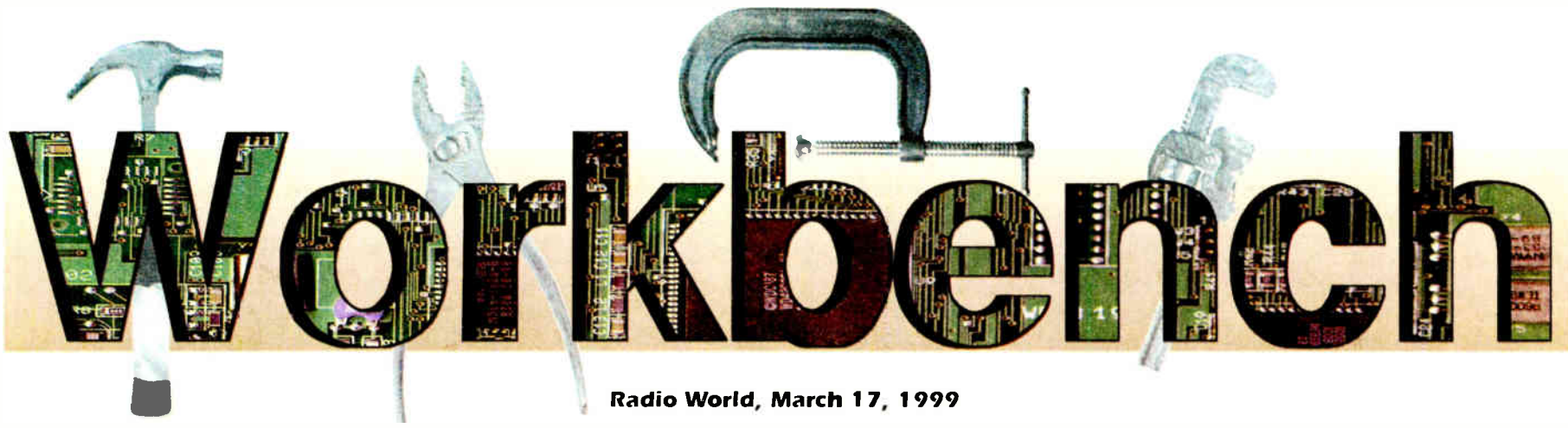

Workbench

Radio World, March 17, 1999

Back Off, Backhoe: Look First

John Bisset

As the weather improves, construction projects will swing into high gear. If you care for an AM station, keep an eye out for cellular, PCS and utility work that could give you headaches.

Figure 1 shows the result of a backhoe on an AM ground system. Eagle eyes will count four broken radials, but there may be more. When a trenching device moves through the earth snagging radials, they can be broken off several feet beyond the trench as the copper radial wire is pulled by the cutting teeth of the trencher. Repair of this kind of damage is almost impossible because you can't find the broken ends.

The lesson learned is to never permit contractors to dig on your site without your direct supervision. When they do dig, make sure the digging is done by hand, and that every radial wire is tagged. I've used white or red electrical tape fastened to the two ends, which permits easy identification.

The broken or cut radials must be silver-soldered together, and you'll find that a good, clean connection using a crocus cloth to remove the dirt and tarnish will make the job go easier. MAPP gas is hotter than propane, and is a good match for silver solder. Watch the use of the torch outside — grass can easily catch fire, or you could burn yourself on the flame that's nearly invisible in bright sunlight.

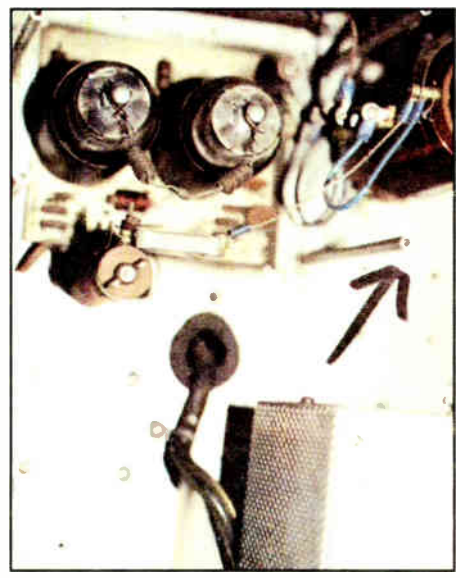


Figure 2 : Four metal supporting rods can be used to improve transmitter cooling by supporting a supplemental cooling fan.

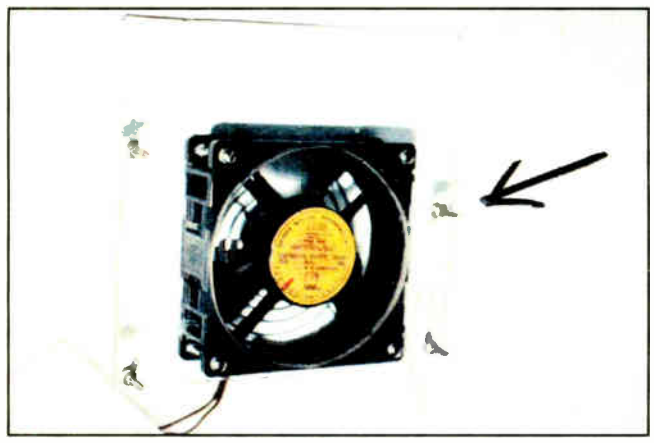


Figure 3 : After mounting the fan to the new cover, in this case a piece of Plexiglas, four banana plug jacks are installed for easy mounting to the support rods.

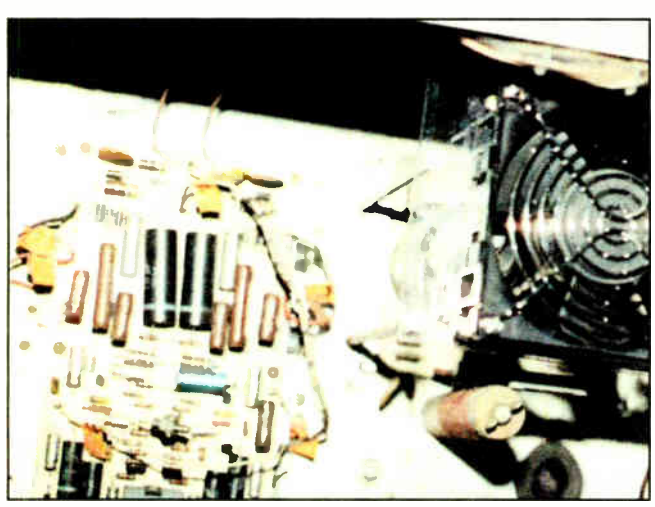


Figure 4: The completed supplemental cooling assembly helps extend tube life by more adequately cooling this transmitter's IPA tubes.

★ ★ ★

Frank Folsom, a contract engineer from the Knoxville, Texas, area, sent some pictures regarding an approach to a cooling problem that occurred 24 years ago. The transmitter is a BC-1H1 that needed some extra cooling in the IPA stage (two 807 tubes).

These tubes are mounted horizontally into a circuit board on a vertical wall in the transmitter. There are four aluminum rods that support a plastic shield above the 807s. See Figure 2: The arrow points to one of the four mounting rods.

The modification process involves removing the plastic shield and drilling out the ends of the four rods to a diameter that will securely serve as a jack to accept a standard banana plug. A new cover shield of quarter-inch thickness was prepared, and a cutout was made to accommodate a small computer-type cooling fan. Four holes were drilled in proper alignment with the aluminum rods to accept banana plugs with a screw stud mounting. This assembly now constitutes a plug-in fan mount, as seen in Figure 3.

Figure 1: Don't let a backhoe ruin your day by ripping up your ground system — personally supervise any construction at your transmitter site.

The arrangement allows for rapid removal of the fan/plate for maintenance and tube replacement. Don't forget to install a protective guard over the fan blades, as shown in Figure 4, the finished product.

★ ★ ★

While we're on the topic of cooling: Econco's Tube Topics booklet has some good pictures of the results of inadequate cooling on tubes. In an age where the semiconductor is king, finding good tube usage and reference information is difficult. Whether you rebuild your tubes or not, Econco's free booklet will be of use to you.

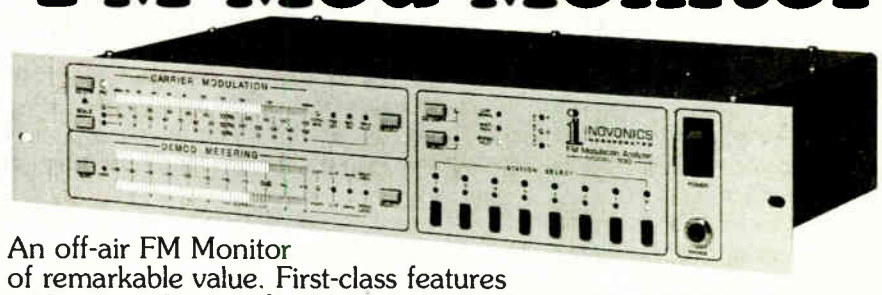
To obtain a copy, contact Econco, or circle **Reader Service 2**.

■ ■ ■

John Bisset has worked as a chief engineer and contract engineer for more than 20 years. He is a district sales manager for Harris Corp. Reach him at (703) 323-8011.

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

A Best-Value FM Mod-Monitor



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World Radio History

AM Radio Fights Its Own Success

Ed Montgomery

This is the third part in a series about the basics of AM radio. The second part appeared in the Feb. 3 issue. The series to date is available at www.rwonline.com

The critical situation AM finds itself in today is really a product of it being a successful broadcasting system. It can reproduce a broad range of audio frequencies approaching human hearing, and in the golden days of radio, it was quite a medium.

In the 1930s and '40s there were far fewer radio stations on the air, producing far less co-channel and adjacent channel interference. Primary service areas received a strong signal with little local interference to compete with the radio signal. Receivers were designed with radio frequency circuits that were broad enough to receive the entire signal.

Life was good for AM. I grew up in the New York metropolitan area, where there were eight 50 kW AM stations. These signals were so powerful that lightning often caused only a small crackle to the audio.

After World War II there was a demand for more broadcasting stations for smaller communities. The FCC reduced interference standards, resulting in thousands of new stations. Many were awarded licenses for daytime-only operation, while others were given full-time authority. Many had narrow directional patterns, a scenario that fit the audience of the times, far less mobile than that of today.

The addition of stations from the 1940s until today created problems for receiver manufacturers. Receivers were no longer picking up clean signals free of whistles (heterodynes) and adjacent channel audio. The solution was to narrow the bandwidth of the received signal. This has been done to the point where now AM, on some of the best tuners available, sounds like it is being received over a telephone line.

Interference was solved — at the expense of fidelity.

AM stereo was an ingenious idea that actually improved the sound quality of AM, giving it depth. Those who have heard it know. Unfortunately, the system never got off of the implementation stage with few receiver manufacturers making radios. I always thought a great disservice was done to AM in the way stereo development was handled by the FCC, the inventors, receiver manufacturers, and even the broadcasters. It has been an opportunity lost, in my opinion.

AM transmission equipment is still capable of doing what it did 50 years ago. Most receivers are a shadow of their ancestors when it comes to reproducing the signal. The technology is there to improve fidelity, but most consumer receiver manufacturers fail to take action. In fact, many FM receivers don't approach the quality FM broadcasters are transmitting.

Audio levels are extremely important for AM broadcasters. The strength of the power in the sidebands creates the "loudness" of the signal in the receiver. It is important to have a strong signal to overcome as much noise as possible.

On some of the best tuners available, AM radio sounds like it is being received over a telephone line.

Audio levels are observed in the studio by monitoring the VU meter. Located on the audio console, this volume unit meter measures the electrical strength of audio signals being broadcast.

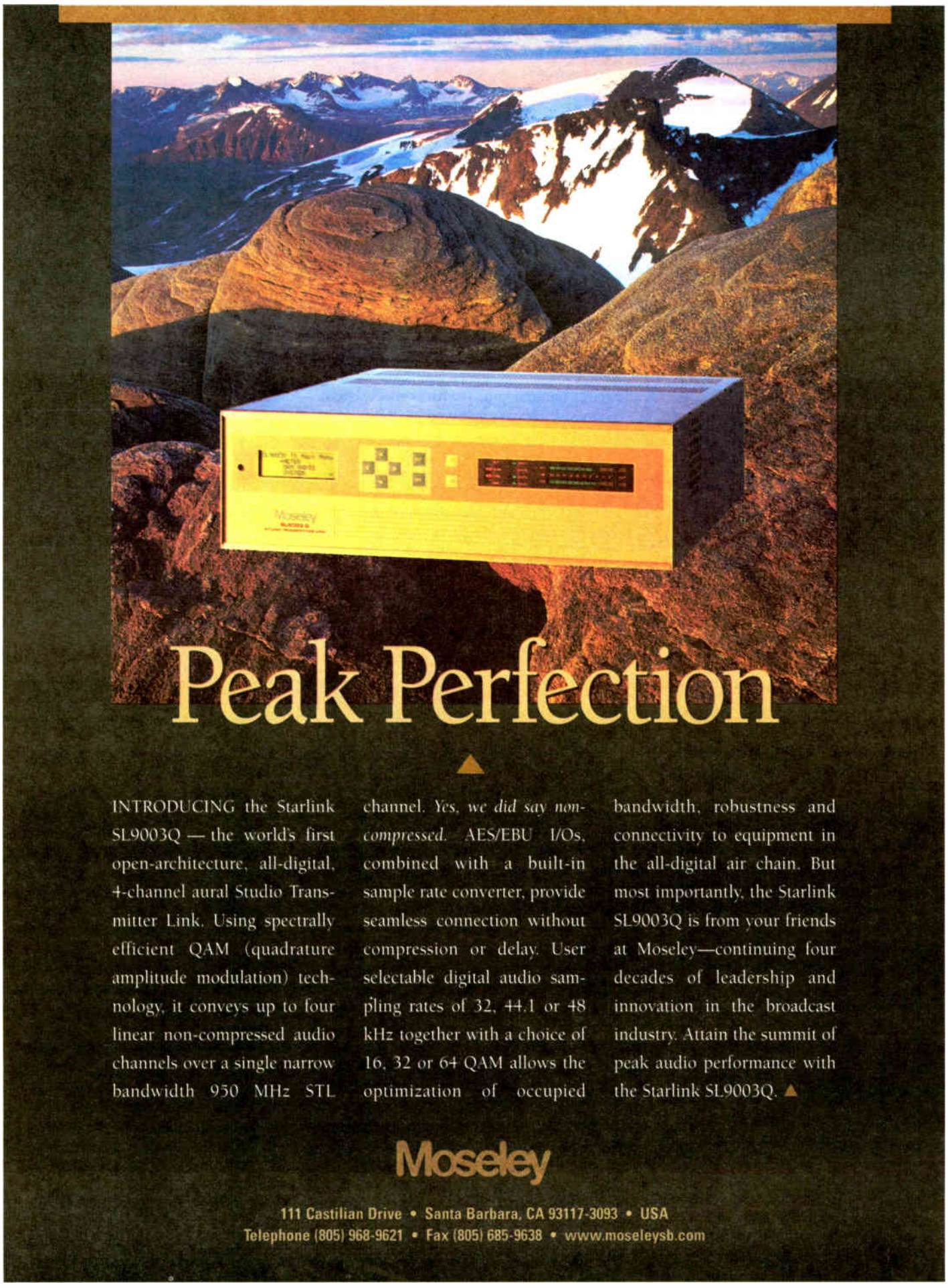
The console receives signals from microwave remote broadcasts or satellite services as well as from the studio and combines or chooses them from local broadcasting. The VU meter measures signal strength in decibels. This a logarithmic measurement that responds to sound the same way our ears do. The '0' level on the VU meter is the optimum operating level.

Reaching your peak

Audio quality starts in the studio. To reproduce audio properly, it is important to have the VU meter readings peak around 0 or +1. Because audio varies constantly, the signal level should be monitored to make sure that the loudest audio is at this level. Do not listen with your ears; observe with the meter. Monitor speakers can be deceiving; the audio system can be checked with calibrated signals from audio oscillators, test CDs and tapes providing a '0' level to make sure the console is operating properly. Along with attenuators that adjust the signal, consoles also have trim adjustments to make sure levels are accurate. Trim adjustments also allow for a balanced output of stereo consoles.

It is important to make sure that the material recorded for broadcast is prepared in a proper manner. If audio is recorded improperly in either a digital or analog format, problems will occur. Recording at an insufficient level will

See AM, page 26 ▶



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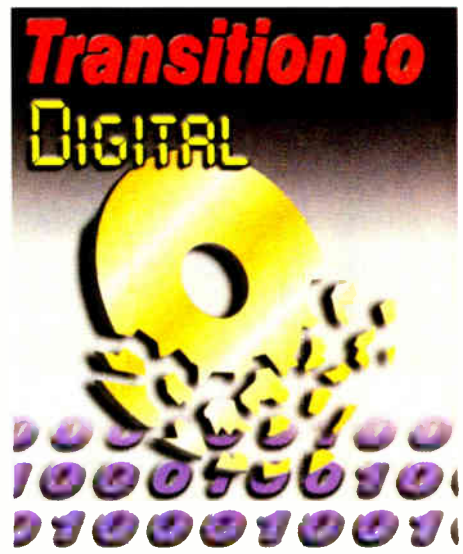
A New Showcase in Indianapolis



Paul J. McLane

In the conclusion of a two-part interview, RW Editor Paul J. McLane speaks with Curtis E. Taylor, chief information officer for Emmis Communications, and Dave Hood, chief engineer of WTLC-AM-FM, about the new Emmis Communications world headquarters. The first part of this story appeared Feb. 17. The full text also is available at www.rwonline.com

The headquarters in Indianapolis is home to five radio stations, two networks, a magazine and corporate offices.

RW: Let's talk about your Broadcast Electronics AudioVault.
Hood: We have 24 workstations, seven servers. If we acquire some more stations locally, we have the capacity to expand the number of servers and workstations as needed.

One of the servers is doing nothing but net delay, and we didn't want to tie up the network with that.

RW: What is the audio storage capacity, and what compression scheme?
Hood: Seven hundred and seventy hours of stereo storage, per server. 6.4 -to-1 is standard on everything. Each server is a clone of each other. (It's) MPEG-2.

On the AudioVault, you can compress on the fly. If one of the guys wanted to record a single cut and use some extreme, weird configuration, like 32 kHz sampling rate, or no compression, or he wanted to make a mono, he can do it on the fly.

RW: You had five vendors come to explain their digital audio delivery systems before you made your choice. What were the deciding factors?
Hood: One of the criteria was that it had to be Windows NT-based. We also liked the fact that the AudioVault allows instant access to your audio cuts. It's not a store-and-forward system, like some.

We didn't want any audio going through the bus or the network. We've got too many workstations to have audio going through a slow bus. SCSI controller had to be on the audio card itself and, man, that narrows it down to one system. That is the BE AudioVault.

Taylor: Dave had experience with the previous version of AudioVault that ran on Windows 95 before the move, so that was a great help.

Hood: It came down to two systems. The other system, we didn't like because it's too network-intensive. If you have a network problem, the whole system goes belly up. Where the AudioVault only uses the network occasionally.

WAN plans

RW: What are your plans for wide-area networking at Emmis?
Hood: Once the dust settles, and I don't want to put a time frame on it —

What we're going to be doing, like at our new Terre Haute stations, we can actually run, control and program that from here. We can send audio cuts over the WAN, control it, program it. If these guys need a cut in New York and we've got that on our system, well, we'll just send it over on the WAN.

RW: What is the physical connection that is allowing that?
Taylor: The AudioVault runs on a Windows NT 4.0 platform and the corporate business application runs over Novell Netware. There was a lot of planning that had to take place to get the two networks linked together.

We have a frame relay wide-area network in place running TCP/IP and IPX between all of our locations.

Between all of our entities, we have a T1. Now, since everything is digital, we're starting to get away from just sending e-mail over it, and sending cuts.

Our New York site has a Dalet system. The Terre Haute station that we just acquired has Dave's old AudioVault system. We can actually interface with some of the other products out there as we move forward.

Hood: Some other systems are very good. It's just that if the network burps, you are dead in the water. Also, the BE does not need to defragment the hard drives. Some others do, and when you defragment you have to shut the whole system down.

RW: Physical interconnection. You are using a Belden multipair digital cable?
Taylor: Actually, our computer network cable, the whole infrastructure was installed by Lucent. So we are using the Lucent cable, whatever they are using as their fundamental cable.

But, the way our network is designed, we have Category 5 and Giga-speed cable throughout the whole network. As the bandwidth needs increase on our digital system, we've already got a Gigabit structure in place so we can start delivering Gigabit speeds. Part of the goal was to build for the future, including video.

The cable used to wire consoles and broadcasting equipment was Belden.

Benefits of Emmis

RW: What is it like to work for Emmis as an engineer?
Hood: I love it.

We were in a meeting with the program guys and engineers. Norm Gurwitz, the executive vice president and secretary of Emmis, was also there.

Norm looked at us and said, "You guys pick out what you want, and what you think you are going to be able to live with, and we'll get it. It's not up to us" — he was referring to executive management — "it's up to you guys, the users of the equipment and the engineers."

I almost passed out.

In 28 years, many of the decisions made by the companies I worked for were political. That was not the case (here). That one statement just put Emmis on the top of the list. ... Another issue is that we have a blind operator. Of the five systems we looked at, three of them said, "Sorry, we can't help you." One even told us to get rid of him, and hire somebody else.

RW: What does BE do for a visually impaired operator?
Hood: We call it the Bernie Box.

Bernie Eagan, an operator on WENS, is totally blind, and man, is this guy good. This came to be a very important issue: "Don't you guys forget Bernie." This is corporate speaking. He was the very first DJ hired by Mr. Smulyan, who is very loyal to his employees. It's a two-way street because we respect him.

Broadcast Electronics — who donated it, didn't charge us for it — got us a little interface console that was made in Germany. It has Braille keys. A blind operator can run the AudioVault.

RW: How do you accomplish audio production?
Hood: We chose Sadie Version 3. We have six production studios, and the booths off of the main studios also have a Sadie, for a total of nine Sadies.

If somebody wants to do production and the studio is full, he just runs over to a booth and does it there.

Audio cuts are transferred to the AudioVault through the network to the BE servers.

RW: The main production studios are equipped with Integrity mixers, configured

See EMMIS, page 19 ▶

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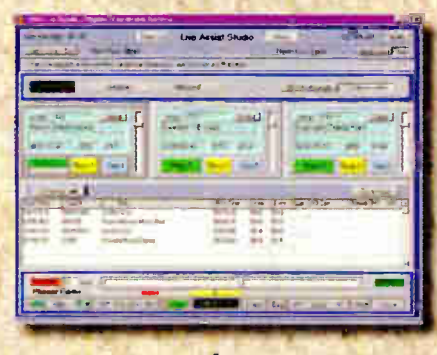

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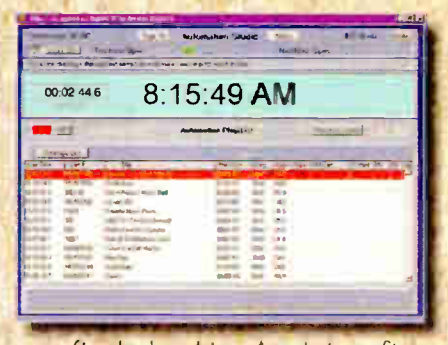

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World Radio History

Emmis HQ Project

▶ EMMIS, continued from page 17

for stereo? You are doing all of your multitrack work in the computer?
Hood: Yes.

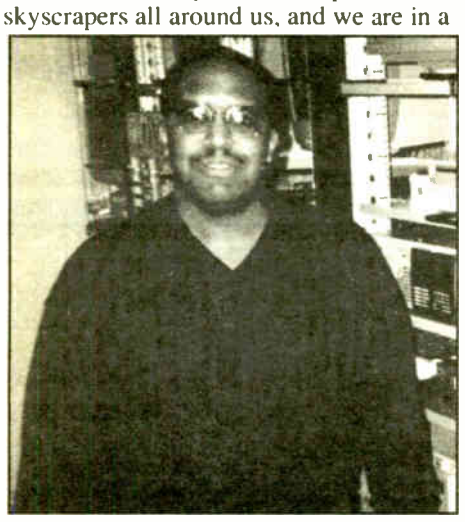
STL links via T1

RW: Where are the transmitters located in Indianapolis?
Hood: They are scattered.

That was a big, big worry, because we would bet money that we couldn't see any of the sites. When they built the top floor, we put on our boots and our hard hats and went up there with binoculars.

We almost all passed out. Out of the five sites, we saw four. We were just dumbfounded.

Taylor: We are smack-dab right in the middle of the city of Indianapolis, with skyscrapers all around us, and we are in a



Curtis Taylor, Emmis Chief Information Officer

seven-story building. There are a couple of 22-story-plus buildings around us.

Hood: We were able to see all but one. So we got all of the T1s going to all the sites — I have two T1s (at WTLC-AM-FM). Then we are using the Moseley STLs for our RF link backups.

RW: Are those digital?
Hood: No. That was another thing that I have been talking to a lot of people about. The chief engineer of WENS/WNAP, Bob Hawkins, insisted on being pure digital from the microphone to the exciter.

RW: You disagree with the concept of the all-digital path?
Hood: Digital sounding sterile. I had been reading about it in **Radio World** and talking about it with other engineers. I went to Orban, talked to them about this digital sterility. I said "I'd like to throw in some analog here just to keep it warm." Out of the 10 people I talked to, I got 10 different opinions.

I don't think the listener is going to determine the sterility of the digital audio. I think there might be some real critics who may detect a difference if you could switch back and forth.

We were also comfortable with the analog. I myself had a little problem with the AES3. I wasn't familiar with it, I was comfortable with analog. The only thing we've had problem with the AES3 is, if it's not terminated, it's like a SCSI cable. The sucker will quit and you have to have the AES3 path terminated.

RW: How are you getting your signals up to your sites? Are you using Intraplex equipment via T1 wired lines?
Hood? Correct. Intraplex has been working great. *(Ed. Note: Intraplex is now owned by Harris Corp.)*

RW: Then Moseleys are your back-up RF STLs, and you are feeding Continental digital exciters at these stations?
Hood: At the three FMs.

RW: Where is your processing?
Hood: At WENS and WNAP, the Orban 8200s are sitting in the tech centers in the new building. I chose to have mine at the transmitter because of the T1 configuration and other links, and I was out there anyway.

I wouldn't mind having it in the tech center. The program director doesn't like going out to the transmitter site, he keeps his fingers out of it. But on the T1, I can get an RS-232 controller. I am going to hook that up in the spring for WTLC-FM.

RW: Are you standardized on an on-air processor for the stations?
Hood: We went all Orban 8200s on the FMs. We have some 8100s as backups.

RW: And the AM processor?
Hood: I'm using the new Orban 9200 on WTLC(AM) and a 9100 as a backup. Jeff Dinsmore at WIBC, he's got the 9100B.

Radio stations keep treating the chief engineer like a janitor. That's why they are getting out.

— Dave Hood

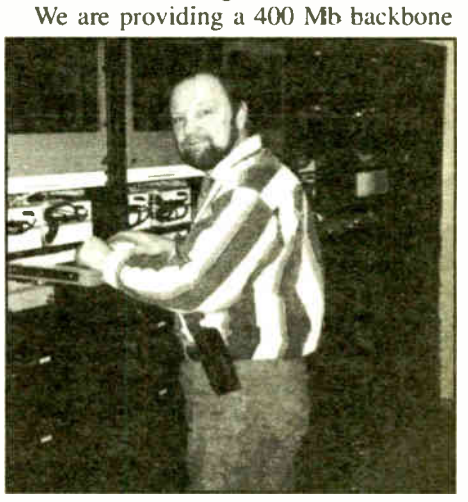
RW: Describe the network computer facility of the stations and the group.
Hood: BE uses a program called AVScheduler, which integrates the traffic and the music and also gives error reports and discrepancies.

But the PDs, music people and traffic are all tied in with the overall Novell. Curtis built a little firewall, so that nobody else can see the AudioVault. Only those specific computers, and when they send the log, the music is combined with it. It is all sent to the AudioVault through the Novell network.

RW: How many users are you set up to serve, Curtis?
Taylor: The number of users here on-site is over 300.

What we have is an Ethernet environment. We standardized on a quad data pull. We have four data cables running into each area, each work cube, and they can be used for phone or data. Again, three of those are Category-5 and one is Giga-speed. We are running Cisco switches in the background.

We are providing a 400 Mb backbone



Dave Hood, Chief Engineer of WTLC-AM-FM and the Emmis AudioVault System

for that. We decided if we are going to do it, we are going to do it right. We are doing a 10 Meg switch to each desktop.

We also upgraded our desktop computers during the move. We standardized on Gateway as our desktop platform, and we replaced anything that was below a Pentium 166 with a Pentium 350. So we only have Pentium 166s and above in this building.

Talk to each other

RW: If a reader is planning a facility project, what lessons can you pass along?
Taylor: Get everybody you can think of involved early, and open up a line of communication.

Our engineers were working on this, myself, the IS staff was working on it, PR&E, we had construction going on — actually *building* the doggone thing — finishing up the rooms, the AudioVault people — there are tons of subcontractors in here, and everyone is doing their own piece.

Our engineers also had to keep the other stations going. They weren't even here a lot of the time. So it was critical that we kept the lines of communication open at all times.

We didn't start doing a great job at that until we started getting close to the end of the project.

See EMMIS, page 25 ▶

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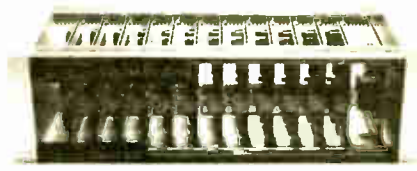

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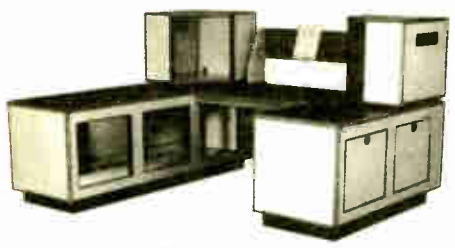

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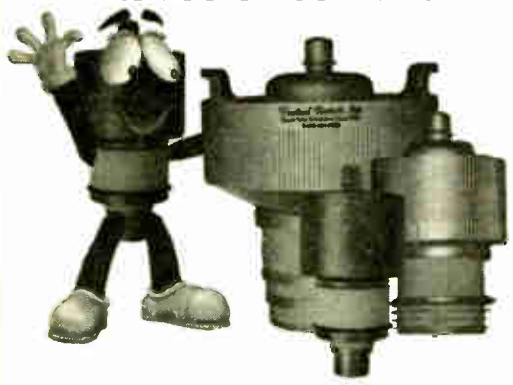

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PRODUCT EVALUATION

Going Digital With the PR&E Integrity

Allen J. Singer

The Integrity digital on-air console from Pacific Research & Engineering enjoys a rather clean track record regarding user problems, given that the technology is relatively new. With the Integrity, what goes in digital comes out digital, and what goes in analog also comes out digital. Most of all, the Integrity offers more features than a standard analog studio console.

We installed two Integrity consoles recently at our Susquehanna stations, WRRM(FM) and WVAE(FM), in our new facilities in Cincinnati. We combined the stations into one building and outfitted them with mostly new equipment. Because our sister stations in Indianapolis installed Integrity consoles into their new facilities, we decided to follow suit, and have been satisfied since.

The Integrity console sells for a bit less than $41,000 direct from PR&E; we received ours in about 45 days, a bit longer than PR&E's normal shipping time.

The console includes four components: the control surface, an electronics enclosure (or what we call the "big box," the brain of the Integrity), a computer and the power supply.

The control surface, what the user might term the console itself, weighs 70 pounds and fits into a furniture cutout of 42-1/8 x 24-7/16 inches. Above the furniture, the console sits about an inch and a half; below, it sits four inches. This meets with the Americans with Disabilities Act permitting wheelchair usage.

The Integrity control surface offers 16 channels: two are dedicated mic channels with built-in processing; channels 3-6 are selectable between mic or line stereo inputs; and channels 7-16 are digital/line stereo inputs. Input levels are the standard +4, and the digital connection is AES3; it can be S/PDIF with modifications. The digital channels have two extra buttons each, for "analog" and "digital" inputs. CD players and digital audio storage devices can be installed here.

What sets the Integrity apart is that user configurations are set and recalled in session files.

Hey, good lookin'

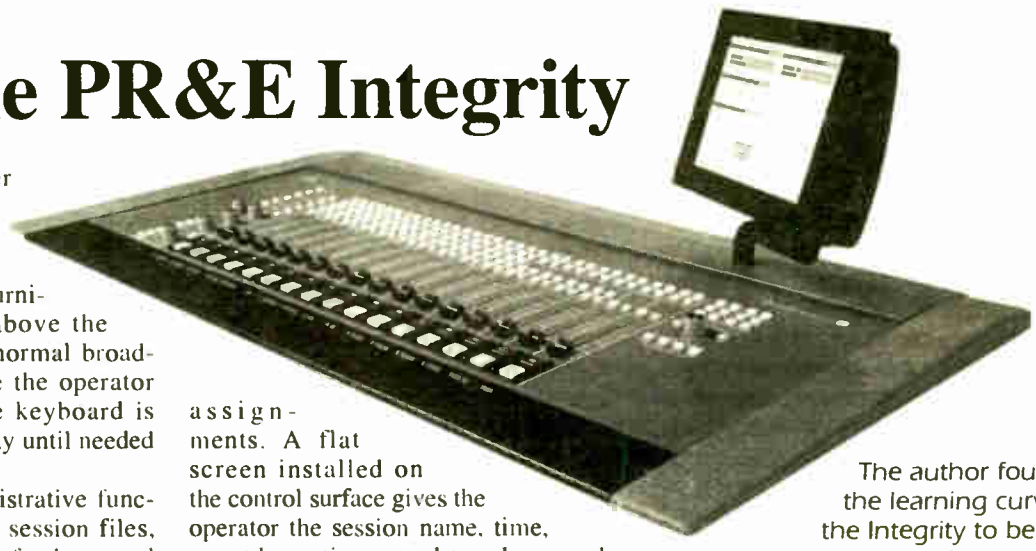
PR&E believes the Integrity is the "best looking console on the market." While aesthetics are subjective, I tend to agree.

Below each fader is a 10-character alphanumeric Channel ID display that labels the channels. The "label" can be changed at any time by loading a new session file from the Integrity's computer. Gone are the Dymo labels of yesteryear.

The Integrity computer has a Pentium/Windows 95 operating system. It's a compact unit, taking only two rack units in studio furniture, usually installed above the power supply. During a normal broadcast day, the only device the operator needs is the mouse. The keyboard is wireless and is stowed away until needed by an engineer.

Among its other administrative functions, the computer loads session files, which basically are programs for the control surface, channel labeling and remote key assignments. A flat screen installed on the control surface gives the operator the session name, time, countdown timers and two bar-graph

See INTEGRITY, page 23 ▶



The author found the learning curve of the Integrity to be quick and easy.

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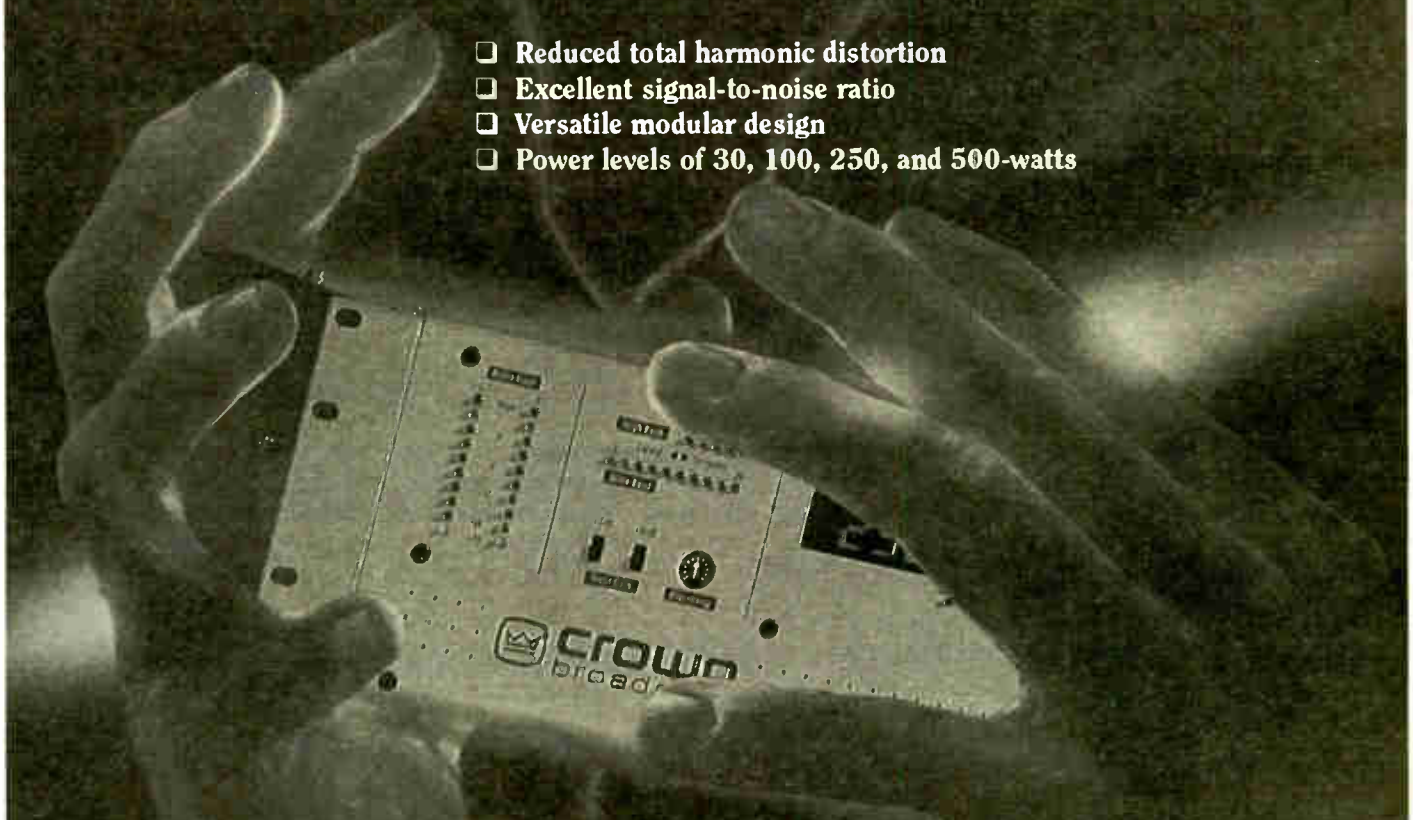

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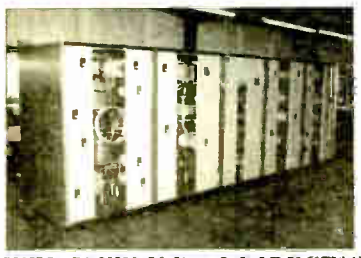

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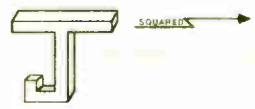

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World Radio History

Integrity: Console With a Brain

▶ INTEGRITY, continued from page 21

meters for levels. Optional external VU meters can be purchased if desired.

The meters are color-coded and show red in overmodulation. In severe overmodulation, a red box flashes around the meters. If the computer crashes, the console will retain its session and can run the show normally, but without the benefit of the screen. In the event of computer failure, the show goes on — the computer is rebooted and the session file is reloaded.

The control surface uses what I call "soft-touch buttons," non-mechanical momentary buttons unlike the push-buttons found on previous consoles, which illuminate when pressed. If any unfamiliar buttons on the console are pressed accidentally by the operator, the session can be easily and quickly reloaded by clicking "again" on the screen to reset the console.

The difference

What sets the Integrity apart from other digital consoles is that user configurations are set and recalled in session files. Also, a different session file could be used for each show throughout the broadcast day. This scheme provides maximum flexibility for a busy radio station's on-air team.

PR&E minimizes single points of failure in the Integrity system by using "distributed architecture." Each channel in the Integrity has a redundant analog substructure in case of DSP (digital signal processing) code failure.

For example, if the CD player's digital output is running on channel 8, and something goes wrong inside the digital path within that channel, the analog path takes over and audio continues to flow as if nothing happened. The same thing will happen if the analog path gets corrupted.

Industry experts assert that radio is going digital, and in my opinion, the Integrity is the way to go. We like the clean sound, the ability to load different session files at any given time, and the relatively maintenance-free operation. We also found the learning curve for operators to be quick, due to similar operation to the old console, but with buttons in different places and a flat-screen monitor for time and levels. The Integrity is easy for both operators and engineers to learn — important for that phone call in the middle of the night.

Installation is typical of any on-air console. It helps to find a studio furniture company that has built cabinetry for the Integrity. Studio Technology made ours, and did a very nice job. The electronics enclosure and power supply require special holes to be cut for venting, and needs to be installed in specific rack spaces.

It's easier for two people to install the power supply and electronics enclosure, and three people are necessary to install the control surface. The electronics enclosure is installed on a hinge system that allows it to be tilted outward for service (into its "service position").

Just like Molex connectors for many analog consoles, the Integrity requires specific connectors. A downside of the wiring process is that the installer must work for days terminating the ends of the digital and analog wires using AMP MOD IV receptacle contacts (supplied by PR&E) and installing them into their connector housings. For an average installation, this process is tedious and can take days to accomplish.

Due to the size of digital wire (Belden 1800A is recommended), installing the connectors can be frustrating. Plugging the connectors into the electronics enclosure is relatively simple due to the labeling and logical placements on the enclosure, arranged in rows according to function. Compared to some analog consoles I've had to work with in the past, the Integrity's wiring arrangement is a real bonus.

Pay attention

The Integrity produces a nice, clean sound. However, inattentive on-air talent can make the sound not so nice. If the jock is not paying attention to the meters during a busy morning show, callers or other sources can become distorted on the air. Just as they learned in broadcasting school, the jocks must "watch the levels."

Also note that the air talent doesn't hear the true air signal. Because Integrity is a digital console, there will always be a slight delay of approximately 16 milliseconds

See INTEGRITY, page 24 ▶

The Integrity is easy for operators and engineers to learn, important for that phone call in the middle of the night.

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World Radio History

The Digital Path With Integrity

▶ INTEGRITY, continued from page 23

between the time the jock talks and when the results come from the air monitor.

To keep the jock from stuttering on the air due to the echo delay, we installed Con Air switchers, which switch the headphones from the tuner to what we call "fake air," fed by the backup processors, when the mic button is depressed. The backup processors are installed at the station, whereas the main processors are located at the transmitter sites. Otherwise, we would use the main processors to feed the fake air.

Outputs from the processor (a digital processor like the Optimod 8200 works nicely; it has analog audio XLR outputs) feed the inputs of the Con Air.

This process can also be accomplished with a relay, but the Con Air has compression, bass and treble adjustments.

To keep the jocks from stuttering on the air due to the echo delay, we installed Con Air switchers to switch the headphones.

When the jocks talks, they hear processed audio before the exciter. When the mic is off, they hear audio from the air monitor.

If your facility has an older analog 8100 or similar processor, you might have to install an equalizer before the Con Air. Our backup processor, the Optimod 8100, doesn't have extra audio outputs — instead, it has RCA output "audio test jacks" that have 75µS pre-emphasis, which causes the jocks to hear themselves in their headphones with high treble and hiss. The EQ, which was necessary for the 8100 (the 8200 didn't require an EQ to feed the fake air), compensated nicely for the sound problem.

The on-air talent at our stations like the Integrity consoles. They enjoy the unit's compactness, easy button accessibility, nice design and digital channel display in lieu of Dymo labels or masking tape. They seem to like the soft-touch buttons instead of the clunky mechanical buttons they're used to, and especially like how the remote channel buttons automatically show the appropriate Channel ID in the display on the channel when pressed.

Little confusion

Some of the on-air talent don't like how when the PFL (pre-fader listen) button is pressed, the audio automatically drops in the studio. Also, the control knob for the PFL volume is labeled as "cue" instead of PFL, which might be slightly confusing to new jocks. Some jocks are die-hard VU meter fans and might not like the transition to a color-coded screen display, while others find the additional buttons on some of the channels (the digital/line channels) somewhat confusing compared to other channels.

The digital channels have 10 buttons on the top, the mic/line channels have eight and the mic channels have six. All buttons aren't used all the time, so sometimes jocks might get confused. Additionally, a few jocks have complained about having to listen to "fake air" provided by the Con Air compared to true air since they can't hear the distortion they might be causing.

Still, the Integrity is an excellent standard for modern digital air studios. Radio stations have eliminated most analog broadcast equipment, and many have even eliminated CD players in favor of digital audio storage devices.

We're glad we chose the Integrity and know it will serve us well.

■ ■ ■

Allen Singer is assistant engineer for WRRM and WVAE. He was employed previously by Harris Corp. in Cincinnati.

The Best Digital Systems

It's a fact: *More* U.S. radio stations *choose Scott Studios'* than *any other* digital system! 2,025 U.S. stations use 4,600 Scott digital workstations. One reason is that the Scott System is the *easiest to use*. It's simple, straightforward, intuitive and powerful!

And Scott Studios' audio quality is the *very best!* You choose from new 32-bit PCI cards by Digigram, Audio Science or Antex. Scott Studios is famous for our *uncompressed* digital systems at a compressed price, but we also work well with MPEG. Scott software can record and play our audio files on a laptop and home PC.

Scott computers are industrial quality in 19" racks, but *not* proprietary: functional equivalents are available at most computer stores. You get 24x7 toll-free phone support. You also get new software features *free* for years from Scott's Internet site.

Scott Studios offers *three* different systems in *three* price ranges to suit *any* budget.

This is the user-friendly Scott 32 System, with 30 sets of 30 hot keys, phone editor and all songs and spots on line for instant play! It seamlessly mixes uncompressed and MPEG digital audio!

Good Spot Box

Scott's Spot Box delivers the *simplicity* of a triple-deck "cart" player plus *compact disc quality* digital sound.

Spot Box has only the one screen, so announcers always know what's playing. On the left of the screen, three digital players have clear labels on each spot. VU meter bars show levels. Buttons show countdown times and flash as each recording ends.

At the right of the screen, "Cart Walls" let you pick and play any recording by name, number or category. Or, number keys at the bottom load spots quickly from your log.

Scott's Spot Box includes a recorder and costs as little as $5,000. Options include log imports from traffic computers and music on hard drive.

Better AXS® 2000+

AXS® (pronounced ax'-cess) 2000+ is radio's premier digital audio system for automation and live assist. AXS® 2000+ is fully featured, with 99 sets of 28 instant play Hot Keys, log editing in the studio, live copy on-screen, big countdown timers and can include a production or phone recorder.

You also get auto-fill of network breaks to cover missing spots, a Real Time Scheduler, unattended net recording, timed updates, macros and optional time announce and WAVE file imports.

For stations with large CD music libraries, AXS® 2000+ can also control inexpensive consumer CD multi-pack and 300 CD juke box players.

See Scott Studios at NAB Booth L11890 in Las Vegas, April 19-22

Best Scott 32 System

The Scott 32 System (pictured at the upper right) is the most powerful digital system in radio. Your log is on the left side of the screen. Everything plays at your touch. On the right, 30 sets of 30 Hot Keys play any spur-of-the-moment jingles, effects or comedy. You also get 10 "Cart Walls" with 1 or 2 second access to *any* recording. A built-in recorder quickly and easily edits phone calls, spots or pre-recorded Voice Trax.

Scott 32 options include recording Voice Trax while hearing surrounding songs and spots, time or temperature announce, *Invincible* seamless redundancy with self-healing fail-safes, newsrooms, 16-track editors and auto-transfer of spots and voice trax to distant stations via Internet.

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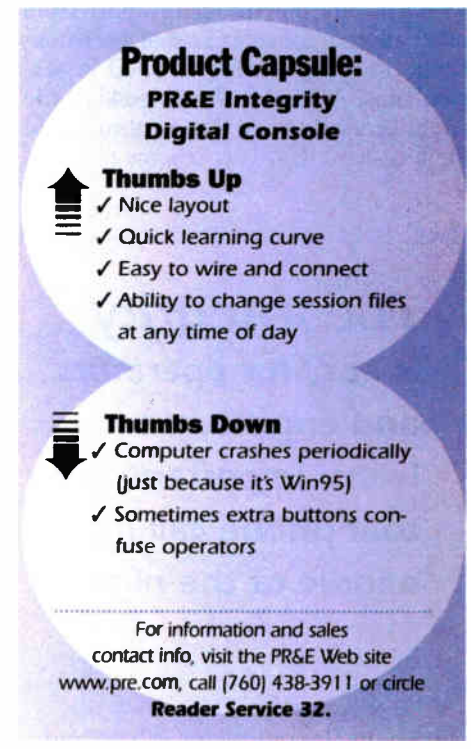


World Radio History

Engineer Frustration

▶ EMMIS, continued from page 19

***RW:** Group engineers are having a hard time finding good technical people. Why?*
Hood: We are losing the engineers! They are second-class citizens.

We had an incident in a small town in central Indiana, at another group, where an engineer was working all night trying to get an FM back on the air. It was apart, and he jury-rigged it, but he got it back on the air.

The general manager didn't care about the fact that he spent all night. The engineer was dead tired in the morning, but he showed up the next day. The GM said, "I had to spend $300 for a part to keep the main transmitter on the air."

He said, "You are the reason I only have two boats instead of three."

Radio stations keep treating the chief engineer like a janitor. That's why they are getting out.

Stations across the street lost a couple going to cellular and computer companies, where they are treated much better and they have a 9-to-5 job.

I don't do any contract work anymore. I know they are having a tough time in these small-market stations, but the GMs expect us to fix things with chewing gum and bailing wire. Then when we charge $30 or $40 an hour, they complain about us, not realizing that if it was a plumbing job, it would cost them more. ...

And there are only maybe three or four guys who know directional AMs in this town.

***RW:** Specialized science like that is where you suffer the most.*
Hood: Nobody else in their right mind wants to do that stuff, but I enjoy it. I do it out of personal satisfaction, not just for a paycheck.

***RW:** Is there any other experience with this project that you think is important to our readers?*
Taylor: The key item left for us is cross-training. Dave mentioned that it is tough to find a backup, but now that he is in this building, there are four engineers in the building, and an IS staff, so it's time for us all to back each other up.

The AudioVault has an engineering piece to it, it has a bunch of software-related and computer hardware-related items too. It's time for all of us to pull together and cross-train, so Dave can take a couple days off. I think that is key in any project.

■ ■ ■

This is one in a series of articles about how radio stations and groups are implementing digital technology.

Emmis Gear Sampler

Pacific Research & Engineering performed system design and installation services for the radio portion of the Emmis headquarters project. Here is a partial list of equipment provided.

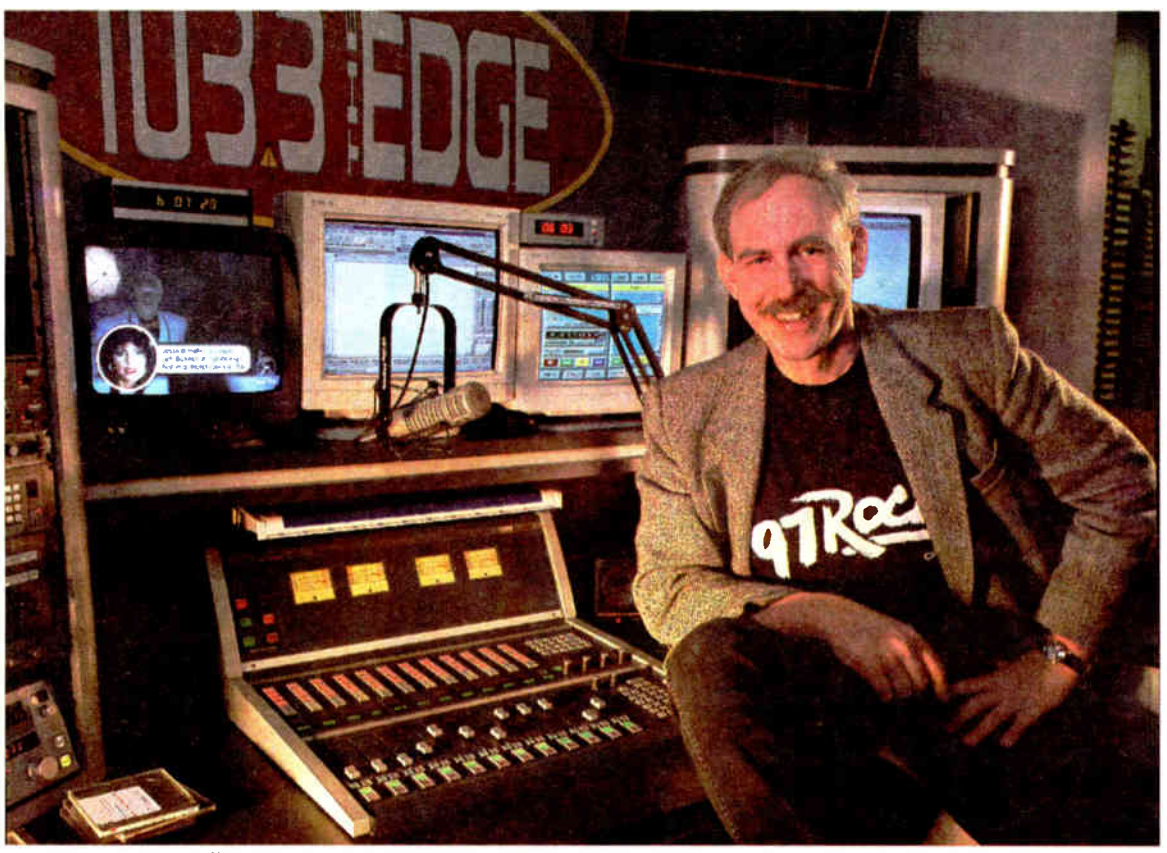
(25) Studios, with custom cabinetry
(20) PR&E Integrity digital consoles
SAS 64000 Dual-Frame 256x256 stereo router
SAS 32000 32-station intercom
Three technical centers, utilizing (32) Stantron racks
News workroom (8 stations)
Broadcast Electronics AudioVault, using PR&E flat-panel displays - 7 servers, 24 workstations
JBL 4400 Series speakers throughout
Inter-room wiring: Belden 1806A AES/EBU multipair cabling (12,000 feet)
Intraplex T1 primary STLs
Moseley aural backup STLs
(88) Symetrix 528E microphone processors

The Result of the Emmis Headquarters Project

(47) Electro-Voice 807 microphones
(41) Shure SM-7 microphones
ESE 185 GPS-based timecode generator driving the Integrity consoles, ESE analog wall clocks & PR&E digital clocks in every studio
Sine Systems Beta-Brite message boards & controllers in each on-air studio, newsroom & tech center

Information was provided by Pacific Research & Engineering.

mercury's rising - in buffalo



Mercury Radio in Buffalo, NY stations include: WEDG fm, WGRF fm, WHTT fm, WHTT am, and network head-end for Buffalo Bills football.

"This is the only product available in the world that allows the digital networking of consoles with each other and the master router," says Dave Halik, CE, Mercury Radio Communications. "I've looked at other digital consoles and routers, but none of them talk to each other."

"One source connected anywhere on the system is available to all locations without any rewiring necessary, thanks to the Vadis' fiber networking. It really changes the concept of routing. Installation is vastly different than with previous consoles. I just plug in one fiber line, and it makes 64 pairs of trunking."

"Thanks to our three fiber optic-linked Vadis DC consoles from Klotz Digital Audio, we can produce all of the mix/minus configurations needed to broadcast the Buffalo Bills ISDN feeds and perform our regular station broadcasts requirements simultaneously. It's truly been a godsend to me."

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World Radio History

You Read It Here

Five Years Ago

"The (RBDS) standard was adopted last year. The time lag that occurs between the publication of a standard and getting equipment in the hands of the consumer can be extremely long, but RBDS is a top priority of receiver manufacturers. ... All major manufacturers have these receivers in the pipeline."

Comment by Charles T. Morgan
Chairman, National Radio Systems Committee
Feb. 23, 1994

Ten Years Ago

The FMX noise reduction system has come under attack in a research project funded by MIT and the Bose Corp.

A report resulting from the project called the system, which was developed by CBS Technology and is marketed by Broadcast Technology Partners, a "step backward" from FM stereo when operating under multipath conditions.

"Bose-MIT Study Pans FMX"
Feb. 22, 1989

DAT is "golden" — golden hits, that is — for WMTR-FM 95.9, which went on the air Jan. 12 declaring itself the first all-Digital Audio Tape (DAT) radio station in the United States.

"Ohio FM Goes All DAT-Gold"
Feb. 22, 1989

Fifteen Years Ago

Claiming that AM multiplexing has the potential to interfere with AM stereo reception, Motorola has asked the commission to defer deregulation of "AM SCAs" until "the stereo marketplace choice is resolved."

"Motorola Battles AM SCAs"
March 15, 1984

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L&S has been among the pioneers in broadcast planning from its beginning. With the CHIRplus_BC software tool for FM and TV, L&S provides the No.1 broadcast planning tool, used by some of the world-wide biggest operators, like the Deutsche Telekom or the Italian RAI but also numerous regulatory authorities throughout the world.

With the development of new digital services, L&S is again in the forefront of innovative, powerful and user-friendly broadcast planning tools. DAB and DVB extensions to the highly sophisticated CHIRplus_BC planning tool are already available.

Features and Highlights:

- Powerful transmitter database containing international and national frequency plans
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- Interference calculations
- Different multiple interference calculation algorithms (power sum, SMM, log normal, simplified log normal, T-Inm)
- Network processor
- Frequency scan
- Coordination Macro
- Import filter for ITU-Plans or IFRB-CD ROM's
- Direct read from weekly circular (WIC) disks from ITU
- Automatic Database update from WIC
- Population analysis

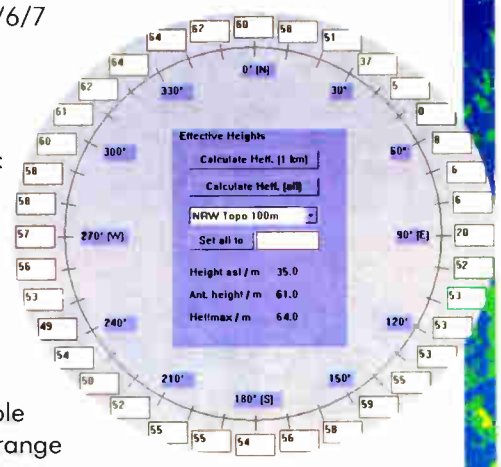
Implemented Recommendations and Regulations (Extract)

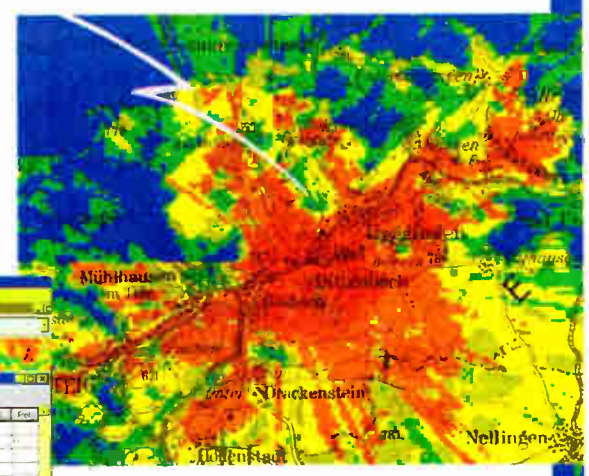
- ITU Rec. 370-5/6/7
- CCIR Rep. 239
- CCIR Rep. 945

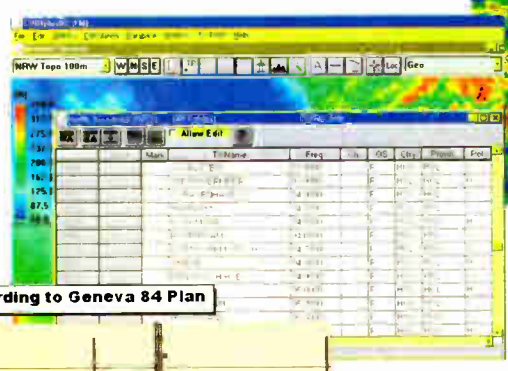
For FM/TV/DAB/DVB:

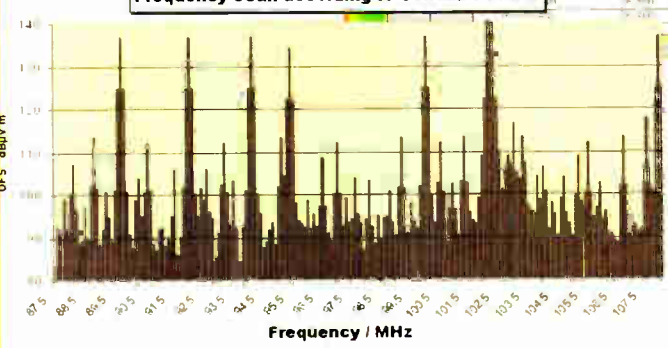
- ITU Rec. 412
- ITU Rec. 599
- ITU Rec. 417
- ITU Rec. 419
- ITU Rec. 655
- CCIR Rep. 624

Extensions available
LF/MF frequency range coverage









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Producing A Sense of Continuity

▶ AM, continued from page 16

permit the introduction of noise. Recording at an excessive level of about +1 dB will cause distortion and loss of dynamic range, the ability to capture audio in its proper range. Every source of audio that emanates from the console should produce the same peak levels, giving the listener a "feel of continuity" from one segment to the next.

If the station is broadcasting in AM stereo, make sure the channel phasing is correct. Most stereo consoles include left, right and sum or mono VU meters. If you receive material recorded out of phase, or a problem occurs within the studio that causes the left and right channel to be out of phase with each other, the signals that are common to both channels will be canceled out. That will cause problems for your listeners, because most AM receivers are monophonic.

In most instances, a phase problem will cause significant loss of signal because the majority of any stereo signal has components common to both channels. When signals are out of phase, the left and right meters of a stereo pair will appear to read normally, but the mono meter on your mixer will drop to zero.

VU meters can also be used to trace hum and noise. For example, if a VU meter will not return to its resting place, it may indicate an unwanted signal in the system. This can be traced by removing audio from the console and turning up the audio monitor. Increasing and decreasing the levels of individual channels along with cutting off inputs can pinpoint the location of the problem; it can be within the console or an external source.

Another important instrument, though not required, is the modulation monitor. It allows you to see what the signal looks like after it has been transmitted, measured in percent as well as dB. It should be as readily accessible as the console's VU meters.

Please note: In the previous part of this series on Feb. 3, the graphic captioned Figure 3 contained an error. The center waveform is the carrier, and should have been labeled "700 kHz Carrier Frequency."

■ ■ ■

Ed Montgomery is the video technology and communications lab director at Thomas Jefferson High School for Science and Technology, Fairfax County, Va. Reach him at emontgom@lan.tjhsst.edu

***RW** welcomes other points of view.*

World Radio History

GM Journal

Radio World — Resource for Business, Programming & Sales — March 17, 1999

OnRadio: A Net Profit Case Study

Bob Rusk

Radio stations that don't immediately jump on the Internet bandwagon run a serious risk of being left in the dust of the emerging technological revolution, which could result in a significant loss of listeners and non-traditional revenue.

That prognostication comes from Ricardo Ramirez, president and CEO of OnRadio. One of a crop of companies that have emerged recently with grand goals of bringing the radio industry to the Net, OnRadio is an integrated media network that supplies radio stations with design, technology and e-commerce capabilities to begin streaming audio or multicasting their station on the Internet.

OnRadio provides an interesting case study in how suppliers plan to pursue that market.

To stream or not?

The sentiment to jump on the Internet bandwagon is echoed and supported by industry research like the recent Arbitron/Edison Media study, "E-commerce and Radio," and has become an important issue in the industry.

For example, "Internet 2000," a headline track at this year's RAB sales and marketing conference, featured a series of seminars, workshops and exhibits related to radio station Webcasts. The conference featured industry leaders like Peggy Miles, president of Intervox Communications, and Greg Verdino of Arbitron.

The upcoming NAB '99 convention in Las Vegas is headlining an address by RealNetworks CEO Rob Glaser on e-commerce, webcasting and IP multicasting, and sessions with the likes of Mark Cuban, president of Broadcast.com, and Steve Perlman of WebTV Networks.

What will be the model of Net enterprises in radio? How are suppliers positioning themselves to serve your station or group?

Consider OnRadio, an "Internet radio network." The company creates interactive environments for established radio stations through its relationships with content providers in music and information, audio/video delivery services and other Net services.

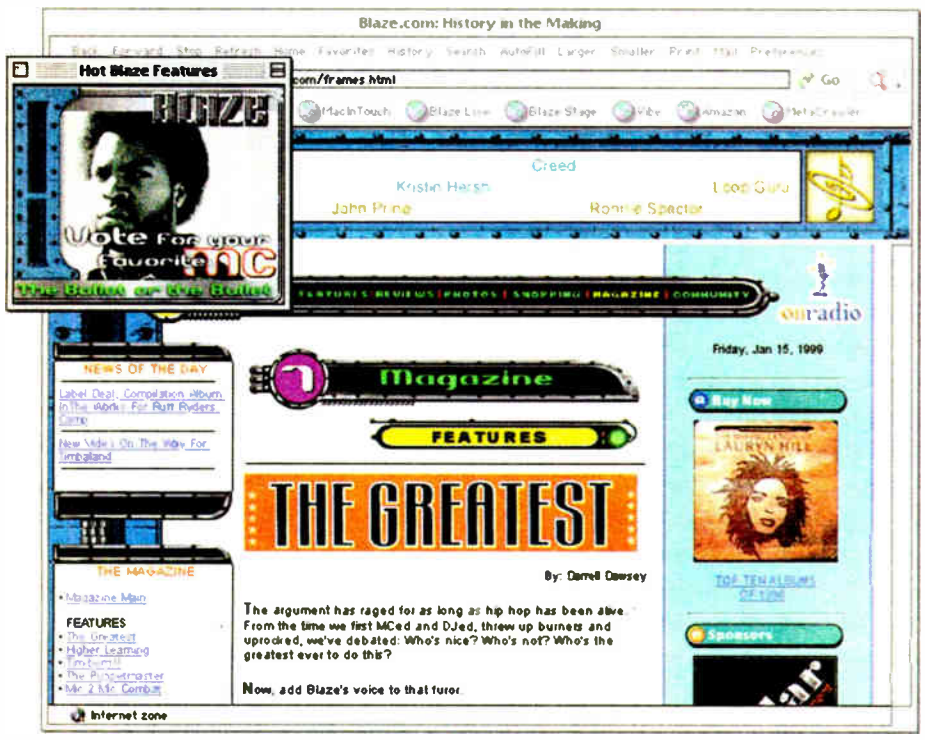
In arguing that it represents the future of radio online profitability, OnRadio mangers can point to more than 550 stations, including the largest group owners, that have signed with their company. They include ABC, CBS/Infinity, Chancellor, Clear Channel/Jacor and Heftel.

Ramirez, its president, said, "Particularly in active formats — including urban, modern rock, and adult contemporary — a lot of P1 listeners are on the Internet. If a station isn't servicing them and providing an alternative in this new medium, they will go elsewhere for entertainment and information."

Ramirez said Internet radio will see a significant rise in revenue in the long term.

"If a station says it will get on the Internet next year, that may be too late. It may have lost its P1's; and it's very difficult and expensive to get those people

See ONRADIO, page 31 ▶



Blaze.com is a joint venture of OnRadio and VibeSPIN.

Disney 'Greases The Track'

Dee McVicker

It has been show business like never before in New York City these past few months.

The country's top market and *grand dame* of the golden era of radio went through plenty of theatrics when its famed American popular standards station took a final bow and made way for ABC Radio Networks' Radio Disney.

A rally staged by loyal listeners and lots of banter by local media pundits were mere bit parts of this drama over the format of WQEW(AM), owned by The New York Times Company but recently leased to ABC. The eight-year LMA on the station, which broadcasts at 1560 kHz, went into effect the end of last year and gives ABC the option to buy at the end of the lease.

What makes this a stage show is that much of the American popular standards music — a mix of cabaret, pop and jazz tunes plus popular hits from the '30s, '40s and '50s — came from the sidewalks of New York. This music came from the lower East Side tenements; from Swing Street, Broadway and Tin Pan Alley.

So, what does it mean when New York City ousts its cabaret singers, its Frank Sinatra, Sarah Vaughan and George Gershwin in favor of "The Adventures of Bud and Iggy," "Aptitude Dude" and, yes, Mickey Mouse?

See WQEW, page 35 ▶

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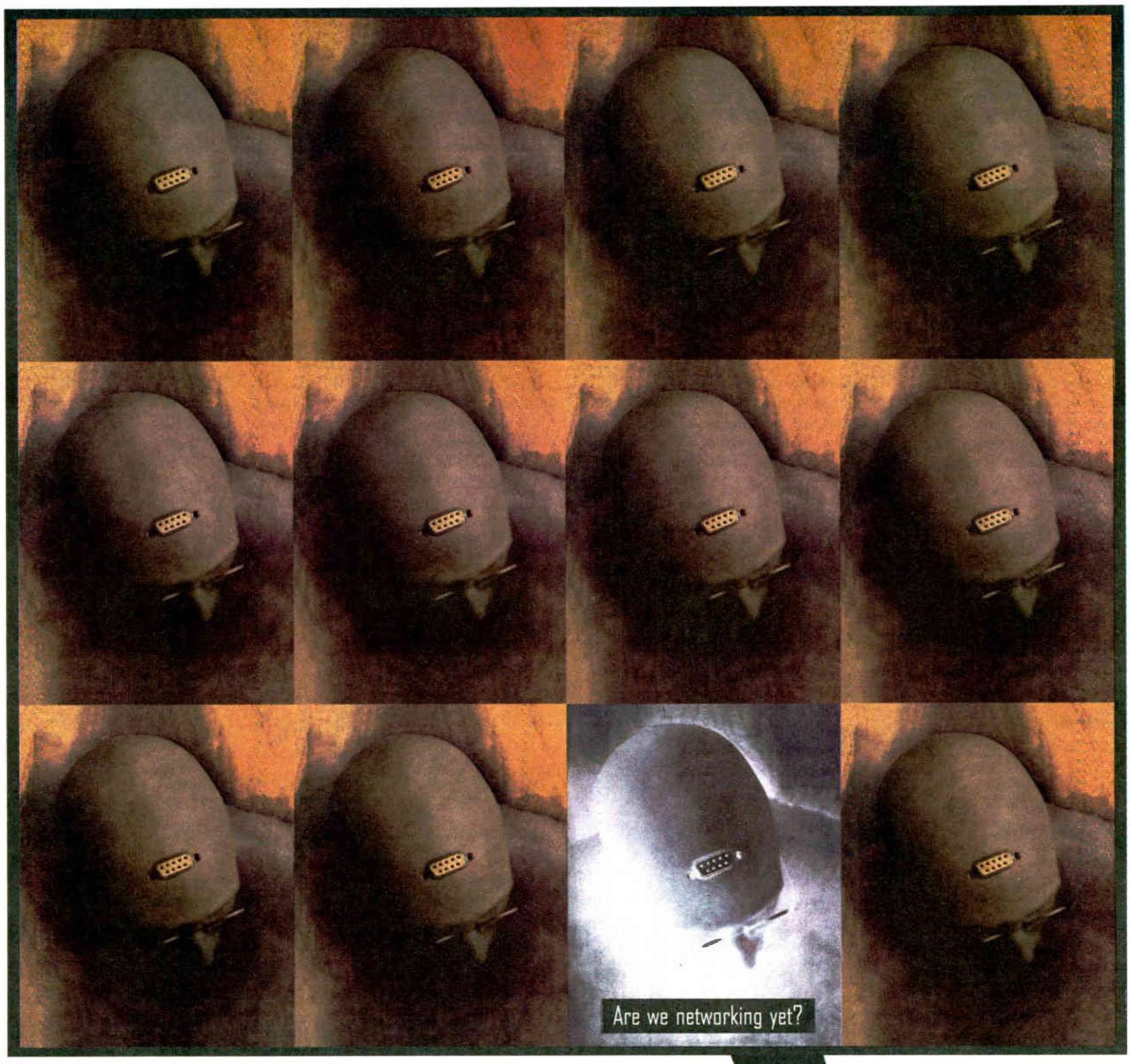

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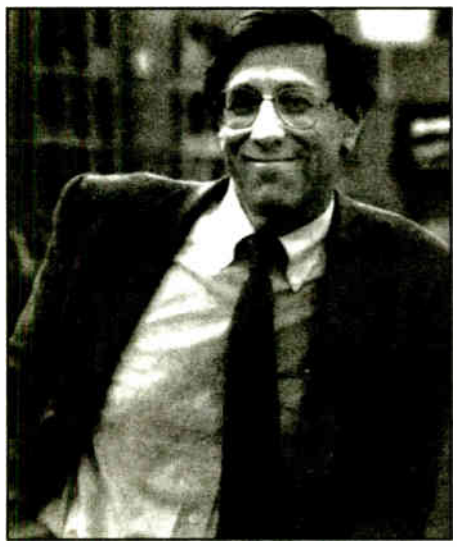
World Radio History

BOOK REVIEW

When Radio Was — A Recollection

John Montone

The uncommon mystique of listening to a broadcast from a plastic transistor radio in America during the 1940s and '50s has made a lasting impression on many people. Radio was the propelling medium that has delivered so many familiar names and faces from the airwaves to the living room as on-air celebrities became television stars.



Gerald Nachman is the author of 'Raised on Radio.'

One listener has chronicled the nation's radio days and the careers of personalities like Bob Hope and Jack Benny in a new book that shares his memories of being raised on radio.

Gerald Nachman, a San Francisco-based journalist, has written a book called "Raised on Radio," published by Pantheon Books.

The subtitle is, "In Quest of The Lone Ranger, Jack Benny, Amos n' Andy ... and Other Lost Heroes from Radio's Heyday." There are more lost heroes in the subtitle than I have mentioned here. Many more fill the pages of this meticulously chronicled history of the medium — from the first vaudevillians to talk into a microphone, through the great radio-bred comedians to the stars of comedy shows, dramas, soap operas and quiz shows and on through the early talk show hosts and newscasters.

Nachman adds a personal touch by bringing us back to his childhood in Oakland, Calif., where he listened devoutly on a little red plastic Motorola radio in his bedroom.

"I have almost total recall of the shows I heard," he wrote. But he is quick to mention that he did not tune into The Golden Age of Radio until the mid-1940s. In order not to omit the birth of the art form, he went back and listened to the shows he missed and interviewed the surviving performers. The result is a one-stop text on the great radio personalities of the 1920s, '30s, '40s and '50s.

Radio superhighway

As a true radio kid, Nachman places this history within the context of radio as it was experienced by its earliest fans. "There was — still is — a mystique to radio unlike that of any other entertainment medium. Its intimacy amounts almost to secrecy," Nachman wrote. He views radio not only as a precursor to television but to the Internet as well. In the book, Nachman calls radio the first information superhighway.

One of the author's heroes was Fred Allen, whom he refers to as "the David Letterman of radio," and "such an influential innovator that 30 years later Johnny Carson was swiping his stuff."

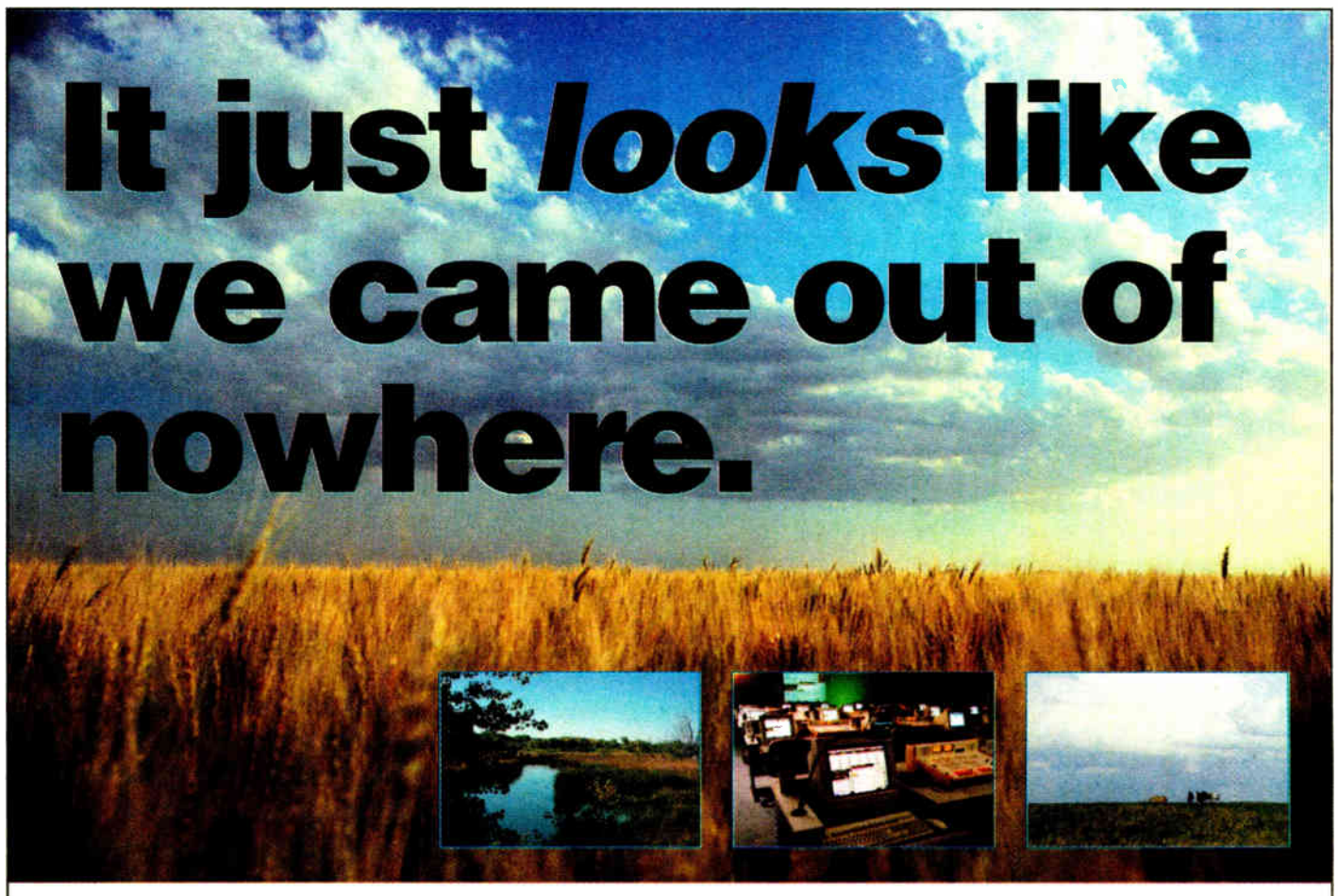
His appreciation for Allen has to do with the comic's cutting style. Unlike the standard comedian of the day who poked fun at himself or role-played real-life situations, Allen was a sharp-edged satirist who dared to bite the hand that fed him. Among his favorite targets were "agency men" and "network vice presidents."

Nachman captures Allen's biting critiques when he quotes such lines as, "A molehill man comes in at 9 a.m. and finds a molehill on his desk and his job is to turn it into a mountain by five o'clock."

Unlike Allen, who had been a vaudeville performer, Bob and Ray were "true radio offspring," and the only stars from The Golden Age to survive that age, according to the book. Nachman traces Robert Brackett Elliott and Raymond Walter Goulding from their first show on WHDH(AM), Boston in 1946 to their final shows on NPR in 1990. He includes samples of their famous characters, "Jack Headstrong, All-American American," and their commercial parodies, "The Bob

See REVIEW, page 32 ▶

There was — still is — a mystique to radio unlike that of any other entertainment medium.



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World Radio History

A Comfy Chair and Your Web Site

Alan Haber

Which kind of chair would you buy? Either for your Internet radio listening room or for your office — doesn't matter. Soft and plush? One with a hard back and a feels-like-granite seat?

Hey, it makes a difference. You've got to sit in that thing hour after hour, day after day. And there's nothing like a sore bum to make the day go slower than molasses on the way to a picnic 25 miles down the road.

Your station's Web site and Webcasts are like chairs you put out for your guests. You wouldn't have a party and ask your friends to sit on the floor, would you? Well, in much the same way, you wouldn't commit to an Internet presence and put on a less-than-invigorating show that nobody would want to come back to.

Nevertheless, the more things change, the more they stay the same. It's rare that a station's Web site matches the impact of its Webcasts, and vice versa.

Cyber-eggs

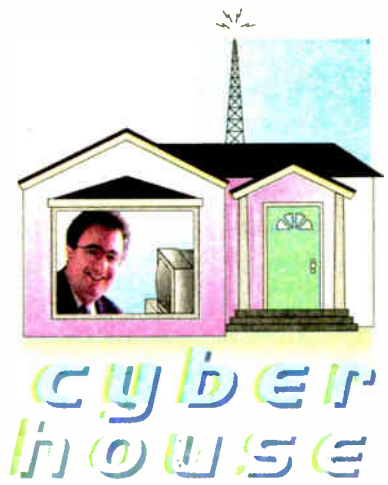
Too often, it looks to me like some stations are putting all of their cyber-eggs into one basket or the other instead of in both.

Case in point: Denmark's The Voice, *www.thevoice.fm*

There's a good, clean idea behind what you see when the home page loads, but you can't see the entire page — the last smidgen of it, anyway — unless you scroll down a click. And that message scrolling in and out of those silver parchment thingees is strictly old hat in 1999.

The rest of the Voice site kind of just lies there for me, and it uses a frame and I still can't see the point of that, but the station's RealAudio 44.1 kbps G2 SureStream Webcast is as dynamic as dynamic can be. Truly outstanding. I wish the station's site were as awe-inspiring.

Radio 10 Gold in Amsterdam at *www.radio10.nl* earns points right away by spicing up its sound with re-sung



PAMS jingles, and anybody who knows me knows that PAMS jingles send chills up my spine!

But I digress. The station gives visitors a choice of 20 or 40 kbps streams, which is aces with me. The regular 40 kbps non-G2 stream isn't as wonderful as its G2 cousin (which Radio 10 doesn't offer, alas), but it rocked and that's all that counts.

Radio 10 is a great example of a station that watches all of its cyber-eggs carefully. A well-thought-out and eye-catching image map comes at you front-and-center on the home page; you can link right to the Webcast links from it. Text links reside right below the image map; the only thing you don't see immediately on the home page is the copyright notice, which is always stimulating reading, I know, but nevertheless ...

The rest of the Radio 10 site is similarly outstanding. The DJ's page is nicely presented. I like the unobtrusive wallpaper adorned with floating 10s. I like it all, in fact. A nice package with equal attention, it seems, paid to both the sound *and* look of the station's Web presence. I wish all radio sites were as top-notch.

Now, just so no one thinks I'm avoiding U.S. stations, let's take a look at KFI's site at *www.broadcast.com/radio/Talk/kfi/*

The AMer's cyber-home is effective, logically designed and information-filled. That and exact change *will* get you a seat on your locally- and

See CYBERHOUSE, page 32 ▶

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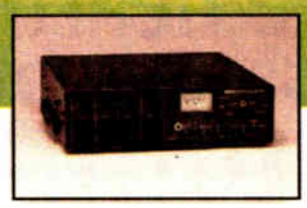

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Attention: News Service Providers

The April 28 issue of **Radio World** will feature a special Focus on News Services. If your organization provides news services to radio stations, including programs, audio and text feeds, software packages and consulting, you should be included in this editorial feature.

We're looking for your list of offerings, contact information and artwork. The deadline is March 23. For more information or to send your material, contact Radio World Business Editor, P.O. Box 1214, Falls Church, VA, 22041 or send e-mail to *Lcebula@imaspub.com*

World Radio History

Radio Marries the Web for Profit

▶ ONRADIO, continued from page 27

back. On every level, it makes a lot of sense for stations to get involved now. In the near-term, the Internet is a great way to drive the brand of the station. In the mid-term, it will be a way to make money. In the longer term, that money will become more and more significant," Ramirez said.

In a recent interview, RAB President Gary Fries said radio broadcasters are in the midst of grasping the possibilities of the merging media and beginning to see the future of radio on the Internet.

"Is it too late for radio stations to get on board? The answer is no. Is there a learning curve? The answer is yes." he said. "Web commerce is going to become a major part of our economy. People are going to need directories of some kind, and radio is going to be the medium to create the need in the mind of the consumer and then say, 'This is the road that will take you there.' And it's going to be a dot-com address."

Big name content

Partnerships with organizations that help radio supply quality content and the added value to marketing by allowing consumers to see, hear and purchase radio advertiser's products are key to the success of a radio station Web site, according to testimony from panelists and experts at RAB '99. OnRadio's alliances with organizations in the industry give a peek at the convergence of radio and the Internet.

A well-known Internet marketing site, online bookseller Amazon.com, has alliances with many different networks, browsers and other Net-related organizations. A recent deal between OnRadio and Amazon.com is an example of the moneymaking opportunities online.

The agreement Amazon.com to sell music through the OnRadio network of station Web sites. Greg Hart, music marketing manager at Amazon.com, said, "Radio moves music; air play is demonstrating its influence upon CD sales not only over the counter, but also on the Web. Working with OnRadio is logical for us because of the many stations and wide range of formats in its network."

Ricardo Ramirez

Under the agreement, Amazon.com has exclusive rights to sponsor playlists on the radio stations' Web sites and sell music from the lists. Listeners will have a direct link to the CDs they want to purchase, and the stations will share in the revenue from those sales.

According to Ramirez, the amount of revenue stations will receive from such electronic commerce arrangements such as this will vary depending on the deal. But he called it "an equitable split."

In some cases, the split between stations and OnRadio will be 50-50, Ramirez said. In addition to getting a piece of the action from online national ad slots that OnRadio sells, stations can sell local ad slots and keep all of that revenue.

Last November, OnRadio and VibeSPIN Ventures rolled out Blaze.com, the online extension of the popular hip-hop magazine, Blaze. A launch party, featuring the rap groups The Roots, A+ and Lost Boyz, was seen in a live Webcast. Along with album reviews, celebrity interviews, features and news, OnRadio will provide the Blaze.com site with content including interactive chats, bulletin boards and Webcasts of live concerts.

OnRadio, formerly known as ElectricVillage, plans to fill every niche in the format spectrum with programming to match its interest. Through a strategic partnership with Sony Music Entertainment's SW Networks, for example, OnRadio affiliates have access to the latest entertainment information in 10 formats. OnRadio also designs, develops and produces Web sites for some of the biggest operators in the business — such as Jacor's Premiere Radio Networks and its "Dr. Laura Program."

Kraig Kitchin, president and COO of Premiere, said, "OnRadio supplies Premiere with an operating platform for our Web sites that include premrad.com and drlaura.com. We participate in a revenue-sharing model; we supply the traffic, they supply the infrastructure and sales." Blaze.com received more than 350,000 page views in January, according to the company, and the number of viewers increased 80 percent over December.

Billion-dollar market

The Internet Advertising Bureau reported that third-quarter 1998 advertising spending on the Internet reached nearly $500 million, an increase of more than 115 percent over the same quarter in 1997. The total dollars spent within the same calendar year, 1998, exceeded $1 billion dollars, a first-time total for Net ad revenue figures.

"The continuing growth of online advertising revenue only reaffirms the vitality of the medium as an increasingly important component for advertisers' campaigns," said IAB Chairman Rich LeFurgy. "We are seeing increasing numbers of large advertisers integrate online spending into their overall media plans, which is a significant boost for the medium.

See ONRADIO, page 36 ▶

Radio moves music; air play is demonstrating its influence upon CD sales not only over the counter but also on the Web.

— Greg Hart, Amazon.com

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World Radio History

Radio Heroes, Stars

▶ REVIEW, continued from page 29

and Ray Overstocked Warehouse."

He heaps high praise on the long-running team when he writes, "They didn't bludgeon their targets to death; they kidded human folly and bombast without feeling a need to destroy their objects."

'Raised on Radio,' by Gerald Nachman, Pantheon Books

Another radio star of the early days was Bob Hope, of whom Nachman writes, "Like Howard Stern, Hope was much discussed and quoted the morning after each Tuesday night show."

Hope's humor, like Stern's today, was considered ribald. In the '40s, ribald radio was characterized by the following example of a typical Bob Hope broadcast exchange.

Hope: Some park.
Girl: Some park.
Hope: Some grass.
Girl: Some grass.
Hope: Some dew.
Girl: I don't.

I'm Chiquita banana

Musical variety shows often were named after their sponsors in the early days of broadcast radio: "The Atwater-Kent Hour," "The Palmolive Hour," "Kraft Music Hall." The children's shows — "The Adventures of Superman," "Buster Brown," "Terry and the Pirates" and "The Lone Ranger" for television situation comedies such as "Father Knows Best," "Ozzie and Harriet" and "The Life of Riley."

And no history of radio would be complete without the commercials. Nachman devotes a chapter to early advertising. "It was via radio that advertisers burrowed their way into the American psyche," he asserts. The radio jingles of yesteryear still play loud in Nachman's ears: "I'm Chiquita Banana and I've come to say / Bananas have to ripen in a certain way."

With commercials came the "voice-over man," none of whom was busier than Ed Herlihy of NBC.

Nachman also provides well-documented critiques of specialty shows and talent like "Dragnet," game shows, radio theater and the great radio newsman Edward Murrow. But he writes about one show and one radio partnership with particular passion: "Amos 'n' Andy" starring Freeman Gosden and Charles Correl.

At the peak of its popularity, 40 million people tuned into "Amos 'n' Andy." Their words became catch phrases of the day — lines like "Holy mack'el" and "Buzz me, Miss Blue."

It is Nachman's contention that the show "altered not only America's entertainment habits forever but also the country itself. Listeners realized they could stay home and be as amused as they would be spending money for a Broadway show."

He continues to praise the medium in the book as he wrote, "Radio had been readily available, but suddenly it seemed indispensable." Sadly, Nachman tells us that the type of radio he listened to as a child drew its last current on Sept. 30, 1962, the final episode of a show called "Yours Truly, Johnny Dollar."

Yet he retains a glimmer of hope that great radio can return. He quotes the legendary radio writer Norman Corwin who said, "Golden Age II could be back tomorrow." If Corwin is right, Nachman will no doubt reach for his little red plastic Motorola.

■■■

John Montone is a radio reporter for 1010 WINS(AM), New York.

Make Web Sites More Inviting and Practical

▶ CYBERHOUSE, continued from page 30

independently-owned cyber-bus.

But there's a bit of a problem with space here. Venture over to the "All Us Guys" page, on which KFI spotlights the week's featured show. You have to scroll clear across the page to read about other shows the station airs and view the list of links to other areas on the site. Other pages, like the intriguingly titled "Life in L.A.," are well-designed.

Radio 10: A good example of an interactive Web site.

Things matter

See, a lot of things matter when you're on the Net. It matters how practical your site is. It matters what kind of information you offer and how you offer it. It's like a comfy chair that you can melt into and take a sumptuous snooze within, your cares melting away like butter in the noonday sun (and who hasn't experienced *that?*).

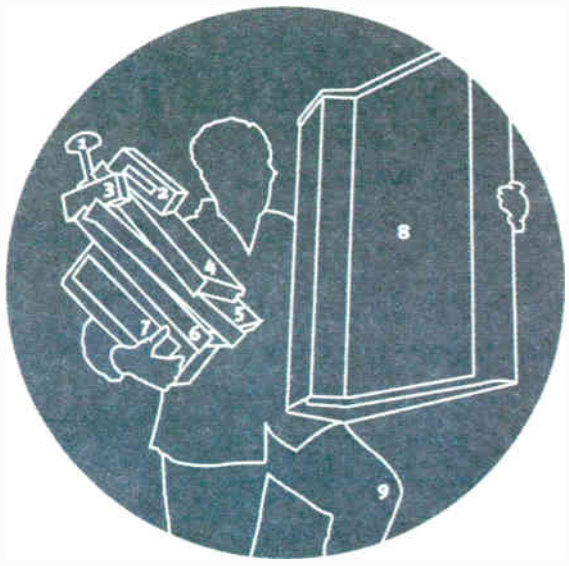
If your chair makes your bones ache, you'd probably better get another chair.

So what can you do to make your site and Webcasts equally inviting? It's pretty simple, really. Remember the plate spinner on the Ed Sullivan Show? If he moved a hair the wrong way, it was *oops!*, plate casualty time. I guess you've got to know how many hairs you can move in any direction before you upset the balance.

Next time, we'll discuss the cool things you can do to achieve Net nirvana. In the meantime, settle back in your comfy chair and listen to the world. And don't move a hair.

■■■

Alan Haber is a regular contributor to ***RW****. Reach him via e-mail at* zoogang@earthlink.net



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Lisa Producer

It's 1 p.m. and the news just began. Even before Julie's report finishes coming in, Lisa starts to edit. Within moments, Lisa alerts the studio and they quickly retrieve it from the station's main computer.

Michael Programme Director

Michael checks tonight's programme playlist, and runs an analysis of the programme plans for the past two weeks. He prints them for a closer look later on.

Leo Technician

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David Presenter

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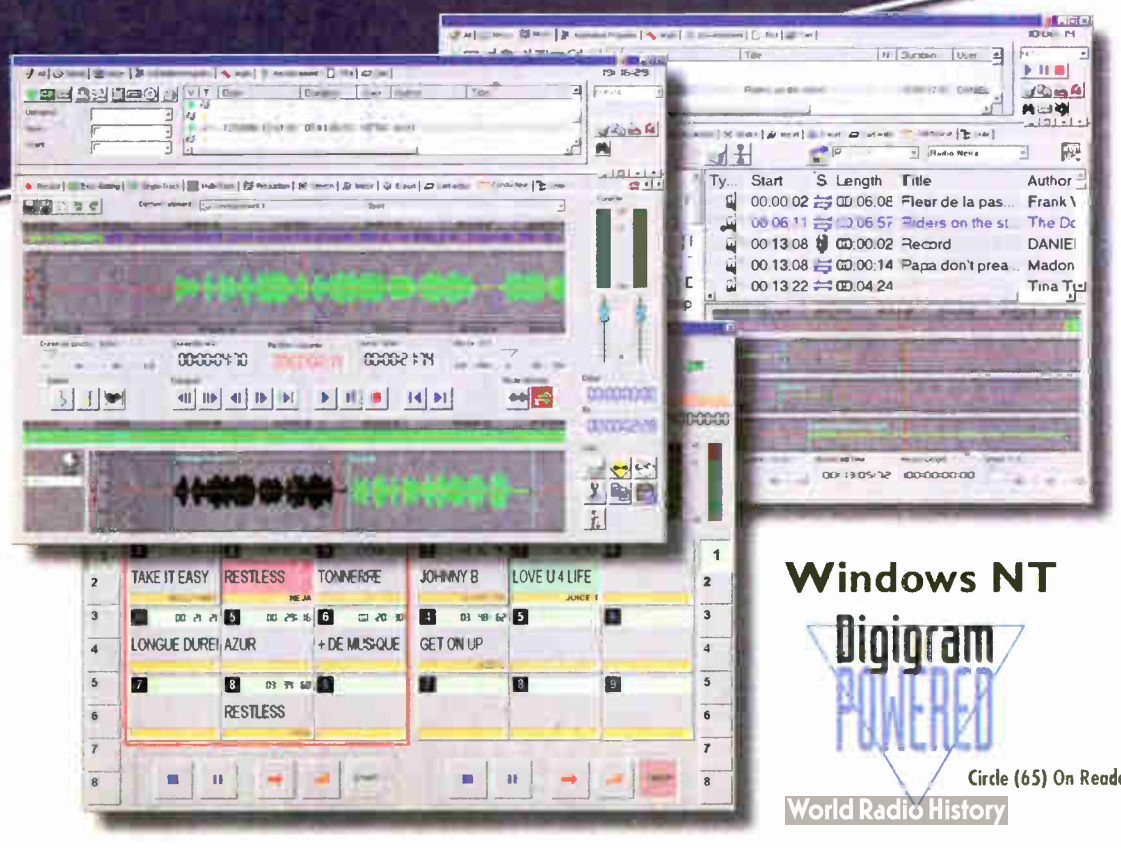

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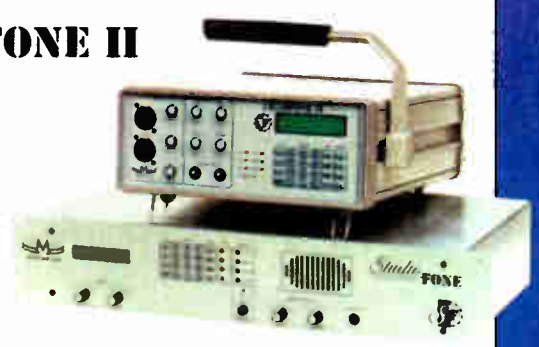

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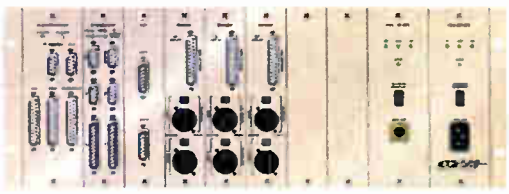

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World Radio History

From Sinatra to Aptitude Dude

▶ WQEW, continued from page 27

"It's a hell of a thing, is what it is," said Jim Lowe, one-time American popular standards host for WNEW(AM) during the 1980s and now the host of a start-up syndication that began taping a similar format the beginning of the year.

"It's wrong for the largest city in the country, the most important city on the earth, to have no Frank Sinatra, no Ella Fitzgerald, no Nat Cole. It's crazy. It's embarrassing."

ABC Radio Networks, which creates and produces Radio Disney, believes otherwise.

"We will be serving an equally underserved audience," said Julie Hoover, a spokesperson for ABC Radio Networks, a part of The Walt Disney Co.

It's not certain if Radio Disney's top 40s-style kids music and features will be a hit with New Yorkers, but popular standards, which broadcast on WNEW before moving across the dial to WQEW(AM) six years ago, does have a rich history here.

Those were the days

When WNEW ran the format, according to Lowe, it consistently brought in an average 3 percent of the city audience. According to Katz Media Group, WQEW pulled in around 650,000 listeners a week with the format, ranking third in the 55-plus demographic for a total reach of 2 percent of the city audience — an acceptable reach for stations aiming at the more advertiser-friendly 24-to-54 demographic but, apparently, not enough reach for The New York Times Co.

"It's a terrific format for reaching that demographic and it's done quite well, but it's certainly a niche player as compared to some of the larger players in the market," said Timothy Kelly, director of research for Katz Media, New York City, who said 2.5 million listeners is an average for a lead station in the market.

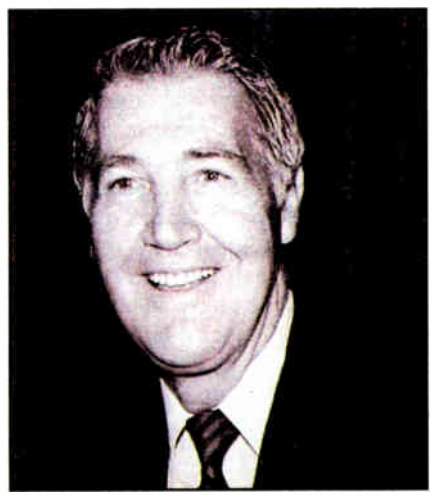
Not surprisingly, WQEW's popular standards format does have a loyal listenership base. Following the LMA announcement, a few die-hard popular standards fans gathered in front of the Times building on 43rd Street in protest of the changeover.

It is that strength and the rich legacy of the format that convinces Lowe, among others, not to give up the ghost on popular standards. There's a resurgence of swing on the streets of New York, said Lowe, who began taping an hour-long show called "The Jim Lowe Show" for national syndication not long before the changeover at WQEW.

The first taping took place at New York's Triad lounge, with cabaret singer K.T. Sullivan and Margaret Whiting as guests. The syndicated program, which is different from WQEW's format in that it has more celebrity commentary, is expected to debut on a number of stations nationwide this year — including WRTN(FM), heard in parts of New York City.

Class it up on-air

Whitney Radio will air the weekend show on FM station WRTN as part of its format of classic middle-of-the-road (MOR) standard selections of the 1930s, '40s and '50s.



Jim Lowe

"I think the salvation of this format is to class it up," said Whitney Radio President William O'Shaughnessy, another WNEW alumni whose WRTN (Returnradio) has regional coverage into Long Island, Westchester and many parts of Manhattan. O'Shaughnessy said new listeners are tuning into WRTN as a result of the WQEW changeover.

Lowe estimates there are currently 300 to 400 stations like WRTN in the country that play a derivative of the popular standards format.

We don't look at our competition as being other radio stations, definitely not. Our competition is television.

— Jim Pastor, Radio Disney

"There will always be a slice of the pie for this music. It will never be what it was, of course, 1930 to 1955, because in those days it was the only music," said Lowe. "In those days if a record became number one, 80 percent of the people in the country heard it, and about 40 percent could tell you who it was. Today, a record becomes number one and 5 percent will hear it."

National showman

If the format doesn't succeed commercially, would broadcasters subsidize New York's beloved popular standards music? Companies do subsidize formats that aren't always box-office hits, but not because they're in love with a performance. It's the companies for whom a radio station is a piece of the marketing strategy that would consider subsidizing.

Take Radio Disney. No one knows for certain if this new format will do any better at targeting its 6-to-11 demographic. This under-served audience is also under-researched, in part because traditional Arbitron diary methods don't adequately rate kid listenership.

Which is why the Mickey Mouse empire hired the firm Statistical Research Inc. in 1996 to rate the marketability of a kids' radio network. SRI, a research firm widely known among television media buyers, found in initial surveys of four test markets that Radio Disney achieved an average rating of 1.3 for kids five to nine years of age, with ratings highest during weekday drive time hours and on weekends.

In-car listening accounted for 41 percent of the listening. But even if Radio Disney doesn't make a good showing in New York, having a radio station in the Big Apple will undoubtedly "grease the track," as one New York columnist put it, for Radio Disney to sell McDonalds and other national advertisers on the format.

Jim Pastor, Radio Disney's director of network sales, confirmed as much. "What we've been hearing from the ad community is ... we need you in top-20 markets before we can justify taking national ad dollars and throwing them your way. That's basically the message from a network standpoint," he said.

Radio Disney is playing in 12 of the top 20 markets in the United States, with plans to have all 20 top markets by late this year. The Big Apple is a big addition to that list. With the addition of New York City, Radio Disney has affiliates in 36 markets, including Los Angeles, Chicago, San Francisco and Boston. Between July and September 1998, Radio Disney signed on in Chicago on WTAQ(AM); Waco, Texas on KWTX(AM); Phoenix on KCWW(AM); Dallas/Ft. Worth on KAAM(AM); and Charlotte, N.C., on WTLT(AM).

"Top 20 market coverage itself is huge for us, and New York, being the number one market in the country, is obviously all that much more important," said Pastor.

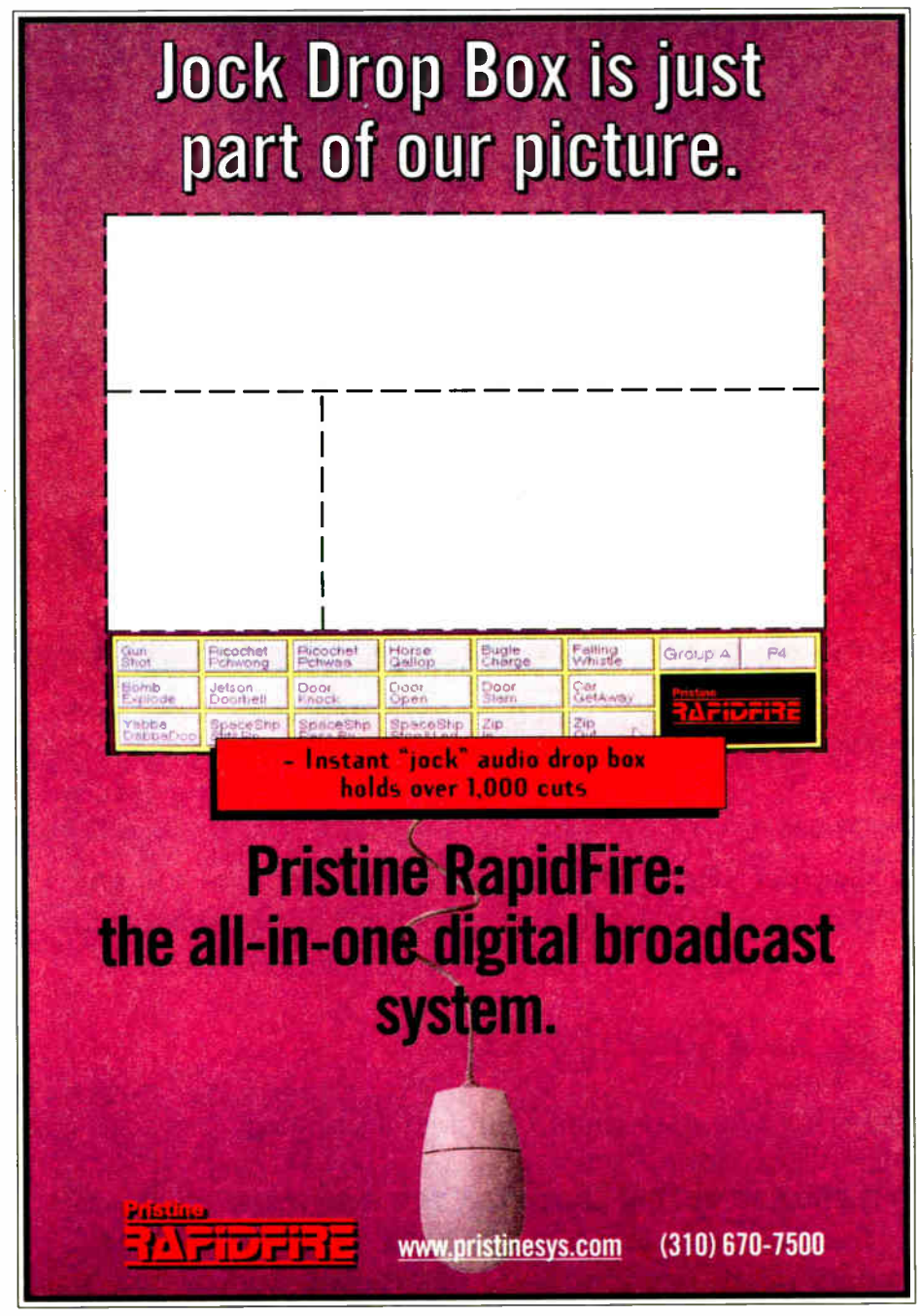
But Radio Disney's reach goes beyond radio. "We don't look at our competition as being other radio stations, definitely not. Our competition is television," he said. "There are folks out there, toy companies, cereal companies, who are interested in that kid audience ... We're able to offer both; we got a dual audience (media) here, which makes us unique."

This format changeover in New York is certainly about radio, but the television element is ever-present. "Television changed our music, it changed motion picture, it changed politics," said Lowe. And now, it seems it's changing radio once again.

"If television would have waited another 50 years, it would have been too soon," said Lowe.

■■■

*Dee McVicker is a regular contributor to **RW**. Her story on Radio Disney appeared in the Nov. 25, 1998, issue of **RW**.*



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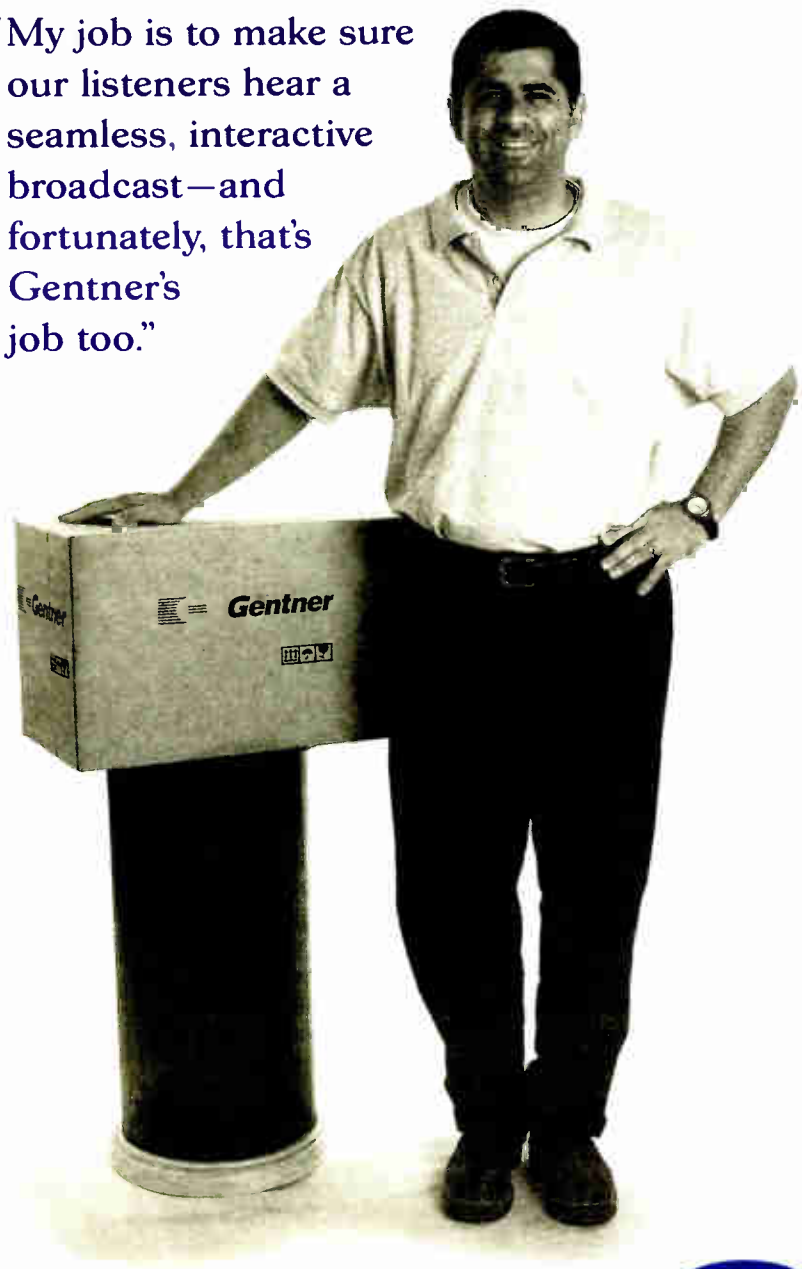

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Circle (95) On Reader Service Card

Hyperlinks and Banner Ads Sell Radio and Net

▶ ONRADIO, continued from page 31

"Additionally, the industry is experiencing a surge of interest from all quarters — agencies, advertisers, publishers, technology enablers, and research companies — all geared toward improving the performance of online advertising for the mutual benefit of all."

OnRadio managers said the Internet provides radio its first real opportunity to exceed the 7 percent piece of ad sales it traditionally holds, by adding minutes to a station's hour. Research to that effect led to a partnership with the representative firm Katz Radio Group.

Stu Olds, president of Katz, said, "Katz believes strongly in the synergy between radio broadcast advertising and Internet banner ads and hyperlinks placed on station (Web) sites. The Internet's strengths include visuals, detail and the ability to interact with customers. Radio is great at building image and awareness, driving traffic and influencing purchase decisions. We formed Katz Interactive Marketing to marry the two and offer one unified campaign to sponsors."

Olds said the strategic partnership with OnRadio allows Katz to combine its expertise in radio sales with a company that has technical expertise to develop Web sites and link station sites for ad-serving, reporting, and billing.

"Advertisers can now place a combined radio broadcast and Internet campaign with just one phone call — trackable by market, demo, (and) format."

Gerry Boehme, Katz senior vice president and director of information services and strategic support, said the online advertising business is in its infancy.

"But we now have some full-time

See ONRADIO, page 37 ▶

OnRadio Alliances

As the methods of successful e-commerce unfold, one thing is clear: Alliances are popular, cost-effective ways to provide quality content. Partnerships between various organizations related to Internet use and marketing are becoming a common way for radio stations to provide their audience with the interactive capabilities they now demand. OnRadio, for example, has several new alliances.

Microsoft

OnRadio and Microsoft Corp. have announced an agreement to accelerate the growth of Internet streaming media in the radio industry. The two companies will provide the Windows Media Technologies platform to OnRadio's network of over-the-air stations. (OnRadio affiliation is not available to Internet-only stations.)

"Radio stations that use Windows Media Technologies will not only improve their business and reach, they will improve their listeners' experience," said Will Poole, Microsoft senior director of business development. "Our relationship with OnRadio provides Microsoft with an experienced business partner and a large network of radio stations." He said the companies can deliver "end-to-end solutions" that will rapidly expand Internet radio.

End users will benefit from new Internet radio services. Online-specific content means listeners have access to Webcasts of new and innovative content available only on the Internet, such as concerts, interviews and sporting events. On-demand audio and video streams allow users to listen to their favorite radio programs at a convenient time, rather than when they are broadcast. Another feature, real-time broadcast service, is available everywhere. The bounds of local radio signals have been eliminated, giving users access to a broad spectrum of radio broadcasts worldwide.

Arbitron

InfoStream is a software program developed by Arbitron NewMedia that provides streaming-media audience measurement services for radio stations operating online.

According to the company, InfoStream addresses specific information needs of Internet radio. In addition to OnRadio, InfoStream will be embedded in the following participating Internet radio networks: Imagine Radio, Magnitude Network, RadioWave.com and RealNetworks.

Sources at Arbitron NewMedia said they hope to have the measurement service installed and operating by the end of March.

Intervu

Intervu is a service provider for Internet audio and video delivery that uses Microsoft's Windows media player streaming technology to distribute content via Intervu's multimedia network. OnRadio has partnered with Intervu to provide stations with 24-hour streaming audio, audio/video on demand and live Webcasting services. The alliance provides more stations with streaming capability and more content availability.

InfoSpace

An agreement with OnRadio and InfoSpace.com integrates local content with radio station Web sites. InfoSpace.com localizes a market by providing directories, weather, regional attractions and entertainment, local school information, restaurant listings and other local news and information. Radio station Web sites that are affiliated with OnRadio are given access to their local markets as provided by InfoSpace.com, thus allowing station Web sites to become an Internet source for local information through this alliance.

— Bob Rusk and Laurie Cebula contributed to this story

World Radio History

▶ ONRADIO, continued from page 36

people at Katz who are devoted to selling it. That has only started in the last few months," he said. "So far we've placed a couple of small buys, for BellSouth and TravelWeb. We're in negotiations with a lot of different people, and think this is going to be a good, strong business for us."

Boehme said, "The OnRadio concept was exactly what we were looking for. The business is on the individual station sites; those are the places that have a direct connection with listeners."

The BellSouth campaign ran on about 20 stations throughout the Southeast, including Jacor's WKLS(FM) in Atlanta, Sinclair Broadcast Group's WEZB(FM) in New Orleans, and Beasley Broadcast Group's WPOW(FM) in Miami. OnRadio executives said analysts reported a 3 percent click-through rate during the BellSouth campaign. The current industry average, according to OnRadio, is 1 percent.

Listener retention

WPOW ran a poll on its Web site asking this question: Would you listen more if we had a live Internet feed? Ninety-four percent of the respondents answered yes. Another station, Chancellor-owned KKRW(FM) in Houston, used the OnRadio Membership Database tool to develop a listener loyalty and retention mailing list that now includes 3,500 names and e-mail addresses. These listeners get the inside scoop on station activities in the weekly Arrow Blast e-mail newsletter that is sent out by KKRW Webmaster and afternoon drive personality Mac McClennahan.

"It's a couple of pages of ramblings about what's going on at the station, (including) the features we're running and places were going, like on-sites at car dealerships," said McClennahan. "Clients like to see that." Ramirez calls creative devices such as the Arrow Blast the "Holy Grail of marketing."

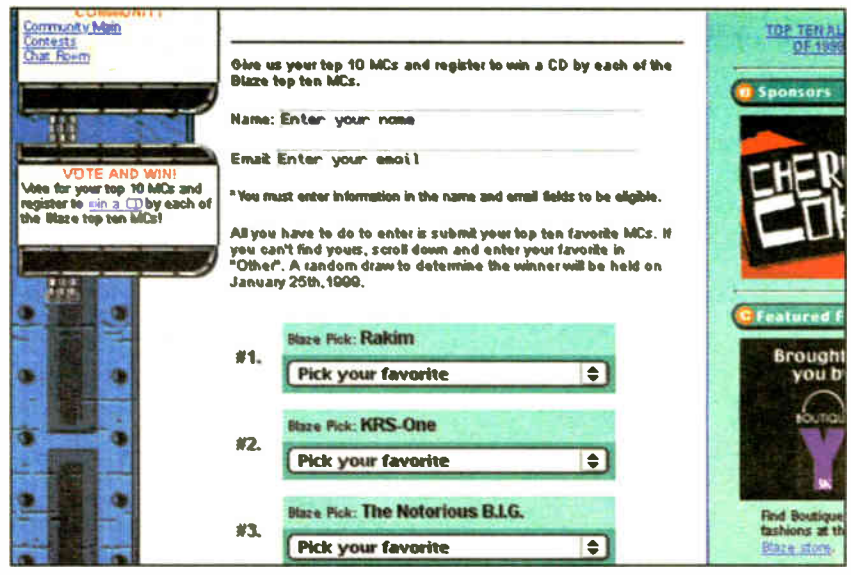
"You're not talking about anonymous listeners," he said. "You know their names and what their preferences are; now you can serve them better."

So what does it cost for a station to be part of the OnRadio turnkey Internet solution? Ramirez said there is a "nominal licensing fee" of about $200 per month, allowing plenty of room to make money through the revenue sharing.

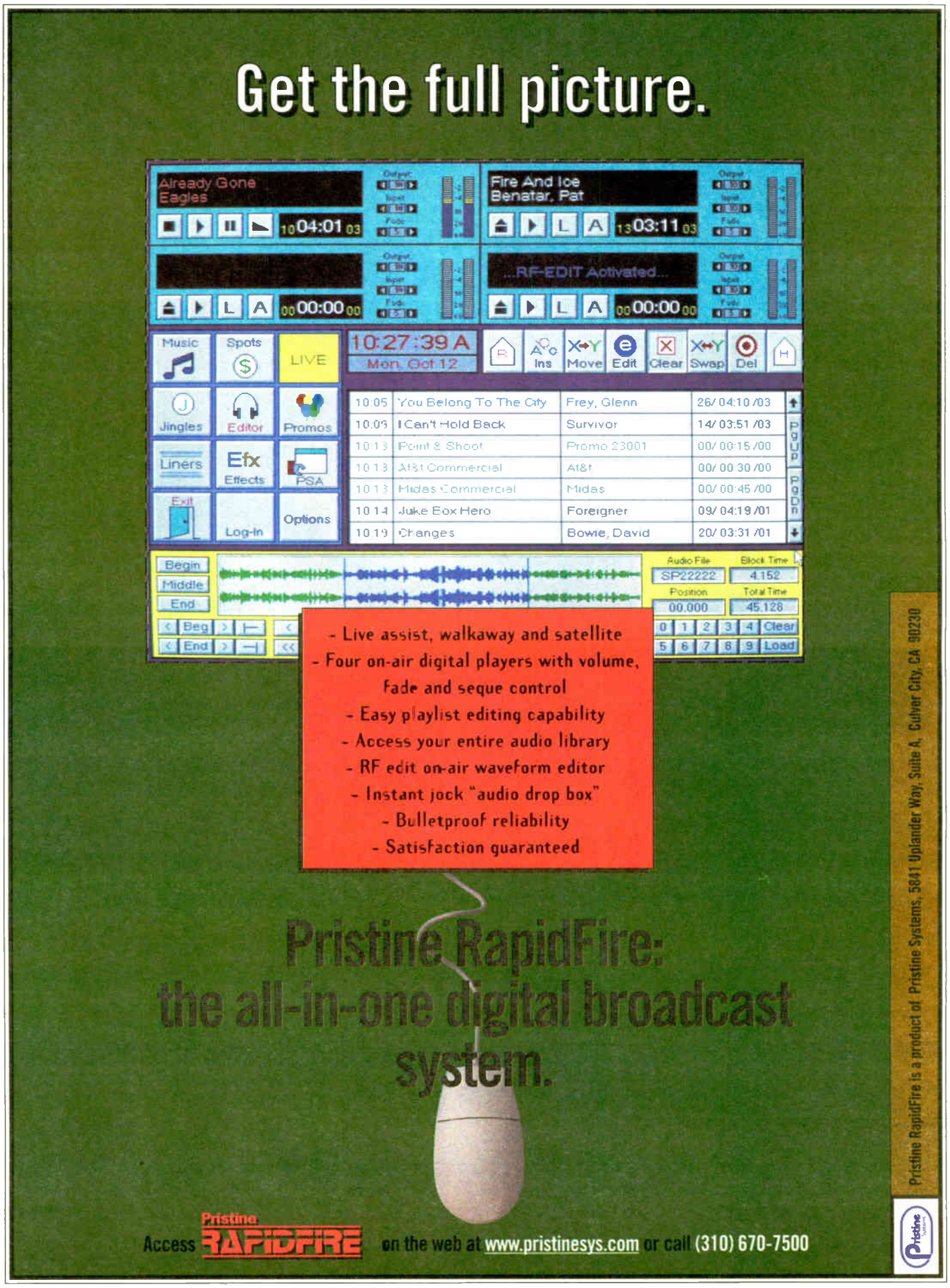
"Radio and the Internet are going to converge," he said. "That doesn't mean radio as we have known it will go away. It just means radio will be different. This is a great opportunity for radio stations."

■■■

RW Business Editor Laurie Cebula contributed to this story.



Radio stations run polls on their Web sites to create databases.



onradio

Company Snapshot

HQ: Scotts Valley, Calif.

Founded: 1996

Employees: 60

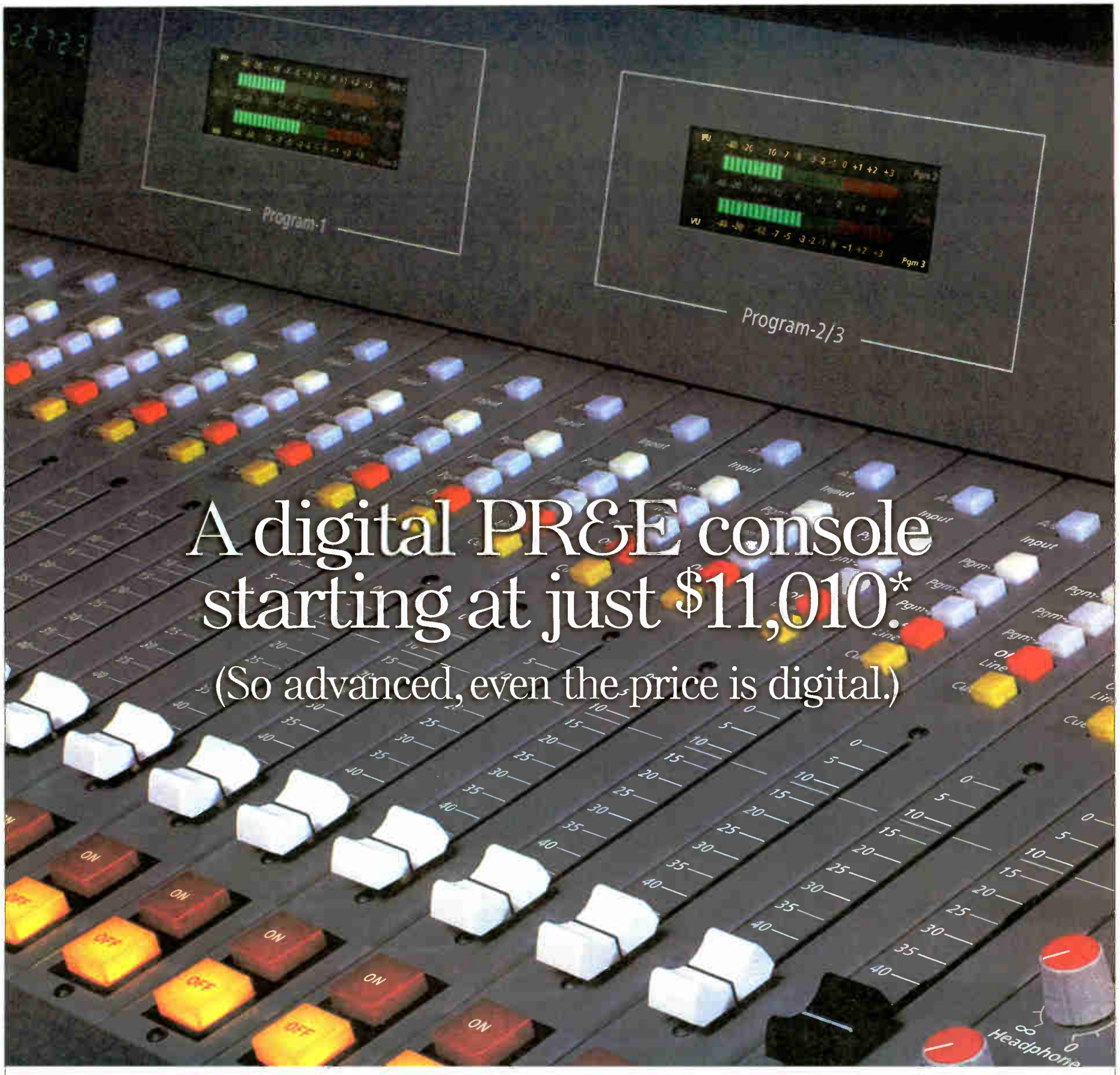
Ownership: Privately held; outside financing

Business statement: "OnRadio embodies our mission to extend on-air to online. Our company is evolving the traditional broadcast model to incorporate the fastest growing medium in history — the Internet," said Ricardo Ramirez, president and CEO of OnRadio. "With our extensive affiliate network and partnerships, OnRadio provides all affiliate stations with a valuable and painless Internet solution."

Contact: Visit the Web site at *www.OnRadio.com*, send e-mail to *sales@OnRadio.com*, or call (831) 440-0300.

World Radio History

Circle (4) On Reader Service Card



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*12 input mainframe, standard clock/timer, monitor and output modules, standard 5 mic preamps (total: 8 analog inputs, 4 digital inputs) and one telephone input/output hybrid.

Circle (14) On Reader Service Card

World Radio History

PRODUCT EVALUATION

Sharp MiniDisc Is a Radio Contender

Carl Lindemann

The rapid evolution of consumer electronics follows a predictable pattern. Once a new gizmo gains currency in the marketplace, refinements to the original design yield smaller, lighter units with more features for less money. But features good for consumers can be a mixed blessing for broadcasters.

As the MiniDisc has become a mass-market item, prices and innovations have taken this format from a novelty to a near-necessity.

Units capable of gathering high-quality sound have now dropped to less than half the price of entry-level DAT units. But the price paid for professionals includes dealing with consumer shortcuts.

The Sharp MD-MS702 Portable MiniDisc Recorder

It has been six years since the first MD units hit the market, and the latest crop has achieved maximized miniaturization. The Sharp MD-MS702 is the first recorder in the "MD Jacket" form factor. That is to say, it is a box barely larger than the MD medium itself!

The dimensions of the MD-MS702 — 3-7/16 by 1-3/16 by 3-7/32 inches — manage to contain the full range of control features including sampling rate conversion. Battery life for the rechargeable lithium-ion battery is rated at an impressive 3.5 hours in Record mode. The unit also incorporates a new ATRAC compression algorithm that is billed as attaining "high-quality 24-bit" sound.

Small but simple

Despite the diminutive size of the MD-MS702, its controls are uncluttered and easy to operate. It has a front-loading mechanism — discs are inserted through a slot on the unit's bottom. There is no hinged door to break or become bent in the field, and a side lever ejects the medium. Overall, my general feeling of the Sharp MD-MS702 is that it is fairly rugged.

In use, the Record/Play/Pause buttons are spaced apart so that it is difficult to begin accidentally recording or re-recording over an existing track. Hitting the Record button puts the unit in Pause mode to allow monitoring through the headphones and setting recording levels.

Unlike some other consumer MD units, recording levels can be adjusted on-the-fly while recording. A basic bar graph meter on the liquid crystal display covers the range from no level to overmodulation in about 1 inch.

The display is not backlit, which can be a potential problem under certain lighting conditions. Curiously, the wired remote control *is* backlit, but does not show recording levels and cannot put the unit in Pause/Record mode.

All this being said, I did not have any problem setting levels on the MD-

See SHARP, page 42 ▶

SHORT TAKE

Neumann Grabs Grammy

Neumann microphones are a studio staple around the world. Now the manufacturer, Georg Neumann GmbH of Berlin, Germany, can claim yet another honor: Grammy winner.

In late February, the creator of the first mass-produced condenser microphones was awarded a Technical Grammy by the National Academy of Recording Arts and Sciences for "contributions of outstanding technical significance to the recording field."

The recipient is determined by recommendation from the Academy's technical committee, with final approval by the National Trustees.

Accepting the award was Dr. Jorg Sennheiser, president and CEO of the Sennheiser Electronic Corp., which purchased Neumann in 1991.

In a company release, Sennheiser stated, "We are honored and gratified that the Academy has recognized Neumann's decades of innovative technology and contribution in establishing a true benchmark of quality in the recording industry."

Neumann Mics, Past and Present

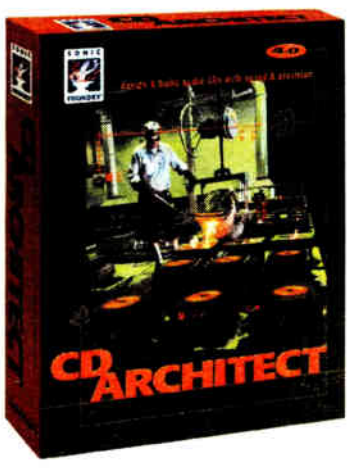
Karl Winkler, product manager of Neumann/USA, told **RW**, "This is exciting for us. Studios have known us for a long time. This award is a way for us to now be known to the public."

The Technical Grammy was first awarded in 1994. Past winners include noise reduction pioneer Ray Dolby, console designer Rupert Neve, and Sony/Phillips for its work in digital audio.

The Neumann product line ranges from the $4,750 M 149 dual-diaphragm tube mic to the $995 TLM 103 large-diaphragm condenser, which won the 1998 **RW** Cool Stuff award.

The 41st Grammy Awards were presented Feb. 24 at the Shrine Auditorium in Los Angeles and was broadcast on the CBS Television Network.

— Alan R. Peterson



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SONIC FOUNDRY

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World Radio History

PRODUCER'S FILE

FireworX High-Octane Audio Tool

Ty Ford

Remember that weekend you spent tweaking your mix through a T.C. Electronic Finalizer? If you were good and careful, the results were well worth it.

If you were not up to the task, you ended up the same or worse than when you started. Except now you have a Finalizer Master's Degree, or at least an Associate's Degree. Write it off to another learning experience.

Well, step up to your next semester, the T.C. Electronic FireworX ($2,195).

Some box

FireworX is a single-rackspace, multi-effects box for mono and stereo analog and digital sources.

The XLR analog inputs are -10/+4 dB switchable. A/D conversion is 24-bit (1-bit, 128X oversampling). Output is 24-bit (1-bit, 128X oversampling) and dither-able to 22, 20, 18 or 16-bit. The S/PDIF I/Os are limited to 20-bit. The FireworX will not work with 32 kHz sample rates, and prefers 44.1 and 48 kHz rates.

The back panel sports XLR balanced analog I/Os; TOSLink digital optical and ADAT light pipe I/Os; a Word Clock In RCA jack; AES/EBU digital XLR I/Os; S/PDIF RCA I/Os; MIDI In/Out/Thru jacks and an external control input jack. There is also a standard IEC power jack and an On/Off switch.

The ADAT thing is pretty cool. You can dial up individual ADAT tracks from an ADAT, run them through the FireworX and put them right back on other ADAT tracks or to another analog or digital destination.

One caveat: FireworX causes some processing throughput delay. That delay may or may not work well when mixed with non-delayed tracks. Of course you might be able to delay a single unprocessed track to minimize the shift. Most ADATs have done that for a while.

To the right of those are Cursor, Exit and Enter buttons for navigating the menus on the main LCD screen, and three rotary knobs for changing states and values.

Offerings

The FireworX is more than a dynamics/reverb/delay/chorus box. It also offers synthesizer sounds, pitch change, distortion, panning, EQ and a vocoder. While you do not need to be a MIDI genius,

FireworX: Presets for the Timid, Parameters for the Adventurous

The front panel is "typically T.C." — way understated and coyly pretending to be a pretty simple toy. There are two small knobs for analog input and output, a PCMCIA card slot for saving presets and updating the unit, adequate stereo input level LEDs with an overflow marker, a gain reduction LED ladder and single LEDs for MIDI presence, digital lock and to indicate edited status of a program.

Between the LEDs is a large-enough main backlit LCD display. To the right are Bypass, Alpha Mod wheel and Tap Tempo buttons, 12 buttons to access each of the 12 processor types, six control buttons (recall, effects, I/O Setup, Store, Mod and Utility.

being one — and having a good MIDI controller handy — will help you get more out of this box.

Given the extensive section of parameters and parameter modifiers, this part of FireworX will not be easy for the uninitiated if they dare to stray past simple modification of the 199 presets. If you have spent some time on the parameter pages of synthesizers, you will probably catch on pretty quickly.

Per the manual, there are more than 35 different algorithms grouped under 12 different kinds of effects — Dynamic, Filters, Formants, Distort, Vocode, Synth, Pitch, Chorus, Delay, Reverb, Pan, EQ. These algorithms have their own dedicated buttons on the face of the unit.

Now imagine an eight-by-eight grid, input on the left, output on the right. Different effects can be placed anywhere on the grid and the signal can be routed through them. Any other effects processor in your rack, analog or digital, can be inserted into the routing, depending on what is being used as actual inputs.

If you are already processing audio coming into the FireworX using the digital I/O, you can only use the analog I/O for inserts and vice versa.

Once around the Block

Here is how the Blocks break down.

There are three stereo Dynamics Blocks: expander, soft compressor and hard comp/limiter. There is one Filter Block, but there are five different filters from which to choose: Stereo resonance and Bandpass and mono in/stereo out Phaser, Resonator and Resochord filters. There is one Formant Block with one set of stereo Formant filters.

The Distortion Block has two filters: a mono Drive and a mono in/stereo out Cruncher. The Vocoder takes one block and offers a dual in/mono out filter, a mono in stereo out Ring Modulator and a dual in/stereo out Ring Modulator. There are two Synth Blocks with a choice of Curve, Chaos, and Noise Generators.

There is one Pitch Block with two voices. There are two Chorus/Flanger blocks with Classic Chorus, Advanced Chorus, Flanger Classic and Advanced Flanger. There are two Delay Blocks: Stereo (and in mono) Dual, Dual Three-tap, One-tap, Six-tap, and Reverse.

The Advanced Reverb block offers Simple and Advanced, both are mono in/stereo out. There are two Pan/Tremolo Blocks with Simple and Advanced Tremolo, Simple Panner, Surround Panner, and Stereo Enhancer. All are mono in/stereo out.

The Surround Panner "uses phase manipulation to create panning beyond the normal stereo image," according to the manual. I guess my monitors are too far apart. I could never quite get the sound that far out.

Finally, there is the EQ Block which offers fixed or modulated stereo EQ.

How much processing power does the FireworX have? With Synth, Vocoder, Pan and Reverb, I was tapped out. A quick trip to the Effects Tool page showed me that 16 percent of the processing was being spent on Synth, 47 percent was devoted to the Vocoder and 4 percent on Pan.

That totals 77 percent. Trying to follow that with even simple reverb at 45 percent tapped out the processing power in the FireworX.

When I asked T.C. Electronic about expanding the unit's processing power, I was told that there was no way to add processing power to FireworX. However, additional FireworX can be used as insert devices with the first one.

My first attempt to build a new effect caused me to run right into a glitch. I had tried to position the two panners at the front of the chain. FireworX did not like that and locked up on me.

With 35 different algorithms grouped under 12 different kinds of effects, I was not about to try each and every possible configuration.

MIDI possibilities

This can be a very MIDI-intensive device, with nine external and 11 internal modifiers.

Internal modifiers include Attack/Decay/Sustain/Release (ADSR), Low-Frequency Oscillators (LFOs), Envelope Detectors and a pitch detector, among others. Up to 20 connections can be made simultaneously. All nine external modifiers can be controlled by MIDI controllers.

Parameters are assigned to different controllers by scrolling and positioning the cursor. The parameters appear on the right of the LCD screen—the possible modifiers appear on top.

The Alpha Mod wheel on the front panel is normally used for real-time control of parameters, but can send and receive MIDI, and its function can be saved as part of a preset.

All tempo-based parameters can be connected to a Global Tempo parameter. Each of these parameters can be set from 16 bars through 1/1 to 1/32 straight, dotted or triplet subdivisions of the global tempo. The global tempo can be tapped, dialed or MIDI clock-based. Each of the effect blocks can be bypassed via MIDI.

The Modifier relationship of each connection can be transformed. These transformations allow complex operations like dynamic ducking, in which the user can control whether an effect begins with the dry signal, replaces the dry signal or follows the dry signal after the signal has stopped.

Preset top 10

There are a lot of useful and unusual presets. The presets offered by any box like this are vital to its success.

In addition to effects for voice, FireworX also has a healthy collection of effects for guitar, synthesizer and

See TC, page 42 ▶

CartWorks
Digital Audio Systems
The Choice is Easy !

Live Assist/Cart Replacement
The first truly user friendly digital audio system. A perfect replacement for those aging cart machines. Operate manually like a six deck cart machine or use Script Automation for advanced live assist features. You won't need a staff of computer wizards to operate it either. Because CartWorks is designed to look and operate like traditional broadcast equipment, it's easy to learn and use.

Satellite Automation
All the features of our Live Assist workstations plus advanced Satellite Automation. Includes 8X2 stereo audio switcher and everything you need for live, local sounding satellite automation.
CartWorks' powerful Script Automation provides more than just the standard features. Extended control capabilities tackle even the most demanding applications.
And there's no macro language to learn. It's all controlled from a simple Windows' point and click interface.

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Designed after the original CartWorks friendly user interface, here's a professional Music-On-Hard-Drive system that's simple to operate yet powerful.
Sound *live* 24-hours a day with pre-recorded, In-context voice tracks that match what's actually on the air.

To keep things simple, Spot sets are played from a familiar cart deck. Music log events are played from a music log.
CartWorks MHD accepts logs from most any of your favorite music schedulers. Or use our included Quick Scheduler.
Switching between automated and live assist modes is as simple as pressing a single button.
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TOP SECRET

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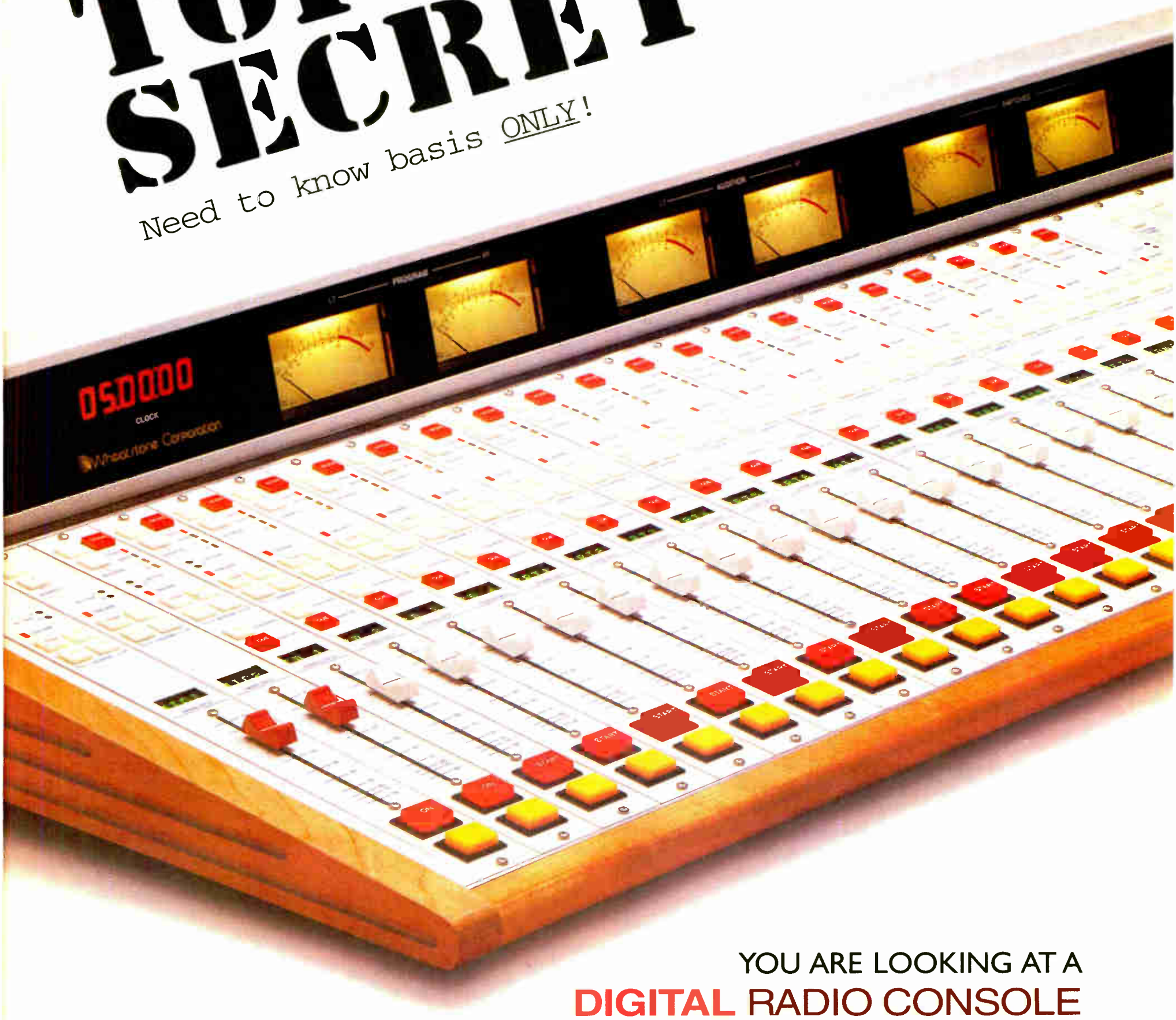

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Think of it: no retraining personnel, no long drawn out learning curves, no expensive on-air mistakes while your operators "get the feel" of a new technology–as far as they're concerned, it's business as usual.

And since the D-500 can accept and output both digital *and* analog signals, your existing equipment doesn't need to be replaced all at once. You can proceed with conversion at your own pace, according to your own financial timetable.

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Circle (44) On Reader Service Card

World Radio History

Sharp Makes MD Even More 'Mini'

▶ SHARP, continued from page 39

MS702. But I discovered a peculiar glitch that apparently is an intentional part of the design. As levels pass from zero to full, the level display shows an additional notation: "L" for low and "H" for high. Passing from one to another creates a dropout of a few milliseconds if done while recording.

The manual says that this is a normal feature. This annoyance does not happen when making minor adjustments on the low or high end of things — only when you cross the middle range. In the real world, it is better to adjust the levels and leave them rather than to insert gaps accidentally in the middle of recordings. It is not clear what this feature adds to functionality.

The usual range of editing and labeling functions allows tracks and discs to be marked, manipulated and moved around. With the obvious absence of an alphanumeric keyboard for data entry, naming tracks is fairly rudimentary.

Again, this is a typical drawback for all MD units. Eventually, some manufacturer will add a sync cable to do this through the computer keyboard, much as many personal digital assistants (PDAs) do.

For now, do not expect to make the effort to mark more than the title of the individual discs or, more likely, resorting to old-fashioned methods such as using ink on the outside label.

Another standard shortcoming is the use of less-than-desirable eighth-inch jacks. The unit has three such connectors: one for the Headphone/Wired Remote Control unit, another for Optical/Line In, and then the Mic In.

Peering in from the loading hatch, I could see that the jacks are wired directly to the circuit board. This tenuous arrangement may make for manufacturing economy, but it definitely detracts from pro applications.

This is a box
barely bigger than the medium itself.

For consumers, this cheap setup is not an issue because field recording is an added extra, not a prime function. I think that is too bad. Results with my home-brew eighth-inch-to-XLR adapter cables were mixed. Some were subject to static whenever the cord was jostled even slightly.

The bottom line is that eighth-inch connectors do not inspire a great deal of confidence. But when the static abated, recordings sounded crisp and clean.

Using an Electro-Voice RE11 microphone (to my ears, a much richer-sounding mic in the low and midrange compared to the EV 635A or its heavy-duty studio counterpart, the RE50), recordings sounded full and balanced. The new version of ATRAC — dubbed Version 5 — claims 24-bit sound quality. In terms of critical listening, it is perfectly adequate for capturing voice and does not seem "clippy" in terms of bass or treble.

Stereo vs. mono

The unit offers both stereo and mono recording mode. Stereo recordings made in ATRAC 5 are compatible with other MD units, but the mono mode is not. In stereo mode, there is a definite increase in definition and background ambiance than what is captured in long-play mono mode.

Still, the extended 148-minute capacity in mono may make up for the slight degradation in audio quality. It depends on the application. For field reporters gathering sound bites, either will do just fine and are a definite improvement over cassettes.

My old and beloved Sony WM-D6C Pro Walkman cassette recorder is able to keep up using Dolby C noise reduction with metal tapes. But add the convenience of being able to access tracks at random, and the MD wins easily.

For music recordings, those making the effort to properly mic a symphony orchestra will likely stick with their trusty DAT, even though it may be bigger, bulkier, heavier and more expensive. But one may also bring the MD-MS702 along to make a backup recording in the stereo mode.

If it seems that I have been harping on shortcomings, it is because of how terrific the Sharp MD-MS702 could be with a few simple tweaks. If Sharp offered a version in a slightly larger case, it could accommodate the much-desired XLR jack.

Would that be worth an extra $100 on top of the $300 street price? Sure. If such a unit were offered, the company would likely be a force in the radio market. Unfortunately, that market is so small compared to the consumer market that it is hardly worth the company's effort.

But if you have accepted the limitations characteristic of any consumer MD, the Sharp MD-MS702 has a lot going for it. It is certainly better than most cassette recorders, and at least a match for other MD machines available for the price.

As this review goes to press, Sharp informed me that the MD-MS702 was recently replaced by the model 722. There is a slight change in the control layout, but it retains the same core and transport mechanism. You will still be able to find the MD-MS702 where Sharp products are available.

■■■

For information contact Sharp Electronics at 1-800-BE-SHARP, check out the Web site at www.sharp-usa.com *or circle* ***Reader Service 148.***

Carl Lindemann is the producer of "CyberScene: The Socially Significant Cyberspace," based in Maine. He can be reached at www.cyberscene.com

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Total Systems Solutions for FM Radio

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T.C. FireworX Brings 'Dramatic Results'

▶ TC, continued from page 40

drums. I do not have the space to comment on all of them, but some of my favorites were:

No. 2 "Vocode Tracker." From voice to simple sources like the noise of my keying in this article to my laptop, the resultant sounds took on a life of their own.

No. 5 "Walkie Talkie." Can you say "Hi, Good Buddy?"

No. 6 "Arctic Strings." Transforms any input into a cold sweeping blast of wind.

No. 7 "Whisperer." Creates an evil empire whisper voice.

No. 8 "Fattener." Reminds me of an old ring modulator I once had, but this one also has delay and a formant shifter.

No. 9 "Vocal FireworX." Freddie Mercury meets R2D2 in multipart harmony.

No. 10 "Underwater." Provides a nice reverb/delay/formant vacation for guitar.

No. 11 "Distorted Room." Guitar buzz with reverb and phase/chorus for that "mine is bigger than yours" guitar sound.

No. 12 "Fireworlds." A cinema within itself. Hit one guitar string and listen.

No. 13 "5th Spins Around Me." Turns a guitar into a single string, sweeping, chordal synthesizer.

No. 14 "The Driveby." Adds doppler-like pitch shifting to a pan.

No. 15 "Ping-Pong." A nice short delay panner.

No. 16, which is a 1kHz test tone.

No. 17 "Masian Synth." Just plug in any MIDI keyboard set to channel one and monophonically wail in stereo reverb. Great for Halloween. And the parameters are adjustable.

No. 18 "Center Remover." A vocal scraper. It removes center-channel information from stereo sources and gives a restored mono output.

Adding some immediate variation with the Alpha Mod wheel helps vary these effects quickly without digging too deeply into the box.

In conclusion

In the hands of an experienced user, the FireworX can provide some dramatic results.

Apprentices should move past the presets and Alpha Wheel adjustments with caution — you might fall in and never be heard from again.

■■■

For information contact T.C. Electronic in California at (805) 373-1828 or circle ***Reader Service 127.***

Ty Ford's commercial and narration demos are available at www.jagunet.com/~tford *where you can also find an upgraded list of copyrighted mic/mic preamp reviews and a new list of production music and SFX libraries. He can be reached via e-mail at the same Web address.*

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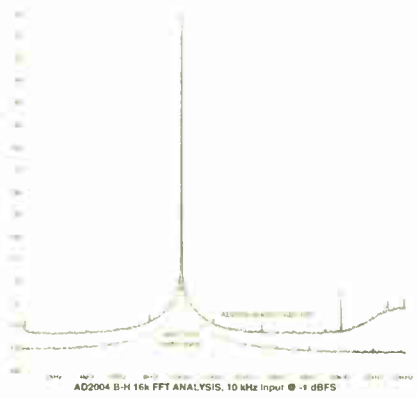

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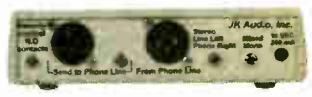

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World Radio History

Consider Nontraditional Processing

Keith Spencer-Allen

This is the third in a three-part series. Part I ran in the Oct. 28, 1998 issue of RW, with Part II published Nov. 25.

In the past, radio production consisted of dilemmas like devoting the right amount of time on material that will only be heard once or twice and deciding what effect the master processor would have on audio output.

For example, a multiband compressor/equalizer could be used to affect signal output — after all, that is why it exists in the first place. The argument in favor of using such a unit is that it is too time-consuming to fine-tune things like sound balancing when the master processor will determine the sound.

Sometimes this is still the case with processors today. It is easy to discern stations that "remix" station audio with brute processing.

New breed

However, things are changing. A new breed of processors are proving to be more subtle.

Using heavy equalization (EQ) to create a "signature" sound can mask the finer points of radio production; dynamic range is reduced to minute fluctuations of a meter. Some processors, however, will not grossly disturb the sound.

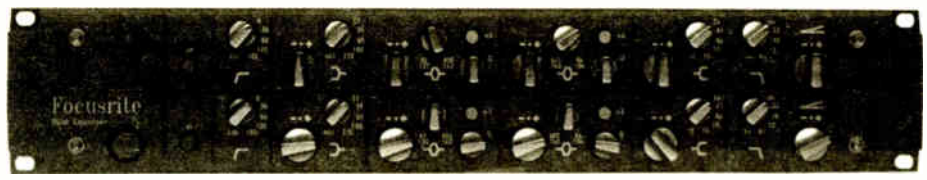
With the eventual coming of DAB and the improved sound quality digital radio promises, it may be worthwhile to consider processors of the *non*-broadcast variety.

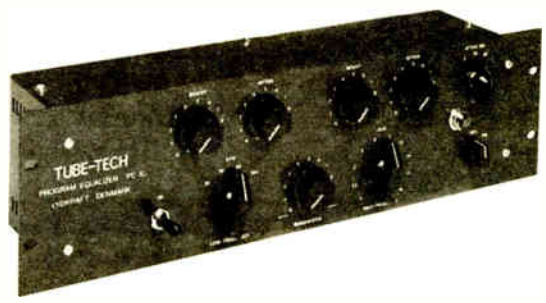
Dynamics is one such area where studio processing can have a great effect.

The average compressor generally uses some form of RMS level sensing to detect when internal voltage-controlled amplifiers (VCAs) should modify their gain characteristics. Most units function quite successfully, but few sound like they "enjoy" handling complex signals. This is particularly true when introducing a significant degree of dynamic control.

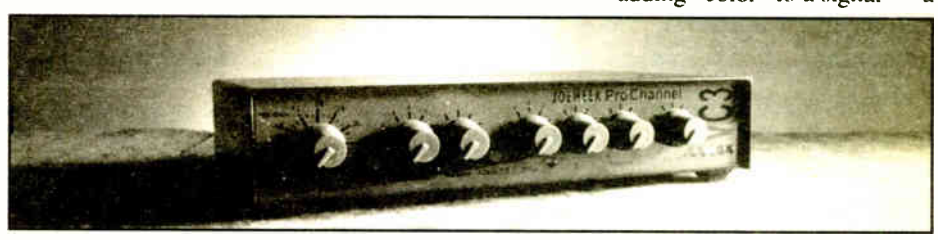
The answer is to process the component signals individually, making the side effects less obvious. An option might be to experiment with some of the more sophisticated recording studio units on the market.

In addition to solid-state compressors like the Amek Rupert Neve-designed 9098 and the more costly Focusrite models, which allow for greater processing control of different program types, there are tube- and optical-based processors available.





Non-radio processors include, from top to bottom, the precise Focusrite 2 dual equalizer, the Tube-Tech PE-1C tube-based EQ, and the optical-based Joemeek VC3 compressor.



The more practical tube-based compressors are actually hybrids that combine tubes with solid-state circuitry for a sound that is less "precise" with an added roundness or warmth, without compromising the performance levels of modern electronics.

Retro designs

The optical-based units hearken back to a time when the level-sensing element was a small light bulb. The audio signal triggers a light-emitting diode (LED), which varies the resistance of a photocell, or light-sensitive resistor. Theoretically, such techniques seem primitive today, but when surrounded by modern electronics the effect can be extremely useful.

The time it takes for the lamp element to light on peaks modifies the attack characteristics, while the sustain and release are similarly different. The effect is one of smoothness even under heavy compression, and it is very forgiving of less-than-perfect setting of the controls. Look for old UREI units or more modern units from Joemeek and the retro designs of Purple Audio.

Equalizers vary considerably in their potential but the finer points of their abilities — which are so critical in music recording studios — may be of less importance in a radio environment. The goal of an equalizer in a broadcast situation must be simply to get the job done.

However, the more costly EQs come with some advantages that ultimately make the job easier.

In broad terms such units fall into one of two camps: precision multiband units and "classic" units.

The precision multiband design allows for great control and is useful for correcting problems, but it may not be useful in just applying a slight tonal boost. With such units, a four-band design with a preference for switched frequency turnovers rather than continuous sweep controls is recommended because their output is more repeatable.

Cut and boost

Look for equalizers such as those from Audio Design, Focusrite and Amek, whose sound does not degenerate when applying steep cuts and boosts fairly close in frequency. I also suggest looking for peak and shelving switching on the extreme EQ bands as these increase flexibility when using high- and low-pass filters of fixed slopes.

The "classic" designs tend to deal in broad strokes and cannot be considered precision tools. They are ideal for adding "color" to a signal — a fuller mid-range, brighter high frequencies or a warmer feel.

Many of these equalizers are tube-based, but in most cases the presence of a tube is largely irrelevant. It is the design of tube amplification that creates the benefits. Such units are best suited to treating the predominant signal or the complete program after the precision EQ has sorted out any problems. Manufacturers of such units include TubeTech, Summit and LA Audio.

With the technology of radio changing and the arrival of DAB, it makes sense to take full advantage of the broad range of equipment available for tailoring audio.

On productions that may be rebroadcast or syndicated, a case also can be made for adopting traditional recording techniques, such as creating a master version and production copies that have reduced dynamics or specialized EQ for more specific uses.

But in the end, high-quality radio processing should always be invisible to the listener, who becomes aware of processing only when something goes wrong.

■■■

Keith Spencer-Allen is based near London. He is a free-lance consultant, writer and recording engineer.

The classic designs are ideal for adding 'color' to a signal — a fuller mid-range, brighter high frequencies or a warmer feel.

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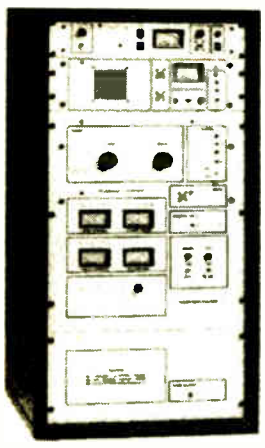

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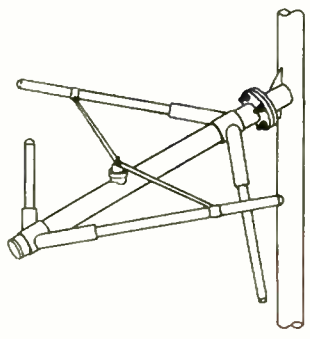

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World Radio History

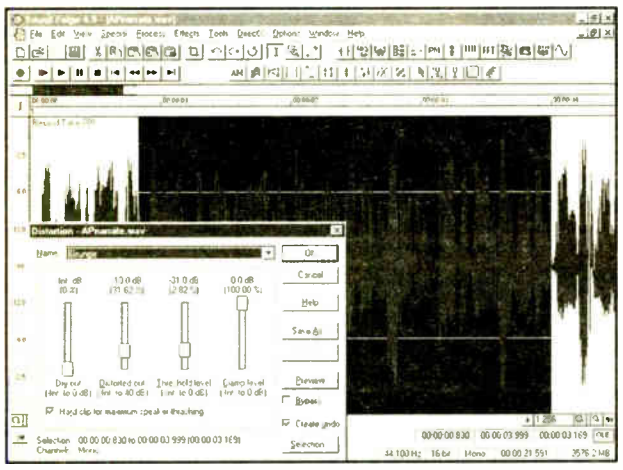
PRODUCT EVALUATION

DirectX Plug-Ins From the Forge

Alan R. Peterson

The DirectX standard for Windows audio plug-ins allows users to swap effect processes between audio programs from various manufacturers.

Say you want to apply your Waves Native Power Pack TrueVerb reverb process to modify a track in your SAW32 project. Perhaps use the EQ from the Event DSP/FX Virtual Pack in a Cakewalk audio endeavor. The ability to link a process from one application to another is accomplished via DirectX.



The DirectX-Compatible XFX3 Plug-ins at Work

Sonic Foundry offers some of its most versatile effect processes from Sound Forge 4.0 and 4.5 in its DirectX-compatible XFX Plug-in Packs. Here, we take a look at the $149 XFX 3 Plug-In Pack, with six different effects available for your audio project: Amplitude Modulation, Gapper/Snipper, Flange/ Wah-wah, Vibrato, Distortion and Smooth/Enhance.

Time saver

A prime advantage of the XFX DirectX plug-ins is the ability to preview the effect in real time. As you alter parameters, changes to a small sample of the audio occur almost instantly. There is no time wasted in processing then undoing audio you are dissatisfied with.

While these effects were evaluated for this article within a version of Sound Forge, note that these *are* DirectX plug-ins and are designed to work in whatever compatible audio processing/editing program you now use.

Amplitude Modulation: This applies modulation to the volume envelope of the file being processed. While it is capable of stock "tremolo" surf guitar effects or "Crimson-and-Clover" vocal processing, it can also pull off a rather respectable ring modulator.

When the modulation setting goes past the normal regions of a low-frequency oscillator, you begin to hear its effect on the frequency content of the audio file. The modulation can be set as high as 5 kHz, but when the setting is only a few dozen Hertz away from the fundamental frequency of your own voice, the effect sounds a lot like single-sideband radio or distant shortwave reception.

I have always enjoyed the scene from the original Star Wars movie where the fighters are taking on the Death Star, coordinating their efforts over the ship-to-ship radio. The sound engineers added some sidebanding to the dialog, making it believable. This plug-in pulled off the effect admirably.

Gapper/Snipper: This plug-in goes in and either slices out or adds in tiny slivers of time to an audio file. Pitch can remain stable or be shifted into unexpected realms.

The plug-in will gap or snip audio durations of .0001 to 1 second, at rates between 1 and 1,000 Hz. The edges of each slice can be "faded" (rounded off) so the processed audio does not sound glitchy or distorted — unless that is your objective — in which case, turn the Fade control to zero.

A small readout at the bottom of the screen displays the length of the processed audio as a percentage figure. It is possible to gap your audio file so large that the percentage can move into four digits. The plug-in will warn before sliding into values this large and stop you.

Flange/Wah-Wah: This is not the same as when worked with a pedal, or automatically triggered like the bass-popping "funk boxes" heard on '70s soul recordings, but it is useable just the same.

You click a button to select flange, wah-wah or phase shift, then set the sliders for the desired effect. This is more useful on a music track than on voice, but if you want to recreate that "Itchycoo Park" feeling in software, this plug-in does the job. Controls include Speed, Depth, Resonance and Center Frequency, with faders to mix dry and wet audio.

It might be possible to get the Flanger to sound as if it is being randomly clocked. In the days when flanging actually meant thumbing the flange of a tape reel, the effect was often unpredictable as machine speeds fluctuated. The flange would flutter, hang for a moment, then dive after it "crossed through zero." If a curve could be drawn over the flange process so it dives at just the right moment, this effect would be a winner. I just could not nail it.

Vibrato: This is the pitch warble that opera singers spend lifetimes learning to do. This plug-in also does what I have wanted an audio program to do forever: simulate a warped or off-center record.

With a Modulation Frequency setting of 1.3 Hz and a 2 semitone pitch shift, your pristine digital track will sound like a badly stamped 45 rpm record. Processed a second time with EQ, and with a scratch sample dropped in, the best of the worst-made vinyl records of the `60s comes alive in your PC.

Control sliders include Output Gain, Modulation Speed and Depth in semitones (24 semitones or 2 octaves).

Distortion: This plug-in is great for applying techno "digitized" effects to voices, but I prefer doing a Normalize function to 200 percent, then reducing the amplitude. By working with the faders and drawing a graphic response on the screen, it is possible to obtain soft clipping as in tubes or magnetic tape, or an extra gritty digital crunch distortion effect.

Smooth/Enhance: A two-fisted plug-in, meant more for gentle operation than drastic modification.

The Smooth function evens out fast-changing transients in a sound and is useful for removing glitches. Meanwhile, the Enhance function does what you would expect from its name: boosts the very highest frequencies in the audio file, making it sound brighter.

I draw the line at calling it an "exciter," as that is a trademarked term and the process is not a similar one. But it does give the upper end a little lift. It is also very easy to overuse this effect and be tempted to add too much enhancement to a project when your ears begin to fatigue.

Other DirectX plug-ins offered by Sonic Foundry include XFX 1, with reverb, pitch shift, delay and time compression; XFX 2, which consists of EQs and dynamics controllers; and Acoustic Mirror, an environmental simulation tool that applies a room's actual acoustic signature to existing audio. The process is open-ended, allowing users to create their own acoustic signatures.

DirectX compatibility is making audio production on the PC a lot more creative. With the standardization of the DirectX model, watch for more plug-ins to come from many more companies.

■■■

Downloadable demos of the XFX Plug-In line can be found at www.sonicfoundry.com

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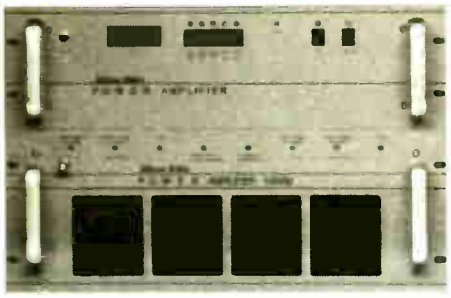

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READER SERVICE NO. 110

World Radio History

SPECIAL REPORT

What Awaits Us Down Digital Road

Alan R. Peterson

Earlier in the decade, digital editing was a miracle while the price was in the stratosphere. The computer was just beginning to make all things possible, at a cost well into the thousands.

Today, digital editing is a mature technology that comes at only moderate expense. Computers are available for $1,000 or less. Dedicated audio editors such as the Roland

The Orban Audicy Digital Audio Workstation

1680 or the two-track 360 Systems Short/cut can be had for the price of an Otari reel machine of only six years ago. You are considered behind-the-times without even a rudimentary audio editor at your station.

Now that digital technology is everywhere inside the radio station, what is next? Where does the technology and the needs of the industry take us from here?

Coming soon

According to some, we can expect more networkability, lower costs, cross-competitor compatibility and fresh new faces joining the fray. We might even witness the retirement of the hard drive as solid-state memory comes into its own over five years.

Just don't bet the station on radio production moving to Linux or BeOS anytime soon.

According to Carl Lindemann, **RW** contributing writer and producer of the audio feature "CyberScene," radio should be moving to where business already is: in networking and enterprise wide solutions.

"We are moving away from standalone workstations," said Lindemann, "especially when it comes to mega-merger radio deals. Audio has to be accessible to all the folks on the network so they can put their local branding on the particular format it is going to pop-up on."

Lindemann noted this is extremely clear in news organizations, where it is a matter of course to rework the same interviews into different versions appropriate for various formats.

Far from a futuristic plan, this is being done now. For example, Radio Free Asia (**RW**, Aug. 19, 1998) has been working toward a goal of 179 edit stations. As of last summer, RFA had 32 Audicy workstations, swapping files with a BE AudioVault system.

Same language

Then, there needs to be a degree of compatibility across competing systems.

Tom Zarecki, director of marketing services for Radio Computing Systems, has spoken with Orban engineers in hopes of creating some means of embedding information in a recording that would implement certain functions on all systems, not just those from RCS.

"A universal standard," he said. "I would like to see it possible to edit and produce on a workstation, and drop 'flags' into a song to indicate Intro, Second Intro, Hook and Next-to-Play, and have it be read on everything, on a Scott system or an Enco DAD."

Zarecki noted there would need to be cooperation from the AES to establish this as a digital audio standard. For now, it is simply an idea.

"Also watch for digital editors to get smaller, faster and probably cheaper," said Zarecki, pointing to the success of programs such as Cool Edit from Syntrillium Software. "There won't always be the need to use the 'big system,' especially when producing audio for broadcast and for Webcasting, or producing audio from home."

Watch for even more power and attention from newer players to come down the pike in the next three years.

Dave Foxx, creative services director at WHTZ(FM), New York, observed that more and more powerful machines are being introduced all the time. "On the Mac side of things," he said, "a 750 MHz machine is due out this year. It's faster and it is more powerful than anything you have seen."

Windows-driven machines take advantage of DirectSound that allows a common PC to mix multiple simultaneous audio streams in software. The advent of the Pentium III processor and faster clock speeds will mean more streams, handled more efficiently.

Today, digital editing is a mature technology that comes at only moderate expense.

Manufacturers not normally known for radio products will begin to infiltrate the circle. Foxx said, "Avid, the parent company of Digidesign (ProTools), will be putting on a radio-*only* presentation at the NAB convention. You will see more companies begin to discover radio."

Will the drive survive?

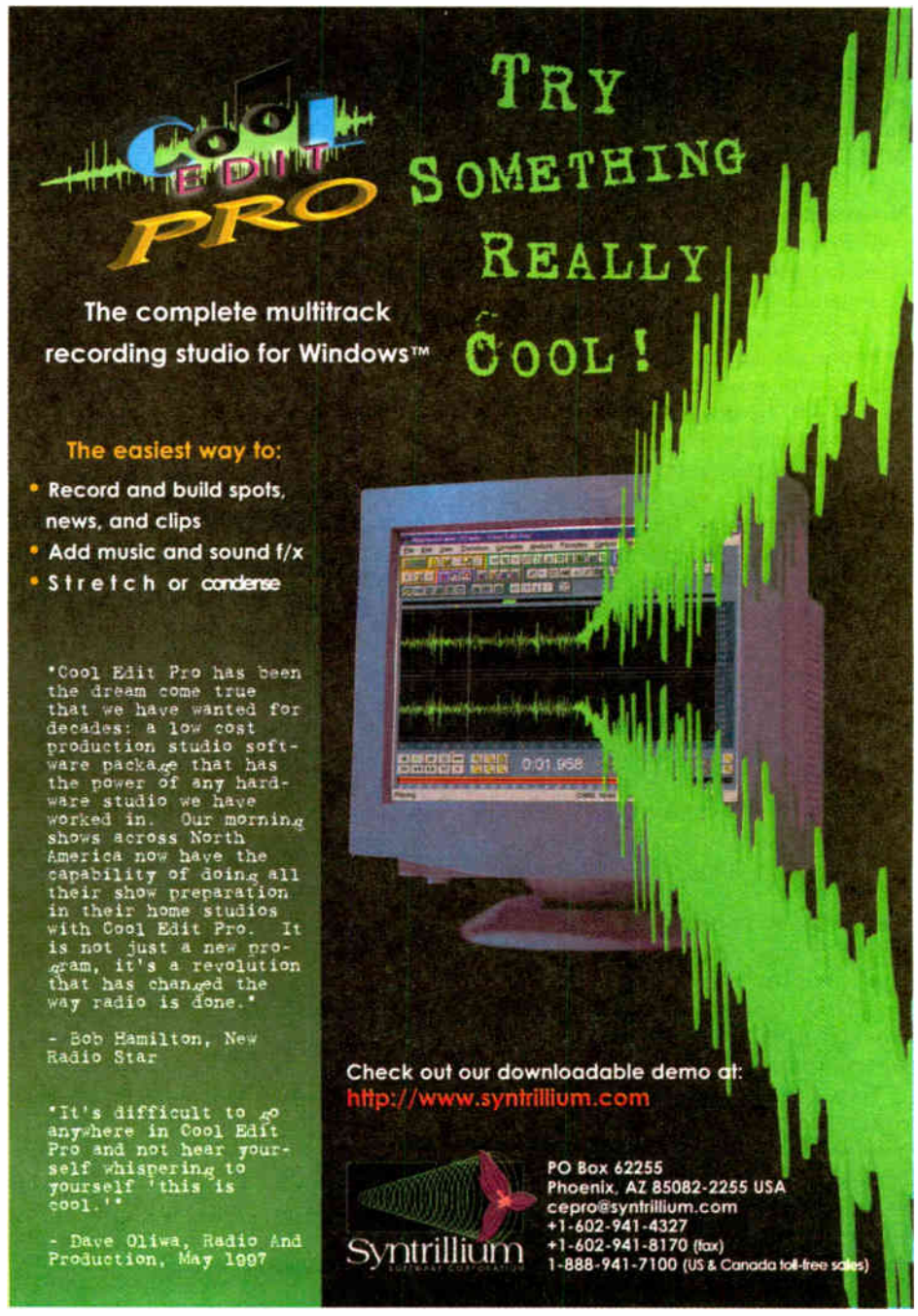
Foxx also sees the day when electro-mechanical media will begin to wane. "DVD will likely be the next place for mass storage and archiving," he said, "but watch for *chip* storage to begin moving us away from moveable media."

According to Foxx, the use of solid memory in radio could gradually occur within a three-to-five year timeline.

Lindemann, meanwhile, believes the digital evolution will mean a new way of doing the job at the station.

"Talent and even sales folks can manipulate sound for presentations," he said.

See DIGITAL, page 51 ▶



Circle (84) On Reader Service Card

World Radio History

USER REPORT

Audicy: The DAW for Duopolies

by Jim Cook
Creative Service Director
Jacor Atlanta

ATLANTA You probably would not use a tire-iron on an electrical socket or a screwdriver to fix a flat. It is the old "right tool for the right job" scenario.

The Audicy digital audio workstation from **Orban** is the right tool for radio production. I emphasize radio because presumably that is what our jobs are all about. In case you have already formed an opinion about Audicy based on what you know about the DSE 7000, read on — this is a whole new ball game.

It is my job to make sure our production rooms are used to top efficiency. In the world of consolidation, a production room is becoming valuable real estate. Jocks need to voicetrack shows for later playback, the morning show producer needs a place to do bits and the program director wants air checks cut down for demos. All of that plus the daily grind of producing station imaging and commercials, and suddenly, everybody needs to use the production room!

It was my contention that everybody should be able to use the equipment. After several abortive attempts at various DAWs, we discovered it came down to one or two power-users who utilized the gear we tried. Everyone else found it too complicated or cumbersome and went back to using a razor blade and tape.

Then we installed the Audicy (originally the DSE 7000) and found a deli-like line forming at the door to the room. We later installed or upgraded Audicy units in four other production rooms at our Peachtree building and two at our WKLS(FM) facility.

No waiting

The Audicy duplicates the feel and ease of analog and the learning curve is about 15 minutes. Yes, 15 minutes, and that is for everyone, not just the power-users.

The main screen lets you begin and name a new production as either temporary (it will be deleted upon exiting) or one that is stored to the hard drive. The opening screen is a simple mixer board layout where the user can adjust pans, Aux levels and more. I have a default set-up that is used 99 percent of the time. The user can then proceed to the "job control" screen and begin production.

Recording involves no more than pushing Rec/Play on the controller. No naming of files or waiting for a waveform —just choose the tracks to record on by enabling the buttons above the faders on the controller board. As the Audicy uses large-capacity RAM cards to do the processing, there is no waiting — recording and editing is instantaneous.

Keep them separated

Unlike some other DAWs where transport control is internal, the Audicy controller is a separate hardware board that provides manual sliders, pan pots, transport controls and edit function keys.

For some production rooms, finding the right real estate for this controller can be a problem. It is important that you place it in the stereo field. We have near-field mixdown speakers mounted directly to the left and right of the Audicy monitor screen so the producer is in the proper orientation.

The Audicy takes over here where the earlier DSE 7000 left off. The controller puts all the knobs and dials in your hands for immediate tactile response. No hunting through screens to find a pan or effect — just hit the key on the controller and you are there. This is a considerable time-saver, and in radio, time is the issue.

Jim Cook uses the Audicy for production in all of his Jacor-owned stations.

We do not have the luxury of taking hours to produce one 60-second spot, so everything needs to be at the producer's fingertips. Audicy has a built-in library where you can store frequently used sounds and import them directly into your project faster than you could record them. Additionally, there is an auto-fade, up/down edit feature for seamless transitions.

The new effects engine is an extra feature that is well worth the cost. It will save the investment in outboard processors. It includes reverbs, compressors, and delays, all customizable. I also recommend acquiring the optional data DAT or Jazz backup, as you will need to archive your production work. Also, until our networking is completed, it is how we share productions room-to-room.

I also recommend the upgrade from existing DSE 7000s to Audicy. The Audicy has 10 tracks — two more than the DSE 7000 — as well as 24 virtual tracks, which is more than enough for most radio production uses. In the rare cases where more are needed, utilize the Copy Self feature. This copies all 10 tracks at the same time.

I can then continue working by mixing several tracks down to one or two, freeing up more tracks. Since I have copied everything, I still have the original in case I need it at the head-end of my production.

"My workstation just crashed! Four hours of work gone!" Fortunately, I have not had to exclaim these words due to any Audicy failure.

I have never lost a file or experienced an Audicy crash. The one I work on has not failed once in two years. One Audicy did lock up once — maybe due to planetary alignment or something — but after a reboot, all files except my last edit were there.

A valuable feature of Audicy: Even though it is RAM-based for editing, it constantly shadows your work to the hard drive. Short of a total disk failure, your files are safe.

The newest features include networking, which allows us to share sessions across the LAN/WAN. Also on the horizon is a direct interface with our digital automation system. Upgrades are free and Orban support is excellent. As for maintenance, our engineering staff has not spent more than a few minutes reseating an errant loose DSP card or stuck button.

If you have the luxury of pleasing only one power-user in your production room, there are several DAWs designed for recording studio application. But if you live in the world of radio duopoly as I do, only one DAW is meant for radio production-designed radio geeks: Audicy. Consider it the right screwdriver to make sure the creative sparks fly from the production room.

■■■

Jim Cook, creative services director for the Jacor radio stations in Atlanta, oversees the production departments at WKLS(FM), WPCH(FM) and WGST-AM-FM as well as the Georgia News Network and Total Traffic. He previously served as production director for WBOB(AM) in Minneapolis and as vice president of programming for JET Broadcasting.

For more information contact Orban in California at (510) 351-3500, fax (510) 351-0500 or circle ***Reader Service 114.***

USER REPORT

Cool Professional Digital Editing

by Jeff Davis
Owner/President
Jeff Davis Productions

HOLLYWOOD, Calif. Here is the brutal truth: There is no digital audio editing program that is perfect for everyone and no unified theory of digital audio workstations.

Most have a valid place in the broadcast and studio collective, but if you do radio production, there is great news that things keep getting better.

It is my belief the cost of the hardware has been going down, down, down while its performance has been going up, up, up.

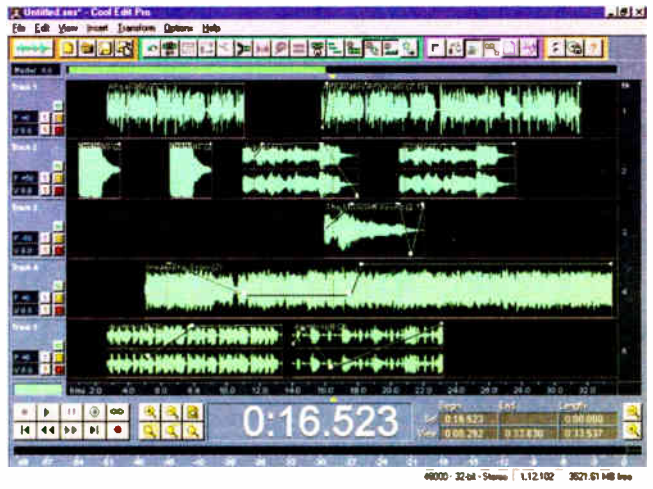
One such example, from the minds of the people at **Syntrillium Software**, is a product called Cool Edit Pro. This turns a normal Windows 95 or NT computer with soundcard into a multitrack recorder capable of mixing up to 64 tracks.

Web surfers with interests in audio have long been trolling the World Wide Web for cheap or free audio editing programs. Cool Edit, the company's original $50 two-track editor, has been well-known for quite some time and has made inroads into radio newsrooms.

The amazing thing about Cool Edit Pro is the flexibility and ease of use packed into a program that has a suggested retail price of $399. Cool Edit Pro has so many effects that my $3,000 audio effects processor never even gets turned on anymore.

The reverbs are smooth and silky, the choruses nice and meaty and the time-stretch function means never having to varispeed your reel-to-reel again (Does anybody use those things anymore?)

Additionally, there are over 30 digital effects that come free as an integrated part of the program.



A Busy Screenshot of Cool Edit Pro

The noise reduction is incredible. When I mastered Henry Rollins' new CD, "Think Tank," I was able to remove the AC line hum that was present in his original recording from a live set at the House of Blues in Chicago. The effects can be changed and renamed as presets for re-use later.

Even if you're stuck on a favorite outboard reverb effect, just program the parameters into Cool Edit Pro and you will have a new preset — as well as a new doorstop — at the same time. Cool Edit Pro can replace an entire rack of equipment. And because Cool Edit Pro has DirectX support, your

See COOL, page 51 ▶

World Radio History

USER REPORT

Sonic: A Long and Winding Road

by Paul Byers
Director of Engineering
WQED-FM

PITTSBURGH WQED-FM in Pittsburgh signed on in January 1973 as the Tri-State area's only all-classical music radio station, a distinction it maintains to this day.

Throughout the years we have striven to maintain the cleanest sound possible, a goal which stretched our quarter-inch analog tape-based studio beyond its limitations.

Broadcast Booth at the WQED-FM Facilities

So, when a generous funding opportunity from Bayer Corp. and the Fisher Foundation to convert our operations to digital presented itself in 1996, we began the search for a vendor who could meet our needs in the areas of production, editing, networking and on-air delivery.

After a year of demos, phone calls, meetings and more demos, we chose **Sonic Solutions**, a developer of digital media tools with two developed product lines (digital audio workstations and high-speed networking systems) and one fledgling product line (an on-air delivery system that we would eventually integrate seamlessly with the other two systems).

We purchased all of the equipment from Washington Professional Systems of Wheaton, Md., our regional dealer for Sonic.

Blueprints

Our plan was to have a workstation at each producer's desk for simple production work such as recording and editing narration tracks. We also wanted two additional dedicated rooms to handle more sophisticated tasks such as multichannel mixes or processing functions such as time compression/expansion or EQ.

To this end, we purchased three journalist editing systems, three mid-level editing systems and one high-end editing system.

All systems are equipped with Sonic Solutions A/D and D/A converters, two to eight channels of digital I/O and support of 44.1 or 48 kHz sample rates with 16- to 24-bit quantization.

The journalist system, built on the Sonic SSP (Sonic Signal Processor) line, provides an interface for cutting voice tracks that is easy to learn and use. Files are opened for editing by dragging and dropping the desired sound file into an edit decision list (EDL).

Unfortunately, it is limited to single-channel (monaural) editing only. The two-channel (stereo) upgrade promised to us has never been developed.

The mid-level systems, featuring the Sonic UltraSonic processor line, have proven to be the workhorses of our operation and are used for spot creation and long-form programming. Being able to handle up to eight channels and provide basic real-time DSP functions makes them useful.

The interface could be simplified, however, to make it more user-friendly and reduce the learning curve for new users.

On the level

It is on the high-end system where Sonic really shines. We use this system almost exclusively for the creation of national level programs like the Pittsburgh Symphony Orchestra series that we produce for Public Radio International (PRI).

Only two years ago, we were editing these shows on reel-to-reel tape with razor blades. Now we have the ability to zoom in to a single sample to make an edit. And because the process is non-destructive, we can be creative without worrying about losing a piece of the music.

Needless to say, the quality of our productions has improved tremendously. We were hoping for an increase in productivity as well, but this has been more elusive since the learning curve on the high-end system is steep and it has taken our staff longer than expected to become proficient.

A feature we recently added to the high-end system is NoNoise. This a Sonic exclusive that eliminates four common types of noise problems: clicks and pops, broadband and background noise, hum and buzz, and crackling and distortion. With the optional real-time effects processor, we can literally dial out most types of noise on the fly.

Also, the Sonic system is a multitasking one: Routine processes such as loading in material, playing out finished programs, burning CDs or archiving can go on in the background while foreground editing work continues uninterrupted.

A primary consideration in choosing Sonic Solutions was its networking application, Medianet, that allows us to link all systems together to share files and processing resources.

Rather than copy files or shuttle removable hard drives to share files, Medianet allows us to play multiple media files from the server or another workstation simultaneously. Sonic offers the option of copper or optical fiber to connect the network. We chose copper primarily because our entire facility was already wired, and all we had to do was connect hub boxes.

See SONIC, page 54 ▶

The mid-level systems, featuring the Sonic UltraSonic processor line, have proven to be the workhorses of our operation.

QEI

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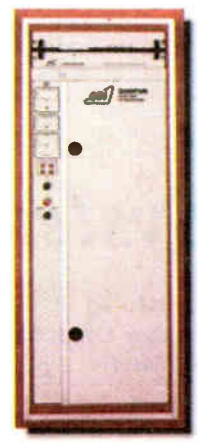

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Circle (94) On Reader Service Card

World Radio History

USER REPORT

Smooth Editing With Roland VS-1680

by Rodger Parsons
Independent Contractor
VODirect

NEW YORK As a voice-over performer, I consistently feel the pressure to accomplish more. The days of Mr. or Ms. Big Voice waltzing into the studio, intoning a few commercials or a narration track and blithely waltzing out are diminishing.

On the other hand, the search for people who can be phoned, faxed or e-mailed a script, lay down a voice track and send it either ISDN or digitally, or at the very least FedEx, has arrived. Also, music and effects usually need to be added. What kind of system does one select?

When I initially hit the shops, my first decision was to choose between computer-driven, on-screen systems and systems that look like traditional mixing boards, either analog or digital. I like to have the control that a traditional board provides, controlling the gain of several channels as I mix. This is why I chose the **Roland VS-1680**, a 16-track digital board with hard-disk recording.

The 16-track Roland VS-1680 features hard-disk recording.

Gone with the hiss

The VS-1680 has a serious learning curve, but once you are inside it becomes a smooth ride. Being digital, it is a quiet system with no hiss to upset your recording.

The first eight tracks are mono; tracks 9/10, 11/12, 13/14 and 15/16 are set up as digital stereo tracks. The eight mono inputs have individual gain controls with peak indication. Tracks 1 and 2 are at Mic level; the rest are at Line level.

Because of the learning curve, I was concerned that the promise of customer service was more hype than reality. From the beginning, I received treatment that left me nothing less than satisfied. Alan, BC and Dave from Roland were right there and got me going whenever I had a problem. There was an interface problem with the DAT machine I had selected, but Roland took care of the problem

The VS-1680 is divided into a mixer section on the left, looking very much like a traditional mixer, and a recorder section on the right, with the look of a digital command center — heavy tech at your fingertips.

Because I do a lot of editing, I liked the big 320-by-240 dot LCD. But once I got the hang of the board, I did not need it. The Scrub function, with its jog/shuttle dial and the ability to time-scale the movement of sound, lets the user flow through the editing process quickly. I can search in minutes or seconds and edit in frames or sub-frames.

Whether it is moving tracks, looping, cutting or adding space, the board has a kind of organic flow that is quite user-friendly. You find that your fingers do the walking almost without thinking, and you can concentrate on the sound. If you make a mistake, 999 levels of undo ought to be able to take you out of harm's way.

The board is designed as a musician's tool and many of the references are musical — an audio file is called a song, but the individual channels are still called tracks. Each track has 16 auxiliary tracks — "V" Tracks or virtual tracks — that are especially helpful when there is a specific element in a commercial that is likely to change periodically, like price or contact phone number.

If you know this beforehand, you can record alternatives and download them when necessary. There is no need to keep redoing the spot.

Mucho info

The large display puts functional bundles of information before you which can be selected by moving a cursor around, then using the dial to toggle in or change values to suit your needs.

For instance, you can change the equalization of individual tracks on-the-fly or switch effects on or off. It would probably be nice to have more than three bands of equalization available per track, but because the center frequency of each band is scaleable, it can cover most needs.

I was disappointed in the track compress function. I had a piece of music I wanted to use that was 67 seconds that I wanted to shrink to 60. It did not come through the process well. Okay, so the VS-1680 can't walk on water.

I like the optical and coaxial digital in/out. I can go from CD or to and from DAT with no problems. Of course, there are several analog outs. I acquired the CD burner which connects to the Roland via SCSI bus. That is also easy to use: Bring up the song menu, select Record CD and the process is underway. This way, I can send a client a DAT or a CD.

What gets me hooked to any machine is the relationship I have with it. In electronic media, people and equipment have to interact; the better the quality of that interaction, the better the result. With the VS-1680, I get great results, easily and consistently.

■ ■ ■

Rodger Parsons is a voice-over professional. His voices and characters are heard on numerous commercials and documentaries. For a demo, e-mail your address to VODirect@aol.com

For information contact Roland Corp. in California at (323) 685-5141 or circle ***Reader Service 116***.

USER REPORT

V8 System: Chock-Full of Ingredients

by Stephen Klong
Senior Creative Director
King Klong Music

LOS ANGELES Several years ago, the system then known as the IBM compatible computer or the PC was none too friendly to the audio editor/composer.

I vividly remember my "fruit-for-the-teacher"-using associates ridiculing me with shouts of disbelief as I planned to purchase a PC system for audio editing and composition.

At this time, ease of use and general habitual compunction made the Macintosh the only way to go for many, even though they were very pricey and its future was uncertain.

My self-image, a bit of a rebel, and some inside information pushed me into the risky PC purchase. Soon after, my hopes were realized as my new V8 system from **Digital Audio Labs** arrived.

Believe the hype

What's the big deal, you might ask? You have to remember that two years ago, this *was* a big deal, and if you check out the capabilities of this system, it still is.

The distinguishing factors are the availability of DSP and the actual sound of the D/A and A/D converters. The V8 system incorporates several features including expandability. The heart of the V8 is the Main board, a large ISA expansion card — soon to be PCI, I hope — that handles processing needs and allows the addition of more RAM and DSP power. More about muscle flexing later.

The main board interfaces with several Digital Audio Labs accouterments, the next-most impressive being the Big Block. This 2 RU breakout box device delivers eight quarter-inch balanced TRS audio inputs and outputs simultaneously from the rear of the unit as well as one pair of stereo inputs and outputs mounted on the face of the unit for easy impromptu access.

The digital domain is well represented. The rear of the unit offers S/PDIF in coaxial and optical formats and AES/EBU on balanced XLR connectors. The digital-to-audio conversion and the inverse are superb. It is unusual to plainly hear the difference between this unit and all of the others I own: warmer, fatter, and certainly more pleasing.

The system has other interface options of merit: ADAT and D88 interface cards allow digital interaction and synchronization between a V8 system and the removable linear media of your choice.

Additional RAM and DSP modules can be purchased and installed for greater overall performance and access to the vast variety of software-based effects and processors available today. The addition of processor-assisting modules is the real bonus; this open-ended architecture has been absent in the PC world. This is the real future of this product and, unfortunately, the primary reason for its slow growth.

Editing capabilities

The possibilities being virtually endless, very few have aggressively pursued software development for this system. My experience has seen some very gallant attempts, including MxTrax, the software package offered with the V8.

A multitrack audio editor allowing mix and effects automation and a neat 5.1 surround interface, MxTrax is light on basic editing features and requires more time to grow through adolescence.

Cakewalk, the prominent MIDI/Audio sequencing designer, has also come up a few steps short, along with the SEK'D Samplitude Studio for V8. The basic problem is making use of every V8 feature while keeping pesky bugs and system crashes to a minimum.

I have been assured that all existing designers and some new participants are addressing this issue.

The bottom line: I have found the hardware V8 system to be beyond compare sonically, and I admire its design and overall robustness. One problem is that the Minnesotan techno-wizards of the V8 design team looked too far into the future. Only now are software companies beginning to understand the possibilities and that actual need for solid use of external DSP and RAM.

The primary task of my organization is to compose music, though there is some emphasis on sound design and editing. The success of a project is often translated into speed and accuracy. Operations per minute (OPM) is the gauge for many involved in our folly. To this end, the V8 system should eventually win due to the sheer brute strength of the expandable DSP, RAM and those fabulous D/A and A/D converters.

■ ■ ■

Stephen Klong began his career as a studio musician. He now composes and supervises the production of music campaigns for television advertising and programming as well as radio imaging and advertising.

For information contact Digital Audio Labs in Minnesota at (612) 559-9098, fax (612) 559-0124 or circle ***Reader Service 22***.

World Radio History

Many Hot Features in Cool Edit Pro

▶ COOL, continued from page 48

favorite compatible plug-in can go right to work in a project.

Ease of use

When it comes to broadcast production, it is doubtful you will find an easier interface that is as inexpensive yet as powerful as Cool Edit Pro.

Basically, there are two windows: the Edit View which displays a single waveform (Fig. 1), and the Multitrack Mixer View (Fig. 2). The Edit window is where you will do most of your recording, editing and DSP.

Want a reverb effect on the word "now" to make it bigger? Just highlight the word and process it; the rest of the track remains unaffected. Does one segment of the voice track need a little punch? Highlight it and use the Amplitude >Dynamics Processing.

The Edit window is like an integrated two-track recorder with multiple instances that can easily be inserted into the multitrack.

One button inserts the audio into the multitrack window. Toggle to Multitrack and you change screens to the new view. When you are in Multitrack View, you can pull the audio file from the Waveforms List onto a desired track.

Inside the Multitrack window you can insert audio, slide, splice and loop or take a section of audio and convert it to a unique copy. Change the volume level on a part of a track, the whole track, or use "rubber-bands" to draw fade curves directly onto the wave and automate your mix. You can even pan using similar techniques.

Add a desktop MIDI controller such as a JL Cooper CS10 and you work blazingly fast with buttons that emulate a tape deck. But even if you don't have the budget for a CS10, your keyboard can be mapped to Cool Edit Pro functions.

Save your money

A friend of mine recently set up shop in his shiny new studio and had his heart set on one of those really wonderful, dedicated "closed-platform" editors that would set him back $20,000. I told him to save his money — plenty tight when you are self-employed.

"Buy a good sound card, Cool Edit Pro and save yourself $19,000," I told him. He responded, "No, this is what they used at the radio station. This is what I want."

He came over last month to use Cool Edit Pro to reduce the noise on a phone call that his $20,000 editor could not remove. He may have finally realized what I was talking about.

Human nature, however, dictates doubt when a product this effective costs less than we expect, so we end up buying a more expensive product that does less. It is like someone who hates the taste of caviar but eats it anyway because it is expensive and therefore it must be good. Costly, dedicated workstations are like that.

Even with all it has going for it, there are a few things I would like to see integrated into Cool Edit Pro someday. For one, the software lacks audio scrubbing, essential for locating an exact edit point. Real-time effects would be nice, as Cool Edit Pro must render and write any processing back to disk before playback. Additionally, there is no fader for real-time audio mixing.

If you have been looking for a digital audio editing solution, ditch the caviar and get Cool Edit Pro. Free demos are available for downloading at *www.synrillium.com*

■■■

Jeff Davis is a veteran personality of WLS(AM), Chicago, and now operates Jeff Davis Productions, a Radio-TV production company, in Hollywood, Calif.

For more information contact Syntrillium Software in Arizona at (602) 941-4327, fax (602) 941-8170 or circle ***Reader Service 115.***

Bright Digital Future

▶ DIGITAL, continued from page 47

"For anyone working in a radio station, learning and doing basic audio editing will eventually be as common as word processing," he said.

Lindemann sees the sales representative patching together promo material about the station and sending a fully customized PR kit, complete with audio samples, over the Web.

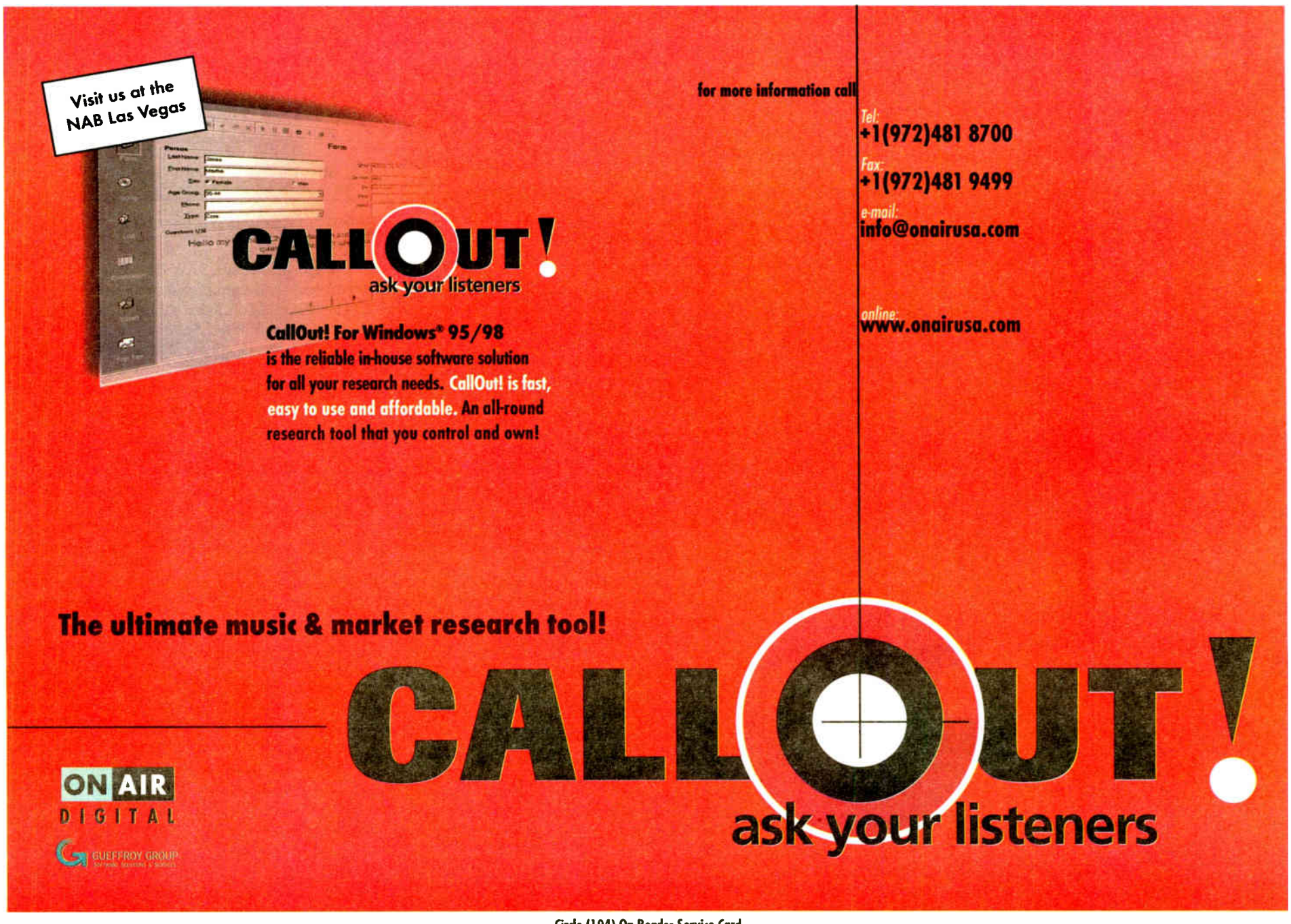
Bob Lentini, president of Innovative Quality Software, the maker of SAW workstation software, predicts a day coming soon when there is little hardware left in the studio.

"Digital audio production will be virtual," he said. "There will be almost no external hardware, except for the computer and maybe a few mic preamps."

Lentini also does not anticipate a move to another operating system very soon.

"A lot has to happen to make Linux or BeOS a viable substitute," he said. "It is nearly impossible to get soundcard drivers for Windows NT, it seems almost a fantasy to expect drivers for Linux or BeOS in any reasonable timeframe, although we are hopeful."

What will happen in the next half-decade could be as exciting as where we have come since 1994. Here in *Buyers' Guide*, we tell you what is here now.



Circle (104) On Reader Service Card

World Radio History

USER REPORT

Surfer: Imperfect, Indispensable

by Marty Bishop
Midday Air Talent
KMXZ-FM

TUCSON, Ariz. I am going to let you in on a secret: Jocks sometimes do production while on the air.

Did you just hear that collective gasp from thousands of programmers and managers across the country? All shocked to find that their policies, notes, memos and threats have been unable to keep busy talent from occasionally cutting spots during airshifts. Their concern is well-founded — it is risky to split attention between a live radio show and, well, anything else.

The advancing tide of technology has provided a solution. For more than two years, I have had the privilege of working with the **Dalet** audio system, and I can say it is the first product I have seen that genuinely enhances the productivity of the average deejay.

The Surfer is a big part of the reason. Surfer is the soundfile editing software module that comes bundled with the Dalet software suite. From my perspective, its single best feature is that it is networked; any sound recorded at any Dalet workstation is immediately available to be edited at any other workstation.

A real world example: Clients often need emergency copy revisions ASAP. In the old days, this might have meant a delay of several hours while I finished my show and waited for a production room to open. Now, my production director might hand me a piece of paper and ask me to voice it.

I don't have to ignore my show or even leave the broadcast studio. I open Surfer, read the copy and save the finished soundfile, all while the Dalet is playing a song on the air.

Within a couple of seconds, my recorded voice is opened on a workstation down the hall. A producer dubs a music bed under it, saves the file again, and presto, the finished commercial is now ready to be played on any or all four of our radio stations at the same time.

Things that go bump

How is it to operate? Frankly, a bit clumsy.

It does not have the intuitive interface of most modern digital editing packages, although it has been improving with each new iteration of the software. It desperately needs a timeline window that shows the whole soundfile in addition to the zoomed-in editing window.

Several commands are laid out as icons for easy mousing, but too many features are buried in pull-down menus. I understand that the next release will be a substantial redesign that addresses most of my concerns, and I am looking forward to that revision like a kid near Christmas.

I could not recommend that a station use this as its *only* audio editing tool. We use more powerful standalone packages in our two production rooms. The Surfer feature set is just too basic: cut-and-paste editing, fades and volume controls, drag-and-drop positioning of multitrack elements. There is a useful Clipboard, and incomplete projects can be saved as editlist files.

It boasts one interesting feature I have never had the occasion to try: You can start recording a soundfile, open the file in a new window and edit it *while still recording*. I imagine that would be great for talk stations.

There is one doozy of a special effect available: the cleanest time-compression algorithm I have ever heard. Every spot now can time out to 60 seconds. That alone may be worth the price of admission.

Yet, for all its shortcomings, I believe I would give up cable TV before I let them take away my Dalet with its Surfer. It makes my job vastly easier and it lets me accomplish a lot in a given amount of time. That is because a simple workstation available *now* is often much better than a fancy production suite I have to wait for.

What the Surfer lacks in elegance, it more than makes up for in speed. Saves and Edits happen in a blink. When I am done with a project, there is no need to dub or transfer it. It is there, sitting in a bank of hard drives, waiting to be dished out to any workstation or broadcast booth.

■ ■ ■

A 21-year radio veteran, Marty Bishop remembers when songs were played by dragging diamonds through squiggly grooves set into small black discs. He designed and maintains the KMXZ Web site at www.mixfm.theriver.com

For information contact Dalet in New York at (212) 825-3322, fax (212) 825-0182 or circle ***Reader Service 140.***

USER REPORT

Innovative Multitrack Digital SAWPro

by Bruce Bartlett
Recording Engineer

There are many diverse facets to the SAWPro package.

ELKHART, Ind. Looking for a versatile digital editing package? Look no further than SAWPro v. 1.6 from **Innovative Quality Software**.

SAWPro v. 1.6 is one high-powered digital editing program. Using a Windows PC and soundcards of your choice, SAWPro can record, edit and play back up to 32 mono or stereo tracks. Each track is capable of up to 24 bit/96 kHz performance, which is the present state of the art in digital audio. Plus, the program is fast and easy to use.

If you want quality sound and speedy editing for a large number of tracks, SAWPro could be an ideal choice for your station. It can be used to record or edit concerts for broadcast, compose musical intros, create commercials and promos or produce documentaries. SAW Pro features nonlinear, drag-and-drop non-destructive editing with 99 levels of undo, all in the familiar SAW environment. Several regions can be grouped for editing at the same time.

Up to 12 stereo soundcards can be handled at once for a maximum of 24 input and output channels. A multichannel record mode lets you overdub directly to one or more tracks while listening to previously recorded tracks.

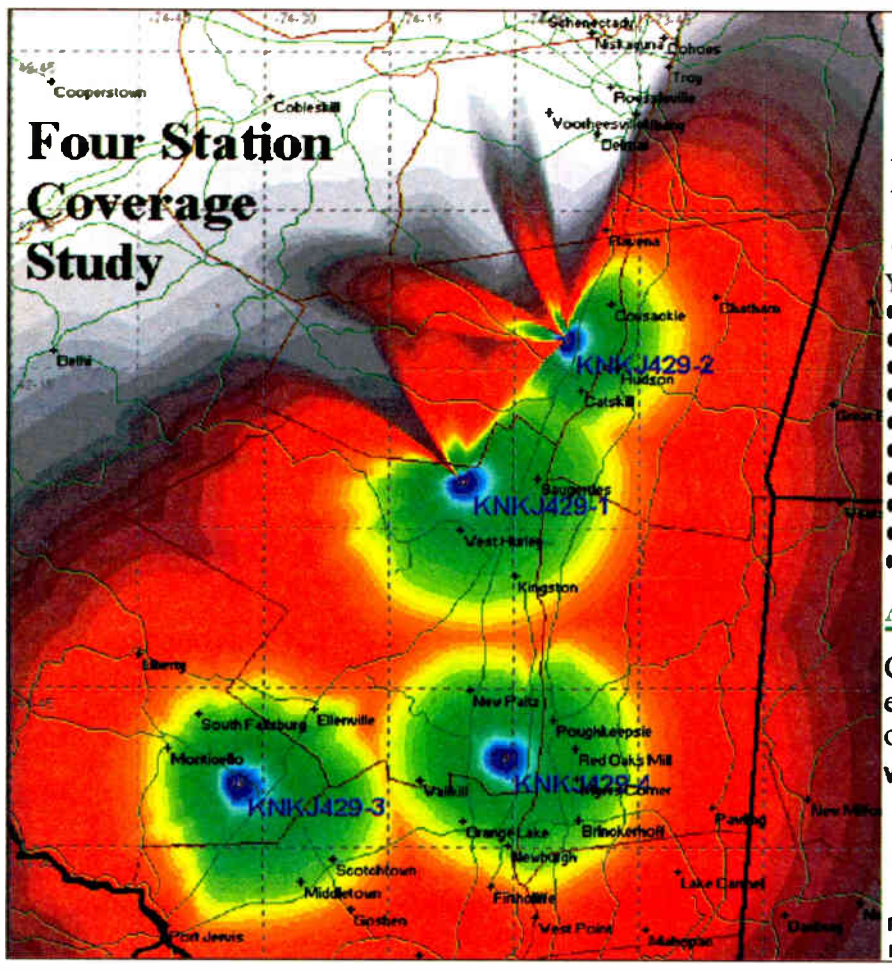
In the engine room

Many effects are built into the software, including a parametric EQ, noise gate, peak limiter, normalizer, compressor, echo/delay, vari-pitch/speed, reverse audio, reverse phase and center channel eliminate. These real-time functions can be patched to each track or soundcard output. Other DirectX plug-ins can be added at any time.

It is easy to adjust volume, panning, mutes, and solos during playback, then accomplish an automated mixdown. You can define fader slope values for each mix change. SAWPro will generate and sync to SMPTE and MIDI Time Code. I also liked the beautiful 3-D rendered graphics.

SAW Pro offers several new features over its predecessors, SAWPlus and SAWPlus 32, including: quantization of

See IQS, page 53 ▶



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USER REPORT

MicroSound: What a DAW Should Be

by Charles Lawson
Recording/Production Engineer
WETA(FM)

ALEXANDRIA, Va. "What should I buy? *What should I buy?*"

I hear these anguished cries several times a year when yet another colleague decides it is time to get a digital audio workstation. It is especially hard for radio people to choose between what their minuscule budgets will allow and the essential features they think they need.

Fortunately, there is a reasonably priced and amazingly capable choice available in the MicroSound workstation from **Micro Technology Unlimited**.

MTU is not a heavy-hype/feature-light newcomer to the realm of digital audio. In fact, the major fault of MTU is they do not market themselves more aggressively: They were reportedly the first to make a workable DAW on a personal computer in 1980.

The MTU system runs with a proprietary PCI sound card/DSP engine on a standard PC using Windows 95/98 or NT. If you worry about the stability of Windows, relax; MicroSound is the single most stable piece of software I have used on *any* platform in more than 23 years as a computer user.

I use MicroSound DAWs daily for everything from long- and short-form radio production to CD mastering, Web authoring and forensic audio restoration. MicroSound offers the reliability of a good plow horse, it also exhibits the power and speed of a thoroughbred racer by allowing me to finish intense, complicated productions. I can edit Baltimore Symphony Casual Concerts in record time with no system crashes or slowdowns.

The MicroEditor is easy to learn and is fun to use. Double-click the icon and the software starts instantly. Open a new 16- or 24-bit resolution project the same way you would start a new document in a word processor, click the Record button at the bottom of the screen and you are in business.

The new audio is recorded in standard protected sound files that are never altered or damaged no matter what edits you make in your project. MicroSound is non-destructive in all operations: Everything is instantly and infinitely undo-able. I cannot overstate the value of this functionality in a deadline-driven radio environment.

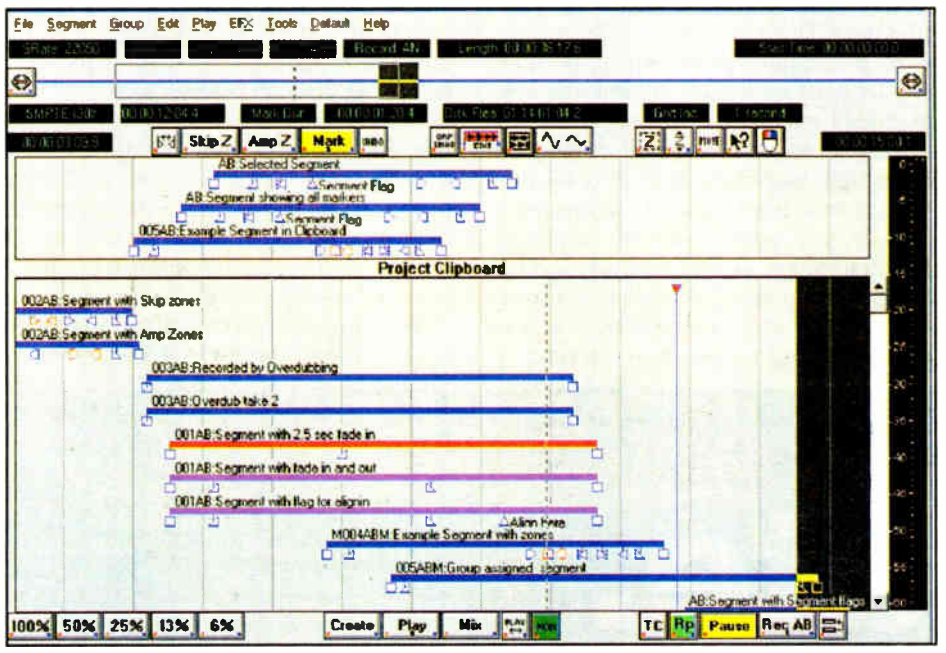
The great advantage of MicroSound is its visual paradigm. Unlike other DAWs that emulate tape recorders and consoles, MicroSound works more like a word processor for sound.

Audio is represented on screen by linear time-line segments on a large pasteboard. These segments can be named anything and moved anywhere within a project by shift-clicking and dragging them with the mouse. Once you release a segment, it is dropped into the new position and will play back there from now on. If two or more audio segments are overlapped at any time, the overlapped portions will mix on-the-fly and play back simultaneously.

You can create marker flags as cuepoints that any segment or number of segments will snap to. Insert a flag within a segment and use that as the "handle" by which to drag the audio. Mark a music post in a segment, for example, and drag the sound *by the post* to its cuepoint. You never have to back-time anything again.

Want something to duck under something else? Drag the mouse over the segment area you want to lower and tell the system via a dialogue box how much to reduce the volume. Even better, split the existing segment into several pieces and assign different levels to each using the on-screen fader. You can even apply separate EQ or compressor/limiter settings to the individual pieces without affecting anything else.

Simple cut/paste editing is just as easy as complex layering. This is where the system is most like a word processor. Turn the marking function on, drag your mouse over the audio you wish to remove and click the Skip Zone button (the equivalent of the Delete key). A zone will be inserted that tells the system to skip over the material that has been marked. If you do not like the edit, undo it at any time.



The MicroEditor screen provides highly accurate samples.

If you need extreme precision, MicroEditor will display a sample-accurate waveform. You may zoom in so tightly that a single sample of audio will fill your entire screen.

Once you finish your project, the whole thing — audio and edit decisions — will archive via the system's digital output to a standard audio DAT.

As much as MicroSound has going for it, no system is perfect. The built-in EQ, while high-quality, is not as intuitive as the rest of the system and requires a little re-thinking. Riding gain on spiky audio material can be cumbersome because the sample-accurate waveform display takes time to draw more than a few seconds of audio, making it difficult to visually scan the amplitude changes. Using a compressor/limiter would help, but if you want to avoid audio compression in an "audiophile" project, count on spending time tweaking levels manually.

The MTU archive-to-DAT function does not yet support 24-bit projects. You might need to get an external device to handle backups if you do much high resolution work.

In spite of these deficiencies, MicroSound has proven itself as a top-notch DAW for nearly any application. There is little else you are likely to buy that will improve the quality of your present work and raise the standard of what you can achieve.

■ ■ ■

For information contact Micro Technology Unlimited in North Carolina at (919) 870-0344 or circle ***Reader Service 150.***

SAWPro Offers Plenty

▶ IQS, continued from page 52

16/20/24 bits; sampling rates from 11 to 96 kHz plus custom rates; dithering types 1, 2, 3 or Off; set tempo or time signature; snap to grids of time, samples, SMPTE, or tempo; and multitrack soft clipping.

The "Save EditListFile and Trim Session" removes extra sound data that is no longer needed, then rebuilds and relinks all regions and sound file data into a new EditList with condensed soundfiles. This saves a lot of disk space.

I found that SAWPro moves quickly. For example, the waveform redraws and zooms are instant. Pressing a function key takes you immediately to the work screen of your choice. Left-clicking on the soundtrack instantly selects any point, and right-clicking plays the soundtrack from that point.

The program is written in assembly language in new 32-bit native NT/98/95 code, which efficiently uses the computer CPU for most processing. You do not have to buy fancy soundcards that include DSP, and you are not limited to any one brand of soundcard or other hardware.

According to IQS literature, "SAWPro can continue to grow and expand rapidly with software updates alone, allowing you to benefit from post-release product enhancements."

Requirements

You will need a powerful computer — at least a Pentium II-266.

According to IQS application notes, "Full advantage of the new 32-bit architecture can only be realized by using the NT platform with 128 MB RAM or higher. Minimum recommended RAM is 128 MB. Less may cause erratic and extremely slow performance because Windows will be constantly swapping memory buffers to and from the virtual memory swap file. SAW Pro requires at least 65,535 colors (16-bit hi-color) for its graphics." The hard drive can be EIDE or Ultra-wide SCSI.

IQS offers a wide range of digital editing software, plug-ins, sound cards, AVI viewer, and CD burning software. EDL files from SAW, SAWPlus/SAW32/SAWPlus32 can be imported into SAW Pro, but once saved, are no longer importable to the other versions. As a user of SAWPlus for many years, I am tempted to get this upgrade myself.

■ ■ ■

Bruce Bartlett has been recording for 30 years, but not without a break.

For more information contact Innovative Quality Software in Nevada at (702) 435-9077, fax (702) 435-9106 or circle ***Reader Service 120.***

Downloadable demos of all IQS products are available at www.iqsoft.com

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Circle (119) On Reader Service Card

World Radio History

WQED Plans for Digital Chain

▶ SONIC continued from page 49

Although the network has been fairly solid, it has not been without its problems. We have had failures on at least four Medianet cards, and occasionally a workstation will become disconnected from the network for no apparent reason. We suspect that the bad cards might have all had some common defect, since the replacements have worked reliably.

No compression

Our goal is to have a completely uncompressed digital chain from origination through transmission. We are counting on Sonic Solutions to be a major link in that chain by supplying us with an on-air delivery system that will record and play out with full automation for parts of each day.

Our format consists of live announcers playing CD music from 6 a.m. until 7 p.m., prerecorded programming from our studio until midnight, concluding with overnight satellite service until 6 a.m.

Throughout the day, we record programming from satellite which we delay anywhere from a few hours to a few months.

Sonic On-Air gives our announcers the ability to access a playlist which, theoretically, could provide full walk-away capability. Currently however, it is used mostly as a cart replacement system.

We used to air our breaks from analog audio carts. Now all spots are recorded into a server, then added to a playlist where they can go directly to air at the touch of a button. A playlist can be chained together so that multiple elements can play out successively.

We have encountered a bug with this feature. The playlist will occasionally stop after the first item in the list is played, even though the entire list is chained together. For this reason we do not yet have confidence in the system, so we are only using it in a manual mode to play out one item at a time.

Another disconcerting feature we have found in the playlist is that sometimes one or both audio tracks will drop out. When this happens, the only solution is to delete the item from the playlist, rebuild its EDL, then add it back to the playlist again.

The screen display is built like a standard spreadsheet application, allowing us to move columns around, reconfigure the screen or add a comments column.

With Record Central, we have the capability to record up to four stereo programs simultaneously, with independent start/stop of each of the four recordings. Programming the recordings has proven to be an extremely tedious task, as 13 separate steps are needed to arm a single recording. Ideally, we would just open the Record Central interface panel (from within On-Air instead of Sonic Studio), select the source for the recording, set the in/out times and the programming would be finished. We currently have capacity to store 60 hours of stereo material on the Record Central server.

Some programs we record may not air for weeks or even months. This means having to archive to tape to keep the server from overflowing. This constant process of capturing, archiving and restoring is time-consuming and requires a database — which we are still building — to keep track of everything.

We would prefer to use a server with removable media, but because Sonic uses a proprietary file system, we must wait for the company to certify any external devices that can connect to the SCSI bus.

Our overnight satellite service sends out 25 Hz trip-tones to signal breaks in programming. These tones activate relay closures which start our analog cart decks. We wanted to replace the cart decks with playlists created in Sonic On-Air, but the mechanism to do this did not exist.

The playlist will occasionally stop after the first item is played, even though the entire list is chained together.

At our request, Sonic developed a software application that utilizes the same tones and relay closures, then translates them to MIDI events (through a third-party interface) to start the playlist. We have not implemented this system yet, but we hope to have it on line in the near future.

Our main concern is that the interface is not as well thought-out as it could be, and we are asking Sonic to help us work through this issue.

Sonic Solutions editing and networking products meet our demands and expectations in most situations, but its on-air delivery system still needs some work. It has to be made easier to use and more reliable before we can bring it online for live broadcasting.

Our road to digital nirvana has been slow and rocky and the end is not yet in sight. I can state unequivocally that both Sonic and Washington Professional Systems have made every effort to keep us moving forward.

■■■

For more information contact Sonic Solutions in California at (415) 893-8000 fax (415) 893-8008 or circle ***Reader Service 130.***

World Radio History

USER REPORT

Medicine for Plug-in Withdrawal

by Dave Foxx
Creative Services Director
WHTZ(FM)

SECAUCUS, N.J. Hello. My name is Dave Foxx, and I am a plug-in-aholic.

Hi, Dave.

I was introduced to the plug-in craze back when ProTools from Digidesign was still in its infancy with two separate applications, a painfully slow CPU, two GB of hard drive storage and a tiny 13-inch monitor. Since then, I've graduated to ProTools 4.3, the fastest CPU on the planet (in my opinion), 18 GB and a 22-inch Radius screen. In that time, I found myself willing to do anything to get my hands on the latest plug-ins from Arboretum, Lexicon, Wave Mechanics, DUY and **Waves**.

Oh, Dave. Tell us it ain't so!

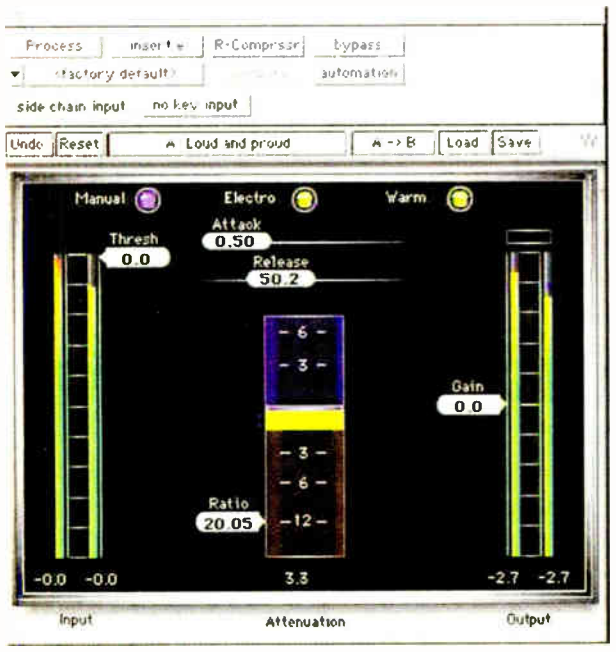


Figure 1: The Waves Interface is no techie plug-in.

Renaissance

Relax. This isn't a 12-step program — it is a review of some of the Waves family of plug-ins. The first is called the Renaissance Compressor. What a sweet little piece of code!

The biggest gripe most audiophiles have with digital sound technology is the hard-edged brittleness it often generates. I hear it too. In the past, I have even recorded voice tracks on analog tape just to recapture that warm saturated sound that formula 456 tape seems to give everything. Now I can record directly to HD and then pump it through the Renaissance Compressor in the mix and get exactly the sound I desire.

The interface is particularly nice, especially if you are not sure of what you may be doing. (See Figure 1) This is not a techie plug-in — it is for people who know a great sound when they hear it, but might not know exactly how to get it.

You can secure a smooth sound on any one track by clicking on the "Opto" compression mode or capture an aggressive "pumped" sound on a voice track by clicking the same button to select "Electro" compression. With another single click, you can add a warm character to a track.

When you do this, the software adds frequency harmonics to the original signal, causing the ear to hear sounds that really are not there. You have to take my word on this.

This harmonic trickery is the magic behind another of my favorite plug-ins called MaxxBass, shown in Figure 2.

Let me begin explaining this one by telling you what it is not. Some producers will try to add more bottom end to a signal by throwing an EQ module into the mix and pushing low frequencies.

Not a good idea. This just muddies up the original signal. MaxxBass only adds the harmonics.

Several decades ago, audio engineers began fiddling with harmonics to make tiny speakers sound larger by tricking the ear into thinking there was more bass than the speaker could ever produce. The belief was, if you add the harmonics, the brain would supply the bass. They called this "psycho-acoustic technology."

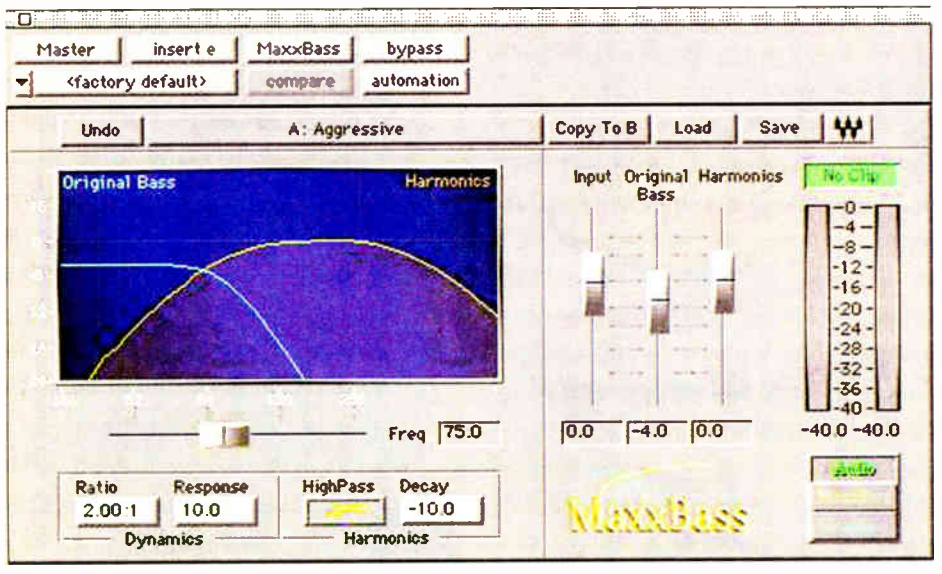


Figure 2: MaxxBass can strengthen lower frequencies.

MaxxBass uses the same idea and it works. Used with some care, this plug-in can open the low frequencies and make them stronger and, at the same time, more clear and precise.

Finally, I wanted to mention the C1 module. This is really the Swiss Army knife of plug-ins as it can perform several functions separately or simultaneously. See Figure 3.

First there is basic compression, then expansion. Add gating and a sidechain and this tool begins to look like the ultimate plug-in. You can add IDR dithering to the mix as well.

I like to think of the C1 as the computer equivalent of the Kepex/Gain Brain combination mic processing chain we used back in the CHR days of WPGC-FM in Washington, D.C., with a parametric EQ thrown in for good measure. If one had to choose only one plug-in for his or her workstation, this would be the one.

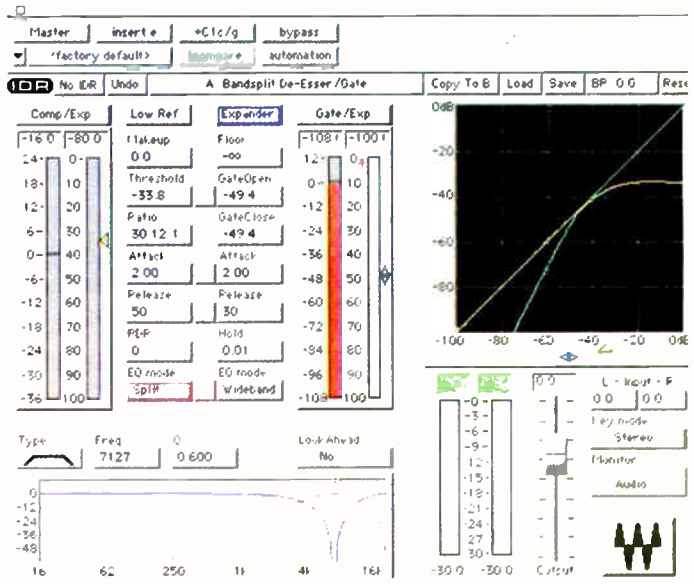


Figure 3: The Versatile C1 Module

But then, that's the beauty of Waves plug-ins. Although I guess you can buy individual plug-ins, Waves sells them in "bundles," each containing several quality plug-ins.

Dongle

Maybe I sound like a shill for Waves. So, to be honest, I have one bone to pick with the guys from Tel Aviv. Actually, not with Waves, but with the idiots everywhere who deal in pirated software.

Everyone has no doubt spent time "authorizing" his or her software. It can be a cumbersome process, but Waves has taken the process to a new level. When you purchase a Waves bundle, you get a little plastic dongle that goes between your computer and your keyboard.

This little piece of encapsulated circuitry is how they make sure you are a licensed user of its products, because a Waves plug-in will not work without it.

To make things even more complicated, if you should purchase another Waves plug-in later on, you need to use their "Wavekey" software, which you fill out and e-mail to Waves.

They will then return some codes for you to enter into the "Wavekey" program which will then update the gizmo. This really seems awkward at best.

But, aside from a minor complaint over that, I do have to give glowing marks for the entire Waves lineup. I recently was asked for a price estimate for a fellow production monkey to set up a complete ProTools system with computer, monitor, ProTools gear and software.

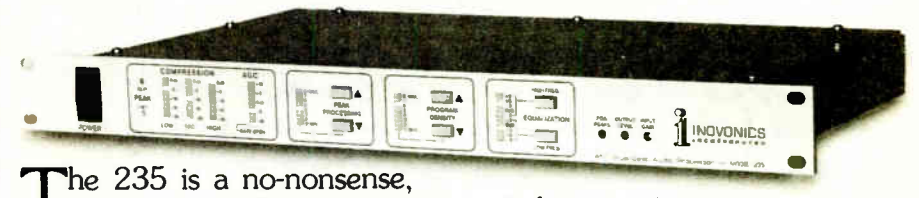
In the "must-have" column was a complete Waves TDM bundle.

■ ■ ■

Dave Foxx has been the imaging guy at WHTZ-FM, "Z100," for more years than he is willing to admit, but concedes that his time there started with Scott Shannon. He also operates Foxx On The Run Productions, Inc., a New Jersey-based studio for radio imaging, program syndication, commercial and industrial work.

For more information contact Waves in Tennessee at (423) 689-5395, fax (423) 689-4260 or circle ***Reader Service 121.***

Honest AM Improvement



The 235 is a no-nonsense, full-function AM audio processor. It features slow, "gain-riding" AGC, 3-band average level compression coupled with variable equalization, and an asymmetrical peak controller combining fast limiting with variable clipping depth. Strict NRSC compliance is guaranteed by specified pre-emphasis and overshoot-compensated low-pass filtering.

You'll find the 235 very easy to set up and use. Front-panel controls and indicators make local operation a snap, and the built-in RS-232 port and our simplified software enable computer or modem remote control if desired.

Your preferred broadcast equipment supplier can arrange a demo at your station. Phone, fax or check our website for complete technical details.

Model 235 — $1800

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World Radio History

TECHNOLOGY UPDATES

SADiE

The **SADiE** V3 software features several digital editing features, including Playlist editing, the Trim Editor and PQ editing.

The Playlist editing features provide an emphasis on accuracy and speed. The cursor highlights exactly which part of the clip that the user is editing will be altered when it is modified. Every part of the clip can be adjusted from within the playlist window, including in points, out points, sync points, individual fade parameters and levels before and after a crossfade. The user can edit graphically or textually, keep all previous or following clips in sync with each other or the timeline and use adjacent unused material to line up musical beats.

The Trim Editor provides a method of fine-tuning an audio edit. Each audio clip is visible both before and after the edit point is visible, along with the position and lengths of the fade-in and fade-out. Audio or fades may be moved with or without audible scrub using the jog/shuttle wheel or the mouse. Once the position of the two audio clips relative to each other is decided, the user can move the fade point itself to insure a smooth transition.

The PQ editor is a complement to CD mastering; PQ lists may be created automatically or manually and freely edited. The software can output the resultant master to all major formats, including DDP conversion for Exabyte tape and CD-R.

For more information contact SADiE in Tennessee at (615) 327-1140, fax (615) 327-1699 or circle ***Reader Service 128.***

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Antex Electronics

Antex Electronics offers several soundcards for digital editing and production uses in its Broadcaster series, including the BX-12 and BX-8.

The BX-12 features 20-bit converters, which produce 92dB dynamic range with a THD+N of .003 percent. Three 32-bit floating-point digital signal processors are utilized for MPEG encoding and decoding, 16-bit linear PCM-processing and multichannel digital mixing.

Its architecture is comprised of independent recording and playback subsystems, each with its own sample clock generator, allowing the BX-12 to support production and on-air demands with a single card. Stereo, balanced analog and digital inputs are provided with the ability to mix any four stereo devices to four physical-balanced stereo outputs.

A playback-only version, the BX-8 also provides four balanced stereo outputs and a stereo AES/EBU or SPDIF digital output. Both cards can utilize an optional field-upgradeable plug-in card to convert analog outputs to AES/EBU digital streams.

For more information contact Antex Electronics in California at (310) 532-3092, fax (310) 532-8509 or circle ***Reader Service 138.***

COMING SOON

Coming in **Buyer's Guide**

April: Remote Audio, Recording and Mixing

May: AM Transmitters

Only in **Radio World**

World Radio History

TECHNOLOGY UPDATES

Digigram

Digigram offers the PCXedit feature as part of its Xtrack system. A digital audio editor development interface, PCXedit brings off-the-shelf editing features and digital audio workstation specifics together into one package.

PCXedit bridges both choices by providing a customizable program shell based on Xtrack. Integration with other audio applications can be accomplished rapidly and economically. Ready to operate as purchased, PCXedit employs a modular approach ideal for single-site development; it is also a valuable tool kit for integration into commercially distributed systems.

For more information contact Digigram in Virginia at (703) 875-9100, fax (703) 875-9161 or circle ***Reader Service 129.***

Digidesign

The Pro Tools|24 Mix from **Digidesign** is a single-card system offering up to three times more DSP power than Pro Tools|24, its predecessor.

The 24 Mix package retains the 24-bit fidelity and TDM-based mixing environment that its predecessor utilized. Several different features have been added including the Mix Core system, which offers real-time digital mixing and processing power for typical 24-track projects. Because it is a DSP-fortified PCI card, the Mix Core system also provides 64 simultaneous audio tracks and up to 16 channels of I/O.

A line of DigiRack plug-ins include a redesigned multi-band parametric EQ, digital delay, and several dynamics controllers such as a compressor, gate, peak limiter and expander. Advanced recording, editing and mastering tools are also evident.

For more information contact Digidesign in California at (650) 842-7900, fax (650) 842-7999 or circle ***Reader Service 131.***

Audio Science

Audio Science offers several digital audio adapters for the PC platform, including models ASI4111 and ASI4113.

Both adapters are based on a high-speed PCI bus, which offers improvements in data transfer efficiency and allows more time for the PC's CPU to run the OEM application.

The ASI4113 offers four playback streams and one record stream. Each playback stream can be independently mixed to one of three physical outputs, and all streams have independent sample rates and formats. The ASI4111 offers two play streams mixed to one physical output and one record stream.

Both adapters include 2 MB of on-board DRAM for audio data buffering for clean audio. AES/EBU and S/PDIF inputs and outputs are also features for direct digital links to other digital audio equipment.

For more information contact Audio Science in Delaware at (302) 324-5333, fax (302) 738-9434 or circle ***Reader Service 149.***

Otari

The Radar II HRD series of digital multitrack recorders from **Otari** provides 24, 48, or more channels of 24-bit record and playback from a single hard drive. The system combines traditional multitrack techniques with random-access editing.

Through a remote control, audio segments can be cut, copied, pasted, slid, looped or quickly transported to a different location. Its file management software supports multiple projects: up to 99 versions of a project can be created and separately edited, backed up or restored without consuming additional hard-disk space.

The controller's layout offers dedicated buttons for transport control, track arming, track soloing and edit operations. Pre/post roll settings, auto-play, cycle and time-code setup are provided with additional keys. A jog/shuttle wheel allows for precise scrubbing and edit-point location.

Radar II offers several dedicated inputs and outputs. Track-arming buttons show the input and record status of individual cuts. LED meters monitor input and playback levels.

For more information contact Otari in California at (650) 341-5900, fax (650) 341-7200 or circle ***Reader Service 139.***

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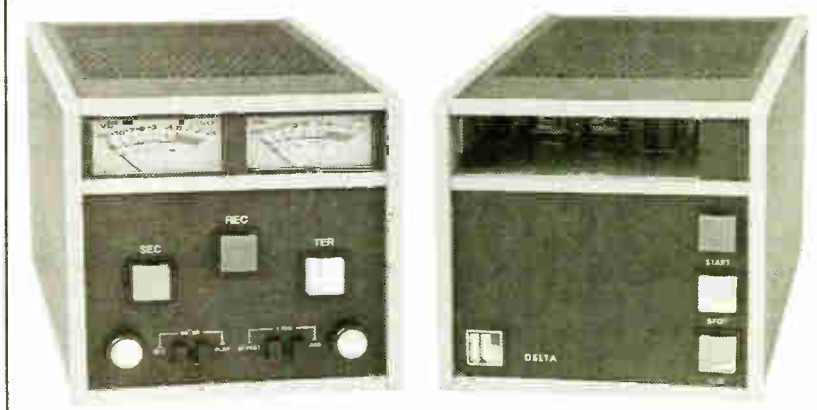

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4 bay antenna on or near 102.7, ERI preferred. P Lopeman, 414-482-1959.

ERI high pwr 6 bay antenna on 96.1, also want 3-1/8" transmission line. B Evans, 502-737-8000.

AUDIO PRODUCTION

Want to Sell

Koss LV-20 stereo headphones, new in box will trade for older pair working AKG K-141 or K-240 headphones; Fostex 3180 stereo reverb unit w/24 mS pre-delay, rack mountable, vgc, will trade for old UREI Cooper Time Cube 920-16; AKG R-25 RCU w/33' cable & connector for AKG BX-25 reverb unit, will trade for TEAC RC71, RC170 or RC-190 RCU; KLH/Burwen TNE 7000A transient noise eliminator, trade for old UREI Cooper Time Cube. J Roper, 812-877-2663.

TEAC 2A 8 chnl mixing board w/meter bridge, excel cond w/manual, $200/firm +shpg. Scott, 352-463-2283.

ANTEX AUDIO CARDS, will not be undersold. A.S.C. (619) 523-1575.

Want to Buy

Soundworkshop 40 for parts, whole or modules. A Polhemus, 212-302-9010.

AUTOMATION EQUIPMENT

Want to Sell

Westwood One Mutualert decoder cards (2), one for 48-58 comm start & one for 48-59 station ID, no pwr supply, edge card connector included, $130 ea; CBS NetAlert decoder in rack mount enclosure w/manual, $250/firm. J Raynor, 703-329-1236.

BE Audio Vault AV100, on air w/prod machine, 2 yrs old, excel cond, ready to ship, BO. M Bohach, 740-653-4373.

Smartcaster Generation 2000, 2 yrs old w/PB unit, prod unit, (2) r2d2 switchers, Akai 4 4 trk digital editor, $15,000. M Williams, 417-781-1313.

ANTEX DIGITAL AUDIO CARDS, NEW, call for price, Shurla at Compusound, 626-859-0213.

Want to Buy

Audisk system w/switcher & monitor. P Lopeman, 414-482-1959.

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ITC Delta stereo play triple decks (5), $895. S Scarborough, 410-335-3136.

Radio Systems RS-2000 stereo R/P w/secondary tertiary tones, phase correction, flutter reduction, white noise gen, documentation, mint cond, $350. K Boone, 530-877-7167.

Spotmaster X-700-P PB, Tapecaster X-700 (2) PB all for $350 +freight; Tapecaster X-700 R/P, (3) Tapecaster 700-RP R/P, all for $650 +freight; Gates PB, $50 + freight; RCA PB, $50 +freight. F Baranowski, 401-274-1999.

Tapecaster 700RP, mono w/low hrs, production mdl, single cue tone, like new, no manual, $200/firm +shpg. Scott, 352-463-2283.

ITC PD-II mono cart machines (4), gd cond, $100 ea. G Eike, 804-392-4195.

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CONSOLES

Want to Sell

Interface Electronics 32x8x2 mixing board w/lots of EQ & transformer inputs, $2000. J Borden, 414-482-8954.

BE 5BEM100 mono; Gates Yard 80 mono; Ampro 8 stereo; BE 85150 dual mono; Arrakis 2100SCT-125 12 ch stereo dual; Sparta 5 pot mono, $75; Harris Stereo 80 (2); Gates Producer; Collins 212M-1 8 chnl mono; Gates stereo Statesman 5 chnl. J Phillips, 419-782-8591.

Harris Stereo 5, 13 inputs, gd cond, $695. S Scarborough, 410-335-3136.

Pacific Recorders BMX-14 slide fader console. J Bahr, 340-719-9336.

Ramko DC-5RA 5 chnl dual mono output w/internal monitor amp, full docs/schematics, $150. C Siegenthaler, 509-453-5492.

Tascam M-2600, 24x8x2 audio board w/supply, like new, $2000. K Fariss, 303-713-0200.

Arrakis 500-SC 8 chnl board, dual inputs, gd cond, $1000/BO. G Myers, 520-341-9730.

Trident 80B, 24 buss, 30"x24 w/patch bay, excel cond, $30,000/BO. Russell, 323-464-7747.

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.

Want to Buy

8-12 channel slide faders. P Lopeman, 414-482-1959.

Auditronics 310, 310SLE, 310MIE, 310BA4 & 310IS4M modules, will consider full consoles. C Layno, 336-821-1144.

Sound Workshop 40 series for parts. A Polhemus, 212-302-9010.

DISCO-PRO SOUND EQUIP

Want to Sell

Radio Shack speakers in walnut, several avail, $25. J Emmel, 717-842-6065.

Westlake BB5M-12, great cond, $3500/pr or BO; BGW Sub 2200, sub-woofer powered, excel cond, $3500/BO. Russell, 323-464-7747.

JB Lansing 2200 bass speakers (4) & D-130's (4), 15" woofers, $75 ea. 616-782-9258.

LIMITERS

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MSI CP-803 composite clipper (2), $595. S Scarborough, 410-335-3136.

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Want to Buy

RCA BA-6 or BA86 in working or repairable cond. M Schackow, 605-374-3424.

Tube limiter for studio. M Hughes, 301-962-6823.

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.

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Want to Sell

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Samson wireless VHF FM ST-2, on 170.245 MHz, Sony mic receiver, MR-1 ch 14, perfect cond, $200. B Kidd, 800-675-8501.

Radio Shack hand-held dynamic mics, $25. J Emmel, 717-842-6065.

Will trade RCA 44 & 77 mics for tube compressors, old or modern. M Wilson, 541-747-5205.

Various mics, (2) AKG D20, (6) AKG D202, (2) AKG D24, EV RE 15, Shure SM53, (3) AKG D19, all are well used & work, BO on some or all. R Rhodes, 212-245-5045.

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.

Want to Buy

Shure SM-5B, EV RE-20 or Sennheiser 421; mic processor Air Corp Pro Announce 500 or Symetrix 528E. P Lopeman, 414-482-1959.

Ribbon & condenser mikes for studio. M Hughes, 301-962-6823.

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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MISCELLANEOUS

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Eventide BD-955 broadcast digital audio delay (2). S Scarborough, 410-335-3136.

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MISC. cont....

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Neumann CMV 563 tube mic, original P/S & cables, M-7 capsule, $2000; Neumann UM-57 tube mic, $1800; Telefunken M221B tube mics w/934B caps, $2000/pr; AKG C-24 tube stereo, $5800. F Danner, 781-294-1218.

Retired broadcast consultants three bibles of the industry: Kraus, Jasik, Laport, $100. M Saxon, 409-634-9558.

Syndicated radio programs avail for air time, various shows from sports, talk, dance music & R&B slow jams. D Mitchell, 888-981-5321.

Technics AM/FM digital tuner, great cond, $50. G Myers, 520-341-9730.

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.

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McIntosh L-12 cabinet for McIntosh C-28 & MA-230. JP Robillard, 504-834-5010.

UTC A, HA. LS, transformers. WE 111C repeat coil, Triad R6A pwr transformers. M Hughes, 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.

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Tascam 401 MK II rack mount CD player, must be nice. Scott, 352-463-2283.

Ampex ATR100 tape recorders 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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Scully 280 parts-meters, cards, transformers, motors, transports, heads, pwr supplies, 2 trk, 8 trk. M Hughes. 301-962-6823.

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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.

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3CX400A7	3CX15,000A7	4CX1600B	6550C (*See SV6550C*)	SV572-30
3CX2500A3	3CX15,000H3	4CX3500A	6AS7G	SV572-160
3CX2500F3	3CX20,000A7	4CX5000A	6BM8	SV6550C
3CX2500H3	3CW20,000A1	4CX5000R	6D22S	SV6L6GC
3CX3000A7	3CW20,000A7	4CX7500A	6L6GC (*See SV6L6GC*)	SV811-3
3CX3000F7	3CW20,000H3	4CX10,000D	6N1P	SV811-3A
3CX4500F3	3CW20,000H7	4CX12,000A	811A	SV811-10
3CX6000A7/YU148	3CW30,000H3	4CX15,000A	812A	SV811-10A
3CX10,000A3	4CX250B	4CX15,000J	833A	TH5-4
3CX10,000A7	4CX250BC	4CX20,000A	8161R	TH5-6
	4CX250BT	4CX20,000B	8560AS	TH6-3
	4CX250R	4CX20,000C	EF86	TH6-3A
	4CX350A	4CW10,000A	EL34	YC130/9019
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Wilkinson 2500E, 2.5 kW w/Continental SSW exciter; Harris 2.5 kW FM xmtr, no exciter, needs work. J Bahr, 340-719-9336.

Jones/Tepco J-316M, rated for 10W of output, input freq on 94.7 FM & output is 95.9 FM, $2000/BO. G Croniser, 315-376-6518.

Want to Buy

FM exciter, BE FX-30 or 50 preferred; 5 kW Harris or CCA single phase preferred. P Lopeman, 414-482-1959.

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3 KW	FM	1975	CSI FM300E
5 KW	FM	1988	Harris FM 5K1
5 KW	FM	1983	Harris FM 5K
5 KW	FM	1982	Continental 816R1
5 KW	FM	1967	Collins 830E
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10 KW	FM	1962	RCA BTF 10D
20 KW	FM	1970	Harris FM 20H3
25 KW	FM	1981	Harris FM 25K
25 KW	FM	1981	Harris FM 25K

1 KW	AM	1979	Harris MW1A
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EMPLOYMENT

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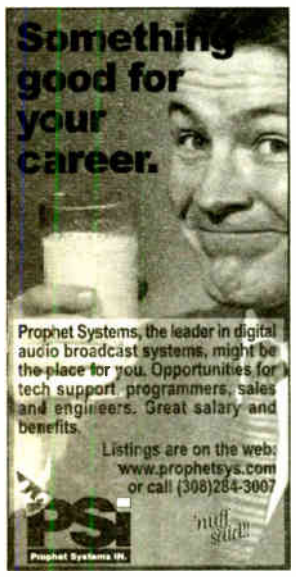
Radio World, POB 1214, Falls Church VA 22041.
Attn: Box #: 99-3-17-2RW.



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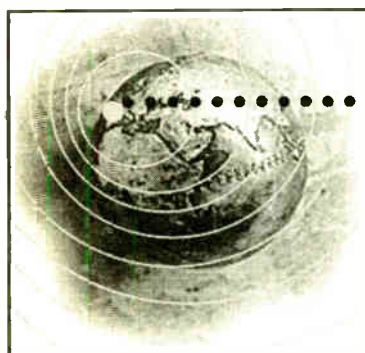

Broadcast Operations Supervisor

Radio Free Europe/Radio Liberty (RFE/RL) broadcasts 800 hours per week in 25 languages to 20 million regular listeners in Central and Eastern Europe, the former Soviet Union, Iran and Iraq. We are currently seeking a qualified professional to join our team in **Prague, Czech Republic**.

The Broadcast Operations Supervisor will coordinate studio usage for a diverse group of broadcast journalists; supervise and schedule studio technicians; provide technical/production assistance and training for broadcasters; maintain statistics data; and manage the Music Library staff.

We require a university degree in Radio/Television Production or related field and a minimum of 10 years related experience, 4 of which are in a management role. Our ideal candidate will have strong skills in TV and video production, AudioVault Digital Audio System and AVID editing systems. A working knowledge of MS Word, Excel, Access and Lotus Notes and advanced skills in reading, comprehending and communicating English desired.

To apply in confidence, please forward your resume, cover letter and salary history to:

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Attn: IQ
1201 Connecticut Ave., NW
Washington, D.C. 20036
Fax: (202) 457-6974
E-mail: HRDC@rferl.org

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Please print and include all information.

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Title _____

Company _____

Address _____

City _____ State _____ ZIP _____

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N23
March 17, 1999 Issue
Use Until June 17, 1999

1 Type of Firm (check one)
- D. Combo AM/FM stations
- A. Commercial AM station
- B. Commercial FM station
- C. Educational AM/FM station
- E. Network/group owner
- F. Recording Studio
- K. Syndicators/Radio Station Service Providers
- G. Audio For Video (TV Station/Teleprod Facility
- H. Consultant/Ind Engineer
- I. Mfg, Distributor, or Dealer
- J. Other

2 Job Function (check one)
- A. Owner/President
- B. General Management
- C. Engineering
- G. Sales
- H. Programming/News
- J. Promotion
- F. Other _____

3 Purchasing Authority
- A. Authorize/Make Final Decision
- B. Evaluate/Specify/Recommend
- C. No Purchasing Authorit

4 Equipment/Services Purchases in the Next 12 Months (Check all that apply)
- A. Transmission, STL/RPU
- B. Antennas, Towers, Cable
- C. Audio Procession Delays
- D. Telco, Codecs, Remote, Field, Audio
- E. RDS/RBDS & Subcarrier Equipment
- F. Delivery Systems & Satellite Equipment
- G. Digital Editing & Production
- H. Live Assist, Automation
- J. Consoles, Mixers, Cabinetry
- K. Headphones
- L. Microphones
- M. Monitors/Speakers
- N. Studio Audio Sources & Switching
- O. Syndicated Programming
- P. Test, Monitoring & Remote Control

5 Equipment Budget For Next 12 Months
- A. Less than $2S, 000
- B. $ 2S, 00- 99,999
- C. $100,000 - 249,999
- D. $ 2S0,000- $499,999
- E. Over $S00,000

001	036	071	106	141	176	211
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014	049	084	119	154	189	224
015	050	085	120	155	190	225
016	051	086	121	156	191	226
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020	055	090	125	160	195	230
021	056	091	126	161	196	231
022	057	092	127	162	197	232
023	058	093	128	163	198	233
024	059	094	129	164	199	234
025	060	095	130	165	200	-
026	061	096	131	166	201	-
027	062	097	132	167	202	-
028	063	098	133	168	203	-
029	064	099	134	169	204	
030	065	100	135	170	205	
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For Immediate Response, Fax to: 703-820-3310

World Radio History

ACTION-GRAM

TV Technology's Broadcast Equipment Exchange provides a FREE listing service for TV stations and production studios *only*. All other end users will be charged. This FREE service does not apply to Employment Help Wanted ads or Stations For Sale ads. These are published on a paid basis only. Send your listings to us by filling out the form below. Please indicate in which category you would like your listing to appear. Mail or fax your listings to the address below. Please be aware that it takes one month for listings to appear. The listings run for only one issue and must be resubmitted in order to run again. Thank you.

Please print and include all information:

Contact Name _____

Title _____

Company/Station _____

Address _____

City/State _____

Zip Code _____—_____

Telephone _____

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

Are you currently a subscriber to Radio World?
❑ Yes ❑ No

Signature _____ Date _____

Please check only one entry for each category:

I. Type of Firm

- ❑ D. Combination AM/FM station
- ❑ A. Commercial AM station
- ❑ F. Recording Studio
- ❑ K. Syndicators/Station Providers
- ❑ M. Ind. Engineer
- ❑ B. Commercial FM station
- ❑ G. Audio for Video/TV Station
- ❑ C. Educational FM station
- ❑ H. Consultant/ind engineer
- ❑ E. Network/group owner
- ❑ I.Mfg. distributor or dealer
- ❑ L. Consultant
- ❑ J.Other _____
- ❑ N.Delivery Service (Internet/Cable/Satellite)

II. Job Function

- ❑ A. Ownership
- ❑ G. Sales
- ❑ B. General management
- ❑ E. News operations
- ❑ C. Engineering
- ❑ F. Other (specify)
- ❑ J. Promotion
- ❑ K. Production Mgt or Staff
- ❑ H. Programming/production

WTS ❑ WTB ❑ Category: _____
Make: _____ Model: _____
Brief Description: _____
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Price: _____

WTS ❑ WTB ❑ Category: _____
Make: _____ Model: _____
Brief Description: _____
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Brief Description: _____
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Price: _____

WTS ❑ WTB ❑ Category: _____
Make: _____ Model: _____
Brief Description: _____
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_____
Price: _____

*Closing for listings is every other Friday for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

Broadcast Equipment Exchange
PO BOX 1214, Falls Church, VA 22041 • Tel: 800-336-3045 • Fax: 703-998-2966

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This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

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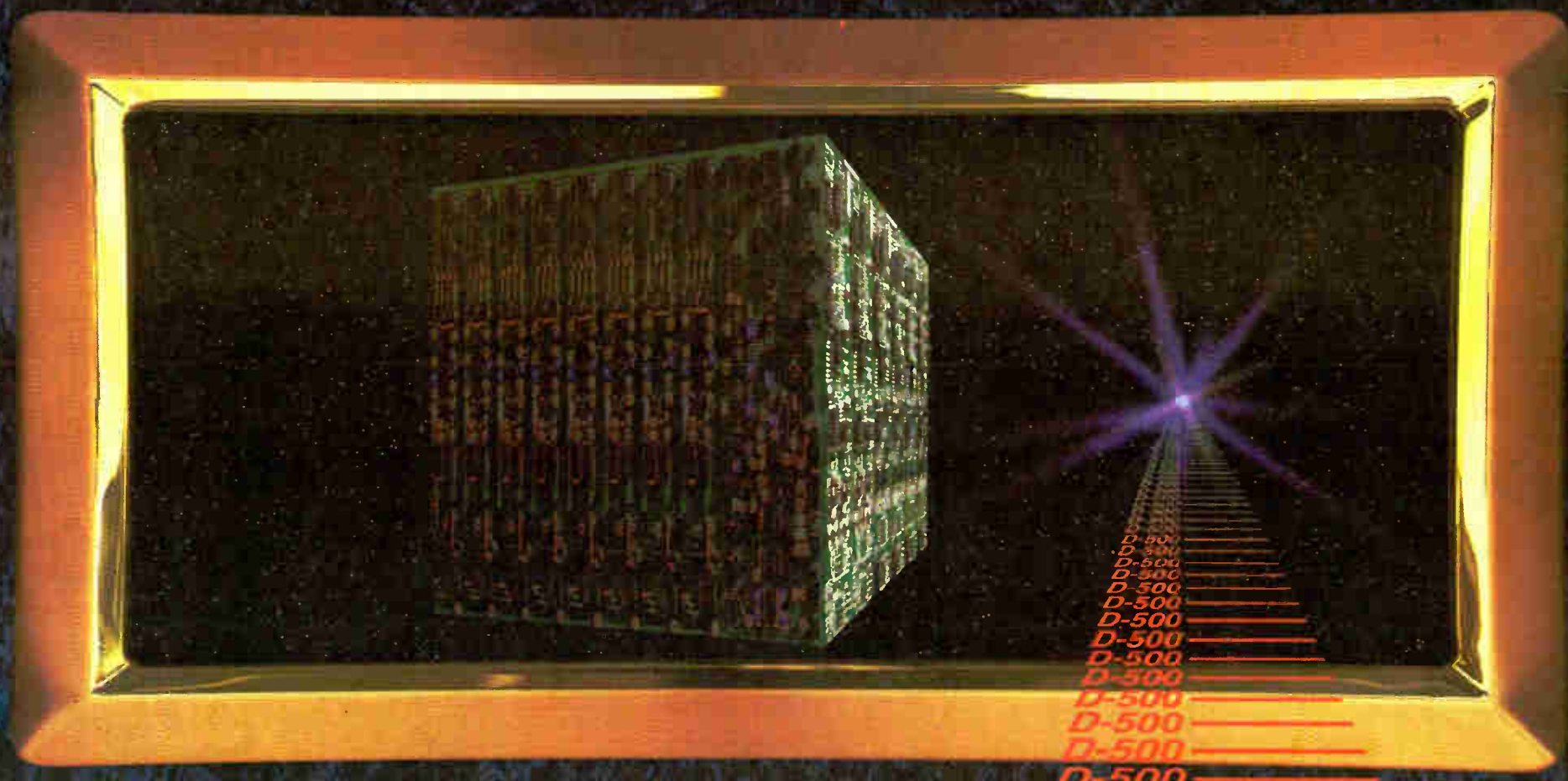

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