

*****3-DIGIT 857
 S117298 D08 9903
TOM MILLER
 ASST CHIEF ENGINEER
 KTZR
 2033 S AUGUSTA PL
 TUCSON AZ 85710 7905

891

Readers Forum

Don't forget: Letters and Opinion are now on the last inside page of RW.

See Page 62

Get Media

This Silicon Valley firm hopes to combine the power of radio and music retailing.

See Page 38

Radio World

**Get
Media**

The Newspaper for Radio Managers and Engineers

June 9, 1999

INSIDE

NEWS

▼ The fate of transmitter supplier CCA may be decided soon.

See Page 3

▼ How can technical people prepare for radio's next decade? Paul J. McLane comments.

See Page 4

ENGINEERING

▼ Dennis Gilliam puts a 10 GHz digital radio system to work in Arizona.

See Page 27



▼ In the highlands of Bolivia, it's not uncommon to see a herdsman with his radio and llama.

See Page 30

GM JOURNAL

▼ Alan Haber on RealPlayer G2 and the latest Microsoft Media Player.

See Page 36

▼ In Ludington, Mich., they call Tommy Roy "The Voice." After four decades, he's earned the nickname.

See Page 42

STUDIO SESSIONS

▼ More powerful processors, hard drives and CardBus slots are turning the new generation of laptops into professional-quality field recording devices.

See Page 47



Visit RW Online at www.rwonline.com

How Radio Covered Columbine

by **Randy J. Stine**

DENVER The shootings at Columbine High School in Littleton, Colo., demonstrated how quickly radio news can react in covering a local emergency. The situation also showed the challenges in getting live reports on the air quickly, especially in an area with such difficult topography.

Two young gunmen killed 12 classmates and a teacher before taking their own lives on April 20.

Along with all the national media, most of Denver's radio stations, from CHR station KQKS(FM) to alternative KXPK(FM), provided special coverage of the tragedy.

The activities at Jacor station KOA(AM) provide a glimpse into how an all-news station in a major market responds to such a breaking story.

Jan Chadwell, chief engineer for KOA, said the Mile High City presents several obstacles when it comes to RPU transmission.

See SIGNAL, page 12 ▶

AM Directional Antenna Proposal Moves Ahead

by **Lynn Meadows**

WASHINGTON There are several proposals before the FCC aimed at helping those who make their living in kilohertz. Of the proposals, it appears one, on AM directional antenna systems, has taken a big step forward.



Photo by Alan R. Peterson

An FCC source said the commission is likely to issue a Notice of Proposed Rule Making soon on a proposal to allow AM stations to use updated technology to make it easier and less expensive to perform performance verifications of directional antenna systems.

The idea is not new; the proposal has

been before the commission for 10 years. In 1989, the firms of duTrel, Lundin & Rackley Inc.; Hatfield & Dawson Consulting Engineers Inc.; Lahm, Suffa & Cavell Inc.; and Silliman & Silliman filed a Petition for Inquiry on the rules regarding the performance verification of AM directional arrays.

The petition asked the FCC to review the pertinent regulations and consider the adoption of simpler, less expensive regulatory means made possible by advances in antenna analysis methods and instrumentation technology.

"There has been no wide-ranging

See AM, page 8 ▶

CEC

CONTINENTAL ELECTRONICS CORPORATION

EXCELLENCE IN BROADCAST TECHNOLOGY.

www.contelec.com

AM/FM

DTV

DAB

HIGH POWER

1999 Continental Electronics Corporation

◆ NEWSWATCH ◆

LPFM Extension, IBOC to Come

WASHINGTON The FCC has again extended the comment period for the low-power proceeding (MM 99-25).

The FCC also announced it intends to begin a rule making on in-band, on-channel DAB this summer. "We believe doing so at the same time we are considering proposals in the low-power radio proceeding will help focus issues regarding the compatibility of the two services," stated the FCC in its order.

FCC Chairman Bill Kennard has said,

"We don't want to leave radio in the Dark Ages while everybody else goes digital."

The Corporation for Public Broadcasting and National Public Radio had requested a 60-day extension in the low-power proceeding. NAB had asked for an extension of at least 60 days, until the completion of several studies on the potential interference that could be caused by introducing LPFM stations.

Several parties, including the Amherst Alliance, opposed another extension.

In granting the second extension, the FCC said it balanced the need to give parties enough time to conduct appropriate tests and the need to avoid unneces-

sary delays in the LPFM proceeding.

LPFM comments are now due Aug. 2 and replies on Sept. 1.

DOJ Challenges Citadel, Capstar

WASHINGTON The Department of Justice filed a lawsuit challenging a joint sales agreement between Citadel Communications Corp. and Triathlon Broadcasting Company in two markets.

The lawsuit, filed in U.S. District Court, charged the companies with eliminating price competition between the companies' radio stations in Colorado Springs, Colo., and Spokane, Wash. The lawsuit also challenges Triathlon's acquisition of three radio stations in Spokane.

According to the complaint, in Colorado Springs, Citadel sets prices and sells ads on three stations it owns, plus four owned by Triathlon, garnering about 58 percent of the radio ad market.

In Spokane, the DOJ said Citadel sets prices and sells ads under the JSA on four Citadel stations, and four Triathlon-owned stations for a combined total of about 44 percent of the ad market.

Triathlon garners about 26 percent of the radio ad market in Spokane on the other three stations it owns.

The DOJ proposed a settlement that,

See NEWSWATCH, page 3 ▶



Audioarts Value!

THE NEW R-17 LIVE RADIO CONSOLE

Of course you want a console that's cost effective, but naturally you don't want to compromise on sound quality.

The R-17's modular design utilizes top grade components and circuits for superb performance, and with basic features like machine control, cue and talkback all handled, it's perfect for smaller stations looking to upgrade—as well as larger facilities in need of an aux studio or newsroom console.

Get in touch with Audioarts...you'll like our specs—and our price!

AUDIOARTS' ENGINEERING

a division of Wheatstone Corporation — 600 Industrial Drive, New Bern, NC. 28562 (tel 252-638-7000/fax 637-1285)



Index

FEATURES

FCC Phone Book	15
A Focus on AM Antenna Sites by Ed Montgomery	16
SBE Publishes New Handbook by John L. Poray	18
Workbench: Solutions to Ground Wire Puzzle by John Bisset	25
Part 21 Works in Phoenix by Dennis Gilliam	27
Quechua Indians Get Shortwave by Eldon Porter	30
A Side Trip Into 'Coax' by Steve Lampen	32

GM JOURNAL

Net Downloads Raise Questions by Carl Lindemann	35
Fries: We Can Do Even Better by Marguerite Clark	35
Media Players Make Listening Easy by Alan Haber	36
Weigh Success by Brand, Not Bucks by Kim Komando	37
Get Media Brings the Retail to You by Carl Lindemann	38
Station Services	40
Roy Returns to Michigan Roots by Scott Seeburger	42

STUDIO SESSIONS

Laptop Tools for Radio Reporters by Carl Lindemann	47
Helpful Hints for the Radio Studio by Bruce Bartlett	47
dbx DDP Takes the Digital Road by Ken R.	48
Radio Life Norwegian-Style by Randy Trelstad	49

BUYERS GUIDE

Processors Continue to Mature by Tom Osenkowsky	51
Optimum Sound With Optimod by Michael P. Kernan	52
Going Against the Grain[ness] by Ken Dillard	52

Decision on CCA Bankruptcy Nears

by Randy J. Stine

FAIRBURN, Ga. A bankruptcy court in Atlanta could soon rule on a motion to dismiss CCA Electronics Inc. from its Chapter 11 bankruptcy claim or to divert the company into Chapter 7 to be liquidated to satisfy creditor's claims.

At the same time, CCA attorney Frank Scroggins said the company continues to seek an outside party interested in providing equity. Scroggins declined to speculate further on any possible partners for CCA.

U.S. Department of Justice Attorney Leroy Culton filed the motion for the special hearing on May 4 in U.S. Bankruptcy Court in Atlanta.

"I've asked the court to either force

CCA and their lawyers to file a reorganization plan by a drop dead date, to dismiss or order them into Chapter 7," Culton said.

Culton said the presiding judge could rule immediately or defer a ruling to a later date.

He hopes to have a final decision from the court by the middle of this month.

"It's easy to sit in Chapter 11 forever and have the protection of the court," Culton said.

"This will force (CCA) to act. They'll either file a plan showing some kind of cash infusion, leave the protection of the court or they liquidate in Chapter 7," said Culton.

"We would have liked more time, but we still intend to file a plan of reorganization with the court," said

Scroggins.

CCA's Chapter 11 filing in October 1998 allowed the company protection from creditors while attempting to reor-

declined comment when asked whether Summit was still willing to negotiate a payment plan with CCA.

CCA had an exclusive period of 120 days from the filing (Oct. 26) to file a plan.

After that period, any creditor or other interested party could have submitted a

It's easy to sit in Chapter 11 forever and have the protection of the court. This will force (CCA) to act.

— Leroy Culton
U.S. Attorney

ganize (RW, Jan. 20). A Chapter 7 filing calls for the immediate dissolution of a company.

The radio transmitter company's assets were estimated at just over \$1.1 million

in court papers filed last October. Outstanding liabilities were listed as nearly \$2.5 million.

One hundred fifty-five unsecured creditors were named. **Radio World** is one of the unsecured creditors.

Summit National Bank was listed as CCA's largest secured creditor. CCA owed Summit \$326,000.

Last fall, Summit National Bank Vice President Ling Chiang said Summit National "was attempting to cooperate with CCA's plans to reorganize operations and remain in business."

When contacted in May, Chiang

plan. Culton said no creditor had filed a plan by mid-May.

Culton said the case has moved along slowly since October because a committee of unsecured creditors appointed by the United States Trustee has not taken an active role in the process. The committee can make recommendations to the court regarding a reorganization plan or a possible Chapter 7 conversion. CCA owner Ron Baker did not respond to several requests for an interview. He told **RW** previously that the company would continue to service customers and honor warranties throughout the bankruptcy proceedings. Baker has owned the company since 1982.

The company has fewer than a dozen employees at its headquarters outside of Atlanta.

NEWSWATCH

► **NEWSWATCH**, continued from page 2 if approved by the court, would settle the case.

Capstar Broadcasting Corp. has acquired Triathlon. Under terms of the settlement, Citadel and Capstar would end the Citadel/Triathlon JSA and Capstar would spin off one station in Spokane.

Capstar and Citadel have agreed to exchange certain stations. The result would lower each company's share of the radio ad market in Colorado Springs to about 40 percent for Citadel and about 16 percent for Capstar. After the exchanges in Spokane, Capstar and Citadel would each garner about 35 percent of the radio ad market.

Clear Channel Buys Jacor

Clear Channel Communications has closed its \$6.5 billion purchase of Jacor Communications. Jacor Chief Executive Officer Randy Michaels was named Clear Channel radio president. The purchase gives Clear Channel a total of 450 stations, making it the second-largest radio group in the country, behind Chancellor Media Corp.

\$4,000 Fine For WLMA

WASHINGTON The FCC has upheld a \$4,000 fine against Morradio Inc., licensee for station WLMA(AM) in Greenwood, S.C., for moving its transmitter without commission authorization. In its original fine in 1997, the Atlanta Field Office cited the station for moving its transmitter ten miles from its licensed site. At the time, a person identified by the FCC as "Mr. More" showed the agent an undated request for a Special Temporary Authorization to operate from the new transmitter location.

The agent said More said he had sent in the request. The agent said More would have to stop operating from the

unauthorized location and send in a legitimate STA request.

The FCC said More sent in the STA request, but it was rejected by the Mass Media Bureau because the station's license had expired and Moore had not filed for a renewal. The FCC terminated WLMA's operating authority. The Mass Media Bureau also denied the STA request (to transmit from the new location) because of contour coverage reasons.

In 1998, the FCC said it verified that the station was still operating from the unauthorized transmitter location and levied the fine. At the same time, the FCC accepted WLMA's application for license renewal and reinstated the station's operating authority.

In Morradio's response to the fine, its attorney said that Morradio did not have the funds to pay the penalty. The FCC said no proof was provided, and upheld the fine.

FCC Page Helps Parents

WASHINGTON Noting that some parents are overwhelmed by the vast opportunities of the Internet, FCC Chairman Bill Kennard said the FCC has created a page — the "Parents, Kids and Communications Page" — on its Web site that contains information on filtering software.

In addition to product information to enable parents to "chaperone" their kids' Internet use, Kennard said that information is also included "on how to block 1-900 calls and how to get a cable 'lock-box' to block out the channels that you don't want your children to see."

The TV ratings system and the so-called "V-chip" are also explained. Parents can use the ratings system (on program content) to program the silicon chip to block selected programs. By July 1, Kennard said, half of all new TV sets will have a V-chip. All new TV sets will have the chip by Jan. 1, 2000.

The FCC's Web site is www.fcc.gov

WHAT COMES AFTER DIGITAL?

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

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

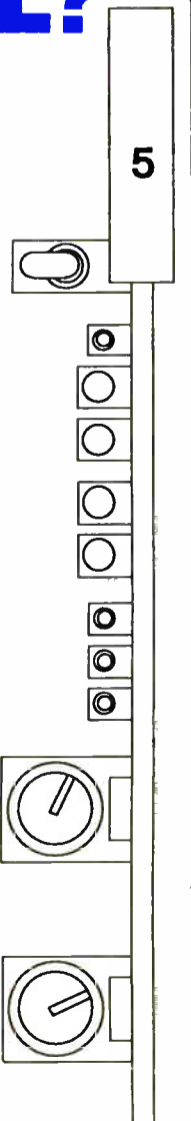
Digital audio is also not a terminal technology. It is simply where we are now.

Want to know what comes after digital? Call (724) 772-2310 and ask for our white paper "Artificial Intelligence, It's What Comes After Digital". While you're at it, you could also ask for a no-obligation, 10-day demo of COBALT BLUE™, the world's first Neural Network audio processor.

CLARK COMMUNICATIONS

221 Commerce Park Drive,
Cranberry Township, PA 16066-6403
(724) 772-2310 Voice (724) 772-4770 FAX

5



Fluency and the 2000 Engineer

Engineers, Owners and Suppliers Must Cooperate To Develop Technically Fluent Radio Professionals

An all-day session at the recent NAB99 convention dealt with "Digital Audio for Broadcast Engineers."

I was asked to speak at this session, part of the Ennes Workshops and the Broadcast Engineering Conference. Here are excerpts from my remarks, titled "The 2000 Engineer."

★ ★ ★

Rick Farquhar, the organizer of this session, asked me in my role as editor of *RW* to speak about how things look from our perspective — how broadcast engineers and managers are dealing with the realities of consolidation and the demands of digital audio.

The short answer is, the industry isn't dealing with those realities well enough, or fast enough.

You know the reality. You hear it from your colleagues every day.

- "There are not enough young people coming into radio engineering."
- "The big radio groups don't pay enough."
- "I don't get the respect of the general manager."
- "I can do better in the information technology business."
- "I don't make nearly enough money to be pulled out of bed with my spouse by a pager call 24 hours a day."
- "The station treats me like a janitor."

The radio engineer — the *digital* engineer, really, because that's where we're headed — in the year 2000 is going to be dealing with the same unpleasant facts of life. But maybe by 2005, we can turn things around.

Fluency

The Computer Science and Telecommunications Board of the National Research Council just released a report called "Being Fluent With Information Technology." They wanted

to understand what's necessary for people to use information technology effectively and to adapt to changes.

The report has lessons for us. It looks at the problem of understanding information technology from the standpoint of "fluency." The group says fluency requires a deeper understanding of how computers work and mastery of technology for information processing, communication and problem solving. It requires people to continually build on their knowledge of information technology to apply it more effectively.

The report wasn't about radio or digital audio. But it reminds us that the successful implementers of technology are going to be those who make fluency a

Are radio engineers and owners committed to developing technical fluency? Many are not.

life-long process.

Today I call on radio engineers, radio employers and radio equipment manufacturers to commit to this: To making ours an industry of fluent technology users.

Are broadcast engineers committed to making themselves more fluent? Many are not.

I know a radio engineer who can tell you anything you want to know about AM ground planes, but until a few months ago didn't know how to work his e-mail.

That's an extreme example. And on the other end of the spectrum is one major group engineer who complains to me that in the past few years, *his* biggest new duty is teaching *his* general manager how to use *his* e-mail.

He's frustrated. He's a high-tech baby-sitter.

But how many engineers do you know who go about their jobs, heads down, without making the commitment to make themselves fluent?

I've asked many people, "What can broadcast engineers do today to prepare themselves for their profession in the next five years?"

Over and over, the answer is the same: They'd better be out there getting to know computer networking, backwards and forwards. Incorporating I-S functions into their skill set.

Freshening skills

A lot of products may not look like a PC, but they are software-based. So much of the integration protocol is on network models.

It's time to go back to school, whether it's on Microsoft Outlook or LAN/WAN basics or Webcasting.

From the Editor



Paul J. McLane

We publish a series in *RW* called "Transition to Digital." Among the newest big installations in the United States is the Emmis Communications headquarters in Indianapolis. Emmis spent \$25 million on it. They put five stations, two networks and several other businesses in there.

It has 25 studios; three technical centers, with 32 racks for satellite, ISDN and T1 equipment; and 20 digital consoles.

There was a big team on that job, but the two people I interviewed typify what I'm talking about.

Curtis Taylor is the chief information officer for Emmis. He started his career in 1989 as a systems programmer and he has a BS degree in Advanced Technical Studies, an AAS degree in Computer Information Processing, a Masters in Business Administration, and an MA in Telecommunication Management.

This is what a successful technical manager looks like.

Curtis Taylor works with Dave Hood, the chief engineer of WTLC-AM-FM. Dave is probably more the kind of person that you and I think of as a radio engineer. He graduated with a BSEET in 1977, and he has done contract work for 12 stations. But he loves working with Emmis and Curtis Taylor, and he's an expert on the BE AudioVault.

Dave comes at this career from a different direction than Curtis, but he too is a fluent radio and computer professional.

Another example is a person right here in

See FLUENCY, page 10 ▶

Burk puts you in control.



ARC-16: The industry standard for multi-site transmitter remote control.

BURK
TECHNOLOGY

Toll Free 1-800-255-8090 • email: sales@burk.com

With
NEW
AutoPilot
FOR WINDOWS

"It's almost like standing in front of the transmitter!"

GUEST COMMENTARY

Quad's Royalty Claims Explained

Mike Fessler of QDI Responds to Industry Questions About EAS Royalty Dispute

Dear RW,

Thank you, for allowing QDI to address the issues raised by Mr. Bill Ashley in his guest commentary published in the April 28th issue of *Radio World* ("Ashley: QDI Should Explain Itself").

QDI developed and patented the Storm Alert For Emergencies *system* that uses encoders, decoders, transmitters, and receivers to deliver geographically specific warnings using the audio channel of commercial broadcast stations to deliver digital warning data. We did not patent, and are not trying to claim patent rights for, the transmitters or any other previously patented components used in our SAFE *system*. We hold a patent for the SAFE warning system that also includes independent claims for a stand-alone warning receiver.

Many patented systems and end user products employ previously patented hardware and sub systems. For example, there are patented breakthrough medical procedures that involve products using lasers. Should patents on these procedures not be allowed because the laser has already been patented? Should any patent granted on a system such as GPS technology be disallowed because the satellite, a key component needed for the system to work, had already been invented? If this were the case, all innovation and new product development would cease to exist.

SAFE patent claims

When the commercial AM/FM/TV broadcasters exercise the Emergency Alert System, they are using claims in the SAFE patent. This is our only motive for asking the commercial broadcasters for a royalty. QDI developed the SAFE system and was granted a patent in 1992. The FCC released the EAS standard two years after we provided them information about our SAFE patent. Any apparent "timing" of our actions has been driven by the actions of the federal government to deny our patent claims and block any attempts by QDI to license the SAFE patent. We invite interested parties to visit our Web site at www.quaddimension.com and examine the history of our development of SAFE. We invented the SAFE system to help save lives, and have no desire to attempt to put the EAS on hold for our own financial gain.

There seems to be a general misconception about automobiles and royalty payments for patented systems within these vehicles. Anyone knowledgeable about the business of manufacturing of any product, including cars, knows that royalty payments are treated like other operating costs and are added into the purchase price of the product.

Consumers are very naïve if they believe that the end user of any product, including cars, incorporating new innovations is not paying for the cost of development, licensing fees, and royalties that the manufacturers incurred in bringing the product to market.

The royalty fee we request for use of our patent is what we believe to be fair for the amount of time and money we have invested in SAFE since the patent was granted and for making our idea available to others. The cost of the EAS

"unit" that all broadcasters were required to purchase is only one element of a *system* protected by our patent claims and has nothing to do with QDI's expectations of fair return in its investment in

We did not patent, and are not trying to claim rights for the transmitters or any other previously patented components used in our SAFE system.

SAFE. The only "item" involved here is the SAFE *system* patent claims.

In any enterprise, there is a cost of doing business. In the broadcast industry, the cost of utilities, transmitting equipment, towers, mobile equipment, salaries, programming, royalties to artists and license fees to equipment manufacturers are ultimately passed on to the advertisers. In a station with only ten advertisers, the small monthly fee we are requesting would result in an increase of only \$1.50 to \$2 per month per advertiser. Monthly expenses for a quick stop at McDonald's each day for breakfast would far exceed what we are asking the broadcasters to pay for use of our SAFE patent.

Regarding comments about the EAS and its capability to deliver warnings, QDI believes that the EAS-adopted SAFE *system* offers the capability to achieve nearly complete geographically specific warning coverage of the United States with transmitter redundancy. This is the most flexible, comprehensive, wireless warning system ever offered to the public. To state that the EAS is "unworkable and useless" demonstrates the general lack of understanding about the operation and possibilities of the EAS.

Should the development and implementation of color TV, the VCR, communication satellites, the Internet, etc. have been abandoned because there were a few minor implementation problems and an initial lack of consumer hardware?

Many people commute to work daily and currently would not be able to receive EAS warnings pertinent to them while listening to their favorite tape or radio station. Some would contend that the EAS could not work as intended to deliver geographically specific warnings in this mobile setting.

Crisis mode

First of all, almost all major devastation, destruction, and loss of life occurs in towns and cities while people are in their homes and unaware of what is going on outside, not on the open road. This is the initial primary focus of any warning system. Assertions that the EAS is unworkable, useless, and impractical, based on mobile warning issues, need a closer look. Should the public be denied the opportunity to have a warning system in their homes because of mobile issues that could be readily resolved?

The fact is that the EAS can deliver warnings to people in a variety of set-

tings with the appropriate receivers and broadcaster participation. For example, consider the following situations:

- Stand-alone, single-tuner home receivers would be programmed by the user with the user's location and warning preferences, and would alert people in their homes at any time, on a geographically specific basis, with automatic

switch-over to user-programmed redundant broadcast stations.

- These home warning receivers could be built into TVs and AM/FM radios by adding the stand-alone warning receiver tuner, warning circuitry, and a programmable location feature to provide warnings even while people are watching or listening to program material not related to the warning broadcast station.

- Mobile, single-tuner, stand-alone receivers—similar to the home

Readers Forum is now on page 62.

receivers—could be used in cars, as long as the user actively tunes them to a broadcast station that is known to send out geographically specific warning codes for the locations of interest to the user.

- Mobile, dual-tuner receivers integrated into a car's radio could monitor broadcast stations—providing warning information pertinent to the vehicle's location—while the user is listening to another station, tape, or CD. The user would simply set the second tuner to a broadcast warning station that was known to send out geographically specific warning codes for the location of interest to the user. Advanced versions of this type of product in the future could be connected to a GPS system located in the vehicle to automatically update the user's location and the second tuner's frequency.

The EAS opens up warning technology to a consumer market that has to date been unable to receive adequate emergency notification in all areas of the United States. New products will be developed to take advantage of this capability. Assertions that the "system cannot work" and calls to "put a stop to

See QUAD, page 8 ▶

Expect The Best...

- Everything from Mics to Transmitters
- Exclusive non-factory source for PR&E products
- "One On One" personalized sales & service
- Fast FedEx shipping on all orders
- 39 years of equipping radio facilities nationwide

Your single source solution.



MAIN/MIDWEST OFFICE

Grand Rapids, Michigan
Voice: 800-999-9281
Fax: 616-452-1652
E-mail: support@abg.com

NORTH CENTRAL OFFICE

Duluth, Minnesota
Voice: 800-788-8759
Fax: 218-525-0455
E-mail: cgrace@abg.com

SOUTHEAST OFFICES

Mountain Home, North Carolina
Voice: 800-369-7623
Fax: 828-697-2691
E-mail: cindy_edwards@abg.com

Lexington, South Carolina
Voice: 800-951-7443
Fax: 803-951-3123
E-mail: jgeorge@abg.com

SOUTHWEST OFFICE

Palmdale, California
Voice: 800-858-9008
Fax: 805-273-3321
E-mail: tmezay@abg.com

www.abg.com

NEWS ANALYSIS

ABC/NABET Standoff Analyzed

by Randy J. Stine

NEW YORK Although the lockout by ABC of members of the largest broadcast technical union is over, the effects of the 11-week standoff between the two sides are still being observed. Engineers who *RW* spoke to had varying reactions to the situation. Some said it had little effect on their operations, that the issues in the lockout affected TV more than radio. But others said the lockout could have an effect on how management treats engineers in the future.

Only seven of 12 National Association of Broadcast Employees and Technicians bargaining units — all involved in the ABC lockout — approved the network's latest contract and NABET-CWA has filed charges against Disney/ABC with the National Labor Relations Board, charging that ABC acted illegally in imposing the terms of its contract proposal on the 1,800 employees who voted to reject the agreement in February.

Of the 1,800-member Engineering Group, about 100 are radio engineers and technicians. The group represents about 80 percent of the ABC union's total of 2,400 broadcast workers.

Glad to be back

Dave Bull, an ABC radio maintenance and field engineer and NABET member based in Washington, D.C., said he would like to see a split contract for radio and television technicians.

"This really wasn't about us (radio engineers), it was primarily about television. We just happened to get caught in the middle of it," he said.

Bull said he could have easily supplemented his income by working as a daily hire for other Washington-based networks and broadcast studios during the lockout, but chose not to.

"There was plenty of work around if you wanted it," Bull said.

He feels most NABET Engineering Group members who work in radio are happy to be back at work, even without a new contract. Bull said most people figured it was 50/50 as to whether the new contract would be accepted.

Lockout fallout

"I don't believe this will discourage anyone from entering the field or harm the profession," said Sterling Davis, vice president of engineering for Cox Radio. "I'm not sure the strength of NABET directly affects chief engineers in our group or any other radio group."

With most radio stations thin in the engineering department already, Davis thinks that the demand and supply for engineers will balance out.

"With consolidation within the groups and markets the past few years, a toll has been taken on the total numbers of engineers working. But eventually for the

little attention to the lockout, Smith said.

"Generally in the radio industry, unions are the exception rather than the rule. If you're unionized, it affects you. If you're not, it really doesn't," he said.

David Stewart, director of engineering for Hefel Broadcasting, does not believe much will come of the NABET lockout.

"It's possible there will be some trickle-down effect, but very little," said Stewart.

As Stewart sees it, the compensation will be there for good, young, qualified engineers. In fact, sometimes it's a case of the money being there, but no engineer.

"We have been so busy the past five to ten years consolidating and trying to grow in our own little worlds, that we have been blind to this pending shortage," he said.

Stewart said he and other group engineering directors were at a trade show recently and gave their business cards to a 24-year-old engineer who worked in a

**This really wasn't about us;
it was primarily about television. We just
happened to get caught in the middle of it.**

— Dave Bull
ABC Radio Engineer

ones who stick it out and continue to train and learn, I think some jobs will come back," he said.

Milford Smith, vice president of engineering for Greater Media, casually followed the ABC lockout. "In terms of our own organization, I don't see it affecting us at all. Where it will have some impact is with some of the other unions and their perceived strength, or lack thereof, after all of this," Smith said.

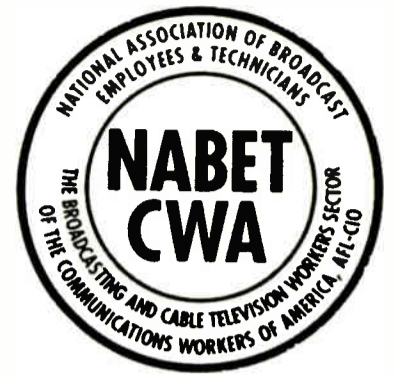
The lack of unionized engineering shops, except for a few major markets, meant that most major radio groups paid

small market.

"We all told her to call us in a couple of years after getting a little more experience. We have to start looking at the future and recruiting better," he said.

Hefel's 13 group chief engineers have a median age of well over 50, with the oldest being 67 years old, Stewart said. "We expect for that to continue to creep up with slim pickings of young talent."

Bull said the engineering interns he finds at ABC are as excited and eager as ever to learn the trade. "That's why we are fighting so hard now. It's to hang



onto the respect we have earned over the years and protect the profession."

NABET members were locked out by ABC for 11 weeks — beginning Nov. 3, 1998 — following a one-day work stoppage.

NABET members were protesting the lack of progress in negotiations with ABC since the expiration of their contract on March 31, 1997.

Replacement

ABC Spokeswoman Julie Hoover said the union workers were replaced by other ABC employees from all levels within the company, including management.

"I think that overall the number of production problems stemming from the strike were limited. We'll admit, however, there were some technical glitches," Hoover said.

An industry source familiar with negotiations said non-union ABC employees had undergone strike-training prior to the time NABET's six-year-old contract expired.

NABET members were allowed to return to work at ABC Jan. 15, after union officials agreed to allow the membership to vote on the latest contract offer and to give ABC advance notice on any future strikes.

"It was universally understood by membership that this could have been a better deal, but it was sufficient enough to vote on," said Tom Donahue, NABET spokesman.

In a letter to union members just prior to the February vote, ABC Inc. President Robert Iger characterized the company's latest proposal as a "final contract offer."

The contract offer

NABET officials said one of the major hurdles in bargaining had been ABC's request to change the pay structure of "daily hires."

"We are certainly not against daily hires," said Donahue. "Half of our membership are daily hires and they're an important part of our membership."

NABET opposed the new formula ABC would implement for daily hires regarding health care. "The daily hires don't have company-sponsored health care. Under the old contract, they received a 30-percent premium payment to help offset the cost of getting it on their own," said Donahue.

The new contract offer called for a flat fee of \$50. NABET sees that as a cut in salary for its members. "When it comes down to it, it is effectively a reduction in pay," said Donahue.

ABC's pension contribution was another point of contention. Donahue said ABC wanted a two-thirds reduction in its contribution to the pension plan. The contribution was 9 percent under the old deal. ABC wanted to cut it to 3 percent.

As of the first of May no new talks between ABC and the union had been scheduled.

On Target.
Performance,
value, and
reliability
through
innovative
technology.

5 models available.

- BC6DSL
- BC6DSR
- BC8DSL
- BC8DSR
- BC12DSL

Vanguard Series

STEREO BROADCAST CONSOLES



Call or write for free detailed brochure.
328 W. Maple Ave. Horsham, PA 19044, USA
(215) 443-0330 FAX: (215) 443-0394



AUDIO TECHNOLOGIES INCORPORATED

<http://www.ATiguys.com>

See Us at Infocomm Booth# 4757

DIGITAL NEWS

Chile Waits on DAB Decision

by Pablo Carrasco Ramirez

SANTIAGO DE CHILE Here in Chile, DAB has turned into a waiting game for broadcasters and authorities alike.

According to media watchers, the stalemate is due to each side waiting for the other to take the first, tentative step.

From the point of view of the authorities, Minister of Transportation and Telecommunications Claudio Hohmann Barrientos has said he is willing to lay out guiding principles for DAB, but he also said there have been no formal proposals for DAB services from broadcasters or other organizations in the country.

Initiative

According to Hohmann Barrientos, the initiative for digital radio must begin with broadcasters, because the law governing telecommunications in Chile is designed to react to changes in the media, not to create changes itself.

Last year public opinion was enthusiastic about reports in major journals

and newspapers about the benefits digital technology could bring to radio.

Part of the indecision lies in the fact that the United States has yet to decide

Chilean broadcasters believe IBOC will be less expensive to implement and more malleable than Eureka 147.

— César Molfino
ARC Chairman

Nevertheless, to speak of DAB in Chile is to talk of a giant step broadcasters are still not taking.

upon a system for digital radio. At the moment there is a great deal of interest in the in-band, on-channel DAB being dis-

cussed for the United States.

César Molfino, chairman of the Asociación de Radiodifusores de Chile, which unites nearly all the broadcasters in Chile, said he is willing to wait for the IBOC system.

Ease the transition

Chilean broadcasters like the idea of a system that eases the transition from analog to digital while preserving the use of VHF band II.

Although the technology is still in development and no one is sure what the final form of IBOC DAB will look like, Chilean broadcasters believe IBOC will be less expensive to implement and more malleable than Eureka 147, according to Molfino.

With no decisions being made about See CHILE, page 10 ▶



BUSINESS DIGEST

Report business news to:
Radio World, P.O. Box 1214,
Falls Church, VA 22041,
or FAX (703) 998-7966

Shareholders: Dissolve CRL

TEMPE, Ariz. Shareholders for Circuit Research Labs have voted to dissolve the company, but President and Chief Executive Officer Gary Clarkson remained hopeful the audio processing manufacturer could find a buyer before that could happen.

Shareholders voted to dissolve the firm at their annual meeting on May 11.

CRL's board of directors had recommended the move in March because the company has lost money in five of the last six years (RW, Jan. 20).

Clarkson said the board has 120 days under Arizona law to revoke the dissolution without shareholder approval.

"That will only happen if we find a buyer for the company, which is still a possibility," Clarkson said.

Otherwise, he said, the company will cease operations later this year.

Shareholders, meeting at the company's headquarters, also re-elected CRL's board of directors.

Clarkson said 64.7 percent of the company's shareholders attended the meeting, with the majority voting for dissolution.

— Randy J. Stine

ISDN Simplicity.

Broadcasting on ISDN doesn't have to be complicated or expensive.

The Nexus has everything you need for full-fidelity, low delay, mono audio on ISDN. And it is extremely easy to use. With a list price of only \$2,300, there's no need to wait any longer to sound great.

(800) 237-1776
Comrex Corporation, 65 Nonset Path, Acton, MA 01720
Fax: (978) 635-0401 Fax-on-demand: (978) 264-9973
Email: info@comrex.com

COMREX
www.comrex.com

The FCC's Focus on AMs

► *AM, continued from page 1*
review of the entire regulatory scheme concerning the performance verification of AM directional antenna systems since many of the present rules were adopted as part of the commission's former 'Standards of Good Engineering Practice' in 1939," the petitioners wrote.

The commission issued a Notice of Inquiry in 1993 (MM Docket 93-177). The FCC is expected to release an NPRM soon.

In addition to the antenna proposal, there are several others before the commission aimed at improving the lot of AM station operators.

FM translators

One proposal would allow some AMs to use FM translators to reach a larger audience.

In 1997, The American Community AM Broadcasters Association asked the FCC to allow AM stand-alones to become licensees of FM translators and to use them to retransmit their signals as fill-in service. The FCC opened the petition for comment in December.

ACAMBA has about 140 member stations, according to Bryan Smeathers, owner of gospel station WMTA(AM) in Central City, Ky., and former president of the association.

Smeathers bought WMTA in 1994. The station must lower its signal to seven watts at night — not much better than a five-watt CB radio, said Smeathers.

Smeathers said the FCC allows FM

AM advocate R. Morgan Burrow of the engineering firm R. Morgan Burrow P.E. & Associates P.C., said that if the FCC allowed AM stations to use FM translators, large group owners would "try to get as much mileage out of it as they could." He said such a rule would make it easy for a well-funded company to buy up small AMs and request the use of FM translators.

An FCC employee said some in the industry are concerned about the large number of translators being used by non-commercial stations, but "the issue has never been raised from above" at the FCC.

Expanded band

Efforts to survive and thrive on the AM band have taken many forms.

What about those stations picked to move to the expanded portion of the band? How have they fared?

Despite years of work, the AM expanded-band list is not quite finalized. Sunrise Broadcasting of New York Inc., owner of WGNY(AM), Newburgh, N.Y., challenged the commission's methods for choosing expanded-band stations. The issue must be resolved before the proceeding can be considered complete.

Of the 88 stations eligible to use an expanded-band frequency, 67 filed applications for construction permits. Two of those applications are still pending.

Sixteen stations have finished construction and are operating with "Program Test Authority."

Although stations have filed for licenses, the commission cannot issue them until the Sunrise Broadcasting matter is resolved. There was no word on when that matter would be resolved.

After the expanded-band stations receive licenses, some frequencies in the expanded band will remain open. The

FCC likely will auction those.

Despite the years and work that have gone into the expanded-band process, comments to the FCC indicate that few engineers and owners feel the expansion will have done much to improve the AM band, thanks to the limited amount of available frequencies.

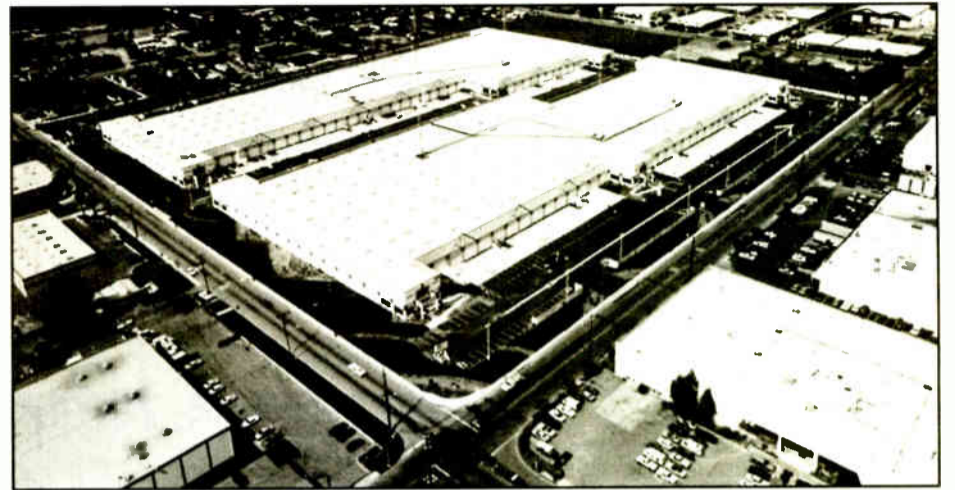
Personal communication

The proliferation of wireless services has, in some cases, meant additional interference on the AM band. Some observers would like to see the commission do something about it.

Burrow has a client who claims a PCS tower built just 600 feet from his client's AM antenna is interfering with that antenna. Burrow said the PCS company took no measurements before construction and did not notify the station before building the tower. The matter is in the hands of the station's lawyer.

The problem, said Burrow, is that the FCC's statute 22.371 regarding AM interference by Public Mobile Service licensees is not specific about what is required from wireless companies. The law states that Public Mobile Service licensees must notify nearby AM broadcast stations in

advance of any planned construction or modifications and measurements must be made to determine whether the construction or modification affected the AM sta-



The directional array of KTNQ(AM), Los Angeles, viewed from the air. This five-tower system is on a large warehouse roof.

tion antenna pattern. Burrow believes the statute should be more specific about what measurements need to be taken.

"This is being abused greatly," Burrow said. "It is unfortunate because the AM broadcasters are being left holding the bag."

AM interference

An Audio Services Division employee said he gets one to four complaints every month from AM stations complaining of interference from wireless companies.

He said those are the complaints he hears the most. He refers them to the Wireless Bureau, he said, because that is the division that authorizes those towers. He said wireless companies can use the FCC Web site to see if the location they want to use is within two miles of an AM antenna.

The FCC has taken some action to ease the regulatory burden on stations.

The recent FCC First Report and Order streamlined some of the radio tech-

nical rules (RW, May 12).

The change extends "first come, first served" processing to applications for minor changes. Before, minor change applications for stations were subject to mutually exclusive proposals. That exposed minor change applicants to "significant uncertainty and delay" because

at any time while their application was pending, a mutually exclusive proposal could be filed which would halt further processing of the original application.

The FCC also expanded the definition of "minor change" for stations to include all changes except changes in community of license and certain changes in frequency and class. Prior to this, most proposed increases in power and any changes in frequency, hours of operation and community of license were considered major changes.

Smeathers of ACAMBA called the First Report and Order "a good thing," but he said more AM owners should participate in improving the service.

"Part of the reason AM is where it is today is because of AM station owner apathy," AM is where it is today is because of AM station owner apathy," Smeathers said.

QDI Says It Is Not Derailing EAS

► *QUAD, continued from page 5*
the whole thing!" are premature and are at best misguided. It appears that some of these declarations have become a voice against innovation by small businesses like QDI—who spend years developing and patenting new ideas—and have lost sight of the true potential of the EAS.

In closing, QDI's assertion of the SAFE patent has been publicly attacked by NOAA on their Web site as having the potential to "disrupt the flow of critical weather and flood information to the public." It would appear that NOAA should be more concerned about broadcasters who apparently do not want to deliver to the public the critical, location-specific, digital warning data over the vast array of redundant radio and TV stations across the nation. This level of coverage is not currently available with the NOAA NWS system and would require costly construction of new additional NOAA

transmitter towers.

Finally, if Mr. Ashley or one of his colleagues were out of town on business and a storm threatened their family at home, would they not feel better knowing that a home EAS warning receiver would be able to wake their family up at night and change to a backup channel if the selected primary TV or radio station's transmitter were damaged?

Would your readers not feel better knowing that in the cases when the NWS data is inaccurate—or not fast enough to show a sudden tornado that just pops up—that local spotters could immediately transmit this digital warning data over the broadcast stations and alert their families? The EAS is limited only by those unwilling to realize its potential.

Mike Fessler is president of Quad Dimension Inc. and may be reached at fessler@quaddimension.com
RW welcomes other points of view.



Some AM stations wish to use FM translators like this one from Crown Broadcast.

non-commercial stations to plant translators "all over the country." The American Family Association Inc., based in Tupelo, Miss., for instance, has more than 100 translators relaying its programming.

"I'm competing against a bunch of FM translators from other states in the middle of Kentucky," said Smeathers.

He argues that the translator stations with which he competes do not provide local Emergency Alert System alerts or local news and weather.

When the FCC adopted its translator rules in 1990, one FCC official said, non-commercial educational groups were given an advantage over commercial groups in obtaining translators.

In addition to serving areas that did not enjoy radio service and helping stations to "fill-in" their service areas, he said, translators were seen as a way to help non-commercial services reach other listener groups.

Translators are licensed as a secondary service; they can be shut down if they interfere with another station.

The ACAMBA petition generated numerous comments. The NAB wrote that the industry should look for an in-band, on-channel digital radio system to help AM stations improve their audio quality.

ONE LOVES TO TRAVEL, THE OTHER PREFERS TO STAY HOME



ZEPHYR IS EVERYWHERE.

The irrepresible Telos Zephyr has earned a hard and fast place in the hearts of broadcasters, engineers, and recording professionals around the world. Why? With its integrated ISDN terminal adapter, MPEG Layer 3 and Layer 2 compression technology, optional AES/EBU digital I/O, and an intuitive user interface, the Zephyr was designed by Telos specifically for broadcast audio applications over ISDN. It's the ideal solution for remote mixing and broadcasts, ad hoc networks, recording sessions, voiceovers, distribution of commercials, backup to satellite and microwave links, and nearly any other application you can imagine. How could anyone function in today's world without one?



ZEPHYREXPRESS IS EVERYWHERE ELSE.



With its ground-breaking design and capabilities, the amazing new ZephyrExpress takes Zephyr's industry-leading operation wherever you need to go, and combines a full-featured ISDN codec and three digitally-controlled stereo mixers in a single, road-worthy chassis. With an unprecedented, easy-to-use interface and specs that blow away most studio codecs, the ZephyrExpress is like nothing you've ever experienced. Now you can hit the road without having to leave your Zephyr behind.



The Best Way to Hear from There™



Telos Systems • 2101 Superior Avenue • Cleveland, OH 44114 • Tel: +1.216.241.7225 • Fax: +1.216.241.4103
E-mail: info@telos-systems.com • www.telos-systems.com

Telos Systems, the Telos logo, Zephyr, and The Best Way To Hear From There are trademarks of TLS Corp.
Other trademarks are the property of their respective holders.

Circle (9) On Reader Service Card
World Radio History

Learning Never Stops

► FLUENCY, continued from page 4
this room. Listen to David Baden this afternoon.

I toured the facility of Radio Free Asia in Washington not long ago, and I wrote about it in *RW*. When I visited, RFA had 30 networked Orban Audicys, 31 Yamaha digital mixers and 235 AudioVault workstations. They've expanded further since.

RFA also has 40 technical people on staff. That kind of facility requires an exceptional technical manager.

When Rick Farquhar asked if I could recommend someone with new insights into what digital audio is all about in a radio facility, I thought of

David Baden right away.

To me, he typifies the computer and broadcast fluency I'm talking about.

I'm also delighted that the SBE Certification Committee has just instituted a broadcast networking certification. I support that effort. We have to look constantly for opportunities to improve our technical fluency.

Broad view

But don't forget to keep the big picture in mind. People I respect say radio engineers should learn to think large, and that goes for digital audio and data training.

Radio engineers have sometimes "thought small." Their jobs were about

cleaning pots and setting azimuth. Engineers who learn about computers sometimes tend to worry about the small stuff, too, about the plumbing. There's too much effort into learning about the latest ZIP utilities or interface cards, rather than a big picture, where it's going, how to manage a facility for the digital future.

What does it mean to "think large"?

We should stop thinking of computer-based solutions as the back end of an analog solution. We have to stop looking at the broadcast facility based on old models.

If you talk to people who have spent a lot of time overseas, like Neil Glassman of Digigram, they'll tell you how different the attitude is there.

Neil points out that, in the United States, cart machines had to be *ripped* out of the hands of radio people. We still

remember radio managers standing up and saying, "You expect me to put my whole radio station on a computer? Are you crazy? Never!"

Now take a look at the show floor, at the computer-based systems out there.

In Europe, the business developed differently. The widespread use of computers emerged at the same time as private radio came into its own. We can learn from those installations.

Look abroad

Just as Europe looks to us for programming ideas, maybe we in the United States should look abroad for the model of "starting with zero" in our thinking.

We should develop a computer data model, make our models about the efficient routing of data. Replace *headroom* with *bandwidth*.

How can broadcast owners help? We could start with a little respect.

It's time for broadcast owners to start treating their engineering talent as professionals who are responsible for mission-critical equipment, as assets to be valued as contributing to a healthy bottom line.

Some companies understand this. Many more do not.

Pay the way

Owners should make money available now to improve the salaries of broadcast engineers, and to encourage staff to stay fluent.

One group engineer I know will pay the cost of your networking class, and give you a bonus too. But even in his own group, that's not standard policy. The next regional manager might do nothing.

See FLUENCY, page 14 ►

SHURE The Sound Of Broadcast Professionals

Worldwide

Shure Microphones and circuitry products are used extensively throughout the world by broadcasters who demand nothing but the best. Designed for the rough and tumble world of broadcasting, robust mixers and microphones can be trusted in any application you encounter. When thousands of listeners and (your career) are on the line, settle for nothing less than Shure — proudly represented by BSW.



SM2



SM7

M367



FP33



SM57



SM58



VP64



SM63LLC



FP22



FP42



FP410



Equipment Solutions To Keep You Number One

BSW

BROADCAST SUPPLY WORLDWIDE

7012 27th Street West Tacoma, WA 98466 USA

Phone: 800 • 426 • 8434

Fax: 800 • 231 • 7055

Website: <http://www.bswusa.com>

Chile Eyes U.S. on DAB Options

► CHILE, continued from page 7

what sort of DAB system to adopt, transmitter manufacturers are left waiting for the industrialists and the government to agree before they can begin planning for the future.

Meanwhile, manufacturers are working with stations to add digital capabilities to their stations, even if the final broadcasts remain analog.

"The formation of radio networks has picked up in the last three years," said Pablo Phillips, technical manager of Sender S.A. "Aside from producing major changes in production and distribution, this has been the driving force behind a major technological updating."

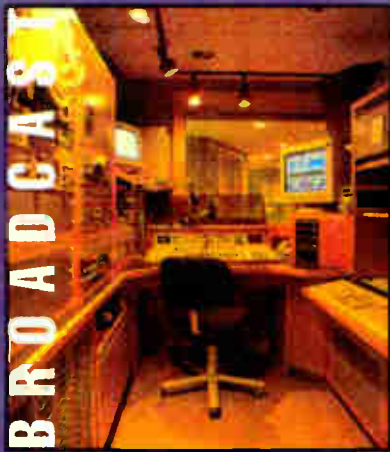
Phillips said that a number of networks and stations have incorporated digital satellite and landline transfer technologies to help improve program quality among affiliated stations across Chile.

■ ■ ■

Pablo Carrasco Ramírez reports on the industry for *Radio World* from Santiago de Chile. Reach him in c/o *RW*.

Marcelo Morichi contributed to this article.

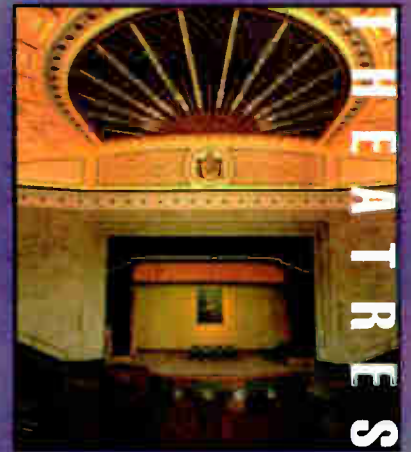
The Versatility Of MiniDisc



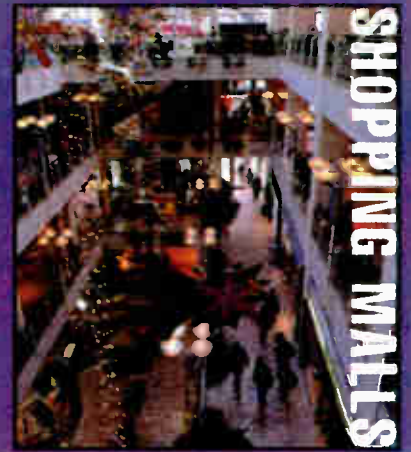
BROADCAST



THEME PARKS



THEATRES



SHOPPING MALLS



Introducing the new Denon DN-M991R MiniDisc recorder/player. MiniDisc is the most versatile media available for archiving

program material for playback in a variety of applications including broadcast, theme parks, theatres and shopping malls, among others. The DN-M991R offers all the features and functions that



engineers have asked for, such as a large and easy-to-read florescent tube display with multiple readouts, Hot Start, keyboard entry, seamless Sleep mode, front-panel Program Play and a variety of control terminals including RS-232C, RS-422A, D-Sub 25 pin and PC-compatible Mini Din keyboard connector.

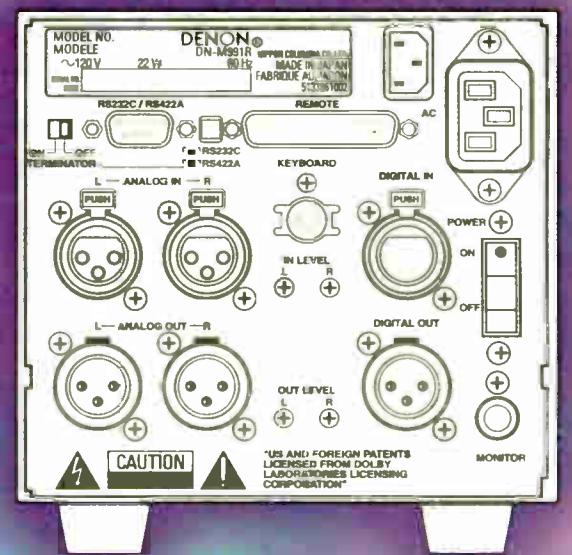


For additional information, contact our broadcast products specialist at (973) 396-7492.



- 10 Hot Starts
- Instant Start
- Auto Cue
- Multiple Display
- Seamless Sleep Mode
- +/- 8% Playback Speed Control
- Program Up To 25 Tracks
- Multiple Editing Functions

- Rotary Track Selector
- Relay Recording
- Auto Level Rec Start
- Optional Wired Remote RC-650



Denon Electronics Division of Denon Corporation (USA), 222 New Rd., Parsippany, NJ 07054, (973) 396-0810
 Denon Canada, Inc., 17 Denison St., Markham, Ontario, Canada L3R 1B5, (905) 475-4085
 Labrador, S.A. de C.V., Zamora No. 154, 06140 Mexico, D.F., (52-5) 286-5509

Visit our web site: www.del.denon.com

Circle (11) On Reader Service Card
 World Radio History

DENON
 The First Name In Digital Audio

Radio Reacted to Columbine

► SIGNAL, continued from page 1

"This city is about as bad as San Francisco when it comes to hilly and mountainous terrain," he said. "It can really tear up a Marti signal and give you dead spots."

KOA and Jacor's seven other Denver radio stations use a system of three wide-band UHF repeaters and six receivers up and down the mountain range to help boost and receive Marti signals.



Chadwell said that, because of Denver's mountainous terrain, "It's tough to get a direct signal shot back to the studio building downtown. So, instead you aim at one of the repeaters or receive-only sites."

Littleton is approximately 11 miles from KOA's downtown Denver studios. Chadwell said the area in between is "very hilly."

The receive-only sites send the signal to the studios on 8 kHz or 15 kHz equalized phone lines. At the stations, the audio comes up on an audio routing switcher in the studio.

The person in the studio then dials in the receive site that has the clearest signal.

Breaking the rules

The crush of media that descended upon the Denver area covering a national story such as Columbine can result in a lot of interference for all the stations producing coverage. Chadwell said most of the rules are thrown out the window when it comes to broadcaster etiquette.

"When you have a big news event and all of the national media comes in, they just turn on their stuff. They don't coordinate or anything," he said. "You'd need a spectrum analyzer to be able to tell what's what."

That creates a nightmare of RF problems, Chadwell said. Being versatile in delivering audio is important.

"It's whatever you can get your hands on and use at the time that works. We used cell phones, the Comrex HotLine when we could find a phone, the Marti and regular UHF two-way."

KOA played a role in coordinating the use of a special UHF frequency used by the radio and television media.

The frequency is licensed to KOA and has been used by the state's Emergency Operating Center, the Office of Emergency Preparedness and now the EAS since the 1970s, Chadwell said. Local police and fire departments also are allowed to use the frequency.

"It's on a loaner basis that the agencies use it," Chadwell said. The frequency, 451.875, was originally used by KOA and the former KOA-TV for walkie-talkie communication in the 1950s and 1960s.

Chadwell said most local stations and networks will give KOA a courtesy call and contact the local FCC office before using the special frequency. Media organizations use it as a means to communicate directly with each other via mobile

radio and walkie-talkie.

"You have so much RF clutter that you really need the extra spectrum space for radio and television stations to coordinate things between themselves," Chadwell said.

Of the eight Denver radio stations Jacor owns, five stations, including KOA, are located in downtown Denver in the same building.

KOA's newsroom served as the nerve center for coverage of the Columbine shootings for the five stations, which include KHOW(AM), KBPI(FM) KRFX(FM) and KTCL(FM).

Jacor's other three stations, KTLK(AM), KHIH(FM) and KBCO-FM, are spread across Denver. They also aired updates on the shootings.

Jerry Bell, news director at KOA, said employees in his station's 15-person newsroom hustled to keep up with the events as they unfolded.

"We had two people at the school interviewing eyewitnesses within an hour of the first shots and filing reports by cell phone," he said.

Bell said using the station's Marti wireless RPU system is much more desirable, but the speed of using a cell phone makes

**When you have a big news event
and all of the national media comes in,
they just turn on their stuff.**

— Jan Chadwell
Chief Engineer, KOA(AM)

up for the difference in on-air quality.

Station personnel fanned out across the area, positioning themselves at hospitals and police headquarters.

"This was an all-out effort. We used everyone in the station, from production people to promotion people."

The station has four mobile units used for breaking news coverage. All have 30 W Marti capability.

Bell and reporter Amani Ali used the Marti to file reports by early afternoon from a nearby school.

Each mobile unit is outfitted with Electro-Voice 635 omnidirectional mics and Sony MZ-R3 MiniDisc recorders to record sound.

An important aspect of KOA's coverage were helicopter reports from pilot and reporter Al Berley. KOA shares a helicopter with KUSA-TV. Berley flew for seven hours that day. Reporter Kathy Walker anchored KOA's coverage.

Bell said the station stayed with commercial-free coverage of the shootings until 10 p.m. that night.

Scott Taylor, program director of adult contemporary station KOSI(FM), said his stations coverage was "resourcefulness at its best." KOSI is owned by Tribune Broadcasting.

The station has morning co-host Dean Curfman deliver the morning news, but without a full-time news department, the station management had to find other sources of information.

"I happened to be on the air that day when the news broke. We had our Metro Traffic plane up by 2 p.m. giving us reports from the air," he said.

Without anyone on the scene of the shootings, the station's coverage was supplemented by anchors from KWGN-TV, also owned by Tribune. The Warner Bros. affiliate and KOSI have an agreement that KWGN-TV



Littleton is about 11 miles from downtown Denver.

will provide news update during breaking news events. The reports were fed via ISDN.

NPR installed a POTS line off a pole in a park near the school, which served as the media's camp.

Roberts and fellow NPR reporter Howard Burkis filed reports using a Comrex HotLine codec with a cigarette-lighter AC power supply inverter. Both the Electro-Voice RE50 omnidirectional and Audio-Technica 835A shotgun mics were used. The two recorded interviews

on Marantz cassette decks and Sony MZ-R3 MiniDisc recorders.

NPR also used KCFR's studios to file reports via Comrex HotLine. In addition, Roberts has an ISDN line installed in his home studio.

One of the commercial networks covering the shootings was the broadcast arm of the Associated Press. The team of Bob Moon and Tony Winton anchored Littleton coverage for AP Network News and AP All News Radio.

John Jones, manager of marketing and communications for AP Network News, said the pair set up a mini studio in their hotel rooms. Using Comrex HotLine codecs, they fed pre-recorded interviews and their reports over a regular phone line.

Out in the field, the reporters used DAT and Sony MZ-R3 MiniDisc to record and mix sound. An Electro-Voice 635A mic was also included in the equipment case.

In the chaos of covering such a breaking event, Bell said KOA's first goal was being responsible about what goes on the air.

"A situation like that is not the time to try to beat your competition on the air with rumors and unsubstantiated reports," he said.

Master plan?

"There is no master plan you can pull off the shelf in a situation like that."

The Radio and Television News Directors Association has published several pamphlets on the subject of covering major breaking news that could prove helpful.

"Keep in mind in this situation, we didn't know until after 4 p.m. that there were deaths involved. We had heard lots of rumors up to that point, but nothing confirmed," Bell said.

Taylor's philosophy of covering a news story on a music-intensive station includes adaptability.

"There is no deciding whether you should cover it or not. You break format and cover it. You must decide on-the-fly where you can pull information from to help keep people informed and avoid panic. It can be done, even without a full-time news department."

DECIDE

To build a successful station and stay on top of the ratings, one decision is clear: The Omnia.fm from Cutting Edge. It's the processor of choice all over the world. Why? Because the Omnia.fm's 48kHz sampled operation, combined with a unique anti-aliasing final limiter, gives you audio quality that's more like the source and far superior to yesterday's 32kHz sampled

systems. And the Omnia provides rock-solid peak control, awesome loudness and unlike the outdated processors, absolutely *no digital grunge*.

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.

And to make your decision even easier, contact your Omnia.fm dealer for a no-risk, sixty-day demo and money-back guarantee*.

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.

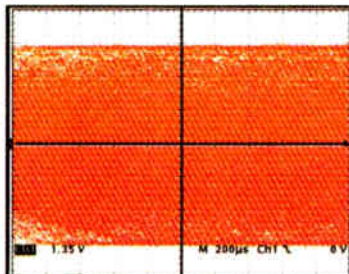
The "flat" lines along the top and bottom of the filled in section represent clipper performance.

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

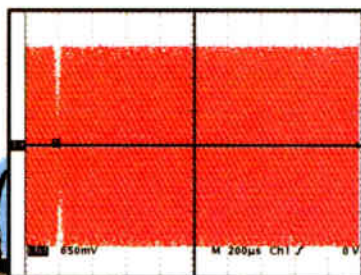
± 0.650 volts. The Prediction Analysis Clipper reduces overshoots in the sample-rate-converted signal path to an insignificant three percent.

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.

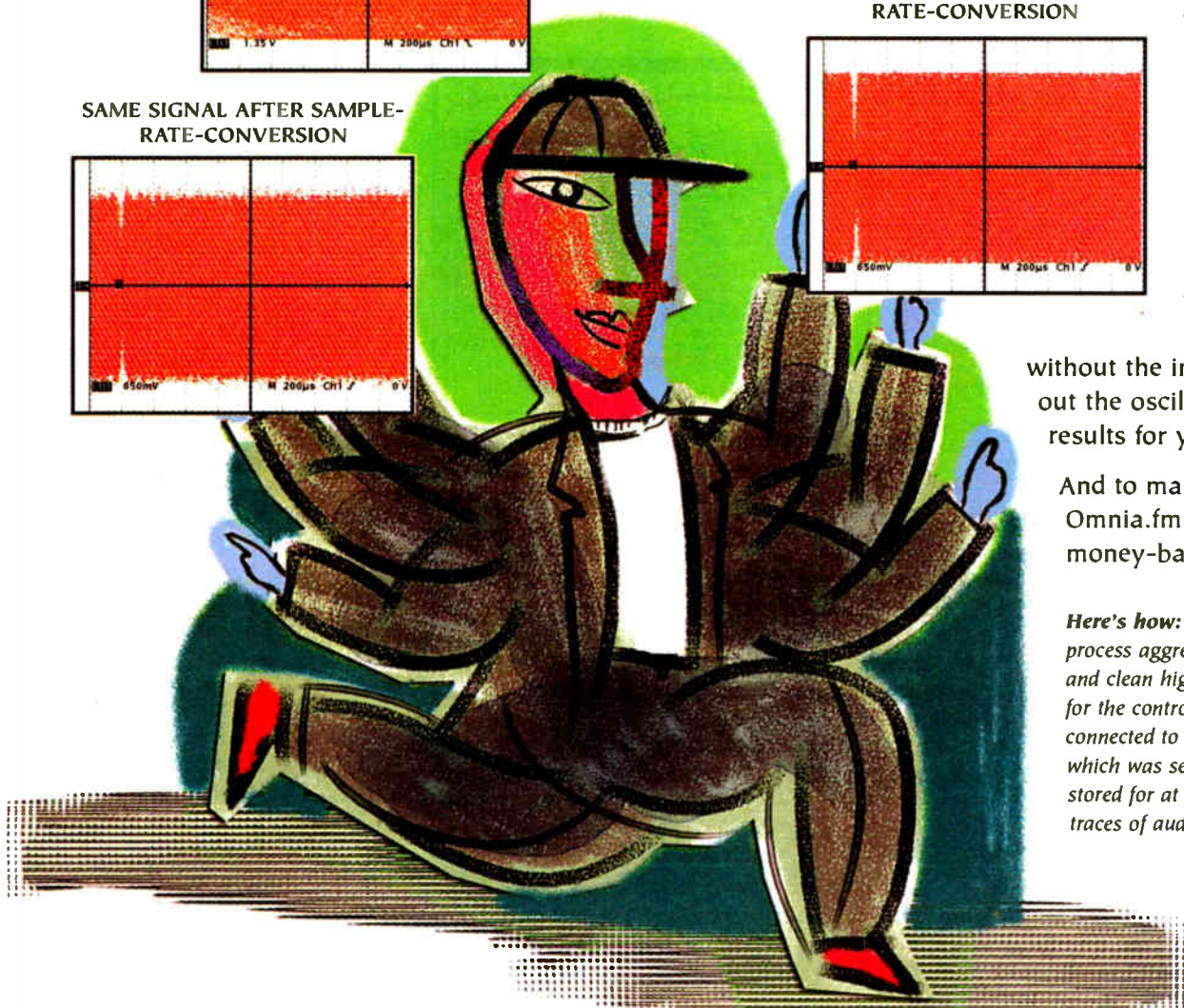
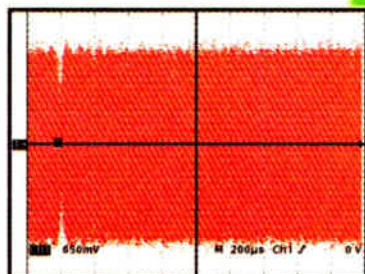
LEFT CHANNEL OUTPUT OF OMNIA.FM



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



SAME SIGNAL AFTER SAMPLE-RATE-CONVERSION



CUTTINGEDGE

2101 SUPERIOR AVENUE CLEVELAND, OH 44114 TEL: +1 (216) 241-3343 FAX: +1 (216) 241-4103 E-MAIL: INFO@NOGRUNGE.COM WWW.NOGRUNGE.COM

*Contact your dealer for details on this demo program. Demo requests must be accompanied by a purchase order so our dealers know you're really serious about some serious sound.

- Audio Broadcast Group 3685 Roger B. Chaffee Blvd. Grand Rapids, MI 49548 Tel: +1 (800) 999-9281 Fax: +1 (616) 452-1652 e-mail: support@abg.com
- Bradley Broadcast Sales 7313G Grove Road Frederick, MD 21704 Tel: +1 (800) 732-7665 Fax: +1 (301) 682-8377 e-mail: info@bradleybroadcast.com
- Broadcasters General Store 2480 SE 52nd Street Ocala, FL 34480 Tel: +1 (352) 622-7700 Fax: +1 (352) 629-7000 e-mail: bgs@mercury.net
- Broadcast Supply Worldwide 7012 27th Street West Tacoma, WA 98466 Tel: +1 (800) 426-8434 Fax: +1 (800) 231-7055 e-mail: info@bswusa.com
- Crouse-Kimzey Company P.O. Box 155999 Fort Worth, TX 76155 Tel: +1 (800) 433-2105 Fax: +1 (972) 623-2800 e-mail: sales@proaudio.com
- Radio Communications Unlimited 5509 Barrington Ooltewah, TN 37363 Tel/Fax: +1 (423) 396-3743
- Caveco 1121 Bellamy Road, North Unit #10 Scarborough, ONT M1H 3B9 Tel: +1 (416) 438-6230 Fax: +1 (416) 438-1065 e-mail: bob@caveco.com
- Marketing Marc Vallée 1067 Chemin St. Lambert St. Sauveur de Monts, QE J0R 1R1 Tel: +1 (450) 227-1828 Fax: +1 (450) 227-8394 e-mail: marc@vallee.com
- All Electric 487 Cariboo Crescent Coquitlam, BC V3C 4X7 Tel: +1 (604) 945-5651 Fax: +1 (604) 945-5652 e-mail: allelec@dowco.com

Circle (13) On Reader Service Card
World Radio History

Fluency in 2000

► FLUENCY, continued from page 10

It's time for owners to invest in a vital asset: their technical expertise as well as their technical infrastructure.

We can't expect owners to save the job of someone who isn't worth saving. But we need clear guidelines. Owners should lay out the skill requirements, which will be network-oriented. Then invest a few thousand dollars to have them certified.

Glynn Walden of USA Digital Radio talks about this. He points out that equipment obsolescence cycles are now much shorter, five years or less. The industry moves on, product support is

gone much faster.

These digital products don't have a 20-year cycle, like a transmitter. You must learn to adapt and you have to learn to expect those cycles. Without better training, you can't do this.

Suppliers

Broadcast suppliers play a part in fluency, too. Manufacturers have a great investment in the pool of technical talent. I know very well how hard it is for radio suppliers to find good tech talent.

Some companies invest in keeping their staffs trained. Again it sounds simple, but many, many manufacturers and

dealers don't take that simple step. It's time to go back to school.

Suppliers should also take a greater role in the standard-setting that affects our jobs. They should make products that talk to one another.

This can be as simple as putting real digital input and output connectors on digital gear. It can also mean making file formats that let broadcast products talk to each other.

Go to the Orban booth. Talk to Geoff Steadman and Dick Pierce, and ask them about the "cart chunk" concept.

Orban is working on an extension to the Broadcast WAVE file format so that workstations and digital audio delivery systems from different companies can really communicate with one another in a more useful way.

This is great. We should have more of this

kind of communication among suppliers.

The suppliers I talk to privately admit there isn't here a good standard among computer-based radio systems to allow people to transfer material from one to another, or easily migrate. And there is no single U.S. standards organization.

Suppliers must be willing to share when it helps the industry. They can still retain their proprietary schemes if they must, but if each supplier can develop a conversion scheme to a standard scheme, it's easier for everybody.

Seller's job market

Success as a broadcast engineer is going to depend on fluency in the basics of digital technology, but also on the broader question of whether engineers can evolve into their roles as information managers, with a seat at the table in the leadership of our industry.

It's happening in some cases, but it needs to happen more. And digitally fluent engineers can lead the way.

It's true that broadcast engineers have a new set of employment demands, new levels of management to deal with. And there's been a lot written about how hard consolidation has been on broadcast engineers, and how so many engineers have been leaving the business.

But I think that shake-out is coming to an end. If you are a broadcast engineer, fluent in digital audio and computer networking and the basics of RF, this can be a golden time.

Opportunity

Look at the job opportunity. One fellow recently wrote online, "I love it. Everywhere I go, every project I'm on, I get a job offer."

We see it happening in the classifieds of *Radio World*. I heard it on the show floor today: "I'm hiring. Where can I find good engineers?"

Radio itself will remain strong, because consumers like audio entertainment, and radio has the franchise, it has a strong position among all the media. Radio advertising is very healthy in the United States.

Radio remains strong globally. If you like to travel, there are 40,000 radio stations in the world, and a lot of them could use your help.

But even within the States, you should feel good about where we're going. Radio has been through a lot of change. It's a survivor.

I know dozens of radio managers and suppliers who can't find good, articulate, fluent engineers. It's a seller's market. There are opportunities, and your professional outlook is strong. As one engineer told me, "Sooner or later, the broadcast industry is going to find itself short of engineers, and people like me are in a position to hold them up."

In the end, the questions I ask in my job every day are the questions we all must ask ourselves:

- What is the most pressing challenge involving digital audio for broadcast engineers? How do I train myself to meet it?
- Are useful standards in place? If not, what must happen for that to take place?
- What can broadcast engineers do today to prepare themselves for their profession in the next five years?

If radio engineers, owners and suppliers ask these questions and work on the answers together, the outlook for the 2000 engineer is bright.

Get Better Jocks for Less Money

Decrease costs, *increase profits* and run your station more efficiently. Outside of drive time, why pay your talent to sit around *waiting* to talk? A Scott digital System can put all your songs, spots and prerecorded Voice Trax together smoothly and easily—without anybody in the air studio!

For years, Scott Studios' client stations have been successfully pre-recording incredibly live sounding fully localized 4 hour music shows in just 10-20 minutes. If you have a hub and spoke cluster of stations with similar formats and names (like Mix, Magic, Kiss or Kicker), you can sound great and save even more.

Scott Breakthrough: Free Software!

Thanks to Scott Studios' new *free* Voice Trax Via Internet (VTVI) software, announcers can phone in shows with studio quality from anywhere. All they need is a good microphone, mic pre-amp and processor, Internet connection, any Windows® computer with sound card and Scott Studios' *free* VTVI!

Simply schedule your station's music. With the touch of a button, your log and latest local copy points are automatically e-mailed to your announcers. And Scott's VTVI works seamlessly with all music schedulers and traffic/billing programs.

Live tags, trivia and copy are displayed automatically on the screen. Announcers don't need a clumsy copy book or liner cards. They can talk as early as they want before songs fade and over intros or in the clear. VTVI is *so* simple to use: a touch of the space bar triggers the next song or the next spot. Voice Trax are recorded with the computer's regular sound card with exceptional digital quality.

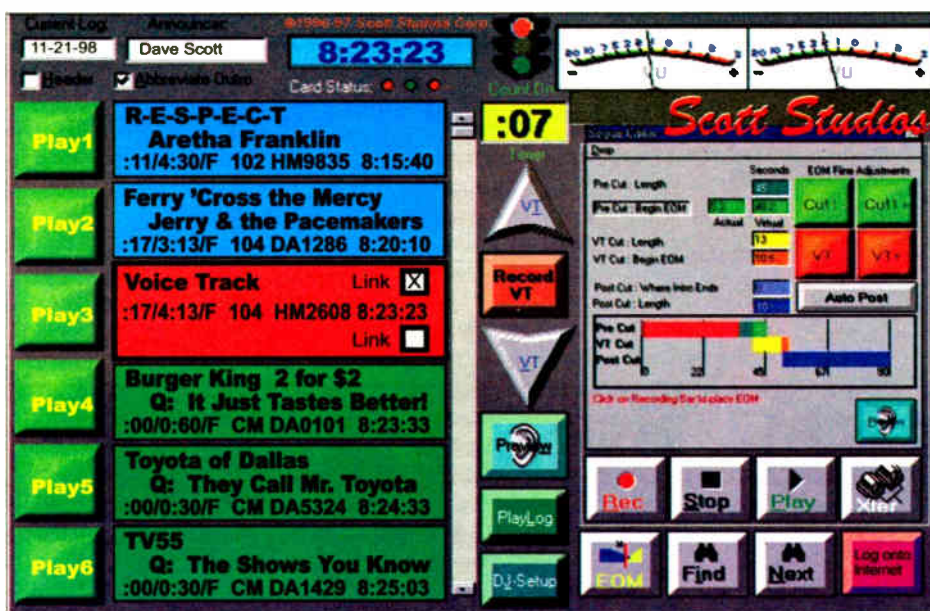
Unlike live radio, any or all of the Trax can be reviewed and possibly improved by re-recording. With the VTVI's Segue Editor, announcers can fine-tune their timing of song intros, back sells and donut spots without re-recording.

VTVI is Goof Proof!

VTVI includes Scott Studios' exclusive Voice/Music Synchronizer. Whenever the announcer mentions song title or artist, he or she turns on the link so the back sell or intro plays *only* with the correct song.

You Can Even Do Time & Temp!

Scott's VTVI lets you record every possible time check, or do a range of alternate recordings mentioning the time in any Voice Trax. The Scott NT System picks the right one at air time. You can also record all the seasonal temperatures and let Scott's optional temperature announce equipment play the right one at air time.



Here's Scott Studios' Voice Trax Via Internet (VTVI) software, shown with the optional Segue Editor. VTVI allows a distant announcer to pre-record a 4 hour show in about 15-20 minutes with nothing more than a Windows computer with an ordinary sound card, an Internet connection and a good microphone.

\$10,000 a Year Cheaper than WANs

When the announcer is done, a click on the VTVI Auto-Send button dials the Internet over a standard phone line and uploads the entire show to your Scott Studios digital audio system automatically. Transfer does take a long time, but your announcer can be answering e-mail, writing copy or creating promos on the VTVI computer while the show transfers.

VTVI isn't limited to music announcements. It gives high quality audio to recorded spots, remotes, weather, stock reports, news and election returns.

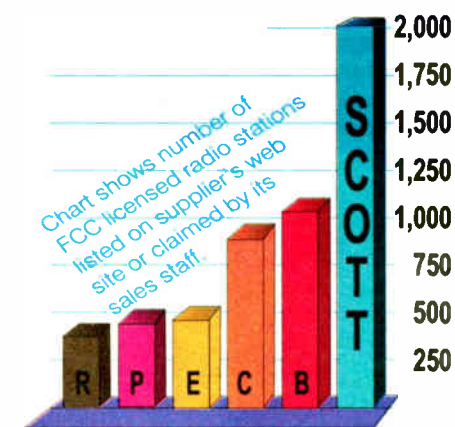
Your station will sound great with Scott VTVI! The only thing you need is an Internet connection on each end, a \$29 a month FTP transfer site and the Scott NT System with Remote Recording Router.

Voice Trax play seamlessly without anyone back at the station. And if the announcer forgets to record something, or if songs or spots get changed at the last minute, Scott's Voice/Music Synchronizer automatically substitutes a generic Voice Trax with the same voice for the day and hour of that break.

3 VTVI Models: Good, Better, Best

Scott Studios also offers a \$500 VTVI+ that sends your distant announcer telescoped song intros and endings via the Internet. With VTVI+, a telescoped aircheck can be previewed and fine-tuned in the context of starts and ends of songs and spots.

Or with VTVI Deluxe, your announcers record their Voice Trax *while listening to song and spot intros and endings* in context!



VTVI is just one of several ways Scott Studios digital systems can improve your sound *and* your bottom line.

It's a fact: More U.S. stations use Scott Studios than *any* other major digital audio system. 2,000 radio stations use 4,400 Scott digital workstations, including *major* groups like CBS, Chancellor, Disney/ABC, Clear Channel, Emmis, Citadel and many more. Last year, 418 U.S. stations bought new Scott Systems. That's more than chose some other "major" digital systems in several years! Call 800 SCOTT-77 to find out why Scott Studios are chosen the most.

Scott Studios Corp.
13375 Stemmons Freeway, Suite 400
Dallas, Texas 75234 USA
(972) 620-2211 FAX: (972) 620-8811
Internet: www.scottstudios.com
8 0 0 7 2 6 8 8 7 7
(800) SCOTT-77

FCC Phone Book

For your handy reference, here's an updated list of contact numbers for the FCC.

Federal Communications Commission Contact Numbers

CHAIRMAN

William E. Kennard(202) 418-1000

COMMISSIONERS

Susan Ness(202) 418-2100
 Harold Furchtgott-Roth(202) 418-2000
 Michael K. Powell(202) 418-2200
 Gloria Tristani(202) 418-2300

FCC NATIONAL CALL CENTER

Gettysburg, Pennsylvania
 Toll Free Number1-888-Call FCC
(1-888-225-5322)

OFFICE OF PLANS AND POLICY

Robert M. Pepper/Chief(202) 418-2030
 Lisa Sockett/Deputy Chief(202) 418-2030
 William Rogerson/Chief Economist(202) 418-2030

OFFICE OF PUBLIC AFFAIRS

Elizabeth Rose/Director(202) 418-0500
 Maureen P. Peratino/Deputy Director(202) 418-0500
 David H. Fiske/Deputy Director(202) 418-0500
 Linda Paris/Associate Director(202) 418-0500
 Sheryl A. Segal/Info,Technology Mgr(202) 418-0260

News Media Staff

Audrey J. Spivack/Press Secretary(202) 418-0500

Public Service Division

Martha Contee/Chief(202) 418-0260

Public Inquiries Branch

Sharon Jenkins/Chief(202) 418-0190

Reference Operations Division

William Cline/Chief(202) 418-0267

Mass Media/Adjudication Branch(202) 418-0272

FCC Reference Center(202) 418-0270

Ownership Reports(202) 418-0258

Records Imaging Processing System (RIPS)(202) 418-0029

Tariff Public Reference Room(202) 418-1933

Call Sign Availability Information(202) 418-0270

Library Branch

Gloria Thomas/Chief(202) 418-0450

Cable Files(202) 418-7092

MDS Reference Room(202) 418-7017

Wireless Telecommunications Reference Room

Maria A. Ringold, Chief(202) 418-1350

OFFICE OF LEGISLATIVE AND INTERGOVERNMENTAL AFFAIRS

Sheryl J. Wilkerson/Director(202) 418-1900

Kathryn R. Dole/Deputy Director(202) 418-1900

Stephen Klitzman/Associate Director(202) 418-1900

Congressional Correspondence Staff(202) 418-1900

OFFICE OF GENERAL COUNSEL

Christopher J. Wright/General Counsel(202) 418-1700

David H. Solomon/Deputy General Counsel(202) 418-1700

P. Michele Ellison/Deputy General Counsel(202) 418-1700

Sheldon M. Guttman/Associate General Counsel (Ethics)(202) 418-1700

Mary Beth Murphy/Special Counsel(202) 418-1700

Jeffrey Lanning/Special Counsel(202) 418-1700

Vacant/Special Counsel(202)418-1700

Richard Welch/Senior Counsel(202) 418-1700

Sharon Franklin/Special Counsel(202) 418-1700

Charmayne C. Keene/Ass't Chief for Mgmt(202) 418-1700

Litigation Division

Daniel M. Armstrong/Associate General Counsel-Litigation(202) 418-1740

John E. Ingle/Deputy Associate General Counsel-Litigation(202) 418-1740

Susan L. Launer/Deputy Associate General Counsel-Trial & Enforcement(202) 418-1740

Administrative Law Division

Susan H. Steiman/Associate General Counsel-Administrative Law(202) 418-1720

Suzanne M. Tetreault/Deputy Assoc General Counsel-Administrative Law(202) 418-1720

John I. Riffer/Ass't General Counsel-Administrative Law(202) 418-1720

Maureen Duignan/Ass't General Counsel-Administrative Law(202) 418-1720

Joel Kaufman/Ass't General Counsel-Administrative Law(202) 418-1720

OFFICE OF INSPECTOR GENERAL

H. Walker Feaster/Inspector General(202) 418-0470

I. Paul Brachfeld/Ass't Inspector General-Audits(202) 418-0470

Charles J. Willoughby/Ass't Inspector General-Investigations(202) 418-0470

OFFICE OF ENGINEERING AND TECHNOLOGY (2000 M Street)

Dale Hatfield/Chief(202) 418-2470

Bruce A. Franca/Deputy Chief(202) 418-2470

Rebecca Dorch/Deputy Chief(202) 418-2470

Stagg Newman/Chief Technologist(202) 418-2470

Michael J. Marcus/Associate Chief for Technology (on Assignment)(202) 418-2470

Lynn Remly/Associate Chief for Strategic Communications(202) 418-2470

Steven S. Kaminer/Legal Counsel(202) 418-2470

R. Alan Stillwell/Economic Advisor(202) 418-2470

Xenia Hajicosti/Ass't Chief for Management(202) 418-2471

Task Force on Year 2000 Conversion

Marsha MacBride(202) 418-2475

Special Counsel for Network Reliability

Kent Nilsson(202) 418-2475

Policy and Rules Division

Julius P. Knapp/Chief(202) 418-2472

Spectrum Policy Branch

Charles J. Iseman/Chief(202) 418-2473

Technical Rules Branch

Karen Rackley/Chief(202) 418-2474

Allocations and Standards Division

Robert M. Bromery/Chief(202) 418-2475

Spectrum Utilization and Economics Branch

Fred Thomas/Chief(202) 418-2476

Standards Development Branch

James R. Burtle/Chief(202) 418-2477

New Technology Development Division

Vacant/Chief(202) 418-2478

Experimental Licensing Branch

Paul Marrangoni/Chief(202) 418-2479

Technical Research Branch (Columbia, MD)

David L. Means/Chief(301) 725-1585

Equipment Authorization Division (Columbia, MD)

Vacant/Chief(301) 725-1585

Applications Processing Branch

Vacant/Chief(301) 725-1585

See FCC, page 19 ▶

Simple Connection

Simply connect to Broadcast Richmond for 200+ product lines integrated to your exact needs - from input to output.

As a leader in the supply of prewired program racks for AM, FM, & TV - and prewired console and mixer harnesses for air and production studios, our daily mission is to make your job simpler.

Our product expertise and equipment integration will save you time and money.

Simply Connect to the Turnkey Distributor...

BROADCAST RICHMOND

Tel 765-966-6468 Fax 765-966-5505 E broadcast@infocom.com
 PO Box 1423, 1821 West Main, Richmond, Indiana 47375 USA
 Connect to www.broadcast-richmond.com



A Focus on AM Antenna Sites

Ed Montgomery

This is one in a series about the basics of AM radio. The previous part appeared May 12.

As AM increased in popularity in the 1950s and '60s, the design of directional arrays became something of an art form. Consulting engineers could squeeze a pattern into almost any location.

in a valley where there is limited population, it may be a detriment to a station in a metropolitan area. This is especially true if the pattern were perpendicular to the major flow of commuter traffic from suburbs to city.

There are numerous AM patterns that could be reworked to fill the needs of today. This may require a new transmitter site, possibly a change in frequency or even a power reduction to improve coverage area. All of this requires quite an investment by the owner.

In some cases, it might be best to realize that the facility is not serving the public anymore and go silent. Some stations have done that; others will follow. As the listening habits have changed from fixed to mobile, some stations, including some FMs, are just not able to compete.

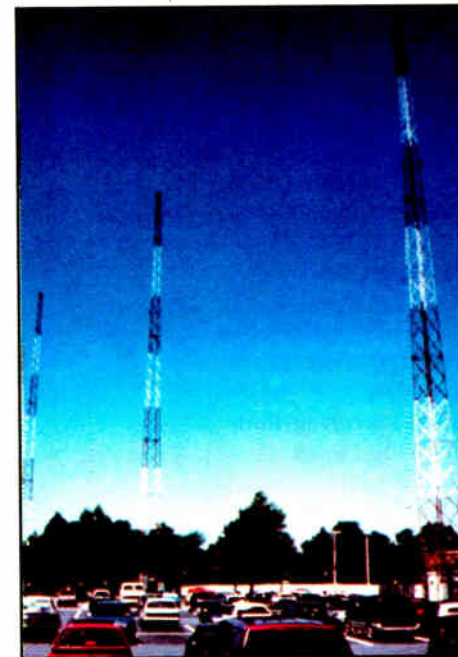
In some instances, AM broadcasters have discovered that their transmitter site, once located away from any civilization, is now a prime candidate for development. The value of the property may exceed the value of the station. In cases where the land is leased, the lessor may not want to renew the lease, realizing the gain if the land became a mall or sports arena.

Several broadcasters have actually given up their tower sites, taken the profit from the land, and used their FM tower as an AM antenna. The downside is that the broadcaster may have given up an antenna site that might have some potential if they invested in upgrading it.

Others have made arrangements to keep their present pattern and transmitter site while paving over the land to become a parking lot.

If this is done, the integrity of the ground system must always remain intact. There are times when a business or government agency may request to cross the antenna site with underground water, sewer, or other utility lines. The radio station manager must realize that this will require the ground radials to be cut. Before any work is done, before any contract or agreement is signed, the agency requesting the right to dig must agree to restore the ground system at its cost. If the property is paved over, all proposed lines for sewer, electric and anything else should be in place. Every party must be in agreement to protect the antenna system.

Many AM systems use directional antennas. The transmitter site consists of a transmitter and phasor/power divider. Radio energy is phased and divided to travel out to the towers in individual transmission lines. The phasor/power divider has adjustments on its front panel that indicate settings on various components. These settings should be recorded and stored for future reference if needed. Do not adjust these settings unless an engineer familiar with the system advises you to do so.



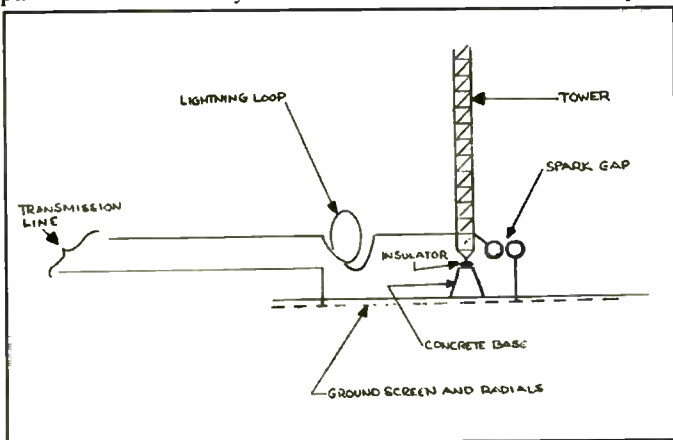
Site managers must deal with later development, like this parking lot.

winter, snow doesn't blow into them and create similar problems that pests do in the summer. The system should be inspected periodically to make sure problems like these are not developing.

There are two ways of coupling radio energy to the tower. Most often used is the series-excited method. In this configuration, the tower is insulated from ground, — at the base — with the radio energy connected to the base of the tower. Because the tower is insulated, if anyone touches the base of the tower they can get a substantial electric shock. For this reason, the base of the tower must be fenced in with warning signs posted.

The other form of coupling energy is known as shunt-excited. In this case, the

tower is grounded with the radio energy carried to a calculated location on the tower where the distance between the ground and that location produces the electrical resistance. While the energy at the base is much lower than a comparable series-excited tower, there is still

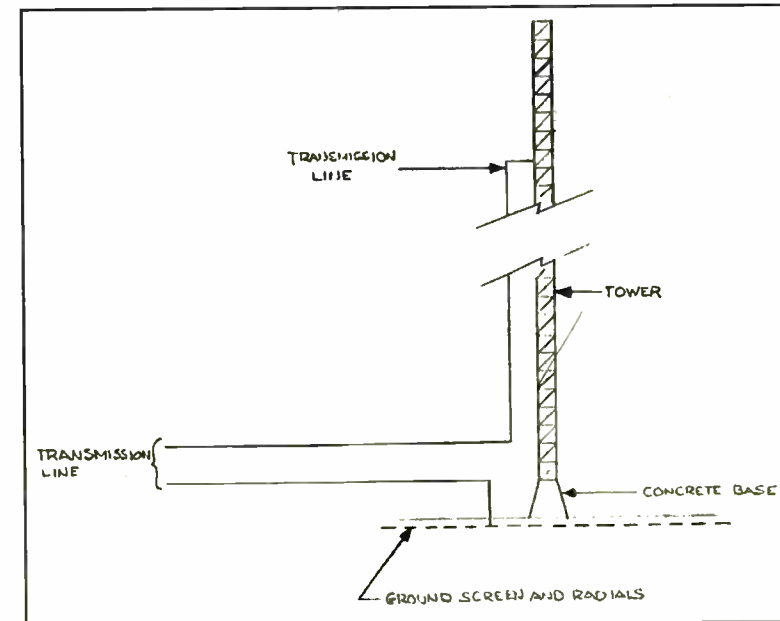


The Series-Excited Form of Coupling Energy

The FCC went along approving these facilities. Some required two transmitter sites, for day and night broadcasting.

While these facilities probably made sense to the people building them, often they have little use today. For instance, while a directional pattern that is 10 miles wide and 100 miles long might work on an island or

discovered that their transmitter site, once located away from any civilization, is now a prime candidate for development. The value of the property may exceed the value of the station. In cases where the land is leased, the lessor may not want to renew the lease, realizing the gain if the land became a mall or sports arena.



The Shunt-Excited Form of Coupling Energy

At the base of each tower is a small building or metal cabinet. This object, the antenna tuning unit (ATU), couples the transmission line to the tower.

Make sure that the transmitter, phasor/power divider and ATUs are kept clean. Remote transmitter sites are warm and will attract all sorts of pests. Rodents, snakes, insects, any living being that would like a dry warm place will try to get in these locations. They don't belong there and can cause electrical fires or short circuits that will take the station off the air.

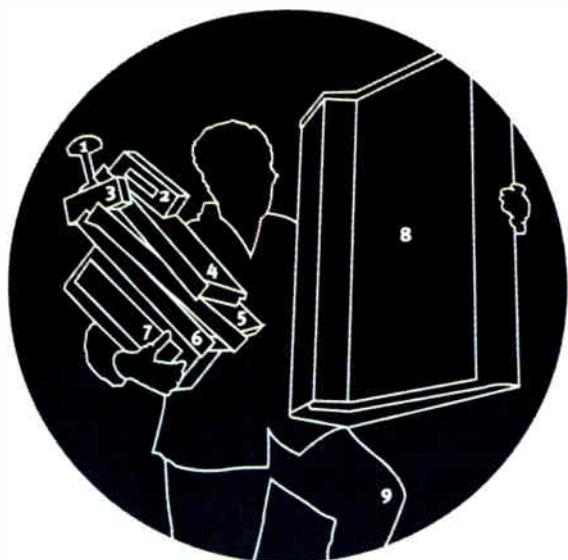
The ATU contains coils and capacitors that will get warm while passing the radio energy. The same pests that can plague the transmitter building can create havoc at the ATU. At the transmitter building, they can short out the transmission line. ATUs also need to be sealed so that during the

some energy present at any point above the grounded base, and the feed wire carrying RF energy to the point of attachment is electrified and dangerous.

When a tower is insulated from ground, lightning can be a problem. If a tower is struck, the only ground for the bolt to follow is through the transmission system, potentially causing extensive damage. This can be prevented by making sure the transmission line contains an inductive loop and that a spark gap exists between the tower and ground. Most lightning bolts refuse to traverse loops and will charge up on the spheres, ultimately arcing safely to ground.

■■■

Ed Montgomery is the video technology and communications lab director at Thomas Jefferson High School for Science and Technology, Fairfax County, Va.



radio SYSTEMS

radio systems millenium products

- 1 CT-6 satellite receiver
- 2 CT-6 desktop clock / timer
- 3 CT-6 thin clock / timer
- 4 DI-1000 telephone hybrid
- 5 DI-2000 telephone hybrid
- 6 DA-4x4a distribution amplifier
- 7 CT-6 large clock / timer
- 8 RS-12a millenium console
- 9 MRS BRAVERMAN, company spokesmodel



601 Heron Drive, Bridgeport, New Jersey 08014, (609) 467-8000 voice, (609) 467-3044 fax, www.radiosystems.com

ENCO + Orban + Harris = DAD_{PRO32} **The Only Complete Digital Audio Delivery Solution**



ENCO and Orban have combined the best features and technology of their digital audio products, and Harris now exclusively represents the new and improved DAD_{PRO32} Digital Audio Delivery System.

DAD_{PRO32} offers all of the features and functionality demanded by today's progressive broadcast facilities. Utilizing standard off the shelf non-proprietary hardware, network architecture, and operating systems, DAD is the logical choice for both Automated and Live Assist On-Air operations, Production, News, and Inventory Management. DAD supports Orban Sound Cube Technology, transparent links to the Orban Audicy Multitrack Editing System, sharing of data with other software applications for Wire Capture & Editing, Scheduling & Billing, and the Internet, as well as interface to other professional broadcast control and switching equipment. And DAD comes with free software upgrades for the first year, permitting immediate access to all of the latest features supported by rapidly emerging technology and evolving broadcast industry requirements.

Integrated LAN and WAN capabilities make DAD_{PRO32} the logical choice for groupwide, nationwide, or worldwide sharing of Audio, remote VoiceTracking, News, Schedules, and other data.

Call Harris today to discuss how the DAD_{PRO32} Digital Audio Delivery System will permit you to realize the operational efficiencies and cost savings available with the latest technology.

next level solutions

WIRELESS

BROADCAST

COMMUNICATIONS
PRODUCTS

HARRIS
Communications

1-800-622-0022 • www.harris.com/communications

Circle (17) On Reader Service Card

World Radio History

SBE NEWS

SBE Publishes New Handbook

John L. Poray

These days, few things remain the same in the radio business for very long. Changes in ownership, management, programming and technology make everyone involved in radio pay close attention in order to stay competitive and prosper.

No less susceptible to change have been the FCC regulations that govern operation of radio stations. There have been numerous changes over the past 20 years which affect licensing and ownership.

One regulation that hasn't changed is that which requires each station to designate an employee to serve as chief opera-

tor. In years past, that person typically was someone from the station's engineering staff.

These days, in many broadcast facilities, a technically qualified engineering staff member is employed only on a part-time or contract basis. This person is only on the premises for a few hours each week, or perhaps only on call for technical emergencies.

Under these circumstances, the person appointed chief operator is sometimes the operations manager, the program director, an on-air personality or the station owner. Frequently, this individual possesses little technical train-

ing or expertise. He or she is not expected to make complex technical adjustments or repairs but is legally charged by the FCC rules to be the "watchdog" of the facility, assuring that the station operates in compliance with the terms of the station license and the FCC rules.

Out of necessity

Recently, the Society of Broadcast Engineers published the SBE Radio Chief Operator's Handbook, a result of the need for an easy-to-understand tool that station chief operators can use to learn their responsibilities. This publi-



cation was written specifically for the non-technical chief operator, its purpose to enable someone with minimal exposure to radio equipment to perform the duties of a chief operator. It will also help the reader to recognize problems that cause the operation of the radio station to be beyond the limits of the station license and/or the FCC rules.

The SBE Radio Chief Operator's Handbook was written for SBE by Jack Layton, CPBE, a veteran of 40 years in broadcast engineering. Layton, owner of Layton Technical Services in Pittsburgh, has served as chief engineer at several radio stations in Chicago and Pittsburgh.

Layton has also authored other books, including "Directional Antennas Made Simple," and "Directional Broadcast Antennas: A Guide to Adjustment, Measurement and Testing." A contributing writer for **Radio World**, Layton is certified by the Society of Broadcast Engineers as a Certified Professional Broadcast Engineer.

Limb by limb

In Chapter 1, an introduction is provided with information about the early days, the Federal Communications Commission, deregulation, FCC Rules, the station license and the chief operator. The author touches on Basic Electronic Theory including amperes, volts and watts, hertz, kilohertz and megahertz; the AM broadcast band, FM broadcast band and other frequencies used by broadcasters; lighting and marking of towers, amplitude modulation and frequency modulation; and both monaural and stereo broadcasting in Chapter 2.

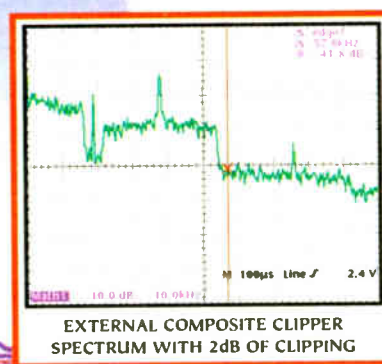
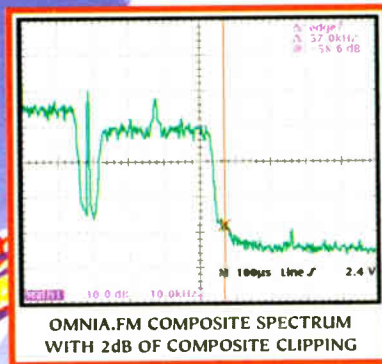
In Chapter 3, the reader will learn about much of the equipment necessary in the broadcast system. Topics include: program sources, consoles, automatic gain control amplifiers, delay systems, EAS program interrupt, studio-transmitter-links, audio processing equipment, FM stereo generators, FMs, FM antenna systems, AM transmitters, AM antenna systems, transmitter remote control systems and connecting the equipment.

Chapter 4 is devoted to the Emergency Alert System (EAS). Sections are included on the Purpose of EAS, How it Functions, What EAS Messages Must be Aired, What Sources Should be Monitored, The EAS Handbook, EAS Tests, Failure of EAS Equipment and Non-Participating Stations.

Chapter 5 includes the daily duties and responsibilities of the chief operator as defined by the FCC Rules. It also helps prepare the reader to handle events that hopefully won't happen

See SBE, page 21

COMPARE



When you compare digital audio processors, it's not apples to apples. Why? Because only the Omnia.fm gives you adjustable composite clipping, a powerful technique used by thousands of broadcasters for PD-pleasing loudness-loudness that can't be achieved in any other way, no matter which processor you're using.

You can have this power without worry: The Omnia.fm includes a precision digital composite low-pass filter which eliminates interference to subcarriers (including RDS) from clipping by-products. And since the pilot is added after the clipper, it remains unharmed.

Sure, you can tack on an external composite clipper to other digital processors. But with the Omnia.fm's integral composite clipper, operation can be controlled remotely and included in stored presets. And because of the Omnia.fm's unique, non-aliasing final limiter, you have rock-solid peak control, even without composite clipping. Put it all together and you have the Omnia.fm's clean spectrum, loud, punchy sound and *absolutely no digital grunge*.

Make your own comparison and you'll find that the Omnia.fm provides unmatched performance, with or without composite clipping. Only the Omnia.fm gives you a choice. And only the Omnia.fm gives you a free 60-day demo with a money-back guarantee*.

Here's how: The test signals were generated by a Delta Electronics SNG-1 (Stereo Noise Generator); spectrum analysis was performed with a Tektronix TDS-744A Digital Scope in the FFT mode. The top graph shows the spectrum out to 100kHz of the Omnia.fm with its built-in, all-digital composite clipper and composite low-pass filter. The bottom graph shows a different processor combined with an external composite clipper. Both composite clippers were set for 2dB of clipping. Notice in the bottom graph the significant harmonic energy in the SCA region as a result of composite clipping.

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



CUTTINGEDGE

2101 SUPERIOR AVENUE CLEVELAND, OH 44114 TEL: +1 (216) 241-3343 FAX: +1 (216) 241-4103 E-MAIL: INFO@NOGRUNGE.COM WWW.NOGRUNGE.COM

*Contact your dealer for details on this demo program. Demo requests must be accompanied by a purchase order so our dealers know you're really serious about some serious sound.

- Audio Broadcast Group 3685 Roger B. Chaffee Blvd. Grand Rapids, MI 49548 Tel: +1 (800) 999-9281 Fax: +1 (616) 452-1652 e-mail: support@abg.com
- Bradley Broadcast Sales 7313G Grove Road Frederick, MD 21704 Tel: +1 (800) 732-7665 Fax: +1 (301) 682-8377 e-mail: info@bradleybroadcast.com
- Broadcasters General Store 2480 SE 52nd Street Ocala, FL 34480 Tel: +1 (352) 623-7700 Fax: +1 (352) 629-7000 e-mail: bgs@mercury.net
- Broadcast Supply Worldwide 7012 27th Street West Tacoma, WA 98466 Tel: +1 (800) 426-8434 Fax: +1 (800) 231-7055 e-mail: info@bswusa.com
- Crouse-Kimzey Company P.O. Box 155999 Fort Worth, TX 76155 Tel: +1 (800) 433-2105 Fax: +1 (972) 623-2800 e-mail: sales@proaudio.com
- Radio Communications Unlimited 5509 Barrington Ooltewah, TN 37363 Tel/Fax: +1 (423) 396-3743
- Caveco 1121 Bellamy Road, North Unit #10 Scarborough, ONT M1H 3B9 Tel: +1 (416) 438-6230 Fax: +1 (416) 438-1065 e-mail: bob@caveco.com
- Marketing Marc Vallée 1067 Chemin St. Lambert St. Sauveur de Monts, QE J0R 1R1 Tel: +1 (450) 227-1828 Fax: +1 (450) 227-8394 e-mail: marc@vallee.com
- All Electric 487 Cariboo Crescent Coquitlam, BC V3C 4X7 Tel: +1 (604) 945-5651 Fax: +1 (604) 945-5652 e-mail: allelec@dowco.com

Circle (18) On Reader Service Card

World Radio History

FCC Phone Book

► FCC, continued from page 15
Customer Service Branch

L. Art Wall/Chief(301) 725-1585

COMPLIANCE AND INFORMATION BUREAU

Richard Lee/Chief(202) 418-1100
 Arlan K. vanDoom/Deputy Chief(202) 418-1105
 Joseph P. Casey/Deputy Chief(202) 418-1100
 Thomas Spavins/Chief Economist(202) 418-1100
 Vacant/Ass't Bureau Chief for Law(202) 418-1100
 George R. Dillon/Engineering Adviser(202) 418-1100
 Roy Kolly/Special Ass't to Bureau Chief(202) 418-1100
National Call Center (Gettysburg, PA)
 Cynthia Jeffries/Director(717) 338-2590
North East Regional Director (Park Ridge, IL)
 Russell D. Monie/Director(847) 298-5405
South Central Regional Director (Kansas City, MO)
 Dennis P. Carlton/Director(816) 353-9035
Western Regional Director (Hayward, CA)
 Serge Marti-Volkoff/Director(510) 732-9046
Office of Management and Resources
 Robert W. Crisman/Ass't Bureau Chief for Management and Resources(202) 418-1135
Resources Group
 Glenna F. Werking/Director(202) 418-1133
Management and Systems Group
 Wayne T. Toivanen/Director(202) 418-1114
Office of Information Resources
 John R. Winston/Ass't Bureau Chief for Information Resources(202) 418-1100
 Frank Lucia/Director, Emergency Communications(202) 418-1226
Training Center (Columbia, MD)
 Michael Anderson/Director(301) 725-3880
Compliance Division
 Pamela D. Hairston/Chief(202) 418-1160
Legal Services Group
 Ricardo M. Durham/Director(202) 418-1160
Investigations Group
 Vacant/Director(202) 418-1170
Technology Division
 Kenneth R. Nichols/Chief(202) 418-1210
Equipment Standards Group
 Bernard L. Stuecker/Director(202) 418-1210
Equipment Development Group (Powder Springs, GA)
 Ferrel Bentley/Director(404) 943-6425
National Operations Group
 Dan Emrick/Director(202) 418-1175
Communications and Crisis Management Center
 David T. Prescott/Director(202) 632-6975
HFDF (High Frequency Direction Finding) Center (Columbia, MD)
 David Larrabee/Director
 (can be reached through CCMC)(202) 632-6975

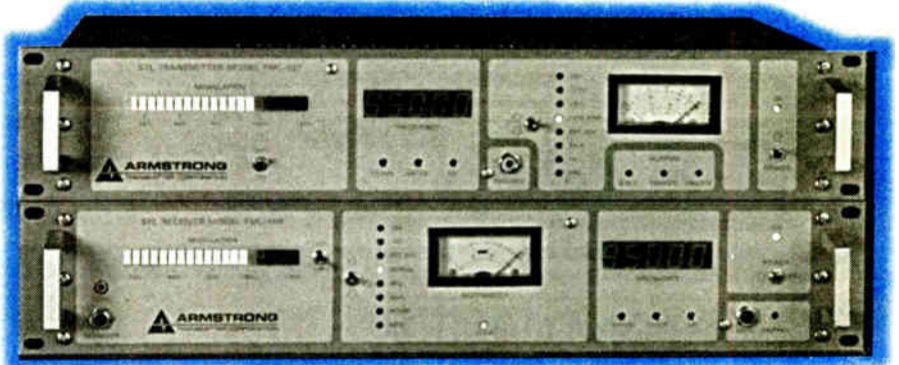
MASS MEDIA BUREAU

Roy J. Stewart/Chief(202) 418-2600
 Renee Licht/Deputy Chief (Policy)(202) 418-2600
 Robert H. Ratcliffe/Deputy Chief (Operations)(202) 418-2600
 Keith Larson/Ass't Chief (Engr)(202) 418-2600
 Jerry Duvall/Chief Economist(202) 418-2600
 Ray White/Special Ass't(202) 418-2600
 Janet S. Amaya/Ass't Chief Mgmt. and Personnel(202) 418-2614
 Thomas Wilchek/Chief Auth. Prog. Group(202) 418-2654
 OBC FAX(202) 418-2828
Audio Services Division
 Linda Blair/Chief(202) 418-2780
 Peter Doyle/Deputy Chief(202) 418-2780
 Melanie Godschild/Ass't Chief (Law)(202) 418-2780
 Dennis Williams/Ass't Chief (Engr)(202) 418-2780
 Brad Deutsch/Special Assistant(202) 418-2780
 Application/Pleading Status(202) 418-2730
 All Other ASD Staff(202) 418-2700
 ASD FAX(202) 418-1411
Enforcement Division
 Charles W. Kelley/Chief(202) 418-1420
 Edythe Wise/Ass't Chief(202) 418-1420
Complaints/Political Programming Branch
 Norman Goldstein/Chief(202) 418-1430
 Robert L. Baker/Political Programming(202) 418-1440
 Complaints FAX(202) 418-2080
 Enforcement FAX(202) 418-1124
Equal Employment Opportunity Branch
 Paulette Laden/Chief(202) 418-1450
 EEO FAX(202) 418-1797

Policy and Rules Division
 Charles W. Logan/Chief(202) 418-2120
 Bruce A. Romano/Deputy Chief(202) 418-2120
 Mania K. Baghdadi/Ass't Chief(202) 418-2130
 Roger D. Holberg/Legal Adviser(202) 418-2120
 Andrew J. Rhodes/Special Legal Adviser(202) 418-2120
Legal Branch
 Victoria F. Phillips/Chief(202) 418-2130
Engineering Policy Branch
 Bruce A. Romano/Acting Chief(202) 418-2120
Policy and Industry Analysis Branch
 Judith Herman/Chief(202) 418-2170
Allocations Branch
 John A. Karousos/Chief(202) 418-2180
 PRD FAX(202) 418-2053
Video Services Division
 Barbara A. Kreisman/Chief(202) 418-1600
 James J. Brown/Deputy Chief(202) 418-1600
 Charles Dziedzic/Ass't Chief(202) 418-1600
 H. John Morgan/Ass't Chief (Engr)(202) 418-1600
Television Branch
 Clay Pendarvis/Chief(202) 418-1600
 Mary M. Fitzgerald/Acting Supv Attorney(202) 418-1600
 VSD & TV FAX(202) 418-2827
Low Power Television Branch
 Mary M. Fitzgerald/Chief(202) 418-1600
 Hossein Hashemzadeh/Supv Engineer(202) 418-1650
Distribution Services Branch
 Clay Pendarvis/Acting Chief(202) 418-1600
Ownership Staff
 LeAudrey Alexander(202) 418-1625
 LPTV FAX(202) 418-7539
MMDS Staff
 Charles Dziedzic/Ass't Chief(202) 418-1600
 Sharon Bertelsen/Supv Attorney(202) 418-7057
 MDS FAX(202) 418-7017

See FCC, page 22 ►

Frequency Agile STL Systems



- ▲ If you are looking to deliver clean, crisp audio to your transmitter via microwave, Armstrong FML-10 STL system offers unsurpassed audio purity in a rock-solid, feature-packed package.
- ▲ Built to tough manufacturing standards throughout, FML-10 system features microprocessor controllers, advanced PLL circuitry, ultra linear VCO and front panel frequency programmability with digital frequency readout.
- ▲ Currently in service at over 300 stations in 21 countries, this field proven design is a "rock-solid" STL choice for any station.

Complete System Under \$5500.00
Same Day Shipping
30 Day Money Back Guarantee



ARMSTRONG

TRANSMITTER CORPORATION

4835 N. Street • Marcellus, NY 13108 • PH: 315/673-1269 • Fax: 315/673-9972
 E-mail: info@armstrongtx.com • www.armstrongtx.com

Products & Services Showcase

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

AES3 Switching And Distribution

Made Easy with the *AES-200*



Features:

- 2 Input AES3 Switcher
- 2 XLR Outputs, 2 BNC Outputs
- Remote Control/Status

Uses:

- Main/Alt. Transmitter Audio Switching
- Digital Studio Switcher
- Professional Digital Dubbing

Broadcast Devices, Inc.



5 Crestview Avenue
Cortlandt Manor, NY 10567
Tel. (914) 737-5032 Fax. (914) 736-6916
Website: www.Broadcast-Devices.com

READER SERVICE NO. 20

SIX MILLION THUNDERSTORMS HIT PLANET EARTH EVERY YEAR! IT TAKES ONLY ONE TO PUT YOU OFF THE AIR!



The STATI-CAT LIGHTNING PREVENTION SYSTEM provides a continuous, low-resistance discharge path for the static electric charge on tall structures. Dissipation points are 1/8" stainless steel rods.

This affordable and rugged system has proven itself in the field for over 15 years.

Cortana
Corporation Inc.

Write or call for a free brochure and design
P.O. Box 2548, Farmington, N.H. 07499-2548
Ph: 888-325-5336 • Fax: 350-326-2337

READER SERVICE NO. 40

POWERFUL DIAL-UP CONTROLLER



The CircuitWerkes DR-10 Dial-up controller is perfect for studio & automation control.

- 10 dry relay contacts out (2 are DPDT for switching bal. audio, etc.).
- Auto-answers on settable ring # and auto-disconnects with telco CPC.
- Each relay can be assigned to any tone & can be set to function as momentary, latching closure with distinct on/off codes, or interlocked latching with other relays. Any relay can be assigned to any tone(s).
- Up to 8 digit user set password prevents pirating.
- Each relay is programmable to close at beginning or end* of tone and can beep when activated. End of tone closures are after the beep!
- Two-tone & detection delay modes eliminate falseing for remotes, etc.
- 4 Status inputs beep when queried, dial 4 numbers & control relays.
- A simple, built-in audio hybrid, with active, balanced input & outputs, lets you control your equipment while monitoring local audio sources.
- All audio & control connections via easy to use screw terminals.
- Retains its settings & prior state after a power failure.
- Silencer option removes DTMF tones from output.
- List price only \$449.00. Compare our features & price to anyone else!

The DR-10 can do a lot more than space allows us to print. For complete info & downloadable manuals, check out our web site - <http://www.circuitwerkes.com/>
* end of tone closures function in momentary mode only.

CircuitWerkes - (352) 335-6555 / Fax 380-0230
3716 Southwest 3rd Place, Gainesville, FL 32607

READER SERVICE NO. 49

SOUND GREAT — INSTANTLY!

- Eliminate flanging (hollow room) effect
- Eliminate bad room acoustics
- Hold absolute levels
- Correct voice symmetry

AIRcorp 500PH Microphone Processor



- Front panel input level select +4 to -50 dB
- Three section variable boost and cut equalization
- Compressor/Expander cross coupled for maximum punch
- Built-in earphone jack
- DE-ESSER designed to protect pre-emphasis curves
- Simultaneous mic level and line level outputs
- Internal 48 Vdc Phantom Supply

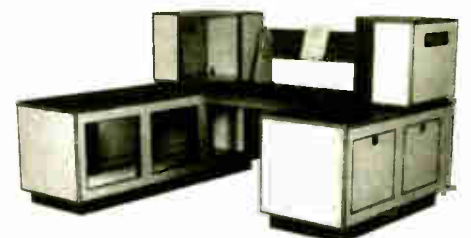
AIR corp

Call your dealer

or call 972-304-0455 or fax: 972-304-0550

READER SERVICE NO. 110

You found what you've been looking for...



The finest in
Modular Studio Furniture
Endless combinations...
precision quality...
attractive design...
and a GREAT PRICE!

Advanced Furniture Systems

1545 N. Washington Ave., Loveland, CO 80538
Phone: 970-663-4123 Fax: 970-663-6338

Email: afs@mail.omn.com
Website: www.omn.com/afs

READER SERVICE NO. 50

DIGITAL ANTENNA MONITORS

In-Stock-Available for Immediate Delivery



Price US\$2700.00 2 Towers
Will operate with any remote control equipment.



Price US\$2100.00 2 Towers
For AM directionals with studio located at transmitter site.

These monitors are state-of-the-art instruments of unequalled accuracy (.5% or better on ratio and .5° or better on phase) and stability. With typical modulation the true ratio readout of these monitors is a factor of 10 more stable than instruments that measure normalized amplitude, and their phase readouts are rock solid. Phase sign is automatic, no extra operation. In addition to the analog DC outputs for remote control the Model CMR has a multiplexed BCD digital output which can be used to drive the Remote Indicator Model CMR-1. RF inputs have dual protection. Gas discharge tubes across the sample line terminations plus relay protection.

GORMAN REDLICH MFG. CO.
257 W. Union St. Athens, Ohio 45701
Phone 740-593-3150 • FAX 740-592-3898

READER SERVICE NO. 15

Switcher tools

Designed by broadcast engineers for broadcasters, our audio and digital audio switchers offer excellent sonic quality, removable I/O connections, contact closures and serial remote control capabilities and flexible mounting accessories.



SS 12x4
Active crosspoint switching/routing with 12 stereo inputs and 4 stereo outputs.



10X1
Passive switching/routing with 10 stereo inputs and one stereo output or vice-versa.



SS 8x2
Active crosspoint switching with 8 stereo inputs, 2 stereo plus 2 mono outputs.



8x1 DAS
Routes any one of eight AES/EBU digital inputs to split outputs.



8X2D
Active crosspoint switcher with 8 stereo inputs, 2 stereo and 2 mono outputs



6X1G
Passive switching/routing with 6 stereo inputs and one stereo output, or vice-versa.



3X2B
Active crosspoint switcher with 3 stereo inputs and 2 stereo outputs.



SS 3.1
Passive switching/routing with 3 stereo inputs and one stereo output or vice-versa.



SS 2.1/BNC
Passive switching/routing with 2 composite audio, video, or AES/EBU inputs to 2 composite audio, video, or AES/EBU outputs, or vice-versa.



SS 2.1/TERM
Passive switching/routing with two stereo inputs to one stereo output or vice-versa.

Check out our web site for product information, list pricing and a list of distributors!

Internet: www.broadcasttools.com E-mail: bt@broadcasttools.com

Voice: 360.428.6099
Fax: 360.428.6719

BROADCAST tools inc.

READER SERVICE NO. 120

Practical Resources From SBE

► SBE, continued from page 18
very often. Sections include: Transmitter Controls, Reading Analog Meters, FM Power Output by the Direct Method, FM Power Output by the Indirect Method, Calculating AM Transmitter Power Output, The Station Log, Reviewing the Station Log, Keeping the Station On the Air, The Public Inspection File, Other Concerns of the Chief Operator, Hazards at the Transmitter Site and An FCC Inspection.

For the reader's convenience, excerpts from the FCC Rules are provided in Appendix 1, followed by a Glossary of Terms.

Other pubs

In addition to the Radio Chief Operator's Handbook, The Society of Broadcast Engineers has published a number of practical handbooks and manuals designed to help the broadcast engineer through everyday problems in station operation. In addition

This book was written specifically for the non-technical chief operator.

to the Radio Chief Operator's Handbook, publications of interest to those working in radio include the SBE Guide to Writing Station Operations Manuals and the SBE EAS Primer.

Recognizing the importance of providing technical publications to broadcast engineers, SBE has created a new Publications Committee, chaired by board member Raymond C. Benedict, CPBE. Benedict is director, spectrum management, for CBS in Washington, D.C. This committee researches and evaluates ideas for new publications and identifies qualified authors to write them. Ideas for new publications may be submitted to the committee. Address your correspondence to: SBE Publications Committee, Society of Broadcast Engineers, 8445 Keystone Crossing, Suite 140, Indianapolis, IN 46240.

These books and others directed toward technical operation of TV stations can be obtained through the Society of Broadcast Engineers by calling (317) 253-1640. Information is also available through the SBE Web site at www.sbe.org

■■■
John L. Poray, CAE, is executive director for The Society of Broadcast Engineers.

MARKET PLACE

Digital Talk System

Telos Systems plans to unveil its Series 2101 digital talk show system for on-air talk radio later this year. The system was on display at NAB99.

According to the company, Series 2101 is the first large-scale multiline talk show system to interface directly with digital phone lines.

Broadcasters can reassign numbers to different studios with the system's open architecture.

"Simply put, this digital path means faster call setup, unprecedented call supervision and ... excellent sounding phone calls," said Steve Church, CEO.

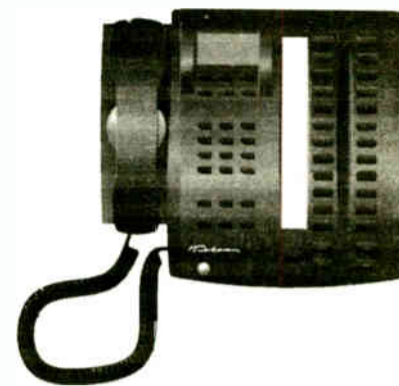
Series 2101 can connect to PRI or BRI ISDN lines and channelized T1 lines.

In addition to analog I/O, AES/EBU inputs and outputs are provided for those stations maintaining an all-digital facility.

Also included is an "intelligent call director," which features animated graphical LED line status displays and a built-in handset, full duplex speakerphone and a headset jack.

The system interfaces with the Telos Assistant Producer, the company's Windows-run, multiline call-screening software.

For more information contact Telos Systems in Ohio at (216) 241-7225 or circle Reader Service 91.

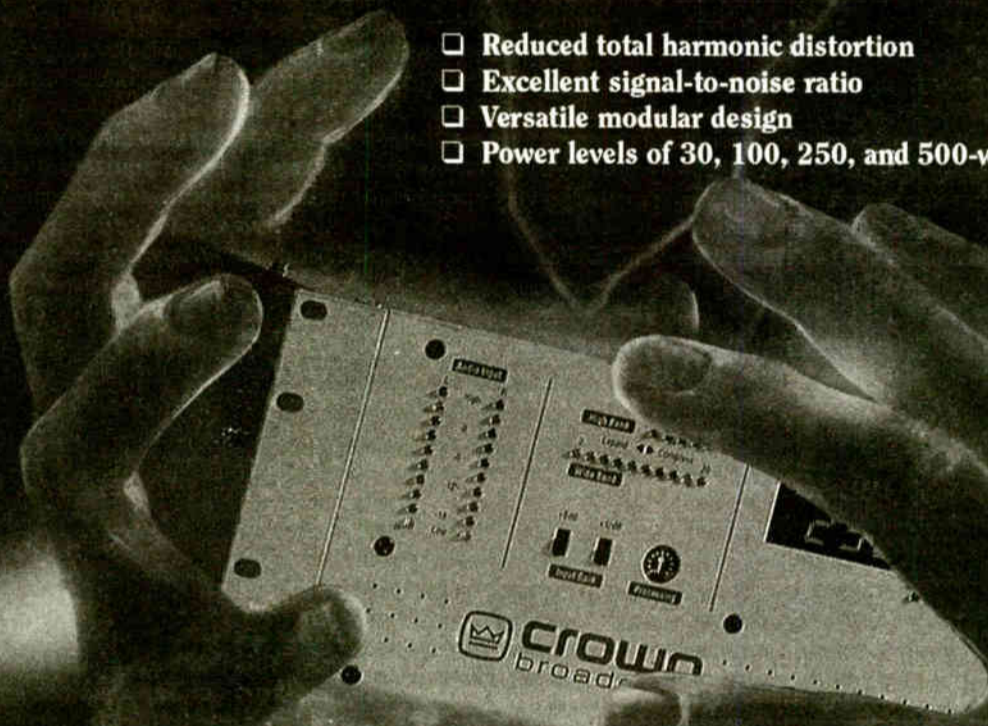


Crown's New Exciter

...we've created a **Monster** broadcast solution!

Our Design Engineers have created a second generation, high-performance FM exciter with significantly improved specifications. Fear no one—this monster solution fends off the competition by ensuring clean, accurate audio quality and includes:

- Reduced total harmonic distortion
- Excellent signal-to-noise ratio
- Versatile modular design
- Power levels of 30, 100, 250, and 500-watts



Need a **Monster** of a solution for...

- Replacement of the IPA in your high-power tube transmitter
- New installation
- Backup

Give us a call!

**In-the-box Innovations.
Out-of-the-box Solutions.**

crown
broadcast

800-294-8050 or 219-294-8050

Fax: 219-294-8222

Email: broadcast@crowntel.com

Web: www.crownbroadcast.com



FCC Phone Book

► FCC, continued from page 22

WIRELESS TELECOMMUNICATIONS BUREAU

Thomas J. Sugrue/Chief	(202) 418-0600
Gerald P. Vaughan/Deputy Bureau Chief	(202) 418-0600
James D. Schlichting/Deputy Bureau Chief	(202) 418-0600
Kathleen O'Brien-Ham/Deputy Bureau Chief	(202) 418-0600
Diane J. Cornell/Associate Bureau Chief	(202) 418-0600
Jeanine Poltronieri/Associate Bureau Chief	(202) 418-0600
David Wye/Technology Advisor	(202) 418-0600
Elizabeth Lyle/Senior Legal Advisor	(202) 418-0600
Robert Calaff/Legal Advisor	(202) 418-0600
Josh Roland/Legal Advisor	(202) 418-0600
Meribeth McCarrick/Public Affairs Specialist	(202) 418-0600
<i>Management and Planning Staff</i>	
Andrew R Cox/Assistant Bureau Chief for Management	(202) 418-0617

Yvette Barrett/Deputy Assistant Bureau Chief for Management	(202) 418-0603
<i>Auctions and Industry Analysis Division</i>	
Amy Zoslov/Chief	(202) 418-0660
Mark Bollinger/Deputy Chief (Legal)	(202) 418-0660
Louis Sigalos/Deputy Chief (Operations)	(202) 418-7520
<i>Auctions Expenditures Management Branch</i>	
Sam Francis/Chief	(202) 418-0796
<i>Legal Branch</i>	
Margie Weiner/Chief	(202) 418-0786
<i>Auctions Finance and Market Analysis Branch</i>	
Rachel Kazan/Chief	(202) 418-0651
<i>Auctions Operations Branch</i>	
Brett Tarnutzer/Chief	(202) 418-0614
<i>Commercial Wireless Division</i>	
Steven E. Weingarten/Chief	(202) 418-0620
Diane Conley/Deputy Chief (Legal)	(202) 418-0620
Stephen Markendorff/Deputy Chief (Operations)	(202) 418-0620
<i>Policy and Rules Branch</i>	
Paul D'Ari/Chief	(202) 418-0620
<i>Licensing and Technical Analysis Branch</i>	
Roger Noel/Chief	(202) 418-0620
James H. Bennett/Chief (Washington)	(202) 418-0620
Terry Fishel/Deputy Chief (Gettysburg)	(717) 338-2602
<i>Licensing Section</i>	
Pearl McGinnis/Chief	(202) 418-1334...8028
Joyce Nary/Deputy Chief	(717) 338-2627
<i>Technical Analysis Section</i>	
Sam Gumbert/Chief	(202) 418-1337
Ronald Fuhrman/Deputy Chief	(717) 338-2615
<i>Enforcement and Consumer Information Division</i>	
Catherine W. Seidel/Chief	(202) 418-0569
Myron Peck/Deputy Chief	(202) 418-0569
<i>Compliance and Litigation Branch</i>	
Gary Schonman/Chief	(202) 418-1795
<i>Informal Complaints and Public Inquiry Branch</i>	
Sharon Bowers/Acting Chief	(717) 338-2533
<i>Information Technology Division (Gettysburg, PA)</i>	
John Chudovan/Chief	(717) 338-2510
Walter G. Boswell/Deputy Chief	(717) 338-2601
<i>Information Processing Branch</i>	
Teresa Flasher/Chief	(717) 338-2526
<i>Information Development Branch</i>	
Judith Dunlap/Chief	(717) 338-2511
<i>Information Maintenance Branch</i>	
Eddie Richardson/Chief	(202) 418-0573
<i>Policy Division</i>	
John Cimko/Chief	(202) 418-1310
Nancy Boocker/Deputy Chief	(202) 418-1310
<i>Private Wireless Division</i>	
D'Wana Terry/Chief	(202) 418-0680
Vacant/Deputy Chief (Legal)	(202) 418-0680
Herbert W. Zeiler/Deputy Chief (Technical)	(202) 418-0680
John Clark/Deputy Chief (Public Safety)	(202) 418-0680
<i>Policy and Rules Branch</i>	
John J. Borkowski/Chief	(202) 418-0680
Vacant/Deputy Chief	(202) 418-0680
<i>Licensing and Technical Analysis Branch (Gettysburg, PA)</i>	
Mary Shultz/Chief	(717) 338-2656
Steve Linn/Deputy Chief	(717) 338-2656
<i>Personal Radio Section</i>	
Darlene Reeder/Chief	(717) 338-2673
<i>Microwave Section</i>	
Ruth Taylor/Chief	(717) 338-2648
<i>Mobile Radio Section</i>	
Kelly Lawver/Chief	(717) 338-2605
<i>Technical Analysis Section</i>	
Albert Knerr/Acting Chief	(717) 338-2647

Large broadcast solutions come from small sources.



Henry Engineering's Matchbox II is all you need to interface to the real world! It's ideal for computer sound cards, DATs, and consumer gear.

Harris and Henry have a wide range of BIG solutions in SMALL packages! You can match, mix, amplify, store, and control your audio with solutions from Henry Engineering.

Call Harris Communications today for a copy of the Henry Engineering brochure or to place your order.

next level solutions



1-800-622-0022
www.harris.com/communications

Gepeco Catalog

Gepeco International, a broadcast audio and video cable manufacturer, recently published its latest product catalog. The updated edition of the catalog features 59 additional products.

At 96 pages, the catalog lists more than 350 audio, video and HDTV broadcast cables and cable-related products. Each item in the catalog has a photograph or line drawing of the product to accompany the text.

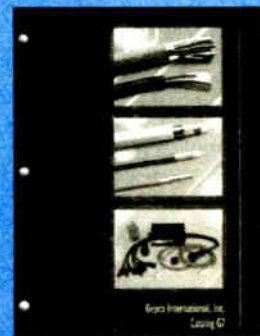
Products are grouped

into "families," which are sections that include audio cable, video cable, and composite audio and video cable.

Two sections new to updated edition are standard cable assemblies and specialty products.

Previously available only by special order, the products in these families can now be ordered directly from the company provided they are in stock.

For more information, contact Gepeco International at (800) 966-0069 or circle Reader Service 53.



Truth in Advertising



The hype for digital audio has been deafening. While digital offers advantages for storage and control, it has severe limitations for dynamics processing. Indeed, Cutting Edge® claims their Omnia unit sounds almost as good as analog.

The Aphex 2020 FM Pro offers the purity of an all analog signal path with the power of digital control. Through its use of 11 patented circuits, the 2020

achieves the greatest possible loudness while retaining musicality and naturalness.

No digital grunge, no aliasing, no overshoot. No subcarrier artifacts from composite clipping. Just the loudest, cleanest FM processing with the greatest possible coverage area.

Contact Aphex today for a demonstration, and we'll show you there *is* truth in advertising.



APHEX
SYSTEMS

Improving the way the world soundsSM

11068 Randall Street, Sun Valley, CA 91352 U.S.A.
818-767-2929 Fax: 818-767-2641 <http://www.aphexsys.com>

Cutting Edge and Omnia are registered trademarks of TLS Corporation. Orban and Optimod are registered trademarks of Harman International.

**WE'VE BEEN CONNECTED TO
THE BEST NAMES IN THE
INDUSTRY FOR 15 YEARS.**



U S A U D I O

In our opinion, the best names in the industry are professional audio and video contractors like you who choose our products again and again. In fact, your loyalty is what inspires us to design and manufacture innovative equipment that is high-performing and user-friendly.

For 15 years, we've worked to provide your customers more control and to give you peace of mind. A commitment that's paid off. Thanks to you, U.S. Audio is hard at work all over the world in churches, nightclubs and stadiums connecting people with sound.

whirlwind

www.whirlwindusa.com
World Radio History

Circle (24) On Reader Service Card

888.733.4396

Workbench

Radio World, June 9, 1999

Solutions to Ground Wire Puzzle

John Bisset

Gil Houston from Chico, Calif., had a great comment on John Stortz' problem with ground wires breaking on his tower guys (RW, May 12).

He suggests that instead of using solid wire for these grounds, an investment in welding cable of the same gauge will allow more flexing.

Gil cautions that the cable is not cheap, but it's designed to carry large current loads, and it is jacketed, usually with black heavy-duty rubber. Best feature of all: it's designed to flex repeatedly.

A good source for short lengths of this cable is your local community college or welder training school, where the students have to use nearly perfect cables, and making a buck or two on the junk pieces would make their day!

If you are able to get a couple of 15- or 20-foot lengths, the cable makes great battery jumper cables. Gil warns they tend to grow legs and walk off; he has lost two sets so far.

Gil takes exception with the PVC, unless newer versions contain UV ray combating components. He also suggests bonding the ground wire to the ground rod. Bolts or kearnays (split bolts) are a good second choice.

Gil can be reached via e-mail at houstonz@maxinet.com

★ ★ ★

Clif Glasgow chiefs an AM and FM in Brawley, Calif., as well as handling some contract stations. He also noted John Stortz' ground problems, and had some comments.

First was a chastening of my repeated exhortations about using black wire-ties outdoors!

In the desert southwest, no plastic tie wrap of any color will last more than six months outdoors. Clif will use the black ty-wraps under eaves, or out of direct sun, and only for bundling and neatness, never where anchoring is important or the tie is under stress.

So what are the options? Clif recommends Band-its from your local coax and connector supplier. They are black-vinyl coated stainless-steel, self-locking and reusable. They are expensive when compared to the cost of ty-wraps, but they last forever.

Trying to make this happen on a budget? Look for salvage wire. Clif has picked up #14 or #12 TW insulated solid copper wire. It doesn't rust, and it maintains its strength even if the insulation falls off and the copper oxidizes. The result is many years of service on the inexpensive side! The color

is unimportant, and if salvage wire is used, the cost is free.

Clif learned this trick from one of the



An audio switcher is installed before the headphone amp for feed selection.

major cell/pager companies that are tenants at one of his sites.

As for the broken ground wires, Clif joins several other readers thinking there must be more to the story.

When Clif grounds guys, he uses a copper split bolt in conjunction with #8 or #6 stranded (THHN) copper wire. This wire is run to the fan plate of the guy anchor, then to the ground rod.

If there isn't a spare hole in the fan plate, Clif drills one and inserts a stainless steel bolt. A copper clamp connector big enough to handle the double wire is about 85 cents at most electrical supply stores, though they may cost around \$2 at a hardware store.

Clif said that there is little movement at the fan plate, and individual wires from the guys across the turnbuckles and gang-clamped at the fan plate might be another choice.

As for the cows — Clif writes, "no bull" — he's found hair in the guys and grips of unprotected anchors where cattle graze. They rub so hard that they can untwist EHS cable, and could undo a grip over time.

If your turnbuckles don't have a safety cable going through, cattle can unscrew it with repeated rubbing. Fencing around guy anchors in a situation like this makes the most sense; a flea-bitten bovine can drop a tower! But then so can the farmer ... read on.

One of Clif's clients invested \$7,500 to replace a guy anchor that was snagged by a "sub-soiler." This is a farming device that gouges down into the earth five feet, turning the soil over. It is pulled by a super-heavy, powerful tractor. The I-beam style heavy-duty guy anchor rod was bent like a pretzel, twisted sideways, and dragged a couple hundred feet out of line — along with the fence.

This happened because someone saved a few bucks by not paying rent on all the ground he needed, and put small fences only

around the anchor head where it came out of the ground. If the fencing had run around the perimeter of the deadman, located 10 feet behind the fan plate and the fence, the problem would have never occurred.

★ ★ ★

Brian Edwards, from New World

Radio's WNWR(AM) in Philadelphia, just finished work on some studios and shares a couple of good ideas.

Brian found an inexpensive way to mount near-field monitor speakers. Plumbing pipe, painted black, is both rugged and inexpensive.

In a production studio, Brian needed a way to separately feed his Symetrix headphone amp that talent would be using.

Many times, talent had to switch between Air and Pgm, or Pgm and Aud. Standing at the talent mike position, their arms would have to grow another couple feet to reach the selector switch on the board.

Brian chose a Radio Design Labs audio switcher (see Figure 1) to solve the problem, giving the talent the ability to select from Pgm, Aud, or Air from the talent position.

■ ■ ■

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

GET YOUR SOUND TOGETHER

CP 803: TURN-KEY PROCESSING FOR THE NEW RADIO

PROBLEM: How to equip your stations with today's competitive radio sound in a consolidated world.

SOLUTION: Composite Processing from Modulation Sciences, The Processing Authority

Radio consolidation means more complex decisions about how to sound and what equipment to buy. The CP-803 Composite Processor punches through clutter on the dial and energizes your stations' sound to grab listeners and ratings. It perks up any format, from hip-hop to modern rock and any shade in-between.

The CP-803 features Modulation Sciences' quality design, meticulous engineering and a processing approach to meet the challenges of the real world of radio. It's simple to set-up and easy to operate.

The CP-803 means one more tool for success in the new radio and one less headache in a frantic industry where things change overnight.

At a time when the newest mega-deal is just around the corner, you can rely on Modulation Sciences to pull your stations' processing together.

CALL NOW for information about the CP-803 Composite Processor or any of Modulation Sciences full line of processing products.



12A World's Fair Drive
Somerset, NJ 08873
Voice (732) 302-3090
(800) 826-2603
Fax (732) 302-0206

100% Orban engineering.

THE OPTIMOD-FM 2200 is

everything you'd expect from Orban engineering: superior design, a big, loud OPTIMOD sound, plus Bob Orban's proven processing know-how. In fact, about the only thing unexpected is the price. Around half what you'd expect to pay for 100% Orban performance.

In one slim package, you get features usually reserved for high-end processors. Including built-in digital stereo encoding, eight factory presets (each with 19 LESS/MORE variations) and eight user presets. No other processor in this price range delivers a louder, brighter, or cleaner sound—with more bass punch. That's because the 2200 is a direct descendant of the best-selling digital processor in the world, pioneered by one of the most competitive engineers in radio.

THE FAMILY RESEMBLANCE IS CLEAR.

The 2200's two key processing structures come directly from Bob's evolutionary work on the OPTIMOD-FM 8200.

In the Two-Band structure, Bass EQ lets you selectively add punch, while a High Frequency enhancer

The OPTIMOD-FM 2200



automatically adds "sparkle." Protection mode maintains unmatched transparency and makes the 2200 an ideal upgrade for stations using Orban's classic 8000A. Both structures tightly limit peaks while providing superb baseband spectrum control. This guarantees highest loudness by

protecting the stereo pilot tone and preventing overshoots in any uncompressed digital STL.

The result is the ability to create a big, loud, signature sound for all kinds of formats: pop music, talk, classical or jazz. All at a price that has competitive written all over it. Just like the engineering.

THE SCIENCE BEHIND THE SOUND

More and more broadcasting chains demand digital consistency. That's why the 2200's built-in encoder generates the stereo composite signal digitally. Digital encoding is ultra-stable; no periodic tweaking is required.

The OPTIMOD-FM 2200D version also includes AES/EBU digital inputs and outputs in addition to standard analog.

So you get loud, clear digital sound across the entire spectrum—and you can keep your signal in pure digital form all the way to the transmitter.

At
about
half
the
price.



orban

A Harman International Company



FIRST PERSON

Part 21 Works in Phoenix

How One Station Got Around a NAFTA Power Restriction With the Help of a Digital Radio System

Dennis Gilliam

Welcome to a radio odyssey, going down the digital road of detours, potholes and budgets.

On this journey, we have discovered ways to link multiple sites, using a bit of innovation and a lot of hard work.

There are two professionally staffed, non-commercial FM operations in Phoenix owned by Maricopa Community Colleges. Operational sites are spread throughout the metro area, population 2.5 million. The studios are co-located in the East Valley in Mesa, Ariz., and can claim

would work out at this site.

Because the park affords an excellent view and transmission site, there are 10 full-power UHF and VHF television stations, 13 Class C FMs and a host of other users from FCC Parts 21, 73, 74 and 90 on the ridge.

Treaty line

This site also is well within the 200-mile treaty line. With the crowded usage and the proximity to Mexico, KBAQ experienced severe logistical problems. The coordination list shows all auxiliary services crowded, and

dish. This system is still in operation for backup.

Bext, by the way, has fulfilled our translator needs for years and I recommend them highly.

Last summer, we used a relocation to escape the treaty power restrictions of the South Mountain location, thereby moving the KBAQ site to White Tank, a large mountain with a county park in the far western Phoenix valley, 35 miles northwest of the old site. The site's name is derived from the natural water retention in the central area of the peak, comprised of a snow-white stone.

Reliable link

The relocation brought a successful power increase application for the KBAQ transmitter, from 3 kW to the present level of 12.5 kW ERP. We decided not only to establish a reliable link to the new site, but to fold in a digital upgrade of both stations.

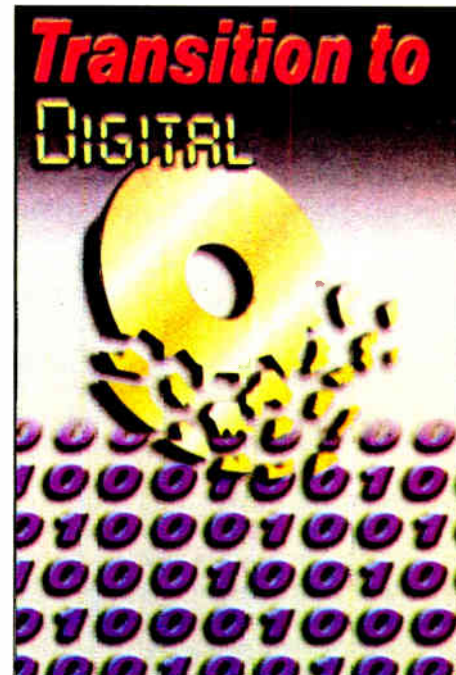
We still retain the use of our older analog consoles, made by Broadcast Audio Corp. (1979!) and Pacific Recorders. Analog console outputs from both stations are bridged into a pair of CRL DP-100 audio processors, the starting point of that digitization. A move of the studio facilities is planned for 2000, and all older audio consoles will be replaced at that time.

From the DP-100 units, the AES-format digital streams are routed into Intraplex multiplexer banks. Also at this point, digital data for our Burk multisite remote-control system is accessed, as well as numerous other analog, digital and housekeeping channels. All this is converted into standard T1 format bidirectional bitstreams for linking to the transmission sites.

From here, the arrangement is less typical. The unique position we took was the design, licensing and installation of the linking system: an Alcatel MDR-6000 series 10 GHz digital radio system.

These digital microwave radios are a staple of the long-haul data and telephone companies, but are seldom seen in support of broadcast stations. Coordination and licensing is a different animal for those accustomed to Part 73 and 74 applications, but the steps are well-defined. Virtually any business, including radio stations, can apply for a Part 21 license.

This microwave radio system is beautifully engineered. The radios take up



about 33 inches of rack space and include two sections, the top RF section, and the bottom I/O interface control.

We ordered the radios configured in hot standby, meaning there is a redundant set of components that share only a chassis and waveguide connection. They can switch inaudibly between sections, providing the greatest possible insurance against system failure.

The power for the radios is from traditional telephone-type -48 VDC systems at the three sites. We derive that voltage



The White Tank Site Approach Road

a combined weekly come of just under 300,000.

The first station, KJZZ(FM), is a 100 kW ERP jazz-talk operation, with roots as a whopping 10-watt station in 1951. The second station, KBAQ(FM), now has a 12.5 kW ERP with a straight classical music format. This station is co-owned by Arizona State University and went on the air in 1993 at 3 kW.

Getting KBAQ on the air and increasing its power has been an exercise in jumping through hoops.

The NAFTA treaty restricted high-power FM within 200 miles of the Mexican border, keeping such stations at 3 kW ERP. This limitation played an important role in the unfolding saga of getting KBAQ on the air.

The KJZZ transmission site is atop Mount Suppoa in South Mountain Park, located in central Phoenix. At 10,000 acres, it is the largest city park in the world. When KBAQ went on the air in 1993, its managers hoped it

virtually every channel has multiple users listed.

Adding a new station into this quagmire was daunting, but KBAQ took to the air in 1993 from the site on South Mountain.

We first tried linking the new station with a leased T1 line from U.S. West, with an early dual-composite conversion system on each end. These units were not successful, and the leased line was less than reliable.

Having used the standard 950 MHz band STL for years on KJZZ with few problems, we were happy when Bext came out with its digital quad-15 kHz audio multiplexer for use with its 950 MHz type-accepted STL radios.

We installed a 15-watt radio and multiplexer system to get both stations' audio to the transmission site. This served admirably — even in the face of extreme receiver front-end overloading from trunked radio and paging services — within the aperture of our receive



Inside the White Tank Site

from a mains-fed rectifier and gel-cell battery bank to afford generous run times in the event of a mains failure at any of the three sites.

The total current demand for the radios and associated equipment is

See PART 21, page 28 ▶

Lucent Technologies
Self Labs Innovations



Lucent Digital Radio IBOC DAB. Tested by Early Adopters.

Listen for Yourself.

Lucent Digital Radio

www.lucent.com/ldr

Big Pipes Serve Arizona Stations

► PART 21, continued from page 27 minuscule, allowing for easy wiring and metering. The metering and steering panels were built here at the station's shop, with easy-to-read analog meters (fully Y2K compliant!). The DC source also runs the Intraplex multiplexers, as they are a critical part of the data chain. All Intraplex rack-shelf units are available with DC power input options for this type of application.

Go with the flow

The flow of transmission circuits originates at the studios, and proceeds directly to the South Mountain Park site. The 11-mile link is accomplished with high-performance, six-foot dishes.

At the first stop at South Mountain, the T1 banks are opened up, or, to use the proper term, given a drop/insert point. The main digital AES feed for KJZZ is directed to a Continental 802D digital exciter. An analog derived L+R feed is first directed into suitable processing, then into an 802A exciter for use with our backup transmitter. At this point, there are also provisions for switching all audio feeds to the backup 950 MHz STL should the need arise.

An analog sample of the KBAQ audio from the Intraplex converters also is used at the South Mountain site to feed a

translator covering an otherwise shaded area to the Southeast.

The Burk remote control is stripped off for insertion at this time, and RPU audio is also inserted bidirectionally. Several other circuits, such as SCA audio and paging data, are included here. The system is configured for complete bidirectional transmission, so each site has a transmit license requirement. This remedies a common broadcaster problem: backhaul from multiple sites.

The signal path continues backward into another Intraplex multiplexer, then into another Alcatel 10 GHz radio link,

The Alcatel 10 GHz radios are capable of operating 16 T1 channels, so capacity should never be a limiting factor.

this one to the White Tank site. This is a 35-mile hop; in order to achieve a system reliability of 99.9999 percent, we used 10-foot, high-performance dishes on both ends.

The maintenance of signal quality is

not a problem — even with so many breakouts — as the bitstream never leaves the 1.544 Mbps T1 domain.

The KBAQ White Tank site is equipped with a new Nautel digital exciter, fed directly in the AES format. The facility uses a Nautel solid-state 8 kW transmitter to good effect and has had no down time after initial setup. This transmitter is remarkably efficient in terms of operating costs, and sheds very little waste heat as a result of this efficiency.

In addition to the audio feeds (both AES and analog), a conventional telephone circuit, control and RPU are in



The KBAQ Antenna (Upper Right)

mance test takes but a moment, from button-push to printout, ready for the Public File. This is a small but important aspect of broadcasting responsibility. In keeping with that spirit, responsibility to the listening audience is important as well, and the performance of the entire system needs to further that commitment.

All microwave radios can exhibit loss of path due to rain fade — it materializes as a "pop" in the program channel — of extremely short duration. This has occurred once during the first six months of operation, during a summer monsoon downpour. Total interruption was less than five seconds and was manifest on the 35-mile White Tank path.

Maintenance consists of changing the gel-cell batteries used in the DC power systems after five years and peaking the 10 GHz antennas every six months. This is important, as beamwidth at 10 GHz is narrow, and rigid dish supports are a must to prevent wind and settling from taking the system off-line.

Celebration!

All digital devices used in this system are reported from the manufacturers to be Y2K immune, so I hope to be celebrating and not servicing that evening!

Ours is an unorthodox solution, but this type of remedy is becoming more attractive and popular in the larger markets. Spectrum crowding, increased capacity demands, rising costs of leased circuits and better system performance are driving the market to this end. I'd be pleased to discuss aspects of our installation with any RW reader. Drop me an e-mail at gilliam@rio.maricopa.edu

I've been privileged to complete this project knowing that the outcome would sing and speak in homes, cars and businesses throughout Arizona. The project has benefited from the efforts of many talented people, and to them I extend great thanks.

■ ■ ■
Dennis Gilliam is chief engineer for stations KJZZ(FM) and KBAQ(FM) in Mesa, Ariz.

Reach him in c/o RW.

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

Affordable Digital Automation **24 HOUR FREE TECH SUPPORT**

NEW



Our new WaveStation 3.0 has all the features of the \$50,000 automation systems, but is priced reasonably like software, not gold-plated broadcast hardware. We often hear, "It can't be true!" More than 1000 satisfied users worldwide prove the contrary. WaveStation includes a powerful digital audio editor and uses standard or compressed audio files, including MP3. On-screen Voice-Track editing, time-shift recording, serial port control. WebCast ready. Full automation, satellite, voice track and live assist. No recurring fees, Free upgrades. Microsoft Windows 95, 98 or NT.

888-BSIUSA1

Try Before You Buy

Download the Actual Software!

www.bsiusa.com

Only

\$999

BSI

◆ MARKETPLACE ◆

Products for the Radio Broadcast Professional

Mail info and photos to: RW Marketplace, P.O. Box 1214, Falls Church, VA 22041

Hook and Loop Ties From Panduit

Panduit introduces TAK-TY Hook and Loop cable ties for use in air-handling spaces where over-tensioning and ease of release are concerns. The ties are in accordance with sections 300-22 C and D of the National Electrical Code.

TAK-TY cable ties feature hook and loop closure for simple release and reuse. According to the company, they



do not pinch or abrade — important for high-performance Category 5 and 6, and fiber-optic cables.

Several sizes are available. Five new models are in the range of 6 to 18 inches to accommodate a variety of bundle diameters.

For more information contact Panduit in Illinois at (888) 506-5400, fax (708) 532-1811 or circle Reader Service 270.

Audio Analyzer

Audio Precision offers the System Two Cascade, a new entry into its System Two family of audio analyzer products and options.

A dual-domain unit, model SYS-2522A features 96 kHz/192 kHz digital capability and other platform improvements.

Additionally, System Two + DSP (model SYS-2422A), a companion model, is available.



This unit has the same new platform improvements except digital I/O. A digital-only model, SYS-2500A, is also offered by the company.

The single or dual 96k sampling rate interface, along with a dual connector 192k interface, extends System Two's measurement capabilities to the new higher sampling rates, including the 96k audio rate featured as the DVD standard.

The Cascade DSP platform also offers increased processing power and is designed to provide future enhancements.

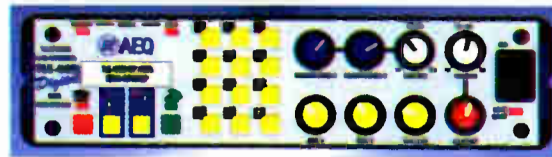
For more information contact Audio Precision in Oregon at (503) 627-0832, fax (503) 641-8906 or circle Reader Service 185.

AEQ Portable Communications Unit

AEQ offers the TLE-02D, a portable unit that features an audio codec, a digital telephone hybrid, a frequency extender and a portable mixer in one compact unit.

The TLE-02D is equipped with a double power supply system through

standard dry cells or external powering. It is useful for remote broadcast-



ing in that it connects several on-air announcers in the field to a studio through either digital or analog telephone lines.

The dial pad has selectable pulse or DTMF tones.

Also featured on the TLE-02D are two microphone inputs and one microphone/line input with level controls. Two outputs for headphones allow independent level control and a monitor signal selector.

The backlit display of the TLE-02D indicates not only status and dial numbers, but also phone book entries and menu options.

For more information contact AEQ in Florida at (954) 424-0203, fax (954) 424-0902 or circle Reader Service 116.

The #1 creative choice of audio professionals worldwide.



Instant Replay® 2.0. Instant music. Instant sound effects. Instant fun.

With this completely self-contained professional digital audio recorder, you're always in the driver's seat creatively.

Versatile and rugged, Instant Replay allows you to record audio from both analog and digital sources to its internal hard disk.

Assign recordings to 10 banks of 50 programmable Hot-Keys™ and play them back *instantly* - in any order desired, as many times as desired.

Sound effects, music, announcements -

up to 24 hours of your greatest material can be titled, timed, on-line and ready to play. And you can easily store and access additional recordings using optional removable Zip™ or Jaz™ disks.

In the studio or on the road, Instant Replay is fast, fun and easy to use.

So take us up on our offer to go out for a joy ride with Instant Replay. It's on us.

We're sure that after you test drive it, you'll want to park it at your place.



Attention call letter stations.** You're only a phone call away from a free 10-day Test Drive.

So try it out. We'll understand if you don't give it back.

(818) 991-0360

360 Systems

PROFESSIONAL DIGITAL AUDIO

For more information call (818) 991-0360 / Fax (818) 991-1360 / e-mail: info@360systems.com / Website: www.360systems.com

© 1998-360 Systems ** Offer good in US and Canada only

SPECIAL REPORT

Quechua Indians Get Shortwave

*Omnitronix Provides Local Radio Station
With a Solid-State Tropical Band Transmitter*

Eldon Porter

As I flew at 14,000 feet in the small one-engine plane, my eyes followed a winding path 1,000 feet below. The path originated somewhere on the other side of one of the many mountains that make up the beautiful Andes. It made its way down one side of the mountain and up the next, around one side and over another, finally ending at a cluster of seven adobe huts. From those huts began two more paths, each

heading in a different direction, each to another village.

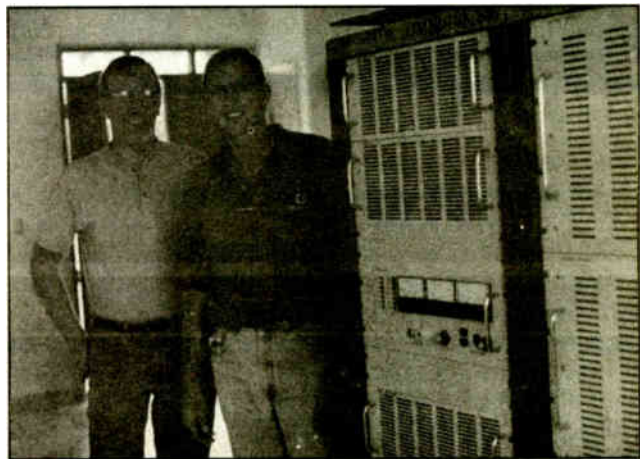
In the southern, central highlands of Bolivia, there are thousands of tiny villages and adobe huts scattered throughout some of the most inaccessible terrain in the world. There are few roads, and those that exist are often impassable. Here live the majority of the Quechua people in some of the most remote areas of the Andes mountains.

Numbering 3.5 million, the

Quechua people make up nearly 62 percent of the population of Bolivia and speak their own distinct language.

It is a common sight to view a herdsman with his radio and llama. Radio is an essential in the life of a Quechua.

Due to their isolation, Quechua people turn to the radio for news, personal messages, and entertainment. Many perceive radio communication to be more credible than face-



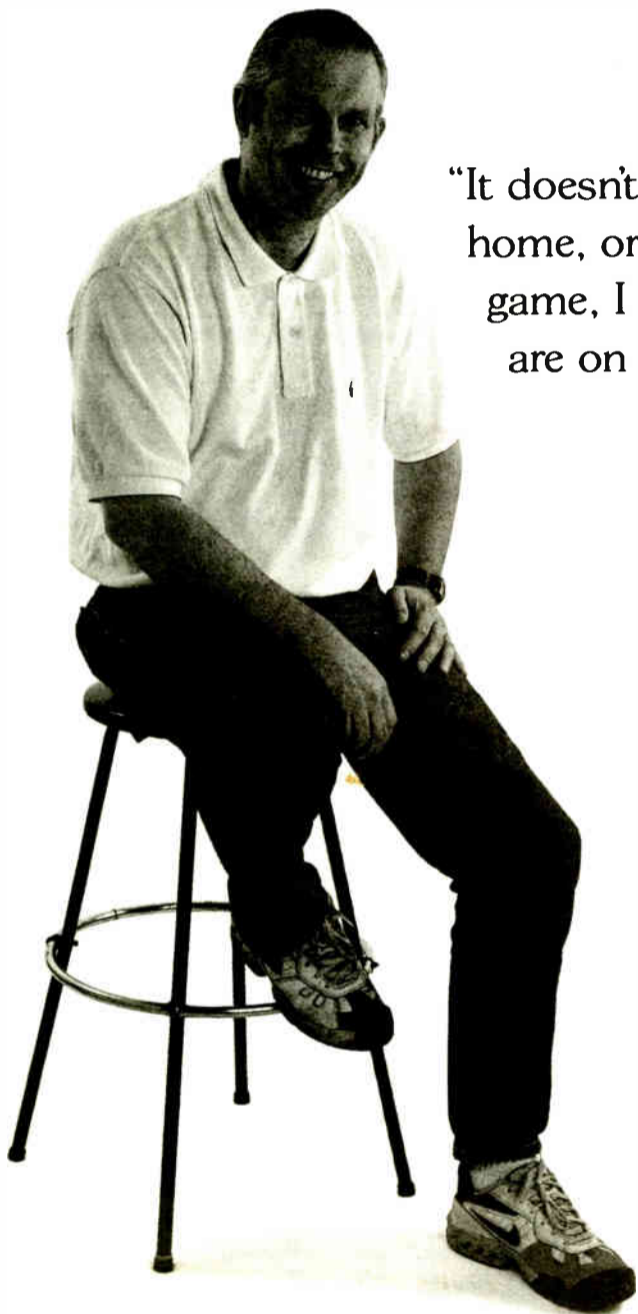
Omnitronix Engineer Wayne Borthwick, left, and the author stand at the 10 kW shortwave transmitter.

to-face communication.

For many years the Quechua leaders of Bolivia have dreamed about having their own radio station. Several feasibility studies were done over the years and the decision was made to proceed with the commissioning of a Quechua radio station.

As funds were collected and plans were made, it was decided to obtain a state-of-the-art transmitter with a rugged design, high-efficiency, low operating cost, and minimal maintenance.

In our search for a suitable transmitter, we discovered **Omnitronix**. At the time, the company was developing



"It doesn't matter if I'm at work, home, or my son's little league game, I know our transmitters are on the air."

Introducing the

**1.9 Network Module
TCP/IP for WAN/LANs**

Now Available!

Remote Facilities Management for Transmitters



The GSC3000 is the most reliable, intelligent remote control on the market today—it can even call you at the baseball park.

Gentner

Perfect Communication through Technology, Service, and Education.™

1.800.765.9320 • 1.801.975.7200 • www.gentner.com



A Quechua Indian man tunes in.

a solid-state Tropical Band (3-6 MHz) transmitter which was exactly what we were seeking.

The reasons we chose the Omnitronix transmitter included the solid reputation of the company, the simplicity of the transmitter's design, the modular construction, and the ability to use "off-the-shelf" replacement parts.

The crated transmitter was shipped by air from the company's headquarters in North Wales, Pa., to La Paz, and over land to Cochabamba. While the transmitter was in transit from La Paz, Wayne Borthwick, Omnitronix engineer, supervised the antenna and ground system installation.

When the large transport truck arrived, it was quickly muscled off by 20 enthusiastic Quechua workers. The installation was not without its challenges, due to the high altitude and abundant rainfall. All packing materials were quickly removed and the transmitter was installed. Power, audio, and antenna were connected and we began initial testing.

At 7 kW of output power, we experienced

See OMNITRONIX, page 32 ▶



Stuck in a Time Warp?

Move into the 21st century with a new console from Arrakis



BSW
BROADCAST SUPPLY WORLDWIDE

Advantage Partner

Let BSW Work To Your Advantage When You Buy Arrakis.

BSW's extensive Arrakis inventory BSW's convenient parts fulfillment
BSW's factory-certified sales representatives BSW's priority factory support

Circle (31) On Reader Service Card

A lot has changed since the '50s (or the '80s). You've replaced reel-to-reels, turntables and carts with new digital equipment. With technology improving so dramatically around you, how can you expect your old console to keep up? A new console from Arrakis will improve your station's quality while acting as the control center to handle all your modern studio equipment. With three analog console series and a brand new digital console line, Arrakis sets the standard worldwide for performance and value. Now is the time to replace your old on-air console.

Call BSW today **1 · 800 · 426 · 8434**

BSW
BROADCAST SUPPLY WORLDWIDE

Radio for Remote Area of Bolivia

► OMNITRONIX, continued from page 30 a VSWR trip and the transmitter would not transmit at any higher power. Further investigation led to the discovery of a burned insulator on the antenna. This was possibly caused by mud contamination during the installation.

Once a new insulator was installed, we went to full power with no further problems.

Radio Mosoj Chaski, broadcasting exclusively in the Quechua language, began broadcasting on 3310 kHz on April 12 using the first 10 kW solid-state shortwave broadcast transmitter in the world.

We have received reports of excellent coverage in a broad radius from the transmitter site, and are convinced that

this transmitter is going to help us meet the goals of communication to the Quechua people in the most remote areas of Bolivia.

■ ■ ■

Eldon Porter is station director of Radio Mosoj Chaski in Cochabamba, Bolivia.

For more information contact Omnitronix in Pennsylvania at (800) 446-6648, fax (215) 699-2323 or circle Reader Service 200.



A local family listens to the Radio Mosoj Chaski broadcast.

WIRED FOR SOUND

A Side Trip Into 'Coax'

Steve Lampen

We're taking a side trip from cables such as twisted pairs, to another common cable, coax. Last time (March 31), we talked about coax cables and different ways they are made for different applications. But we forgot to talk about one key thing: What the heck does RG mean anyway? Also, where did it come from?

RG means "radio guide" and was the original military specification for coax cable, starting in the 1930s. So what do all the numbers mean — RG-6, RG-8, RG-58, RG-59, RG-62, RG-122, RG-213, RG-405 and on and on?

The number is just a page in a book. RG-1 was the first page (and obviously wasn't a very successful cable design). RG-6, the sixth page, was wildly successful. Most CATV/broadband cable these days is RG-6.

Since each RG number is just a page in a book, it really doesn't mean anything. That's why you can have RG-58, a 50-ohm design, right before RG-59, a 75-ohm design.

Actually, I lie. As the specs read, RG-58 is a 53.5-ohm design.

Here is an example of things that went wrong: While the military can pick whatever it wants, and pay whatever it costs to have stuff built to match that impedance, the commercial world (your world) doesn't always have those options.

All systems you have are 50-ohm systems (on the transmit side). So 53.5 ohms would exhibit a fair amount of mismatch. But if you made a cable for 50 ohms, since you couldn't call it RG-58, you'd call it RG-58 Type.

The word "Type" is the key. It means "sort of" in technical-ese. So our 50-ohm version is "sort of" like the RG-58 spec. Pretty lame, huh?

Oh, but that's not all: As the military itself changed the original spec, it brought out different versions. RG-58/A, RG-58/B, RG-58/C. And some of these could be considerably different from the original. One might have a stranded center conductor instead of a solid one. Or it might have a special jacket compound so the chemicals in the jacket would not contaminate the dielectric underneath, called a "non-contaminating" jacket.

And then, not long after World War II, the military decided that the RG system was getting too unwieldy (duh!) so they abandoned the entire system and replaced it with the current system.

In the current Mil Spec, coax falls under a heading of C17. Each time the spec is changed, a new letter is added. We're currently under C17G. This spec supersedes everything written before — not just C17A through

See LAMPEN, page 33 ►

If Sending Audio is Your Business...

Giving You the Best Way to do it is Ours!

MUSICAM USA Codecs, Used by More Audio Professionals Than All Other Brands Combined.

CDQ Prima

Stereo Codecs

- MUSICAM® MPEG Layer II, Layer III and G.722 coding
- SMPTE Time Code capable
- Point-to-MultiPoint Transmission (up to 6 sites)



RoadRunner

Portable Codec/Mixer

- Your one-box remote broadcast solution
- Three-channel mixer
- Built-in ISDN terminal Adapter



FIELDPHONE II

Analog (POTS) Codecs

- The best quality audio over a single telephone line
- Perfect for sports, breaking news, even music!



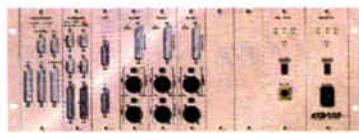
Studio FONE

TEAM

T1/E1 Audio Multiplexing Transmission System

T1/E1 Audio Multiplexing Transmission System

- Digital master-quality audio with no compression
- Transmit 12 audio programs simultaneously



Over 17,000 in use worldwide

Need a Codec? Call Us!

670 N. Beers St. • Bldg. 4
Holmdel, New Jersey, USA 07733
E-Mail: sales@musicamusa.com



Tel.: 732-739-5600
Fax: 732-739-1818

www.musicamusa.com

► LAMPEN, continued from page 32
C17F, but all RG numbers as well. To the people who invented the RG system, RG means nothing.

Of course, there were a few million customers, like you and me, who thought the RG numbers were fine. A large number of technicians who entered broadcasting after World War II came with extensive RG knowledge, so it was logical for those cables to continue. And, like any ancient religion, these numbers continue to be used (and modified) long after the High Priests (the military) had moved on.

Difficult ratio

One other question that often comes up: Why 50 ohms and 75 ohms, or any other impedance, for that matter?

These impedances were not chosen by accident. It was known in the 1920s that cables of different impedance worked better for one application than the other. For instance, it was determined, through experimentation, that the best power rating was around 30 ohms.

Because the impedance of any coax cable is the ratio of the sizes of the center conductor and the distance to the braid (and the quality, or "dielectric constant" of the plastic in between), you might wonder why we don't have 30-ohm coaxes.

To be sure, there are customers out there who would buy as much 30-ohm coax as we could make! The problem is that 30 ohms represents a ratio very difficult to make — so much so that it is quite likely that most of what you would make, you would throw away. Only a small percentage would be usable.

The people who would die for 30-ohm coax are the really high-power people. Those are customers such as nuclear physicists (those with some kind of atom smasher) or medical scanners, such as X-ray, CAT scanners or NMRI machines. They all use high power and would love to have 30-ohm coax. It would deliver their voltage with even less loss (and higher efficiency).

Those customers who wanted low-signal attenuation found that the ideal impedance was 77 ohms. But this was an odd number in terms of wire sizes. If you "fudged" just a bit to 75 ohms, then standard wire sizes and dimensions could be used. This was why all those low-power, low-voltage signal-carrying cables (baseband video, CATV/broadband, antenna lead-in) were all 75-ohm.

And then there are customers who want to deliver high voltage; the ideal impedance for them is around 60 ohms. This is an eminently "makeable" cable, but it never really got started, mainly because it was soon realized that most high-voltage customers were often high-power customers too. Therefore, there really needed to be a compromise between voltage and current; that compromise was 50 ohms.

We'll have more on the strange story of 50-ohm coax, with a trip into the world of wireless microphones, in the next installment. Let me know if you have any questions or comments.

■ ■ ■

Steve Lampen is a senior audio video specialist for Belden Wire & Cable Co. in San Francisco. His book, "Wire, Cable, and Fiber Optics for Video and Audio Engineers," is published by McGraw-Hill.

What Do These Numbers Mean?

Here's a guide to RG numbers. These are "general" descriptions. Remember that RG/Type can mean just about anything, and don't assume that all RG-58s (or any other number) are the same! Other questions: Is the conductor solid or stranded? If solid, is it bare copper, tinned copper, silver-plated copper, copper-clad steel or silver-coated copper-clad steel? If stranded, how many strands of what gage and what are the strands made of? Shielding is another area to explore. Is the shield braid, double braid, or braid and foil? What coverage is it and what is it made of? How many conductors of what size? Also study applications. It is unlikely you would use any of the 93-ohm versions unless you're into old-time data wiring. Most likely, you'll stick to the 50-ohm/75-ohm varieties. Do not forget there are dozens, maybe even hundreds, of coaxial cable designs that don't fall under any RG or Mil spec. Don't limit yourself to just RG if searching for the perfect cable!

RG #	Impedance	Center (AWG)	O.D. (inches)
6	75	18	.275
8	50	10	.405
8X	50	19	.242
11	75	14	.405
58	50	24	.195
59	75	24	.242
62	93	22	.242
63	125	22	.405
71	93	22	.245
122	50	22	.160
141	50	18	.187
142	50	18	.195
174	50	26	.110
178	50	30	.071
179	75	30	.100
180	95	30	.141
187	75	30	.111
188	50	26	.108
212	50	15.5	.332
213	50	13	.405
214	50	13	.425
216	75	18	.425
223	50	19	.212
303	50	18	.170
316	50	26	.098
402	5	19	.138
405	50	24	.087

digital consoles — outstanding



**Fast, powerful and intuitive and best of all
... priced like a quality analog broadcast console**

- SPHERION features:
- unlimited input & output expansion
 - any source available on any fader
 - the ultimate in "logic follow"
 - programmable button bank accessory
 - "on the fly" recall of entire console setups
 - expandable mix-minus
 - powerful DSP capability
 - multiple console integration via DiAN fiber optics
 - ... and much more

**integrates with
VADIS 3d:
audio router**

KLOTZ DIGITAL ... you just have to speak to the right people



KLOTZ DIGITAL <http://www.klotzdigital.com> • e-mail: sales@klotz-digital.de
KLOTZ DIGITAL Audio Communications GmbH, Germany Hans-Stiessberger-Str.2a • D-85540 Haar • Phone: +49-89-46 23 38-81 • Fax: +49-89-46 23 38-61
KLOTZ DIGITAL AMERICA INC., USA Nortech Park • 5875 Peachtree Ind Blvd. #340 • Norcross, GA 30092 • Phone: +1-678-966-9900 • Fax: +1-678-966-9903
KLOTZ DIGITAL, France 87 Rue St. Martin • F-75004 Paris • Phone: +33-1-4887 4681 • Fax: +33-1-4804 7146
KLOTZ DIGITAL (M) SDN BHD (454 317-X), Malaysia Wisma Samudra • Level 4, No.1, Jalan Kontraktor U1/14 • Seksyen U1, Hicom-Glenmarie Industrial Park
 40150 Shah Alam • Selangor Darul Ehsan • Phone: +60-3-5193233 • Fax: +60-3-5195133

It's 10 O'clock...
**Do You Know Where
Your Gear Is?**

We know where
it's at, man!



If the equipment you need isn't in your studio, it's probably still at Full Compass! Our new catalog is out and these guys are ready to hit the road! Call **800-356-5844** today or visit www.fullcompass.com!

Free Catalog!



AUDIO • VIDEO • AV • LIGHTS

www.fullcompass.com

800-356-5844

608-831-7330 • Fax: 608-831-6330
8001 Terrace Ave. • Middleton, WI 53562

ARE YOU THE BUZZ?

COMPASS Xpress

The Xpress order division of Full Compass.
Call 800-476-9886 from 7 a.m. to 11 p.m. CST weekdays
and 10 a.m. to 6 p.m. CST weekends!

Net Downloads Raise Questions

Carl Lindemann

Digital distribution of audio to consumers is a storm that's been gathering for some time. All of a sudden, there are lightning strikes all over.

The rapid rise of MP3 audio on the Internet is no passing shower.

The record labels and a host of other technology and new media companies are getting set to take advantage of what promises to be a new climate in the music business.

Real possibilities

This could change not just the way people buy music, but also the way they listen to it. These developments carry with them profound implications for radio. Increasing online bandwidth and improved audio compression have long promised to make high-quality digital

ble for the average consumer," said Cris Banfield, group product manager for Real Media's RealJukebox.

"We've been evaluating this market for well over a year. Well before everyone started jumping on the MP3 bandwagon, we were planning and designing this product. We saw a market developing, and positioned ourselves for it — we didn't just react to the craze that's going on now," she said.

The RealJukebox is a free download that plays, records and organizes audio files both on and off the Internet. Basically, it gives almost any Windows-based computer a range of functions to serve consumer needs.

But filling these needs can't cross over into what some consumers want — music for free.

Fear of rampant bootlegging has reignited the same controversy that killed the DAT format for the consumer market. According to Banfield, "(We) walk the fine line between personal use rights guaranteed by the American Home Recording Act and the rights for traditional intellectual property holders."

Consumers have a right to convert their CDs into other audio formats — say, to play on their Rio portable.

When RealJukebox does this, it encodes the files with the same Serial Copy Management System standard as used in consumer DAT decks. SCMS allows copies of originals, but prevents copies of the copies.

The recording industry is nervous

because you can defeat SCMS in RealJukebox. You simply click a setting and a warning screen pops up explaining



the law. If you accept the conditions, and, presumably, the consequences, you can disable the copy protection. For Banfield, this follows a common custom.

Watermark

As she explained, society does not put limiters in cars to keep them from going too fast. Instead, it posts speed limits. If you want to break the law, you can. But most won't.

At press time, RealJukebox was available in beta format. The final product also will include a digital watermark feature. This will identify who made the original copy — a major deterrent to illegal duplication.

(BMI has announced it will encode registered music with an exclusive watermark, and use the mark to digitally record or track the use of the music. Reports are then generated from the data and distributed to licensees and songwriters, including playlists for radio stations.)

The piracy issue is crucial. Whatever standard is developed will have to gain the recording industry's confidence by assuring intellectual property rights. Microsoft's Windows Media Technologies 4.0 is a proprietary codec that manages to compress

See JUKEBOX, page 46



RealJukebox

sound practical online.

Recently, both RealNetworks and Microsoft introduced products and initiatives to meet and shape consumer demand.

"Technology's finally gotten to the point where digital downloads are possi-

Fries: We Can Do Even Better

Marguerite Clark

With a 12-percent increase in advertising sales in 1998 and a 16 percent increase in the first quarter of 1999, these are prime times for the U.S. radio industry.

But its leaders can't afford to sit still.

This is the message from Gary Fries, Radio Advertising Bureau president and CEO, in recent remarks to the industry.

More change ahead

Fries said radio is continuously evolving and that its leaders are going to have to change with the times.

"What we all have a tendency of doing is thinking that this is a great business and we have arrived. And for some reason we kind of think that it is going to stop — that this is what radio is all about," said Fries during his "State of Radio Sales" keynote address at NAB99.

"I would predict to you that over the next five years we will probably evolve to a degree that is probably equal to the last 50 years. We are going to change, and the leaders of this business are going to have to change with it," Fries said.

Fortunately, he said, the people who make up this industry tend to look for improvements and are willing to change and be innovative. That is the spirit of the industry, he said.

Fries has two concerns in the way radio is being sold. He feels radio is

See FRIES, page 42

Radio Assist[®] Complete Radio Automation Systems.



Netia Americas Ltd. • 10805 Green View Way • Columbia, Maryland 21044 • tel: (410) 730-2616 • toll free: (877) 730-2616 • fax: (410) 730-6718
http://www.netia-broadcast.com

PRODUCT EVALUATION

Media Players Make Listening Easy

Alan Haber

It seems like only yesterday that people like you and me were first able to listen to audio on the Internet.

It was 1995, actually. And how easy was it then to tune into the comparatively few audio offerings that were available?

Nowhere near as easy as it is today, that's for sure.

Net audio's salad days

I can remember standing in a relatively nondescript booth at an NAB get-together, experiencing a demo of RealAudio 1.0 from a rather nervous but proud Rob

Glaser, now RealNetworks CEO.

I don't recall what Glaser was demonstrating that day, but I do remember that the connection to the Internet was less than perfect. There was a lot of rebuffering and Glaser was apologizing for it.

He needn't have done so. I remember telling him that the simple ability to listen to audio over the Internet was so cool that it overshadowed any deficiencies present early on in the development of this technology ... which was what, exactly?

In those salad days of Internet audio, streaming media seemed as complex a concept as gene splicing, but it was apparent to some of us, at least, that things were going to get better in short order.

A whole lot better

Four years on, things are a whole lot better. Not only does Internet audio sound like a million bucks (compared, certainly, to the aforementioned salad days) but it's easier than ever for everyday people to listen in on the world.

Thanks to RealNetworks' latest incarnation of its RealAudio player, the basic RealPlayer G2 (a souped-up version, called the RealPlayer Plus G2, adds a graphic equalizer and other doodads), and the latest release of the Microsoft Media Player, tuning in to the world's radio stations and other audio programming is click-simple.

In other words, if you can click a mouse, you can enjoy the wealth of audio programming available. Now, that sure sounds like a pretty simplistic statement in these pre-millennium days—"Haven't we come farther than that at this point?," you ask — but you would be surprised at how many broadcasters still aren't on the

cyber-bandwagon.

Fact is, the basics can't be stated often enough, especially if we're to spread the word to potential listeners.



And that is the point of all of this Webcasting, isn't it? You want to reach as many listeners as possible with your Webcasts and that doesn't necessarily mean just your local diehards who can listen at work on their computers or when

use either player with no trouble at all, making it easy for them to become frequent listeners to your station.

The Microsoft Media Player, the latest version of which is hot off the presses as part of the download of Internet Explorer 5 (or as a separate download), is a sleek-looking, no-nonsense, go-and-get-it-and-deliver-it player.

There is no muss or fuss here; you simply click on the link to a station's Webcast and the Media Player fires up automatically. If you like what you hear and you want to come back to that station in the future, you can save a link to it by adding it to your favorites list.

The RealPlayer G2 operates in much the same way, albeit in a bit of a flashier fashion. If you want to take advantage of them, there are a number of "channels" accessible from the player's face, from which you can link to such info as weather forecasts, busi-

Your listeners don't care about all the technical mumbo-jumbo, they just want to get on the Net, click on a link and listen.

they're out of town.

If you don't take advantage of the seemingly infinite audience out there, you may be missing out on a whole new distribution success for your programming.

Hot off the press

Both the RealPlayer G2 and the Microsoft Media Player are fit for the task of bringing your programming to listeners around the world. Any potential listener who has even the slightest bit of experience using Windows will be able to

ness news and news headlines.

But if all you want to do is listen to radio or other audio programming on the Internet, the RealPlayer G2 is as easy as pie to operate (well, it's easy any old time). It fires up automatically when you click on a listen link on a site, you can save your favorite stations on the handy presets menu.

Sound quality is, to these ears, a bit better on the Real player, although the Microsoft player is no slouch. Finding stations to listen to, other than your own, of course, is also easy as pie. A visit, for example, to the BRS Web Radio site at www.web-radio.com provides a plethora of primo picks and hour after hour of listening pleasure.

If you're looking to make it easy on people to listen to your station on the Internet, you really can't go wrong targeting either Real or Microsoft player users.

The key to making the decision about which to commit to is in thinking like your listeners. For the most part, they don't care about all the technical mumbo-jumbo being bandied about these days, they just want to plug in their computers, get on the Net, click on a link and listen. To them, streaming media might just as well be a ripped up newspaper floating in the air.

New frontier

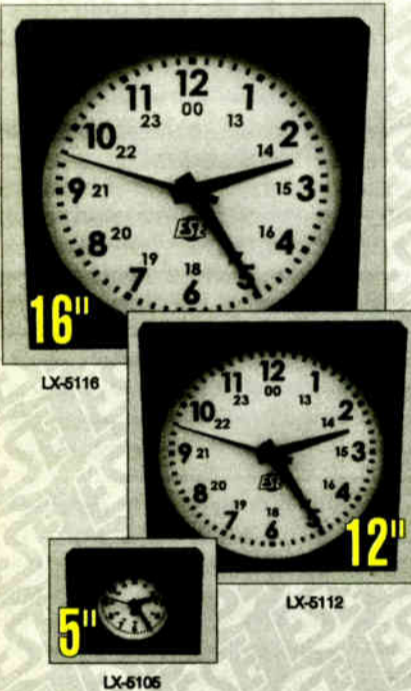
The Internet is the new frontier for broadcasters. With faster connections to cyberspace for all closer at hand than ever before — witness the speed of the cable modem, for example — and the Web basically a blank canvas that can grow a business with the right tools and input, it is only the broadcaster who wears dark glasses in dimly lit rooms that will lag behind all others.

For everyone else, the RealPlayer G2 and the Microsoft Media Player are making the world of Internet audio a little easier to live in.

Both the RealPlayer G2 and the Microsoft Media Player are free downloads. Grab the former at www.real.com and the latter at www.microsoft.com/windows/mediaplayer/download/Win32IE4x86.asp

ANALOG CLOCKS

"5100" Series



The LX-"5100" Series can read Time Code (ESE, SMPTE/EBU & ASCII), as well as operate as Stand-Alone or Impulse Clocks. These clocks are loaded with many features, here's just a few...

FEATURES:

- Self-setting time code readers
- 5", 12" & 16" models
- Sweep & Step second hand modes
- Lighted Dial and Rack Mount options
- Time Zone Offset
- 3 Year Warranty



www.e-se-web.com

310-322-2136 • FAX 310-322-8127
142 SIERRA ST., EL SEGUNDO, CA 90245 USA

Circle (86) On Reader Service Card

STATION/STUDIO SERVICES

Sound Effects Production Effects Buy-Out Production Music!

Over 60 products to choose from.
Call 612-522-6256 or get full details and hear on-line demos at our web site:

<http://radio-mall.com>

Dave Dworkin's Ghostwriters
2412 Unity Ave N., Dept RW,
Minneapolis, MN 55422

READER SERVICE 45

Radio

Satellite Delivered Radio Programming

Tel: 954-735-4070
Fax: 954-735-0370

READER SERVICE 38

Music Maintenance

Adult Contemporary Programming

- › Song by song playlists customized to your market.
- › All AC formats are available.
- › Discounts for stations who lease scheduling software.
- › Affordable prices for small markets.
- › Complete format packages with image production.

La Palma Broadcasting 714/778-6382
E-mail lapalma@pacbell.net

Are you reading someone else's copy of Radio World?

If so why not apply for your personal subscription?
Simply complete the subscription card & return it to us! You'll never have to risk missing an issue of

Radio World.

ATTENTION PROVIDERS!

Promote your services to **Radio World's** 15,000+ readers. Reach Radio Station and Recording Studio owners/managers and engineers with your message. For information on affordable advertising call **Simone** at **1-800-336-3045, extension 154.**

ONLINE RADIO

Weigh Success by Brand, Not Bucks

Kim Komando

In the good old days, it was easy to measure the success of just about any business venture.

Take a radio station, for example.

You have certain expenses for equipment, personnel and what-not, and you have income from advertisers and other miscellaneous sources. If your income adds up to more than your expenses, most would consider you a success.

In the case of radio talk shows, you might measure success by taking a look at the ratings. Pretty simple, right? Unfortunately, measuring the success of your Internet Web site is not quite as easy.

New business model

The Internet has given rise to a new economic and business model that doesn't necessarily gauge success according to the bottom line. Consider e-commerce poster child Amazon.com.

The key measurements for success on your Web site are growth and acceptance.

While it's true that founder Jeff Bezos made a killing when he took the company public, as a separate entity Amazon.com hasn't shown a dime of profit.

What's more, Bezos says he doesn't expect to turn a buck for at least two more years.

Instead of producing an immediate profit or revenue, "success" on the Internet seems to be about building infrastructure and gaining market share, with profits a secondary concern — at least for the time being.

This whole idea should sit quite well with radio stations.

A promotional tool

As I've said numerous times, any radio manager that expects to turn his or her Web site into some amazing profit center is going to be sadly disappointed. For us, the Web is primarily a promotional tool. If we derive any income from it directly or indirectly, that's just icing on the cake.

So, the questions become: How do I know if my Web site is a success? How do I measure success in cyberspace?

We hear all the time that so-called portal sites like Yahoo! and AltaVista get millions of hits per month. Should you expect your station's Web site to keep that sort of pace?

Hardly.

The talk of "millions of hits per month" can be a little deceiving, for a few reasons.

First, you must consider the overall market for these sites. By definition, por-

tal sites attempt to be all things to all people. That means their target market is absolutely anybody with an Internet connection.

When you consider how many tens of millions of people are online, the market share for any single portal site isn't all that impressive.

Second, the total number of hits isn't necessarily meaningful. A "hit" just means a single request to access a site. Suppose you had some rabid fan that logged onto your Web site 100 times a day. That would equate to more than 3,000 hits per month. On its own, that number doesn't sound so

bad, but those hits are all coming from one person. You could hardly call the site a success.

Finally, there's little brand loyalty on the Web.

Software and stats

Because such sites try to be all things to all people, they offer virtually identical services.

Imagine the marketplace if every radio station in town carried the identical format. How much brand loyalty could one of those stations expect?

The point is, there's no reason to believe that the people causing millions



of hits on Yahoo! aren't the same people causing millions of hits on AltaVista.

The key measurements for success on your Web site are growth and acceptance.

Ask yourself: Did I get more people in
See KOMANDO, page 44 ▶

No Tradeoffs No Risks Only Top Performance...

...at a cost savings means real value in any broadcast market. But don't take our word for it or let our 25-plus years in the business cloud the issue. Try these or any of our first-quality products at your station at no risk with our no-fault, 30-day return policy,



"David-II" FM PROCESSOR/STEREO-GEN

Famous the world over for surprisingly competitive and clean audio at a budget price. Digital synthesis design gives great specs and terrific sound.

FM MOD-MONITOR WITH PRESCALER

Off-air modulation measurement with easy-to-read display, 8 station presets, alarms and multipath indicator. A companion tunable subcarrier monitor/demod is also available.

PRECISION FM REBROADCAST RECEIVER

A feature-packed receiver for translators and other demanding off-air program pick-ups. Synthesized tuning, MPX/demod outputs, alarms and more!

RDS/RBDS "MINI-ENCODER"

Quickly program it with any PC to transmit station call letters, format and other identifiers, translator frequencies, promos/slogans, phone number, etc.

"PBX" TELEPHONE LINE "ELIMINATOR"

Save telco line charges! Up to 7 remote controls, modems, alarms and other dial-up gear can share a single phone line for incoming and outgoing calls.

Visit us on-line: www.inovon.com

Inovonics, Inc.

1305 Fair Avenue • Santa Cruz, CA 95060
TEL: (831) 458-0552 • FAX: (831) 458-0554



Get Media Brings the Retail to You

Carl Lindemann

Suppose you manage a station that is running a music format. A major local music retailer offers to tune you in for their customers. More than that, they'd like to set up a special in-store automated system that posts who and what is playing.



Steve DiNardo, KLLC(FM)

This helps shoppers know how to get what they're hearing. Because your programming is helping introduce the audience to this music, you get a cut of the sales when they buy from the playlist.

Top this all off with an offer to share information that is compiled from their point-of-sale system or frequent buyer plan.

The store data generates detailed information about your listener's demos, interests and habits to give your marketing and promotions a strategic advantage over the competition.

Web radio retailers

What do you have to do to keep your end of the bargain? Just say yes. That's all that Get Media asks from — and potentially offers to — radio stations. The only catch is that the music retailer isn't located at the mall. It's on your Web site.

Get Media is a two-year-old Silicon Valley-based venture. The company went "live" with its first station in early May and is bracing for a massive national rollout. It hopes its new media concept will transform the way radio managers think of their Internet presence.

It offers the possibility of enhancing a station's relationship with listeners while creating a new revenue stream.

Get Media is the brainchild of Robert Goldman, the company's founder, chairman and CEO. Goldman does not have a broadcasting background but saw an opportunity from the consumer's perspective.

"I was listening to the radio and wondered how I could buy the music I liked. When they didn't announce the songs, I couldn't. I figured that if I was having this problem, others were, too," Goldman said.

Get Media addresses what has been an inherent disconnect between listener interest and their ability to act on it with impulse buying.

"Radio drives music sales," Goldman said. "The desire to buy

something diminishes greatly over time. So if the ability to buy something *as you want it* can occur, then the odds of a transaction going through are much higher."

What Get Media offers listeners is a way to make the connection through the station's Web site. Visitors to the station's homepage see a 90 kb Java "applet" that shows what's playing and the album it is from. They can click to buy or to get additional information.

Continual updates

The playlist continually updates in real-time with scheduling information taken from the station's on-air automation system. Visitors can search through a full day's music to find what they've heard.

For the station, this requires minimal effort. According to Goldman, "This is a one-day installation. It's that simple to install. And the playlist information is transferred automatically. So the station doesn't do anything different from what they're doing already."

The idea is to make this service nearly effortless for radio station managers. "We provide all the e-com-

merce, all the technology, all the back-end fulfillment and all the customer service. This is truly a 'plug and play' solution," said Goldman.

Flagship station

The first field-test for the system is on Infinity Broadcasting's KLLC(FM), Alice@97.3 in San Francisco (www.radioalice.com). Steve DiNardo, KLLC's general manager, said he decided to be an early adopter to Web-related radio because it is a natural match for the station's audience and image.

"We're targeting the 25-to-35-year-old in the Bay Area. They tend to be professional and very Web-savvy," he said. For DiNardo, Get Media's service "synchs up nicely with the lifestyle of the group we're trying to reach. It's just a logical extension of our brand to have an Internet component and try to integrate it into who we are and what we do."

Get Media is the latest in a number of KLLC's Web-based initiatives designed to draw listeners online and keep them coming back. For example,

Site traffic

"That's where we get the most page views," said DiNardo. "People want to see what's going on, see what the guests look like. Cameras have driven a lot of traffic to our site."

In addition, a partnership with Xoom.com, a community-oriented Web service provider offers free e-mail, chat and free Web-hosting to listeners.

"Our whole concept is to add as many consumer services to the site as we can to make it 'sticky,'" DiNardo said.

DiNardo's concept for his station goes beyond traditional radio management. "Alice@97.3 is a brand, a lifestyle and entertainment. Everything else — the radio frequency or the Web site — is just a means of distribution," he said.

But Get Media could mark a fundamental shift in radio's usual non-contingency revenue model. Stations only make money (30 percent of the net proceeds) when listeners buy CDs through the site. Is this the beginning of a larger trend?



Get Media displays radio station playlists.

DiNardo doesn't think so. "I don't see our business becoming one that's completely performance-based," he said. In fact, the revenues generated from Web site sales are secondary to the real value-add: customer intimacy.

"Ultimately, the Internet and the content that's manifest on the Internet is a way to build a community — a community that's completely data-based. Once you have that, then you have a commerce platform. Record retailing is just the beginning," DiNardo said.

Like any community, DiNardo's depends on trust. Members must open up with information about themselves to fully participate.

Get Media's system allows stations to offer questionnaires as part of the registration process for purchases. This information is the community's cornerstone. "We're not in it for the transaction fee, *per se*, unless it really becomes huge," DiNardo said. "We're in it for the image that it casts on our product, for the service it provides to our listener and the fact that we get credit for it."



Robert Goldman, Get Media

"We're in it for the potential of getting to know our listener and to interact with him or her in all these additional ways. So even if we don't make a great deal off this up front, we make a great deal off of this in the long run in terms of what it can do for us," he said.

But Get Media is betting that the transaction fees will become huge. Goldman predicts that his company is "going to be a major player in the distribution of music in the United States, if not the world."

Additional capabilities

Their system will soon add additional capabilities like being able to handle impulse buys from the cell phone-equipped in-car audience.

"We know most people are listening to the radio in their car. So the most elegant Web interface is an irrelevancy," he said. By summer, they will have an automated system for toll-free dialing to obtain information on what's playing. "You can buy in real-time while you're listening in your car," Goldman said.

Will radio embrace the Get Media concept?

"The acceptance rate is much higher than we ever anticipated," Goldman said. "We've been contacted by large station groups who want this, and want this right now."

Goldman would not name specific groups with which he has had discussions.

The bottom line may lie beyond the commission checks Get Media writes to stations. DiNardo's strategy for success in the emerging "Information Age" is not without precedent.

His "community" is built on the same tried-and-true management science techniques that have fueled the direct mail and credit card industries since the 1980s.

Get Media's e-commerce may provide radio with vital consumer information to expand and entrench its audience. This could greatly improve the industry's ability to profile, identify and target potential customers while enhancing the relationship with existing ones.

Whatever happens, Get Media bears close watching. This company, or the concept, could spark a magic synergy between Web and wireless. Ignore it at your own risk.

■■■

Carl Lindemann is a regular contributor to RW. Visit his Web site at www.cyberscene.com or send e-mail to carl@cyberscene.com



A digital PR&E console
starting at just \$11,010*
(So advanced, even the price is digital.)

Airwave™ Digital. Three program busses. Two mix-minuses. One remarkable board.

\$11,010. Now there's a string of binary code anyone can understand. So if you're budgeting to go digital—and running tight on budget—take a close look at a 12 or 20 input Airwave Digital on-air console. Its familiar layout flattens the digital learning curve. And with 3 program busses, talent can be playing Madonna, time shifting a Dr. Laura feed, and laying down voice tracks—all at the same time. So you can squeeze more production out of your payroll.

Airwave's flexible, too. One or two telco modules and B-side logic are among a host of available options. And unlike some digital consoles, you can reconfigure input modules from analog to digital—or vice versa—at your studio, just by changing a card.

Best of all, Airwave Digital comes with that “no-need-to-rationalize-to-anyone” PR&E quality. Want to know more? Call 760-438-3911, visit www.pre.com or email sales@pre.com.



PACIFIC RESEARCH & ENGINEERING

*12 input mainframe, standard clock/timer, monitor and output modules, standard 5-mic preamp module, 3 analog inputs, 4 digital inputs and one telephone input/output module.

Circle 39 On Reader Service Card

◆ STATION SERVICES ◆

Programs and Services for Radio Stations

Mail info and photos to: RW Station Services, P.O. Box 1214, Falls Church, VA 22041

N.Y. Public Radio Devoted To Frankie, Baby

Pop music expert Jonathan Schwartz hosts "The Sinatra Show," Saturdays on WNYC(AM) from 10 p.m. to midnight. The two-hour late-night show will feature Frank Sinatra's recordings exclusively.

Artistic Director of Lincoln Center's American Songbook Series, Schwartz is also an accomplished novelist, commentator and performer. He acquired his passion for American pop standards through his father, Arthur Schwartz, author of "Dancing in the Dark."



The show is underwritten by Community NetWorks, a New York City-based ICP (integrated communi-

cations provider). In addition to "The Sinatra Show," Community NetWorks is sponsoring "The Sunday Show," also hosted by Schwartz. The show not only features musical selections from the host, it also features storytelling and cultural issues.

Community NetWorks offers telecommunications, data and Internet services the Northeast and provides integrated billing and technology. The company donates a portion of its revenues to customer-selected community organizations. WNYC-AM-FM, a member of the National Public Radio network, airs locally produced programming, as well as programs produced by NPR and PRI.

For additional information contact Virginia Gold at WNYC, (212) 669-8978 or circle Reader Service 71.

Late Late Show's 'Five Questions' on Radio

Television talk show host Craig Kilborn is the host of the new CBS show "Late Late Show." His signature piece featured on the TV show "Five Questions" is presented to radio by Westwood One for morning-drive broadcast each weekday.

The show debuted on March 30. The

nightly delivery of "Five Questions" will be excerpted from the previous night's "Late Late Show" and delivered to radio



stations each morning.

For more information contact Susan Mazo at Westwood One, (212) 641-2057 or circle Reader Service 161.

Today's News, Jokes Attached: Premiere Distributes Daily Fax

Premiere Radio Networks has recently begun distribution of a nine-page daily fax, "The Shipper Report," a full-service entertainment and research report. The report features accredited news stories with punch lines and jokes already attached. The daily includes "Extras," blurbs on offbeat news, contacts and information sources.

The acknowledged sources and contact information provide affiliate stations the opportunity to investigate leads and



the proof of credibility.

The author of the report, Mark Shipper, claims to deliver reports obtained through his network of inside information sources and claims to routinely get the scoop on stories from those sources.

The Shipper Report is distributed on a market-exclusive basis.

For more information call Jennifer Erin Johnson at Premiere Radio Networks at (818) 461-5418 or circle Reader Service 45.

When I'm P1, Who's P2? New Arbitron Software

New software from the Arbitron Company is used to generate reports that attempt to answer those questions on the minds of program directors. Mainly, the software compiles information that tells PDs more about who their audience is — who listens the most and who is listening to their rival station(s).

Last month, Arbitron announced an early release version of "PD Advantage," new software for radio programmers that



allows PDs to access comments in Arbitron diaries directly from a PC at their radio station.

The software is designed to gather more information on a radio station's audiences and on a station's competitors. It delivers 10 new reports which were designed by Arbitron in conjunction with program directors and programming consultants.

"PD Advantage" is the latest addition to the Programmer's Package, a software suite for program directors.

The preview of PD Advantage was shipped to subscribers of Arbitron Maximizer free of charge in early May. The full release is scheduled in time for the delivery of the Spring 1999 Arbitron Survey.

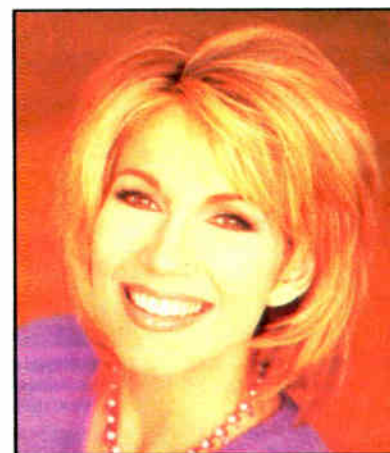
The preview is a self-running CD featuring the ten new reports including: "When I'm P1, Who's P2?" The report tells PDs who is second choice for their station's P1 listeners.

Another report, "Hour by Hour," gives PDs an individual hourly composition of their stations. Other reports contain information on trends in age groups, core age groups, diary keepers by quarter-hour, zip codes of listeners and more.

For more information on PD Advantage contact Laurie Peters at (310) 306-4125 or circle Reader Service 91.

Leeza Gibbons Hosts Top 20 Countdown

A soft AC countdown, "Top 20 Countdown with Leeza Gibbons," debuted on Premiere Radio Networks.



The three-hour program features soft adult contemporary hits, commentary and interviews with celebrities.

Gibbons is entering her sixth year on network television as the NBC talk show host of "Leeza." Gibbons is the host of a Top 25 countdown for hot adult contemporary formats and the daily feature "Entertainment Tonight with Leeza Gibbons."

For more information contact Jennifer Johnson at (818) 461-5418 or circle Reader Service 101.

Hot Talk Radio in Portland Enters Syndication

"You might not always agree with me, but I'll definitely be controversial without being political," said Rick Emerson, host of the Portland, Ore., call-in, hot-talk radio show "The Rick Emerson Show." The show is broadcast live on KOTK(AM) from the NBG Radio Network studios in Portland Monday through Friday from noon to 4 p.m.

Since May 10, network syndicator, NBG, in association with Fisher Entertainment, now redistributes the first three hours of the program via satellite from 4 p.m. to 7 p.m. PST.

The network said the talk show is See SERVICES, page 41 ►

Radio's Most Wanted

PROFILE: Terry Baun, CPBE

Vice-President and Director of Engineering
Cumulus Broadcasting, Inc.
Radio World reader for more than 20 years

Favorite piece of equipment: Anything that continues to provide service well beyond its warranty period with a minimum of broken switches, leads and software upgrades.

Least favorite piece of equipment: Anything that ships with a "Preliminary" manual or requires more than one factory "lead lit."

Favorite place to listen to the radio: In the automobile, because I now understand that it contains the only receiver by which program directors and consultants can judge the performance of any radio station. To heck with \$25,000 worth of test equipment!

Favorite format: I enjoy oldies - both from the 18th century and the 20th.

Hobbies: Computers, high-end audio & collecting (Kenwood-era transistor radios, tuning fork Accutron watches).

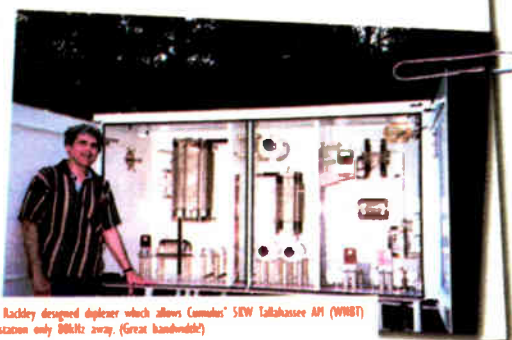
Pets: Two cats, Buster and M' (Radio Frequency). M' was found abandoned at a transmitter site, match.

Proudest moment professionally: Fighting local bureaucracy and citizen opposition to re-erecting a fallen transmission tower in time to meet a deadline for a station transfer. What a lesson in both civics and politics!

Proudest moment personally: Working with the SBE as a board member and officer to initiate a meaningful strategic planning initiative to help move the organization forward and improve member services. As Chairman of the SBE Certification Committee, I am very proud of the efforts SBE has made and continues to make in setting achievable standards by which our industry can judge engineering competencies.

Favorite Radio World column: I enjoy Paul McLane's "Earwax" column because it often gives insight into technology issues bubbling just below the surface. And, because I'm dealing with more than 45 market managers throughout Cumulus Broadcasting, the "GN Journal" is a must-read.

Reads RW because: It is the most genuinely useful of the industry technical publications I receive. There is always something that speaks to issues that our Cumulus engineering team is working on.



Terry Baun, standing in front of the Ron Rackley designed diplexer which allows Cumulus' SEW Tallahassee AM (WWSB) to successfully duplex with another SEW station only 1000ft away. (Great hardware!)

Here at Radio World, we strive to deliver the information that helps you, our readers, deliver the goods that make you the most wanted people in the industry. We salute you all, and thank you for reading Radio World.

Tell us why YOU read RadioWorld!

Send your answers to the above questions and anything else you'd like to share to: lharris@imaspub.com, or fax us at 703-998-2966 attn: H.Harris. Include your contact information, and we'll get back to you.

► SERVICES, continued from page 40 caller-intensive and topic-driven.

For more information on "The Rick Emerson Show" contact John Holmes at (800) 572-4624, send e-mail to john@nbgradio.com or contact Fred Coombes at (800) 472-604, send e-mail to info@coabmarketing.com or circle Reader Service 111.

Microsoft's Streaming Media Support

Microsoft Corp. has developed a Streaming Media Division to provide technical support and marketing advisories for those businesses involved in digital media applications such as streaming music, radio, news and events.

The Streaming Media Division joins existing divisions: Consumer

One benefit results from the development of the company's watermark — used to identify music on all BMI recorded media. BMI uses the mark as a fingerprint, an exclusive identifying mark to a particular piece of music, to track and compile data on the music and deliver the information to licensees, including radio stations.

Described as "an end-to-end digital music use reporting system for broadcasters" according to the company, the new paper reports generated from the digitally monitored music has been traditionally called "airplay logging" which BMI said will become "a thing of the past."

The automated playlist serves as a reporting system for BMI licensees to report music use, a task that will no longer require the compilation time and expense it had in the past. With the goal in mind of making airplay report-

ing easier for radio stations, BMI Senior Vice President of Licensing John Shaker said, "We plan to make this option available to the entire industry in early 2000."

For more information on the new digital reporting system and other BMI services contact Pat Baird at (212) 830-2528, send e-mail to pbaird@bmi.com or circle Reader Service 141.

News Report Is Exclusive to African-American Business

"The Bloomberg Urban Business Report" is now available through syndication. Launched in April from WBSL-FM in New York City, the 60-second report features business news with a special focus on African-American business.

According to Bloomberg, its urban

business report is the only nationally syndicated one of its kind.

The business report airs three times daily with a total of 15 original reports per week.

The news report offers business stories, highlights of current market conditions, tips, how-to strategies and a daily report on the Bloomberg Amalgamated Pub Index.

"We are dedicated to bringing important business news to the underserved African-American community. It is a continuation of Bloomberg's ongoing commitment to serving all segments of society," said Diversity Manager for Bloomberg, Burton Waddy.

For more information contact Christine Taylor or Lisa Chajet at Bloomberg in New York at (212) 318-2660, send e-mail to taylorc@bloomberg.net or circle Reader Service 151.



Windows Division and Business and Enterprise Division.

All three are directed by Senior Vice President Jim Allchin. The divisions offer digital media support in Windows 98 operating system, Windows 2000 and those versions that are yet to come of Microsoft operating systems platforms.

The new division develops and markets the Windows Media Technologies including Windows Media Player, Windows Media Services, Media Tools and Media Audio SDK. General Manager of the Streaming Media Division, Anthony Bay, heads up the new division. Will Poole, senior director at the new division, is the contact for marketing and business development.

The new division will work to intercede with customers, consumers, business and Internet content providers and those organizations which have become a part of the virtual marketing scene of e-commerce and the Internet business community.

For additional information contact Sara Murphy at (503) 245-0905, send e-mail to saram@wagged.com, visit the Web site at www.microsoft.com/windows/windows/media/ or circle Reader Service 121.

BMI's New Services for Broadcasters

It's called "The Horizon Project" and it's BMI's answer to the ongoing complications of digital music licensing. The new services address the needs of songwriters, composers, music publishers and licensees — as well as other copyright organizations around the world. BMI offers radio, specifically, some new services and benefits thanks to the ease of new technology.

Things you can say about our old fashioned meters



- "2 or 4 VU meters"
- "2RU enclosure"
- "Familiar"
- "High impedance inputs"
- "Lighted VU meters"
- "XLR connectors"
- "Priced right"
- "Phase reading"
- "Balanced bridging inputs"
- "Easy to install"
- "Sturdy"
- "Reliable"
- "Zero adjust control"
- "Easy to read"

2VUB or 4VUB Mechanical Meters

How to say "MINE" --
Call us

Logitek digital with a better difference!

3320 Bering Drive, Houston, TX, 77057 USA Voice: North America 800.231.5870
Others: 713.782.4592 Fax: 713.782.4592 e-mail: info@logitekaudio.com
Visit our home page at www.logitekaudio.com for more information

PERSONALITY PROFILE

Roy Returns to Michigan Roots

Scott Seeburger

In the 1950s, Tommy Roy, a white DJ, hosted a live ABC radio show, broadcast from a black nightclub. He became friends with teenage sensation Aretha Franklin, helped introduce a new generation of black performers to radio in the 1950s, and pushed government bonds when he signed off the air each Saturday night.

In the decades following the war, Roy settled in Manhattan and became a promotional agent for popular musicians on tour. But twice yearly, this dedicated DJ relives his big start in a small town in Michigan as a radio broadcaster.

All aboard

Roy, still living in New York, packs his bags, boards a train and totes boxes full of recordings from the Big Apple to WKLA(AM), the news-talk radio station serving the small resort community of Ludington, Mich.

Roy has been loyally bringing his two-week radio show here every June and December for 23 years. The station actually breaks format for two weeks while Roy takes over the broadcast and hosts his music radio show.

Tommy Roy celebrated his 79th birthday this year. He plans to be on air this month and again in December.

Local radio fans describe his show as a "lovefest." Residents send him hundreds of letters, bake him more cookies and loaves of bread than he can possibly consume and take him out to dinner every night he is in town.

This year he learned that one listener named a cat after him.

Roy mixed guitar greats B.B. King and T-Bone Walker with white, mainstream artists like Frank Sinatra and Patti Page.

"This would not happen if I were in a big city. I think this is really nice here," said Roy. "My style is my own. I keep it intimate, like I am visiting in your living room."

The locals refer to him as "The Voice." Fans say Roy looks at least 20 years younger than his actual age.

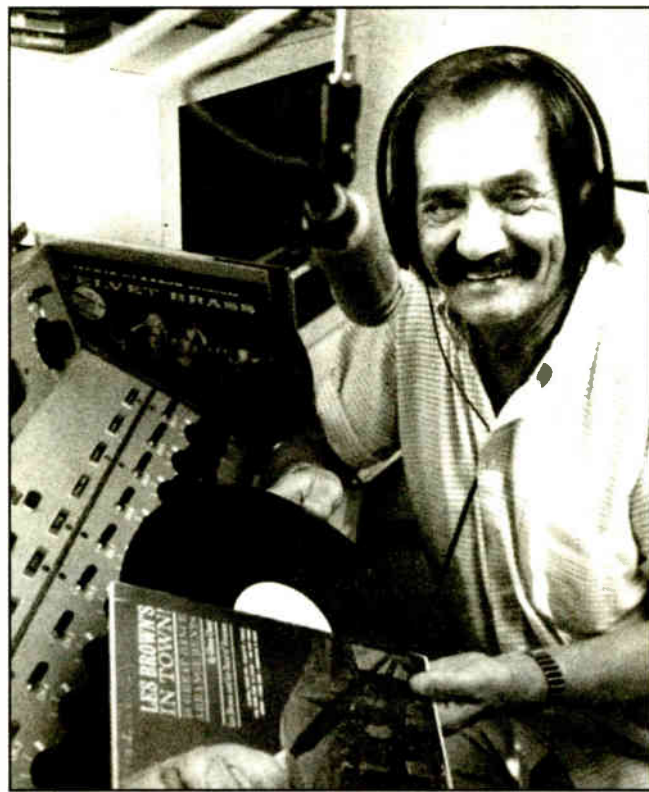
"At my age, if I wake up at 7 a.m. and get out of bed, I don't take a second chance by going back to bed. I eat right, take vitamins, exercise and I do not go to class reunions."

After brief careers in jitterbug dancing and movie theaters, Roy's broadcasting career started after the radio personality turned 30. He enjoyed friendships with big-name entertainers. In his earlier days, he was president of numerous fan clubs that included Glenn Miller, Tommy Dorsey and Stan Kenton.

His choice of radio as a career likely was influenced by his service as a radio operator during the second World War. Roy served in the Guadalcanal and New Guinea campaigns in the South Pacific.

He is noted for helping African-American entertainers succeed in the 1950s, white-dominated business culture through his public relations acumen and straightforward negotiating skills.

When his broadcasting career started in the 1950s, he was working at WKLA.



Tommy Roy in the Studio

He hosted several radio programs but he was best known for an afternoon show called "Melody Time."

The ABC radio network decided to take its "Rhythm on Parade" live-music revue to the Paradise Gardens, a nightclub in a tiny black resort community

called Idlewild that neighbors the town of Ludington. ABC chose WKLA as its hosting station and picked Roy as the show's announcer.

It was 1956, and Tommy Roy was one of the few Michigan announcers at the time that mixed guitar greats T-Bone Walker and B.B. King with the more mainstream, white artists of the day — Frank Sinatra and Patti Page — into his show.

A representative from Capitol Records informed him that he was the only one playing "race records" on the west side of the state, according to Roy. He surmises that could be the reason he was picked to be the announcer of the ABC show.

"Good evening everyone, along the vast ABC network, from the Fiesta Room of the Paradise Gardens, in Idlewild, Mich., the home of the oh-so-happy feet," said Roy every Saturday night.

The live show featured some of the greatest black entertainers of the day: dynamic Jackie Wilson, comedian George Kirby, talented teenagers like

Erma and Aretha Franklin and Lloyd Price, Barbara McNair, LaVern Baker, Jerry Butler and Ruth Brown.

The show ended with mention of the co-sponsors including the U.S. Treasury, and Tommy Roy recalls urging everyone to regularly invest in U.S. savings bonds.

He was the only white staff person at the Paradise Gardens. He became friends with Kirby, went on shopping trips with Franklin and conducted Della Reese's first broadcast interview.

Reese and Franklin at the time were barely out of Detroit high schools. Roy's trustworthiness was an asset to up-and-coming artists attempting to develop a career in a what was a competitive business world.

During this period, Roy helped negotiate a Columbia Records contract for the Paradise Gardens house quartet, The Four Tops.

"Columbia didn't believe that the Four Tops had commercial potential and so they

eventually dropped the group. Berry Gordy signed them to Motown Records and the rest, as they say, is history," he said.

Paradise lost

Roy also was earning a reputation as a sportscaster. In 1959, the National Sportscasters and Sportswriters Awards honored Roy, who joined an impressive Michigan roster that included Van Patrick and Detroit Tigers announcer George Kell, who at the time was beginning his distinguished career.

Eventually, Roy looked for ways to expand his career. He left announcing to join the Idlewild Revue tour in 1961, handling public relations.

One New Year's Eve, the Idlewild Revue was playing a club in Boston when someone torched the facility on opening night.

"The Idlewild Revue was wiped out," said Roy. Costumes, musical instruments, musical arrangements and nearly everything associated with the show were destroyed, bringing an end to the tour and the eventual demise of the Paradise Gardens.

Roy's career was hitting its stride, however, as the 42-year-old promotions man went to work for jazz and blues legend Dinah Washington.

He worked with her during the last three years of her life. He then moved to Manhattan to manage the office of rock pioneer Lloyd Price. Over the years, he has helped promote tours with Count Basie, Harry James, Duke Ellington and, more recently, Natalie Cole.

When Roy makes his annual sojourn to Ludington, he brings that rich heritage along, replaying rare interviews

See ROY, page 44 ►

'Dot.coms' Bring New Demand

► FRIES, continued from page 35 under-pricing itself and that it needs better salespeople.

He sees a number of opportunities that radio salespeople can use to their advantage.

Dot.com loves radio

One example is the potential of so-called "dot.com" advertising. Online companies are putting approximately 80 percent of their ad budgets into radio.

In 1997 trackable "dot.com" advertising on radio was \$15.6 mil-



Gary Fries

lion. For the first nine months of 1998 that figure increased to \$44.6 million.

"A whole new platform on prices will occur and a whole new demand on radio will occur. We need to position ourselves to be ready and capable of moving forward at that time," he said.

Investing in sales

Fries also said that there is a definite need for better salespeople.

The days of recycling salespeople is gone, he said. Radio needs to create them.

"We cannot accomplish building better salespeople without building better leadership," he said.

"You can't take these young people and put them on the street without having training and leadership."

To help in this endeavor, the RAB is developing a training academy in Dallas to teach professionals how to market their products better.

But Fries also called for dedication within each company. "It must be a culture within the organization."

"Everyday when you get up you need to hold the listeners in your hand and figure out how to make them happy and how to give them more," he said.

"And everyday when you get up, look inside of your radio station, and say to yourself, 'How much am I investing in the training of these people?'"

© NAB 1999

Products & Services Showcase

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

Automating Programs? No Problem!



The NEW SUB-03 Subaudible Tone Decoder

You can use the Sub-03 to automate your network feeds or take the guess work out of when to cut away from networks. The decoder listens to your audio source and gives you dry contact closures from any service that sends subaudible tones, including satellite receivers, RPU's and POTS frequency extenders. The decoder's relay contacts interface easily with your automation system. The Sub-03 is a reliable and inexpensive problem solver. The Sub-03 can be ordered set for 50/75Hz operation. Rack mount option (as shown) available. List Price only \$329.00. Check our website for more info or to download the latest manuals.

The Sub-03's features include:

- Interlocked, dry relay closure outputs for 25, 35 & combo.
- Balanced or unbal. audio input.
- Provides filtered, balanced out.
- Indicators for all three tones, audio level setting & power.
- Enable input lets you (or your automation) prevent closures.
- Uses standard 1/4" TRS (head phone style) jacks for all audio.
- Db-9 and screw terminal outs.

CircuitWerkes

3716 SW 3rd Place
Gainesville, Florida 32607
(352) 335-6555 / fax 380-0230
<http://www.circuitwerkes.com>

READER SERVICE NO. 58

Your New Interview Tool



INLINE PATCH Telephone Audio Interface

Simply connect Inline Patch between your telephone and the wall jack. You will get separate control over your voice and the caller's voice. A great little hybrid!

List Price
\$270.00



JK Audio Remote Broadcast Gear

800-JK Audio (815) 786-2929 www.jkaudio.com
800-552-8346 Fax: (815) 786-8502

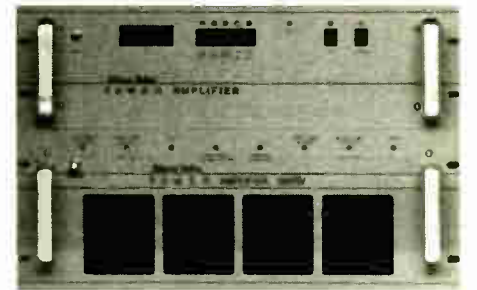
READER SERVICE NO. 59

Silicon Valley POWER AMPLIFIERS

The RF People

FM Broadcast Power Amplifiers

Designed for reliability, durability, & efficiency.



Models from 165 watts to 2.4 KW

- Solid state.
- VSWR foldback.
- Remote operation.
- Full documentation.
- Frequency agile.
- Digital display.
- Easy installation.
- Modular construction.

1-800-986-9700

www.svpa.com e-mail: sales@svpa.com Fax 1-408-986-1438

READER SERVICE NO. 60

Ultramod FM



The UM-2000 is a self contained split band stereo FM processor, with AGC and an -ultra-transparent- digital stereo generator. Designed to give you concert quality, at a price you will like. Contact us for details and dealer information.

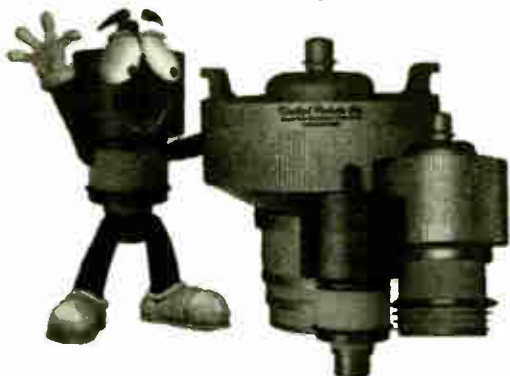
AFFORDABLE AUDIO PROCESSING

Broadcast Technology Company

PO Box 751, Lamar, Colorado 81052 Phone: 719-336-3902
<http://www.broadcasttech.com>

READER SERVICE NO. 109

Your best source
of quality rebuilt transmitter
tubes since 1940



Freeland Products, Inc.

75412 Highway 25
Covington, Louisiana 70435 U.S.A.
1-800-624-7626
(504) 893-1243 FAX (504) 892-7323
www.freeland-inc.com
Email freeland-inc.com@freeland-inc.com

READER SERVICE NO. 80

NEW

RU-SM16 Dual Audio Meter



Anywhere you need

- ✓ 16 Element Resolution
- ✓ Peak Hold Indication
- ✓ Precision Audio Level Metering
- ✓ Digital String Display Indication
- ✓ Precise Left/Right Meter Tracking
- ✓ Individual Channel Calibration Controls
- ✓ Selectable PEAK or AVERAGE Metering
- ✓ Visual Verification of Adequate Headroom

You Need: RU-SM16
Dual Audio Meter

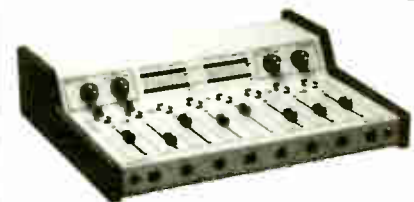


Toll free (800) 281-2683
Local (805) 684-5415
Document Server (800) 391-0017
Web Page www.rdl.net

READER SERVICE NO. 90

World Radio History

Designed for Broadcasting! MINI-MIX 8A



**\$2499
List**

12 Stereo Inputs 2 Stereo Outputs
2 Dedicated Mikes 1 Mono Output

Service & Affordable Quality for Over 28 Years

AUTOGRAM CORPORATION

1500 Capital Avenue (972) 424-8585
Plano Texas 75074-8118 1-800-327-6901
FAX (972) 423-6334
info@autogramcorp.com

READER SERVICE NO. 70

REMOTE MONITORING AND CONTROL FOR ANY SIZE SITE

Davicom systems provide all the automated monitoring, reporting and control functions you need to keep your site(s) operational and legal. Our systems are practical: they are sized for every type of operation from small AM sites to large TV facilities, with set-up and operational software that even casual computer users can understand.



Call us today
for more information!
Toll Free : 1.877.327.4832
(609) 653.1065

READER SERVICE NO. 36

Business Models Change on the Web

► KOMANDO, continued from page 37
this month than last month? And then, ask: *How can I get even more people in next month?*

To answer these questions, you need to take an in-depth look at what's happening on your Web site.

That means looking at more than just the number of hits.

There are a number of software packages that can compile statistics about site usage. Which one your Internet provider uses isn't important.

Meaningful interpretations

What is important is that your provider does use one of them and that they can provide you with meaningful interpretations of the information on a regular basis.

Sure, you're going to want to know how many "hits" your site gets, but you need to go beyond that. For example, if

someone comes to your home page, clicks on some sub-page, then clicks back to your home page, that will count as two hits on your home page.

Site visits

However, a good Web statistics

The Internet has given rise to a new business model that doesn't only gauge success according to the bottom line.

package will break down information according to sessions — a session being one complete visit to your site. This will let you know how many

times people are actually coming to your site.

Another useful bit of information is which page people are going to first.

Maybe you put your important announcements and breaking news on your home page. But if the majority of

people have bookmarked a sub-page via your site and are, therefore, bypassing your home page when they drop by, they're missing your announcements. A change may be in order.

Along the same lines, you want a page-by-page breakdown of your site's usage so that you can tell which pages are more popular than others. The best way to keep people coming back to your Web site is to keep changing and improving it. If you find that users like one type of page more than another, you can include more pages of that type and less of the others.

This may seem obscure, but you may also want to look at what Internet service your visitors are using. Believe it or not, a good stats package can tell.

What's the point? The IP service alone can indicate demographic and statistical information for marketing research.

For example, suppose cable modem service is available in your town. And suppose you notice that many of the visitors to your site use the cable modem service.

Demographic information

First, this gives you a little demographic information: Cable modem users are generally a little more upscale than the average user. Plus, this lets you know that you may want to consider adding some optional high-bandwidth multimedia content to further attract these users.

Hit counts make a good general indicator. If they continue to rise, you're probably doing a good job. However, to truly see if you're achieving the results you want and to further fine-tune your site, you simply must dig deeper into the statistics.

■■■

Kim Komando's radio show is syndicated by WestStar TalkRadio. Inquire about the show at affiliaterelations@weststar.com, contact Kim via her home page, www.komando.com or call (602) 381-8200 ext. 200.

Tommy Roy, Beloved In Ludington, Mich.

► ROY, continued from page 42
or recordings that recapture the magic of the Paradise Club era.

"Although WKLA has evolved to a news-talk station over the years, we always welcome Roy," said Roger K. Baerwolf, WKLA station manager and CEO for Lake Michigan Broadcasting Inc. "His show is unique in every respect and popular with our advertisers. Roy spends months preparing for his show and

His June shows include a 100th-anniversary tribute to Duke Ellington and memories of violinist Yehudi Menuhin, trumpeter Al Hirt and singer Patti Page.

More than 500 fans of his show wrote last year. Roy responds to every one. He claims at this stage of life it makes no sense to invest in computers and join the e-mail world.

Residents take their memories with

His show is unique in every respect and popular with our advertisers.

— Roger K. Baerwolf
Station Manager

his thoroughness shows."

In his Manhattan apartment, Roy has 30,000 recordings stuffed in closets and scattered in cabinets. His collection of recordings allows for some colorful shows, including last year's Christmas show, which played tribute to several artists including the late Roy Rogers. Tommy Roy unearthed a rare recording of Rogers yodeling his way through Jingle Bells.

them. Jean Covell wrote in a letter to the Ludington Daily News that she misses the Tommy Roy show from her winter home in Alabama.

"I guess a long extension cord wouldn't really solve the problem."

■■■

Scott Seeburger has written extensively about entertainment and the arts in Michigan, and is a recent fan of Tommy Roy.

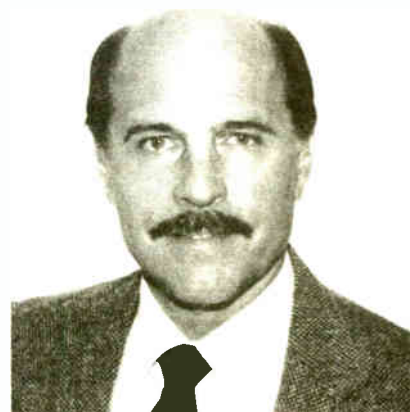
Reach the author in c/o RW.



Solid State Logic Appoints Mungovan

Timothy R., Mungovan has joined Solid State Logic in the position of sales engineer, broadcast and post production. Mungovan has pro audio experience, and a background in professional sales and engineering applications.

SSL manufactures analog and digital audio consoles for music, film, post



and broadcast facilities. The company is headquartered in England and has regional offices in New York, Los Angeles, Toronto, Tokyo, Paris, Milan and Singapore.

Antoine Joins Aeta Audio

AETA Audio has another new face on staff. David T. Antoine has been appointed to the position of national sales engineer and technical support for the company.



Antoine previously served as a sales and project manager for DSI RF Systems. He also has experience as a chief engineer.

AETA Audio manufactures audio products for the broadcast industry, specializing in audio codecs. The company recently opened its U.S. office in Rockaway, N.J.

Harris Appoints Terry Radio District Sales Manager

Harris Corp. has announced the appointment of Ellis Terry, Jr. as radio district sales manager for Hawaii, Southern California and Southern Nevada.

Terry previously served as director of engineering and operations at Douglas Broadcast/Personal Achievement Radio Inc. in California.

Terry, who has 28 years in the radio industry, will be working in Harris' Broadcast Communications Division.

MediaFORM

Mediastore: The World's Largest Distributor of MediaFORM CD Duplication Equipment

3707

7 Drive Autoloader
This 7 drive autoloader accommodates up to 200 CDs for unattended cd duplication.

3704

4 Drive Autoloader
This 4 drive autoloader accommodates up to 150 CDs for unattended cd duplication.

3706

Autoloader & Printer
This 6 drive autoloader accommodates up to 200 CDs for unattended duplication. Also features printing directly to cd-r media.

3701

Single Drive Autoloader
Single drive autoloader accommodates 50 CDs for unattended cd duplication.

5900

8 Drive Duplicator
The MediaFORM 5900 is the industry leader. This 8 drive system boasts of easy one-touch operation and options for DAT import.

All drives now available in 8x speed!

MEDIASTORE 800.555.5551

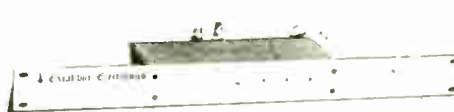
www.mediastore.com

Circle (8) On Reader Service Card

Products & Services Showcase

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

Excalibur Electronics
CDA-1
Composite Distribution Amplifier



This 1 in, 3 out distribution amplifier allows you to distribute stereo composite and/or subcarrier signals as easily as audio.

- ◆ DC-100 kHz frequency response
- ◆ 90 dB signal/noise ratio
- ◆ +6 dB to -20 dB gain range
- ◆ Individual 20-turn output trimmers
- ◆ 1 3/4" rack mount enclosure

EXCALIBUR ELECTRONICS, INC., CHANTILLY, VIRGINIA
Please circle our bingo number for a data sheet and a dealer list.

READER SERVICE NO. 69

Shively Labs
Reach for Ratings!
Shively Antennas Deliver Coverage!



- Superior Engineering
- Multistation Solutions
- Filters & Combiners
- Translators
- Reliable Pattern Studies

FM & TV Antennas and Related RF Equipment
because ... it pays to be heard!

P.O. Box 389, Bridgton, ME 04009 USA
Tel.: (207) 647-3327 FAX: (207) 647-8273
1-888-SHIVELY e-mail: sales@shively.com
Web: www.shively.com
An Employee-Owned Company

READER SERVICE NO. 79

NEW! FC-1
Digital Format Converter



- ◆ S/PDIF to AES/EBU Converter
- ◆ Coaxial and Optical Digital Inputs
- ◆ XLR AES/EBU Digital Output
- ◆ Sampling Rate Indicators
- ◆ Accepts Word Lengths 16-24 Bits
- ◆ Compact Size
- ◆ Low Cost



Call for a Videoquip products catalog or visit our web site.
Phone: (416) 293-1042
Toll Free: 1-888-293-1071
Fax: (416) 297-4757
Internet: www.videoquip.com

READER SERVICE NO. 89

THE COST EFFECTIVE ALTERNATIVE TO MANUFACTURER SERVICE

SERVICE, REPAIR & CALIBRATION

- STL's • RPU's • TSL's
- Exciters • Optimods
- AM/FM Monitors
- Remote Control Systems

SPECIALIZING IN EQUIPMENT BY

- Belar • Marti
- Moseley
- McMartin
- TFT
- And others...

WE ALSO PROVIDE
Free, over-the-phone technical assistance
STL loaner/rentals
PCL 505 Certification



2198 Hubbard Lane, Grants Pass, OR 97527
(541) 471-2262

READER SERVICE NO. 99

SPATIAL ONE STUDIO MONITORS

**Compact Size
Unique Design
Stunning Imaging
> 90dB Sensitivity
True 49Hz Bottom End!**

\$695.00 per pair

1-877-LPB-COMM
YOU CAN RELY ON LPB

READER SERVICE NO. 68

EQUIPMENT LEASING

**START UPS
TURNAROUNDS**

**\$100,000
TO
\$1,500,000**

CALL ... (617) 267-2900

BOSTON FINANCIAL & EQUITY CORP.
20 OVERLAND STREET BOSTON, MA 02215
WWW.BFEC.COM

READER SERVICE NO. 78

1,000 Hits on HARD DRIVE for \$695!

Compatible with Arrakis, BE, BSI, Enco, Prophet, Smarts, Register Data, others...

All formats! Oldies, '70s, AC, Country
1-day service at no extra charge!
We load IDE, SCSI, JAZ


HBS
HALLAND BROADCAST SERVICES, INC.
1289 East Alost Avenue
Glendora, CA 91740 USA
Tel 626-963-6300
Fax 626-963-2070
www.h-b-s.com

Just call our name
800-HALLAND
800-425-5263

For Music on CD
call **800-759-4561**

READER SERVICE NO. 43

PTEK LOW COST FM TRANSMITTERS & POWER AMPLIFIERS



Exciters/Transmitters	Power Amplifiers
10W	150W
25W	300W
	500W
	1000W

CALL 888-411-5174 FOR DETAILS

1814 SCHOOLDALE DRIVE, SAN JOSE, CA 95124. 408-448-3342 FAX 408-448-5951

READER SERVICE NO. 108

Selecting a Standard in Net Audio

► **JUKEBOX**, continued from page 35
audio to half the size of MP3 files while including a strong copyright protection.

Microsoft also has announced a new Streaming Media Division, to support the new product by offering digital

Media Technologies 4.0.

But Rykodisc is not ready to support the Microsoft product exclusively. "We're platform agnostic," Murray said.

"Security features on digital downloads have yet to prove that they're user-friendly enough to fly. We want to be

the programming that's provided, or tune out in favor of their own programming.

Maybe they put on a tape or CD. Of course, the track order on any prerecorded disc or tape is also pre-programmed. If the listener wants to program track-by-track, they have had to skip past unwanted cuts or hassle with recording "greatest hits" tapes and the like.

The new digital formats change that. The digital files can be recorded up to five times faster than real time and be rearranged instantaneously. This fulfills the digital age's promise of servicing the "audience of one."

The listener gets *exactly* what she wants, when she wants it. Radio pro-

grammers will have to face the fact that listeners may be tuning out not for their collegial competitors, but for this new media alternative.

But the oft-cited criticism of the "audience of one" concept is that it fails to fulfill one of broadcasting's unique capabilities — community building.

Formats that are just playlists are susceptible to intrusions by the digital jukebox. But programmers can enhance and enrich their offerings with value-adds that emphasize radio's local presence.

Creating and deepening this maintains a vital connection to their audience. So as radio listeners consider taking up residence on the Internet, they may find that a cyberhouse is not a cyberhome.



MP3 has raised new questions for Web content providers.

rights management and reporting capabilities — necessary for the business infrastructure.

But for all the technological superiority (remember Sony's Betamax?), Microsoft's proprietary package has to struggle to catch up with the populist appeal of MP3's open code.

Will Microsoft's proprietary products define the standard?

What the recording industry does may be the deciding factor. The recent collaboration between Microsoft and Sony Music Entertainment reportedly will offer downloadable singles for \$3.49 each, the same as the retail product.

Other record companies may opt to hedge their bets. Rykodisc, a pioneer in offering MP3 singles for 99 cents, also is working with Microsoft.

"This is a credible platform with the potential to reach a very large user base," said Lars Murray, Rykodisc's director of new media, said of Microsoft Windows

involved in the process of improving this situation but Microsoft and any of the other proprietary formats have a lot of catching up to do to match where MP3 is already," said Murray.

For RealNetworks, the point isn't which codec the listener chooses — it's how the player serves their tastes. Today, Real Jukebox supports MP3 and Real Audio G2.

"Right now, MP3 is the format that people want to be able to play and record to," Banfield said. "We're following what the market wants. If the market decides they want another format later, we can add it and distribute it instantaneously to everyone using Real Jukebox."

Whatever becomes the standard, Real Jukebox and Microsoft's Streaming Media Division offer a new way for consumers to listen.

This may affect radio's audience. Typically, listeners can either tune in to

Web Audio Freebies: Not Worth the Wait?

How easy is it to get freebies on the Web?

Giveaways of obscure or up-and-coming acts are everywhere. But what about a bootleg of that hit single you just can't get out of your head? Using Lycos' MP3 search engine (<http://mp3.lycos.com>), I tried to find a free download of Smashmouth's "Walking on the Sun" — a big hit last fall. The search engine showed more than a dozen illegal copies available at various Web sites.

But every attempt to pull one failed. I was shut out of all the sites because there was too much traffic. I repeated this in the dead of night — 4 a.m., on three successive nights. Still no luck.

Even though MP3 files are 10 times smaller than uncompressed audio, it's still a strain for most servers to deliver files that are this large, typically 2 to 4 megs. Finally,

I found a true pirate, a college student going by the name of "Gothic Nazi" (he claims this does not imply fascist tendencies) who e-mailed me the file.

This tied up my e-mail for about 15 minutes, and must have done the same on his end. This was hardly practical for either of us and isn't likely to pose a threat on a mass scale.

During these early morning attempts, I kept wishing I had the opportunity to pay a nominal fee for the privilege of downloading a copy. With the current bandwidth, the major labels don't have to worry about these freebies.

The cost in time and inconvenience for getting a bootleg makes buying their product the better deal.

I did, by the way, also buy the CD.

— Carl Lindemann

BELAR
STEREO MONITOR

You can measure... with the best monitor and the most accurate test set.

The FMM-2/FMS-2 series monitors provide an even greater degree of precision measurement than ever before. You can measure S/N below 90 dB, You can measure crosstalk below 85 dB, You can measure separations of better than 70 dB, You can measure frequency response to better than 0.25 dB, You can measure distortions to lower than 0.01%, and much more... Our uncluttered panels and autoranging voltmeters make these measurements a dream.

BELAR (610) 687-5550
ELECTRONICS LABORATORY, INC.
LANCASTER AVENUE AT DORSET, DEVON, PENNSYLVANIA 19333
Call or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.

Circle (46) On Reader Service Card

Now showing...

AFS-2 AUDIO FAILSAFE
CAS-1 CON/AIR SWITCHER
CTI-1 COMPUTER TEMPERATURE INTERFACE
DAI-2 DIAL-UP AUDIO INTERFACE
MBC-1 MESSAGE BOARD CONTROLLER
RFC-1/B REMOTE FACILITIES CONTROLLER
TTA-1 TIME-TEMP ANNOUNCER
TTT-1 TIME-TEMP THING

Coming soon...

ACU-1 AUDIO CONTROL UNIT
our incredibly popular audio switcher makes its public debut

RAK-1 INTELLIGENT RACK ADAPTER
the ultimate accessory for your RFC-1/B

WE SPECIALIZE IN RELIABLE COST EFFECTIVE PRODUCTS FOR YOUR BROADCAST RELATED NEEDS

Innovative solutions!

Sine Systems, INC.
innovative solutions

615 • 228 • 3500 (VOX)
615 • 227 • 2367 (FAX)
615 • 227 • 2393 (F.O.D)
WWW.SINESYSTEMS.COM

Circle (12) On Reader Service Card

Studio Sessions

The Digital Road



See Page 48

Radio World

Resource for Radio Production and Recording

June 9, 1999

Laptop Tools for Radio Reporters

Carl Lindemann

In part one, in the May 12 issue, we looked at the integrated elements that make the latest generation of Laptop PCs. Faster, more energy-efficient processors, SDRAM, UDMA hard drives

more than a match for many in-studio cards. If pristine sound quality, not price, dictates your decision, this is the way to go. The newly announced VXPocket card is a more economical version without the PCX's onboard DSP chips. Look for the review in an

upcoming **Radio World**.

If budget is a major factor, the E-mu Systems 8710 delivers reasonably good sound at a reasonable price. The 8710 connects to a "media access breakout" box with mini in and out, a digital out (S/PDIF) and stereo analog line in and out plus a mono mic in. Unfortunately, these are 1/8-inch jacks. (The company is considering offering an optional XLR break-



The New VXPocket PC Card From Digigram

and the new 32-bit CardBus slots open up new possibilities. These features make laptops capable of professional-quality field recording with much of an in-studio DAWs power.

Many machines under \$2,000 can come close to the size, price and functionality of a DAT field recorder with all but the most sophisticated editing capabilities of a studio-based DAW. Even when properly equipped with the right PC cards, the laptop DAW isn't a desktop DAW replacement. Nor does it eliminate the place for DAT or MiniDisc. It does, however, create a new combination of functionality that's ideal for certain everyday tasks the radio reporter faces. Also, it frees independent producers (like myself) to "take the show on the road."

The key shortcoming of most every off-the-shelf laptop is the integrated sound system, so the first item to add is a good audio PC card. Digigram's top-of-the-line Pocket PCX series is

out box.) I had some initial difficulties with the installation and setup that created an overmodulation "burn" at peaks in soundfiles recorded. Once past this, the sound quality is far better than the integrated unit.

The published specs post a 70dB signal-to-noise ratio on the analog stereo input. This isn't quite as crisp and quiet as the in-studio gear, but it's certainly adequate. For NT fans, the 8710 only has drivers for Windows 95/98.

Support

That's not unusual. Even as NT 4.0 becomes the OS of choice for PC-based audio production, laptop support for the platform remains limited. Microsoft's code for the OS does not fully support the CardBus standard. The next release, Windows 2000 (NT 5), promises to give laptop users better support. (If history is a guide, don't hold your breath waiting for Microsoft to get the bugs out of their next-generation NT. Stay tuned for future

reports in **RW**.)

So what can you use this for? Don't expect to chase after newsmakers with this rig; that's not what it's designed for. It is, however, terrific for sit-down situations.

Say you're out on the campaign trail gathering speeches or covering city and town council meetings. If there's a multi-box, this sure beats gathering sound with a field recorder and then having to take it back to the studio and dump it into a DAW. So far, I've tested this setup recording sit-down interviews for a documentary project. I used SAW 32 to record

.wav files on my Digital HiNote 735 (described in part 1).

On the plus side, the unit's IBM hard drive gave me hours of recording space, so there was no worry about having to stop these hour-plus interviews to pop in a new blank. The sound quality with the E-mu 8710 was on par with the Sharp MD-MS702 MiniDisc used for backup.

But there are other issues to consider. I monitored through a pair of Grado Labs SR-60 headphones. These are perhaps the only quality "cans" I've found that are designed to deliver decent sound out of portable consumer players. They are efficient and get good volume

See TOOLS, page 49 ▶

LINE OUT

Helpful Hints for The Radio Studio

Bruce Bartlett

Every time I am involved in a recording session, I learn something to make my life easier.

Sometimes it's a new mic technique suggested by the client, or a way to place monitor speakers to get a flatter response. Or maybe it's just a more efficient way to produce quick mixes.

In *Studio Sessions*, I hope to share some of these useful secrets gleaned from the real world of audio production.

Snare sound

During a recent mixdown, a drummer asked me to make his snare drum sound "fatter." I turned up the lows around 150 Hz. He said, "That's better, but not quite what I wanted."

I asked for a demonstration: "Do you have a CD with a fat drum sound?" He did, and he played it for me.

On this recording, the snare had a reverb with a short decay time — a

"small-room" setting. So I dialed in a similar setting on my Alesis Microverb 4, and asked, "How's that?" The drummer smiled broadly and gave me the thumbs up. He got what he wanted.

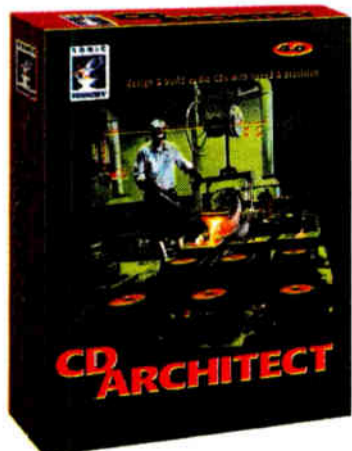
If you don't understand what sound or effect a client is looking for, have him or her play you a CD or cassette containing that sound. Listen and try to duplicate the effect that you hear.

Fat and bassy

"Fat" means "bassy" to some musicians, but means "ambient" or "spread out in time" to others. It's understandable why a demo can be helpful.

A rap group gave me a multitrack analog tape that it wanted to remix. Two tracks of the tape had a stereo synthesizer playing a stereo mix of MIDI sequencer tracks. Three other tracks consisted of the lead and back-up vocals. The group wanted to change the mix of the synth tracks

See HINTS, page 50 ▶



Trash your carts, burn CDs

Give all your production material the performance and reliability that only comes from CDs. CDs are the new standard in audio — compact, easy to use and efficient.

CD Architect is the professional mastering software that's accessible to untrained users. It verifies Red Book

standard audio before burning, fully supports PQ code editing, and lets you prepare the material in its own editor with multi-level undo.

From Sonic Foundry, the leader in Windows-based digital audio. Visit www.sonicfoundry.com or call us at 800-57-SONIC for more information.



PRODUCT REVIEW

dbx DDP Takes the Digital Road

Ken R.

Did you ever own a puppy that you loved dearly but who kept chewing up your couch and driving everyone crazy?

That's how I feel about the DDP digital processor from dbx. Everyone

After parting with \$500, I received my new toy. To my surprise, there were absolutely no digital inputs in the back. I called the supplier and they said those magic words: "that's extra." No mention was ever made of this when I ordered it, but oh well. After sending another hundred of my hard-

are limiting. There are even two little downward expanding multistep meters so you can watch your gate working.

The front panel also shows your selected setup (preset) and many other details, all without stepping through menus. There is a data wheel which magically adjusts whatever parameter you need at that moment. You can tweak the gate, compression, EQ, limiting de-ess and other functions all with one nice-feeling wheel, but it's not a pain in the butt because you really only need to do one thing at a time. All parameter buttons, the on/off switch and bypass are handy to get to on the front panel as well. Excellent! I have never seen a product with so much on display all at the same time.

For you button and knob fans, you get 12 buttons which select the process you wish to alter (EQ, de-ess, limiter, compressor, gate or other options). You get four small dials (input and output, left and right), the aforementioned data wheel and some red lights which can either show you the input or output of the unit. You can go pretty deep into the parameters if you like. Each audio processing function has three or four pages of characteristics you can adjust, and of course you can store your brilliantly conceived settings in a "user" preset.

Another problem with some of the few stereo setups is that unless you rewrite them in your own user programs, many have weird phasing that makes mono listening most unpleasant.

One would think it would be better

earned dollars, I was in business.

The DDP can receive analog signals through one-quarter-inch TRS-balanced inputs or digital signals through the (optional, thank you very much) AES/EBU or S/PDIF ports at 24-bit word lengths. It can even read MIDI, which can control automation functions. Those of you who were really hoping for a wall-wart (all both of you) will be disappointed. It's a regular power cord.

The good news

The front panel is wonderful. There are two "in" and two "out" level displays (left and right) so you can really see what you're doing. There is a light graph so you can see at what point you are compressing and at what point you



The DDP Digital Processor

has used various analog compressor/limiter/gates from these folks and those little boxes have worked very well. This is the company's first entry into the digital world and it's a good first effort. It's marred, however, by non-intuitive software that will make you think you are losing your mind.

Why is a digital compressor worth owning? It allows one to go directly from audio-editing software into this magic box, and back out, all in the digital realm. A fine idea! Additionally, the sound of digital is cleaner, without all the analog grunge that many no longer find charming. (Rap producers may find this higher signal quality a problem ... a hint of sarcasm.)

Product Capsule:

dbx DDP
Digital Processor

Thumbs Up

- ✓ Thorough front panel
- ✓ Data wheels
- ✓ De-ess function
- ✓ Can read MIDI

Thumbs Down

- ✓ Non-intuitive software
- ✓ Ineffective factory setups

For more information contact
dbx in Utah at
(801) 568-7600;
www.dbxpro.com
or circle **Reader Service 201**.

swell!

The EQ and de-ess are a little like dancing bears: They don't have to dance great, they just have to dance. The EQ is actually pretty useful, albeit somewhat limited, but you can plus or minus three different ranges at once. We use it to take some of the lower frequency "woofiness" and room noise out of our jingle vocals. If your mics are located in a room that gobbles up the highs, put them back in using the DDP. The de-ess function is also useful in that it saves you patching all over creation to get the job done.

The compressing is not obvious-sounding, but it works. The gate is very good and easy to control; it won't clip the beginning of your audio unless you want it to.

There is a data wheel which magically adjusts whatever parameter you need at that moment.

to offer mostly stereo presets so one can compress stereo vocals, stereo drums, stereo brass, etc. If one wanted to split the box into dual mono, that should be easy to do. It should also be easy to take a factory setting which is tweaked and perfected for the left channel and copy it to the right channel with one easy button. Forget it — you have to step through multiple menus. None of this is apparent unless you inhale the manual.

The positives absolutely outweigh the negatives, however. Once I got this thing cooking, we noticed a *huge* improvement in our sound.

Our application here is all jingles, all the time. I wanted a box that I could run stereo vocals through to make them punchier and limit their dynamic range a bit. (This allows us to run the instrumental tracks hotter.) I selected the "Nashville Vocals" preset, tweaked one channel until it worked just right, then copied it laboriously to the other channel to match. Works

In fact, if you can get through the manual and actually learn to use the DDP, it will make your projects sound great. Unless, of course, your singers are awful and your guitar is out of tune. The DDP can't help you there, pal.

Another tip: Make sure you set the various thresholds (buried in a menu somewhere) at a point where the DDP actually works on your program material.

Otherwise, the unit does absolutely nothing and you will think about using it as a boat anchor. Actually, this is as it should be, but it took me a while to figure out why nothing was happening.

The next software upgrade for this thing ought to be a killer! dbx gives you the tools, but you have to figure out how to use them.

Ken R. produces classic and contemporary radio jingles for his company, Ken R., Inc., in Toledo, Ohio.

TRY SOMETHING REALLY COOL!

Cool Edit Pro

The complete multitrack recording studio for Windows™

The easiest way to:

- Record and build spots, news, and clips
- Add music and sound f/x
- Stretch or condense

Cool Edit Pro has been the dream come true that we have wanted for decades: a low cost production studio software package that has the power of any hardware studio we have worked in. Our morning shows across North America now have the capability of doing all their show preparation in their home studios with Cool Edit Pro. It is not just a new program, it's a revolution that has changed the way radio is done.

- Bob Hamilton, New Radio Star

It's difficult to go anywhere in Cool Edit Pro and not hear yourself whispering to yourself "this is cool!"

- Dave Olliv, Radio And Production, May 1997

Check out our downloadable demo at:
<http://www.syntrillium.com>

PO Box 62255
Phoenix, AZ 85082-2255 USA
cepro@syntrillium.com
+1-602-941-4327
+1-602-941-8170 (fax)
1-888-941-7100 (US & Canada toll-free sales)

Circle (48) On Reader Service Card

SPECIAL REPORT

Radio Life, Norwegian-Style

Randy Trelstad

Climbing his family tree, a production director's trip abroad "branches" out to include visits to Norwegian radio stations.

I was fully satisfied, at the time, with the original idea of going along as a part-time chaperone — ten high school students and my Dad, the superintendent of schools in Lyle, Minn., on a school exchange trip to Norway.

My original plan was to spend as much time as I could personally tracing my family roots in the village area of Hegra. This was going to be my vacation, and truthfully, radio was just about the last thing I wanted to think about for two whole weeks.

But, as our departure date neared, I got to thinking, what the heck? Being able to visit a Norwegian radio station or two might not work out, but it never hurts to ask.

With some quick research and a lot of help from my new Norsk friends I was about to make, it quickly became a tentative plan.

Similar traits

Landing in Oslo on a Sunday night washed out the chances of visiting NRK (Norsk Rikskringkasting, Translated: Norwegian Broadcasting) radio station there. Seems they like their weekends off too. Go figure.

No matter. My best prospects of visiting a radio station in Norway lay in the central part of the country, some 40 kilometers west of our ultimate destination ... in the town of Hell and in the sizable city of Trondheim, which serves as home for two of the four governmentally-funded NRK Programmes (stations). The others are in Oslo and Lillehammer.

The eight-hour Monday morning train ride north from Oslo to Trondheim gave me time to consider and ponder what I expected would be, at best, just a few precious moments talking shop with Norwegian radio folk.

Trying to understand how radio works in Norway, I relied heavily on comparisons. I found early on during my "recon mission" that NRK strongly resembles our own NPR. Financially supported by the government, commercial-free, and perhaps the best part — aside from Norway's FCC equivalents — is that the bureaucrats keep their noses out of programming. Additionally, besides a few scattered, independently operated day-timers, NRK is basically "it" for radio.

Competition for listeners is almost nonexistent for NRK, although there is a ratings system, of

See NORWAY, page 50 ▶

Sound Improvements With Laptops

▶ TOOLS, continued from page 47 without needing much output. That's important because the headphone amp is powered by the laptop's battery. Driving a more heavy-duty rig could take a big bite out of battery life and recording time. With the SR-60s, I had plenty of juice left even after an 80-minute recording session.

layer between the breakout box and the PC card and can gave greater flexibility with monitoring.

Shortcomings aside, it was great to have the interview immediately accessible. The whole thing was ready and set for me to edit. The usual lag time for dumping the raw audio from field recorder to studio DAW was eliminated.

Getting sound in is only half the challenge with a laptop DAW. My experiments with a 3Com cell modem yielded mixed results.

The current technology limits wireless Internet connections to around 14.4 kbps. That's fine for e-mail and even light Web surfing, but for sending audio, it's agonizingly slow. Even using the latest MP3 compression, a minute of sound takes up about a megabyte. If you're sending short sound bites and there's no landline available, it is usable, but only as a last resort.

Drawing it out is where the CardBus really comes into its own. Say you want to offload onto your station's Local Area Network. You can tap in fast with a 10/100 Ethernet card. For SCSI connections, I hooked in an Adaptec SlimSCSI 1480. As Adaptec's first product to use the new CardBus standard, it achieves nearly triple the throughput of its old-



The Adaptec SlimSCSI 1480 achieves nearly triple the throughput of its 1460 PCMCIA card.

Drawing it out is where the CardBus really comes into its own.

If you plan on untethered recording for more than two hours, be ready to swap batteries.

A bigger concern is the tenuous connection between the breakout box and the soundcard. This is an inherent shortcoming of the PC card format. I'd hate to see what would happen if someone stumbled over a mic cable and yanked it out accidentally. One solution is to add a portable mic mixer to the setup. That puts an extra

er PCMCIA card, the 1460.

For improved DAW multitracking capabilities, add an external SCSI hard drive. Iomega "Jaz" fans will also find this irresistible. Adaptec claims it increases data transfers on "Jaz" drives by 173 percent! For the most part, I use this to burn CDs on a Yamaha 4260 external CDR/RW.

For field reporters, putting a laptop in your recorder arsenal removes the bottleneck of having to playback sound in real-time into a DAW. For road warriors, it allows you to setup shop with almost full deskbound DAW capabilities fast.

This hybrid concept — half field recorder, half DAW — is also being tackled with the latest Integrated Circuit (IC) recorders. Basically, they are hard-disk or static RAM recorders with editing capabilities. Depending on your needs, adding serious sound-gathering capabilities to your laptop may be the better way to go — especially if you're using a laptop anyway.

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



The 3Com Cellular Modem PC Card

Furman: The leader in pro audio power conditioning for 25 years is now serving the broadcast industry.

HERE'S HOW TO MAKE YOUR FACILITIES QUIETER — INSTANTLY.

BALANCED POWER FROM FURMAN

THE FEATURES

- Available in 10, 20 and 30 amp models
- All three models provide precisely balanced AC power for ultra-low-noise installations
- The IT-1210 and IT-1220 have 12 outlets on the rear, plus two on the front. The IT-1230 has one 30A twistlock outlet and ten 20A outlets on rear, plus two outlets on front
- Exclusive "Soft Start" circuit prevents turn-on transients
- Extreme Voltage Shutdown circuit protects against dangerously high or low input voltages
- Toroidal transformer with center-tapped secondary is the most efficient, compact design, with least magnetic field leakage
- Faraday shield reduces electrostatic coupling between primary and secondary
- Provides Furman's best power conditioning (spike suppression, RFI filtering) plus gas discharge tube to dissipate spikes
- Ground fault (GFCI) protection
- Microprocessor-controlled "smart" AC voltmeter also flashes alerts for marginal and extreme conditions
- Three Year Limited Warranty
- IT-1210 and IT-1220 UL/CUL listed



THE BENEFITS

Furman's IT Series Balanced AC Power products are specifically designed to reduce buzz and hum in installations where ultra-low-noise performance is a must. The IT Series is a proven solution for decreasing noise. We've been selling them to top recording studios for years.

Every production studio and news facility can benefit from Furman Balanced Power. The IT Series dramatically reduces the noise floor (up to 16 dB improvement), and noticeably improves dynamic range and clarity. Set-up is as easy as plugging in an AC power cord.

Furman has a Balanced Power model for every application: IT-1210 (10A), IT-1220 (20A) and IT-1230 (30A).

Furman Balanced Power. It's what you need. It works. Available at:



FURMAN
 FURMAN SOUND, INC.
 1997 South McDowell Blvd.
 Petaluma, CA 94954
 Phone: (707) 763-1010 • Fax: (707) 763-1310
 Web: www.furmansound.com
 E-Mail: info@furmansound.com

A Simpler Life in the Studio

► HINTS, continued from page 47 and keep them in sync with the vocals. That was going to be difficult, since the MIDI instruments were already mixed to two tracks.

I asked the group if they still had the original MIDI sequencer file. Fortunately, they did. We were able to remix the synth tracks after recording them one at a time onto a hard drive.

The procedure went like this:

1. In the synth, turn on *only* the bass voice in the sequencer.
2. Record the bass onto one track of a digital audio workstation.
3. In the synth, turn on only the drums voice in the sequencer.

4. Record the drums onto another track of the workstation.
5. Repeat these steps for each voice or instrument in the sequence.
6. Copy the vocals, one track at a time, onto tracks in the workstation.
7. In the workstation, slide each track in time to align all the tracks.
8. Using the workstation's mixing facility, remix the tracks.

Boosted bass

Suppose a singer or announcer is miked a few inches away with a directional mic (such as a cardioid). Usually, this results in proximity effect: the bass is boosted, which provides an unnatural boomy sound. Some people like the sound of proximity effect; others don't.

If you want to get rid of the extra bass, try rolling off the lows — about -6 dB at 100 Hz for starters. This removes the low-end boost.

If the mic is near the mouth, the proximity effect might extend up through the 500 Hz area, so even if you roll off 100 Hz, the voice will sound "puffy" because 500 Hz is still boosted by proximity effect. By cutting a few dB at 500 Hz with a multiband equalizer, you can remove the puffy sound from the voice.

Better yet, consider miking further

away (or use an omni mic) so that no EQ is needed.

At one session, I recorded a singer who played a synthesizer at the same time. The synth and vocals were on separate tracks. During playback of

the vocal track, we heard some clicking of the keys on the synthesizer keyboard whenever the singing stopped. The player's fingernails turned out to be the culprit.

Key clicks

Usually, the vocal masked the key clicks, but the clicks were audible during pauses. So, we erased the portions of the vocal track where there were pauses in the singing, which eliminated the key clicks. Another solution would have been to use a fingernail clipper!

On that same session, the final mix sounded thin because the recording had

no bass guitar in the mix. To add warmth, we boosted the low-frequency EQ on the synth parts. This filled in for the missing bass line.

The same trick works for solo recordings of New Age acoustic guitar. A song made entirely of acoustic guitar tracks tends to sound thin if there is no bass line. Sometimes it helps to boost the lows slightly around 80 Hz.

By cutting a few dB at 500 Hz with a multiband equalizer, you can remove the puffy sound from the voice.

This makes the overall mix warmer and more pleasant.

Here are some tips that can make CD-R recordings more reliable.

Remove the dust from the CD-R drive lens with a lens-cleaning CD-ROM. Don't apply a non-centered label to the disk because it can make the disk wobble. Apply a circular label instead, or write on the disk with a pen. A Sharpie is a good choice of pen because it uses harmless water-based ink.

■■■

Bruce Bartlett is the author of Practical Recording Techniques 2nd Ed., published by Focal Press. He runs a 16-track digital recording studio.

Save Your Issues of Radio World in Style



Now there's an easy way to organize and protect your copies of Radio World, the industry's best read newspaper, keeping issues readily available for future reference.

Designed exclusively for Radio World, these custom-made titled cases provide the luxury look that makes them attractive additions to your bookshelf. Each case is sized to hold a year's issues (may vary with issue sizes), and is made of reinforced board covered with durable leather-like material in blue, with the title hot-stamped in gold. Cases are V-notched for easy access and free personalization foil is included for indexing the year.

Cases

1-\$8.95 3-\$24.95 6-\$45.95

Call Toll Free
7 days, 24 hours
1-800-825-6690

Charge Orders (Minimum \$15):
AmEx, Visa, MC, DC accepted.

Jesse Jones Industries,
Dept. 95RW
499 East Erie Ave.
Philadelphia, PA 19134

Allow 4 to 6 weeks for delivery
SATISFACTION GUARANTEED

Add \$1.50 per case for postage & handling.
Outside U.S. (including AK & HI) \$3.50 per case
(U.S. funds only).
PA residents add 7% sales tax

NRK Serves Norsk Speakers

► NORWAY, continued from page 49

sorts. Norwegian radio audiences can get a vast potpourri of signals, originating from many European countries, broadcast in as many languages. But the predominantly Norsk speaking listeners seem to be content with, and partial to NRK.

Grab a fork

One important thing to know about the Norwegian people is that when you come to call, you must eat. Norwegian hospitality is unbelievable. Typically, a virtual buffet of Norse delicacies is set before you, literally minutes after you've taken a seat at the oversized coffee table found in every home and most businesses.

And, since it's considered impolite to refuse, you eat. There is no choice in the matter, but there are never any complaints about the food ... except, perhaps, that you're full.

(Dad and I figured it out when we got home. During our ten-day stay, we "ate" an average of seven times a day! Neither of us gained an ounce, however.)

So was the case the day I visited Trondheim's NRK broadcasting facility. With directions from a petrol station attendant — through her broken English and my yielding Norwegian — we'd find the station "at the tower." The tower?

Driving the suggested route, the "tower" came into view over the Norway Pines. (Don't be so surprised.) It's a grand structure, resembling Seattle's Space Needle, from which the signals of NRK's radio and television

stations were transmitted. The tower also boasted a high-class restaurant halfway up that rotated one full turn every hour, providing patrons with a view of the entire city.

Upon our entrance, we announced ourselves to the receptionist. Less than a minute later, we were greeted with open arms by Morten Granas, head of management, and Tommy Hansen, program director (and Morten's son-in-law). My expectations were already exceeded.

Morten escorted us to his plush office where we talked shop for awhile ... and ate.

What I'd expected to be a quick 5- to 10-minute meeting and presentation of gifts (a couple of station T-shirts and a few bumper stickers) became an afternoon-long tour, starting with the minimum 10,000-song music library vault (almost all in Norwegian), which was the size of a small gymnasium.

Our group of four quickly gained an entourage of NRK personnel glad to follow "The American Radio Man" around.

Studio toys

We visited studio after studio, each decked out with top-of-the-line digital and analog toys. This place was huge! The large number of production studios, no doubt, account for nearly every bit of programming being created in-house, since there probably aren't many Norwegian-speaking program suppliers in the world.

In the Norwegian tongue, the word hell means "fortune" or "promise." Hell

is also a picturesque community near Trondheim, and city of license for one of the independently owned and operated radio stations in Norway.

Although privately owned radio stations are something relatively new in northern Europe, and not often taken seriously, "Radio Hell" has a lot going for it.

Roar Lynum, program director, signs on at 8 a.m., followed by Ronald Grahn, air talent, from 10 a.m. to noon. Radio Hell then concludes its four-hour broadcast day.

Unlike NRK, several economic problems are the norm for independent broadcasters. Other problems include low power on a number of frequencies, poor signals, many strict local and national regulations and the high price of planning copyrighted music on the air. Despite all this, Radio Hell has gained an impressive following.

It's popularity can be credited, in part, to the station's name itself, and the "Americanized" imaging and cutting-edge approach to radio broadcasting, which to many Norse listeners may seem (excuse the pun) foreign. To be the sole welcoming station for the three-day "Hell International Blues Festival" doesn't hurt either.

A return trip is planned for the summer of 2000.

■■■

Randy Trelstad is production/creative services director at KRCH/KMFX/KWEB/KNFX in Rochester, Minn. Contact him at (507) 288-3888.

Buyer's Guide

Tech Updates



Inside

Radio World

On-Air Processing

June 9, 1999

SPECIAL REPORT

Processors Continue to Mature

Tom Osenkowsky

On-air audio processing has taken an evolving course from the early days of radio.

Early forms of processing consisted of an audio limiter to prevent overmodulation and possibly an Automatic Gain Control (AGC) amplifier to compensate for less-than-perfect board operators.

Up until the 1970s, all processing was single-band. In single-band processing, the entire audio spectrum is treated equally. It wasn't unusual for the bass to "pump" the audio envelope, causing an unnatural breathing sound.

With the evolution of multiband processing, each audio band could be treated with attack/release time constants suited for that spectrum. A side benefit of multiband processing was a more consistent sound despite variations in the source material.

In the 1990s, digital audio processing has become a dominant factor. Gone are the Collins 26 series limiters, the CBS Audimax and Volumax, the Level Devil, Sta-Level, and many other such devices.

Enter products like the Orban Optimod-FM 8200, Cutting Edge Omnia and CRL DP-100 processors.

Integrated package

These combine a multiband processor, final limiter and stereo generator in one integrated package.

Orban manufactures the popular model 8200 digital audio processor. New for the 8200 is Version 3 software. According to Bob Orban, founder and chief engineer, the Version 3 software upgrade "has been very well received. We've already upgraded a substantial portion of the existing customer base."

The software upgrade provides users with new control with the addition of 21 presets, each labeled for certain programming formats such as urban/rap, rock, news and folk/traditional.

Orban also makes a cost-effective, two-band version of the 8200, the 2200. The company says sales of the 2200 are slightly outpacing those of the 8200.

The 8200 usually is equipped with five bands of processing and features can be upgraded later through software (unlike the 2200).

Orban also manufactures the 9200, a digital audio processor for AM.

"The 9200 is doing better (in sales) than the 9100 (processor). There's a lot of acceptance of this product," said Orban. The 9200 features adjustable release times and output mix from each audio band. The 9200 also has user-adjustable bandwidths, which may be an

important feature for certain types of IBOC DAB broadcasting.

What does the future hold for Orban?

"We're selling twice as much product than we did 10 years ago. Digital has really paid off for us," Orban said. "As for future development, it is certainly ongoing. We're not asleep."



Processors like the Optimod-FM 8200 are mission-critical in radio today.

Cutting Edge Technologies recently introduced several new upgrade paths for its Omnia digital processor. New for the Omnia are the Hot, Veris and Space-EFX plug-ins.

The Hot is aimed at those users who desire the ultimate in loudness whereas the Veris is for classical, smooth jazz and other formats striving for audio purity. The Space-EFX offers spatial enhancement effects which may be used in conjunction with the Hot or Veris plug-ins.

"Introducing new plug-ins makes good on our promise of open-ended architecture," said John Grayson, distribution sales director of Cutting Edge.

"The Omnia allows you to sound different even if your competition is also using an Omnia due to the wide selection of user adjustable parameters

and plug-ins," said Grayson.

"We're just scratching the surface of what we can do with these plug-ins. This is only the beginning."

Aphex manufactures the model 2020 FM Pro multiband processor. The 2020 features digital control and an analog audio path.

"People are waking up to the fact that dynamics processing in a digital domain leaves a lot to be desired," said President Marvin Caesar. "The biggest problem is that any effective peak processing in dig-

ital leaves unpleasant artifacts.

"Loudness is a trend people are backing away from," he said. "They want to be competitively loud but still maintain quality. The loud-vs.-quality equation is tending toward quality."

The processor has been used not only in radio, but on the public address system at the Super Bowl, on a number of European news channels, as link protection between CBS Television and its backhaul to New York City and for mastering of several major motion pictures.

More processing

CRL has manufactured audio processing products for quite some time. Its DP-100 digital FM processor has been a very good seller.

Recently introduced was a software upgrade for the DP-100. This upgrade, free of charge, adds remote-control capability to the DP-100. The upgrade may be downloaded from the CRL Web site at www.crlsystems.com

Unfortunately, the company recently decided to close its doors. Despite the board's vote to close the company, CRL at press time hoped to find a buyer for the firm.

Inovonics has an interesting product in its WebCaster, an on-air audio processor for real time Internet broadcasts of radio programs.

Pre-processing of the audio signal is done prior to encoding to create a better sound from the receiver.

Also for webcasting, Cutting Edge offers Omnia.net, which delivers audio

See PROCESSORS, page 53 ▶


ComStudy by RadioSoft.

Radio Mapping At Its Best.

ComStudy by RadioSoft sets a new standard for accurate and efficient mapping of all radio signals. ComStudy can bring a world of information about your existing or planned signals right to your screen. ComStudy 2 offers a lot...

- Fully integrated transmitter databases
- Fastest and most accurate calculations
- Automatic interference calculations
- Real time 3D displays
- Area reliability studies
- Accepted by the FCC
- APCO coordination standard
- All FCC, TIA, and ITU procedures included

ComStudy offers breakthrough software at a fraction of the cost of more cumbersome software programs. We'll even let you test drive ComStudy for 15 days. Just call or visit our website.



The World Leader In Radio Mapping Technology.
109 W. Knapp Avenue, Edgewater, FL 32132
Phone 1-888-RADIO95 in the USA
Globally, phone 1.904.426.2521 • www.radiosoft.com
RadioSoft Is A Customer Friendly Company.

USER REPORT

Optimum Sound With Optimod

by Michael P. Kernen
Chief Engineer
Greater Detroit Radio Group

FERNDALE, Mich. As an employee in the radio industry, it would come as a surprise to me if you have not heard of the Optimod. As a listener, you certainly have heard what an Optimod can do for a radio station, whether you realize it or not.

The use of the Optimod is widespread,



Mike Kernen in the Equipment Room

responded positively but deep inside have known the concession would be sound quality.

Most of us are familiar with the grungy top-end and ear-fatigue that the 8100 can be pushed to produce. Many of us have added equipment upstream to combat this problem and help yield a louder and more balanced sound. Some stations even use downstream composite clippers to gain loudness. These should only be used to protect STL equipment and should never be set too aggressively.

For several years I've felt that improvements could be made. The Optimod had given us many great years, but an audience that owns substantially improved radios (and speakers) compelled the Optimod's technology to improve.

My first look at the Optimod-FM 8200 was very near its introduction. The promise of a clean top end with gains in loudness and an

improved stereo generator motivated me to obtain a demo unit. Unfortunately, the version 0.9 software left me cold and the station lacked a budget for the processor. Nonetheless, I liked the overall package and chalked up the problems to the beta version software.

New software

The necessity for DTV tower capacity required the removal of the WRIF(FM) auxiliary antenna and circumstantially caused an entire RF plant rebuild.

I took this opportunity to evaluate several processors and settled on the Orban Optimod 8200. It shipped with version

3.0 software, the optional digital input card and the excellent remote-control software.

During installation, I found its menus and controls easy to navigate and understand. The rack-mountable chassis is top-quality and good-looking. The rear panel is comfortably laid out and well-labeled.

Unlike its predecessor, there is no key or front door. The front panel can be opened without removing the unit from the rack but this is only necessary for card installation and access to the power switch. All controls lock

following a time-out period, after which you must enter a passcode to gain access.

Setup could not be easier and is done by means of a wizard-like macro. Answer a few easy questions; pick a preset and you're ready to go. All menus, meters and dialogue are displayed on a high-contrast backlit LCD screen and are easy to read.

The use of the four navigation buttons, five "soft" keys and the large knob enable almost all user control. There is even a Help button. The only other setting is done via screwdriver through holes in the front panel and deals only with separation, pilot and composite output levels.

Because sound is our only product,
See OPTIMOD, page 54 ▶

USER REPORT

Aphex: Going Against The Grain(iness)

by Ken Dillard
Chief Engineer
WKLS-FM
Clear Channel Communications

ATLANTA I am neither a diehard analog guy nor someone who believes that if it is digital, it must be perfect. My bottom line is whatever sounds and works best, whatever will improve our product, I will use it.

As important as my thoughts are, so

was intrigued when I saw the ad for its 2020 FM Pro multiband processor. I arranged for a demo, then put it through its paces.

The first thing I noticed was that the screen on the front panel was small. This made for an unfriendly trip through the menus. The remote program, however, is extremely easy to use and set up. It is so intuitive, straightforward and simple to navigate that I was up and running on the



Aphex 2020 FM Pro

are the opinions of our program director, who is one of the most highly respected AOR program directors in the Jacor (now Clear Channel) organization. He knows exactly what he is looking for.

Avoid 'synthetic' sound

Unfortunately, we have had a hard time with the two popular digital processors we had on hand. Both he and I felt that the boxes produced audible artifacts and a "synthetic" sound — one in the high-frequency range and the other in the low — that could not be compensated for with adjustments.

We tried for hours and hours on a daily basis to create an acceptable sound. To make matters worse, we deal with an extremely diverse format that makes processing very difficult.

I have used the Aphex Compellors for years with great success. Since I prefer its AGC, I used the Compellor to drive both digital boxes. Being familiar with Aphex, I

2020 in no time. I actually have the software running full-time in my equipment room. It has been on continuously for as long as a month without crashing.

The 2020 is a wide-band leveler, multiband compressor and split-band clipper. Options include a digital I/O, a high-frequency limiter and a stereo generator. My unit has the HF limiter and stereo generator. It is truly a stand-alone box with no external processing necessary. There is an insert point between the leveler and the multiband compressor but I have not had time to utilize it yet.

We use a Pacific Research & Engineering BMX II console, analog into the 2020, composite out of the 2020 into a Moseley PCL606, then into a Continental 802 exciter and a CCA transmitter.

There are eight factory presets and 16 user presets. I started with the Country preset and worked from

See APHEX, page 54 ▶

"David-II" ...FM Simplified



Common sense

tells you that even a "giant" of an FM audio processor can't guarantee market dominance. Day after day, hundreds of "David-II" users prove that a strong-yet-clean, *non-fatiguing* sound is an ideal companion to *creative programming*.

Inovonics' "David-II" combines rock-solid PWM audio processing with true digital synthesis of the FM composite baseband signal. Elegant in its simplicity, "David-II" more than holds its own against the more complex and far more expensive FM processing alternatives.

But don't take our word for it, your preferred broadcast equipment supplier can arrange a demo at your own station. Phone, fax or check our website for complete technical details.

"DAVID-II" (Model 716) — \$1985

Inovonics, Inc.

1305 Fair Ave., Santa Cruz, CA 95060 USA
TEL: (408) 458-0552 • FAX: (408) 458-0554

www.inovon.com



The Era of Digital Processors

► PROCESSORS, continued from page 51 in real-time for radio stations broadcasting on the Internet, which, according to the company, delivers "absolutely no digital grunge" with the help of "unique" DSP algorithms.

Additionally, Orban offers the Optimod-DAB 6200 for webcasting, as well as digital radio broadcasting.

The 6200 offers multiband processing for audio enhancement and a clean, consistent sound for broadcasting over the Web.

For DAB, automatic gain control, compression and peak modulation control combined with the multiband processing make the 6200 a product to watch as DAB progresses. According to the company, the 6200 will work for Eureka-147 and proposed IBOC digital systems.

Cutting Edge also offers something for the DAB market: Omnia.dab. Countries with DAB systems in use will find this product available.

Fulfillment of needs

Omnia.dab is built on the same hardware platform as the Omnia.fm. The stereo generator (encoder) and pre-emphasis sections are left off this unit. Otherwise, a wideband AGC, thunder bass boost, warmth control, multiband AGC/Limiter section and a non-aliasing, distortion-controlled final limiter

are all included.

What are users looking for in an on-air processor?

Different stations, different needs. Consider the choices made by Frank Jankowics, chief engineer for Buckley Broadcasting in Connecticut.

"I chose the Aphex 2020 for WDRC-FM (Hartford) because I was unhappy with the sound of another

early '70s. The recording and mastering techniques employed over that time span are quite different.

For his AM stations, Jankowics chose the Orban 9200 digital AM processor. "I like the sound of it a lot. We use the 9200 at WMMW(AM) and WDRC(AM)," he said. Those stations are in Meriden and Hartford, respectively.

"It is flexible in its sound and the

"The Omnia allows you to sound different even if your competition is also using an Omnia due to the wide selection of user adjustable parameters and plug-ins"

popular processor," said Jankowics. "The other processor had digital grunge, especially noticeable on high-energy songs.

"I knew what the rest of the market had for processing," he said. "I wanted to sound different, not necessarily louder. I'm now competitively loud and have achieved the sound I desired."

Jankowics faces a challenge with FM processing, as he works with an oldies format spanning the late '50s through

ability to remote control it from a real-world listening environment is a definite plus."

The loudness-vs.-quality debate will no doubt continue for some time.

The choice of which parameters to allow the user to adjust is also an item of some debate. Too much user control can permit an inexperienced person to develop an inconsistent, distorted sound. Too little control can detract from the sales base if a user wants total control.

MARKET PLACE

Audio Snake Cables

Belden Wire & Cable is offering two new series of Brilliance audio snake cables: 1408R and 1509C. Both series of riser-rated cables meet the performance requirements of UL 1666.

The CMR-rated 1408R series serves as a replacement for the company's CM-rated 1408 "B" series cable and offers a higher NEC CMR rating. The CM-rated 1509C cable replaces the company's previously un-rated, high-flex 1509 "B" series cable.

These new Brilliance Snake cables are useful for the connection of multiple audio channels in low-level

(microphone) and high-level (line) component systems. The cables can be used with punch-down connectors. Typical applications include console board equipment for recording studios, radio and television stations, post-production facilities and sound system installations.

Series 1408R cables are applicable for installations where the audio is run from floor to floor or through vertical shafts. The cables feature 4, 6, 8, 12, 16, 20, 24, 26 or 32 pairs of 7 x 32 stranded 24 AWG bare copper conductors with polyolefin insulation. Pairs are individually shielded and jacketed.

Series 1509C cables have specially formulated Belden compound that provides the flame-resistance necessary to

meet NEC CM requirements, yet they display much flexibility. They can be used for CM-rated installations or as flexible, mobile snakes.

For more information contact Belden Wire & Cable in Illinois at (765) 983-5200 or circle Reader Service 73.



IDT Plans Digital Virtual Processor

French company IDT has sold more than 5,300 Sound Design and Sound Style processors, mostly in Europe. Later this year, the company plans to roll out a new FM processor, and hopes to introduce it to the U.S. market as well.

At the recent NAB99 and AES Munich conventions, IDT showed prototype versions of its Digital Virtual Processor, a 96 kHz/24 bit device. The DVP will use one-point FFT processing rather than a multiband approach. The company argues that this reduces the number of filters required, and allows a more nat-



ural sound if desired by the user.

A sophisticated LCD screen displays all major functions. Control is via Windows 95/98/NT software.

The DVP will offer an architecture open to "plug ins," to accept products developed by others, such as stereo boost or RDS devices.

The company also plans to develop AM and DAB versions later.

For information, contact IDT in France at +33 472 181920, send e-mail to reynes@idt-fr.com or circle Reader Service 211.

MicroCon Systems

The Kamikaze! FM processor from MicroCon Systems provides a dominant sound by increasing peak-to-average ratio as well as "fattening" a station's audio with the addition of correlated low-frequency, even-order harmonics. According to the company, this effect adds dimension, power and 3-D quality to audio.

Kamikaze! is considered a "wrap-around" processor, as it wraps around the compressor/limiter of the user's choice. The unit provides low-pass filtering, pre-emphasis, intensity processing, high-frequency control, stereo coding and composite processing.

There are two fundamental modes of operation for Kamikaze!, defined by how high frequencies are handled.

The preferred mode is to insert a compressor/limiter into the control

chain of the unit. In this mode, Kamikaze! applies low-pass filtering and pre-emphasis before sending the audio to the external compressor/limiter.

After dynamics processing, Kamikaze! takes over and the Vari-Clip circuit substantially increases intensity. After stereo coding, a second Vari-Clip circuit serves as a clean composite processor. Up to 4 dB of composite loudness processing is provided without ruining the baseband.

The other mode allows the user to feed the compressor/limiter directly into Kamikaze!, allowing the Vari-Clip circuit to control high frequencies. The result is a brighter but harder sound, useful for high-intensity formats.

For more information contact MicroCon Systems at (440) 546-0967 or circle Reader Service 131.

You
Read
It
Here



Five Years Ago

Radio has lost one of its longtime AM engineers. John H. Mullaney, 73, who formed Multronics in the 1950s and introduced the industry to the folded AM unipole system, died May 18. ...

Multronics was a cutting edge electronics company that made military antenna systems, geiger counters, wind recorders, submarine emergency buoys and burglar alarms. Mullaney also supervised design and construction of the U.S. military's first high-power AM, FM, TV and LF transmitting airplane, which was used during the Vietnam War.

Another accomplishment was construction supervision of the world's biggest satellite tracking station at Lake Kickapoo, Texas.

Mullaney (subsequently) formed Mullaney Engineering along with his son John.

News Item
June 29, 1994

Ten Years Ago

Fears of a modulation war on FM is high on the minds of radio engineers here (in Los Angeles) now that Westwood One and Scott Shannon are on the air with the highly processed "Pirate Radio" at KQLZ-FM.

Several competing chief engineers said that with stations already at peak modulation levels, the potential exists for a station to push the legal limit to try to gain an advantage in the extremely lucrative advertising market.

"Loudness Wars Infiltrate L.A."
May 10, 1989

The Well-Designed Optimod

► OPTIMOD, continued from page 52

it is needless to point out its significance. Every time I have put new processing gear on the air, someone, unaware of the equipment change, has quizzically asked, "What is wrong with the sound?"

Usually a jock will notice first because jocks get very used to their own voices in their headphones. The Optimod 8200 caused no comments at all.

Curious, I asked a few people and the responses were, "It's great," "Best on the dial," "Crisp," and "Now that you mention it, I did think we sound cleaner or something."

This speaks volumes for the 8200 — that its benefits are subtle but important, and that with no lengthy adjustment and listening periods, you can get the sound you want.

No audio drop

The factory presets cover every format and are loaded by a point-and-click user interface. They can be modified easily and compared with previous settings. There's even a "Less-More" mode.

Another great benefit is that no audio drop occurs when switching preset (or user-stored) settings unless you go between five- and two-band mode, which is not a likely occurrence for most people. You can even automate day-parted processing changes.

The PC software may be the coolest part of the whole thing. It allows you to go to a familiar environment where your ears aren't assaulted by transmitter blowers and air conditioners and make adjustments to the sound.

I ran a phone cord to my truck, sat in my garage and did some fine-tuning with my laptop. I listen to the stereo in my truck more than any other and can more accurately discern what I'm hearing.



The Optimod-FM 8200 at Work

It is also useful to listen on as many systems as possible to judge the overall performance of your sound. Bright, alive and clean are the most important qualities to me. It doesn't take long to add loudness and bottom to that. Grunge is

nowhere to be found.

The 8200 is well thought out. It gives you all of what you want without any pre-processing. It doesn't boot up like some other units I've tried, so it comes right back after a power fail-

ure. I tried one that would lock up during reboots; scary!

A not-so-obvious benefit is a fast DSP so talent can continue to monitor off air. Two composite outputs and one SCA input make interconnecting RBDS simple.

My only complaints are that the menu scrolling could go faster, especially when you are scrolling through the many presets, and that an L-R meter would be useful for setting channel input balance.

The Orban Optimod 8200, in my opinion, is the best there is. That ensures that the Optimod name will continue to be synonymous with on-air audio processing. I now have two.

For more information, contact Orban in California at (510) 351-3500; fax (510) 351-0500 or circle Reader Service 61.

An early interest in audio and music led Mike Kernen to enroll in the nationally acclaimed Specs Howard School of Broadcast Arts in Southfield, Mich. He joined WRIF(FM) in 1988 and is chief engineer for WCSX(FM), WRIF and WXDG(FM).

Rich Analog Sound

► APHEX, continued from page 52

there. One of the most astounding things about the unit is that it can be adjusted by 0.1dB steps. It is a testament to the clarity of the unit that changes that small are audible. Having that resolution on the controls gives us the ability to dial in exactly the way we want our radio station to sound.

The sound is a rich, warm, full analog sound. We have all the loudness we want and still sound open and dynamic. One of the adjustments I made was pulling out of the final clipper a little bit. This allowed the bass to open up even more while remaining solid. The high end is clear without any of the

annoying artifacts of the digital processors. We are still making tweaks — only minor ones once a week or so — but, so far, no complaints.

Stronger signal

I have driven from Atlanta to Cincinnati and back to Atlanta several times. I noted that with the old processors, the station's signal had a reach of 65 to 80 miles for a quieted FM signal.

After the installation of the 2020, that reach increased to 85 to 100 miles. I can pull the station in clean all the way from Dalton, Ga. Amazingly, I was able to hear my station while I was still

west of Knoxville, over 150 miles away! There has been a certain amount of skepticism about how far the transmission reaches, but after experiencing it, I am a believer.

Life as a chief engineer in a major market radio station is not easy. Having a program director who does not believe in compromise when it comes to the quality can be tough. Times are rare that programming and engineering can both embrace a product that can have such an impact on our radio station. The Aphex 2020 is the synergistic tool we have been waiting for.

For more information, contact Aphex Systems in California at (818) 767-2929, e-mail to sales@aphexsys.com or circle Reader Service 135.

Products & Services Showcase

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

NEW! World's Most Advanced CD Duplicator



- Industry's First System with Pro Audio Compare Mode
- 7-Drive / 200 CD Capacity
- Networkable to 28 CD-R Drives
- Simple Unattended Operation
- Analog/Digital Audio Import Options
- ONE-BUTTON Operation
- Copies All Current CD Formats

CD-3707
AUTOMATED
Spindle Based CD-R Copier

Mitsui Silver as Low as \$1.35

MITSUI
CORPORATION

GLOBAL DATA INC. SINGLE SOURCE SOLUTION FOR ALL YOUR CD/DVD NEEDS

CALL 414-797-9772
FOR ADDITIONAL DUPLICATORS AND CD ROM PRINTERS

READER SERVICE NO. 88

REMEMBER THE **CORTANA** FOLDED **UNIPOLE ANTENNA?** WE STILL MAKE IT WITH THE SAME HIGH QUALITY MATERIALS AND WORKMANSHIP. IT FEATURES...

- BROAD BANDWIDTH for better sound,
- GROUNDED ANTENNA for lightning & static electricity,
- ELIMINATES ISOCOUPERS in VHF & UHF antenna lines,
- BEST ANTENNA FOR DIRECTIONAL ARRAYS.

Also
DETUNING SYSTEMS FOR ANYTHING THAT DISTORTS YOUR AM COVERAGE PATTERN: TOWERS, POWER LINES, TANKS OR ANY METAL STRUCTURE.

FOR INFORMATION CALL, FAX OR WRITE:

nott ltd.

4001 La Plata Hwy
Farmington, NM 87401

phone 505-327-5646 fax 505-325-1142

READER SERVICE NO. 98



Econco
REBUILT POWER TUBES



Approximately One Half
the Cost of New

3,000 Hour Unconditional Guarantee

Call for Our Price List

Econco 1318 Commerce Ave. Woodland, CA 95695
Phone: 530-662-7553 Fax: 530-666-7760 Telex: 176756
Toll Free: 800-532-6626 From Canada: 800-848-8841

READER SERVICE NO. 119

TECH UPDATES

Inovonics

The WebCaster from **Inovonics** is an on-air audio processor for broadcasting radio programs in real time over the Net.

The unit allows pre-processing of the audio signal prior to encoding for



improvement of quality at the receiving end. Features include automatic gain-riding, dynamic range control in three discrete frequency bands, flexible frequency response equalization and aggressive bandwidth protection filtering.

Two processing variables are possible: Program Density and Peak Processing.

Program Density controls "blending" within the tri-band dynamic range

compression section as well as the compression release characteristic. Eight incremental settings range from a slow, blended (single-band) function to fast and independent three-band operation.

Peak Processing programs the action and interrelation of the program

peak limiter and clipper circuits in eight MIN to MAX increments.

An RS-232 serial data port (DB9 connector) allows all processing presets to be programmed by an IBM-compatible computer either directly or with a modem.

For more information contact **Inovonics in California** at (831) 458-0552 fax (831) 458-0554 or circle **Reader Service 81**.

Circuit Research Labs

The DP-100 digital FM on-air processor from **Circuit Research Labs** uses advanced digital compression algorithms and FIR linear filtering (Finite Impulse Response) to provide a natural sound with heightened loudness.

The DP-100 is based on a 32-bit floating point DSP processor. The



unit's digital architecture with fast parallel processing capability means data can be processed much faster than with "one processor at a time" architectures. The DP-100 boasts a fifth order 18-bit A/D converter with a dynamic range of 107 dB A-weighted (20-bit, 110 dB optional).

The DP-100 includes a true digital stereo multiplex generator, AGC, five-

band compressor and three-band limiter. Also included is the company's stereo sound enhancement and improved digital version of its patented Dynafex noise reduction system.

The unit's touch screen graphical user interface (GUI) operation lets the user touch the screen and it instantly goes to the desired functions folder for fine tuning. The DP-100 offers a fast basic menu or a comprehensive advanced menu. It also has a configurable security system. Eight different passwords can be customized based upon a user's needs.

Release 2.0 of the DP-100 software is now available. This release contains enhancements to the AGC, five-band compressor/limiter and supports remote-control operation. Release 1.0 of the remote-control software for the DP-100 is now available, allowing the user to control the DP-100 either directly or through a modem RS-232 link.

For more information contact **Circuit Research Labs in Arizona** at (602) 438-0888, fax (602) 438-8227 or circle **Reader Service 96**.

Tiessecci

The Digimod 8300 from **Tiessecci** combines the power of digital audio



processing technology with the versatility of the unit's simple control interface and factory presets.

The unit makes 24-bit calculations, taking care of all the decimals in each calculation. Digimod 8300 is built with 10 Motorola DSP56301 chips, one of

the most powerful DSPs on the market. Each has enough memory and power to manage high-resolution calculations to provide natural, consistently clear and loud audio.

The Digimod 8300 will provide punchy bass, open voices, clean high frequencies and no artifacts to your sound. It works well for news and talk formats as well as all styles of music. On-air telephone callers sound much clearer as well.

For more information contact **Tiessecci in Italy** at +39 332 288164, fax +39 332 831281, visit the Web site at www.tiessecci.it or circle **Reader Service 230**.

AEV

AEV offers the Mirage FM broadcast audio processor, a multiband unit that allows a station to create its own sound.

The Mirage FM allows for complete control of modulation. The unit divides the signal into three frequency bands and controls them separately, acting only on the band where the



parameters include Bass, Presence, Brilliance and Density. Adjustable AGC drive/release and adjustable gate threshold are included.

The adjustable functions allow the audio signal to be processed and immediately adapted to the requirements of the user. The company says Mirage FM can produce deep, powerful bass, brilliant mid-range and clean, sharp treble.

For more information contact **AEV in Italy** at + 39 51 950350, fax +39 51 950249, visit the Web site at www.aev.net or circle **Reader Service 196**.

Arrakis Studio Furniture systems are #1 with over 1,000 sold !

The Master Control Studio, shown right, is one of seven Arrakis studios in Sony's Manhattan network origination center for SW Networks.



Arrakis furniture is #1 ...

- Off the shelf -or- Custom
- Easy to design & assemble
- Very fast delivery !!!

call today to find out why Arrakis studio furniture is the choice of broadcasters worldwide...

from Moscow, to Tokyo, to Manhattan...



(303) 224-2248

or (970) 224-2248

1995 Arrakis Systems inc. 2619 Midpoint Drive, Fort Collins, CO. 80525

TECH UPDATES

Solid-State FM Transmitter

Broadcast Electronics offers the FM-10S, a solid-state 10 kW FM transmitter with redundant systems and soft-fail designs to keep stations on the air during a power failure. This product won a Radio World Cool Stuff Award at NAB99.



An optional standby IPA, exciter and PA power supply ensure operation at full power under nearly any conditions without a trip to the transmitter site.

Front-panel monitoring of all module parameters is possible.

Additionally, the FM-10S can save room at crowded transmitter sites with its small footprint. It is 15 percent larger than the company's size-conscious 5 kW solid-state model.

For more information, contact Broadcast Electronics in Illinois at (217) 224-9600, fax (217) 224-9607 or circle Reader Service 127.

Andrew Dehydrator

Andrew Corp. offers the XT4500 DryLine automatic dehydrator for pressurizing broadcast transmission line. It is specifically designed for large-volume sites.

According to the company, the XT4500 is the first membrane dehydrator to provide sufficient dry air for pressurizing up to 2,500 feet squared.

The unit automatically protects transmission equipment against the effects of water vapor. It eliminates the costly maintenance associated with nitrogen tanks. It forces pressurized air through a membrane drying cartridge, where moisture is sepa-

Don't Forget!

Readers Forum is now on the last inside page of RW.

rated from the airstream and vented to the outside. This results in an output with a dew point of -50 degrees Fahrenheit.

By use of a programmable controller and remote pressure sensing, the XT4500 dehydrator activates and deactivates the compressor only when needed, reducing wear, tear and the need for frequent maintenance.

The units are available in stand-alone versions and in a configuration for redundant operation.

For more information, contact Andrew Corp. in Illinois at (708) 349-3300, fax (708) 349-5222 or circle Reader Service 94.

Complete used broadcast equipment solutions.



When you call Harris used equipment department, you get the same great service that you've come to expect from the nation's leading supplier of broadcast equipment. Harris has the largest inventory of used equipment worldwide.

Each piece of used equipment is thoroughly inspected by Harris' knowledgeable, factory-trained service staff (who have a combined experience of over 30 years) to insure that it meets factory specifications. And, of course, all used equipment from Harris comes with a warranty to insure your complete satisfaction.

And with Harris' low prices, you can be sure to get the most value for your money. Whether you're buying, trading, or selling, call Harris for quality, selection, service and price.

next level solutions

1-800-300-0733

www.harris.com/communications

HARRIS
Communications

New Plug-Ins From Cutting Edge

Cutting Edge offers several versions of its Omnia on-air processors, including the Omnia.fm and Omnia.am.

Several new plug-ins are available for the Omnia.fm. The Hot, Veris and Space-Efx all boost the Omnia.fm sound in certain ways.

The Hot plug-in is useful for louder formats such as urban, dance, rap, CHR and rock, providing a louder yet clean on-air sound.

"From clean and loud and in-your-face, this plug-in will 'crank your station up to 11,'" said Frank Foti, president.

According to the company, the unique multiband architecture creates the illusion of five-band processing in a four-band system and combines complex limiter algorithms and specialized FM pre-emphasis control. The result is a rich sonic texture for loudness enthusiasts.

On the opposite spectrum, the Veris plug-in also provides a clean, loud sound, but does so for lighter formats such as classical and smooth jazz. It is designed to increase loudness while maintaining the natural tonal quality and dynamic range of these formats.

"There is added loudness without the aural penalties normally associated with aggressive processing," Foti said.

For ambience, the Space-Efx plug-

in adds dimension to program material that's missing stereo "width." Up-front vocals and heightened detail to instruments are two noticeable enhancements from the Space-Efx plug-in.

Its Sound Field Ratio algorithm allows the plug-in to vary its characteristics according to the programming. It dynamically calculates the ratio of stereo to mono for the ideal degree of stereo enhancement.

With the Omnia.am, broadcasters in AM radio are provided with loudness, clarity and punch that eludes the sound of most AM broadcasts. An all-digital signal processor, the Omnia.am overcomes AM's common sonic boundaries by using specialized processing algorithms. Signal coverage also is enhanced.

"Programming processed using Omnia.am will punch through the airwaves like never before, yet remain sonically clean," said Foti.

The Omnia.am includes a four-band limiter section plus NRSC low-pass filtering and selectable narrow-band filters for news/talk formats and international requirements. Mono or stereo processing abilities are combined with EQ adjustment for plate-modulated transmitters. Future processing plug-ins can be accepted.

For more information, contact Cutting Edge in Ohio at (216) 241-3343, fax (216) 241-4103 or circle Reader Service 106.

Radio World

Broadcast Equipment Exchange

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

ACOUSTICS

WANT TO SELL

AcousticsFirst™
Toll Free 888-765-2900
Full product line for sound control & noise elimination.
www.acousticsfirst.com

AMPLIFIERS

WANT TO SELL

Dynaco ST-70, 70 W stereo tube amp, excel cond, \$250. J Borden, 414-482-8954.

Heath WM-5 mono bloc amps(2) w/(2) preamps & Heath FM tuner, \$400/all; McIntosh MC-60 single mono unit, very nice cond, \$800/BO; Heath WM-5 single mono unit, nice cond, \$150. C Collins, 414-363-9205.

WANT TO BUY

WE 129 preamp, 25B console, paying \$1500 if nice, other models also wanted. 1-800-251-5454.

ANTENNAS/TOWERS/CABLES

WANT TO SELL

S.W.R. FM Antennas
Great Antenna Great Price!
HE HALL Electronics (804) 984-4255

Shively 6600 HP FM antenna, 1-3 yrs old, 6 bay, tuned to 104.5 w/heavy duty radomes, still on tower, avail after May 1st, 400'+ of 3" Cablewave transmission line, in excel cond, also still on tower, you remove & transport, tower crew avail to remove for additional charge, \$4000 for line & connectors, \$5000 for antenna. D Thomas, 719-549-3472.

Shively 68121 single bay antenna, \$350. J Evans, 207-942-3311.

Coax patch panel 3-1/8"-7 pole. Mike, 800-588-7411.

ERI FML-3E w/heaters & DC stub, vgc, tuned to 104.1, on ground in Central Wisconsin. C Gennaro, 906-932-2411.

Potomac Instrument 5 tower antenna monitor, digital read out, new, never used in original box, BO; ERI 2 bay FM antenna, 106.9, can be returned, new, never used, BO.

Rohn 100' SSV series self supporting tower N-1 through N-5, used 11 months, tower on ground, \$7000. Ms Sharp, 316-856-3794.

Scala CA5-150 EB 5 element yagi antennas (4), \$150 ea/BO. G Croniser, 315-376-6518.

Dielectric 3-1/8" coaxial relay, Mike, 800-588-7411.

WANT TO BUY

10-12 bay CP FM antenna at or near 104.9 MHz. B Campbell, 580-223-6797 or 580-221-1480.

AUDIO PRODUCTION

WANT TO SELL

CASSETTES • CARTS • REELS
J & I AUDIO/VIDEO
A wholesaler in the Radio and Television market. Now running SPECIALS on audio and video:
BASF CASSETTES-AMPEX R-Rs AUDIOPAK, FIDELIPAC & ITC CARTS DAT & THE NEW R-CD
For more information call Kris Elliot at 1-800-942-1711 or write to: J&I Audio/Video 20899 Kelvin Pl. Woodland Hills, CA 91367
Circle (233) On Reader Service Card

Fostex PD-2 full featured portable timecode DAT, Anton Bauer 4 bay charger, NP13 batteries, hard road case & manual, even w/expensive updates & mods, PD-4 & HHB DATs don't have all features standard on PD-2, factory maintained, beautiful cond cosmetically, electrically & mechanically, \$4500. T Hoffman, 503-788-8841.

KLH Burwen TNE 7000A transient noise eliminator (2), excel cond, \$125 ea; Maze R-1 reverb, rebuilt 1/99, gd cond, \$75. D Bailey, 214-343-0879.

Roland 6101 vintage pro 20 band EQ w/all freq switchable, mint cond studio unit, \$375/BO. J Thornton, 320-634-3213.

Sansui SE7 graphic EQ, RCA ins & outs, workhorse, \$100. P Paquin, 508-385-0805.

Wheatstone 1202A compressor/limiter, \$350; CRL SPP800 stereo processor, \$300. J Evans, 207-942-3311.

Antex SX9 digital audio adapter for DOS and Windows, like new cond, \$900. R Herrick, 909-584-5247.

Ramsa WZDE40-20 bit true stereo digital effects processor, w/2 graphic, parametric, notch EQs, compressors, speaker delays, spectrum analyzer, excel cond, \$2000/trade for older recording gear. M Hughes, 301-962-6823.

Sony PCM-501ES, 16 bit PCM digital audio processor, records digital audio up to 6 uninterrupted hrs on std VHS tape rcdr, w/manual, \$500. B Meuse, 650-969-2433.

Symetrix 538, complete recdg or bdct chnl, excel cond, \$300 +shpg or will trade for EV RE20 or RE27. M Schackow, 605-374-3424.

White 4000 28 band parametric EQ, \$200 +shpg. M Schackow, 605-374-3424.

ANTEX AUDIO CARDS, will not be undersold. A.S.C. (619) 523-1575.

WANT TO BUY

Orban Optimod 9000A audio processor; CBS Volumax. Joe 860-433-6046 days, 860-376-0134 evenings.

TEAC portable DAT machine; Cinema 4031-B EQ. T Coffman, 619-571-5031.

WE 753 or 757 speakers, single or pair, will pay \$1500-\$2000 ea. 1-800-251-5454.

AUTOMATION EQUIPMENT

WANT TO SELL

Smartcaster (4) satellite automation, dual mono, audition/play, 5 network switcher, clock software, 1 Gig+ hard drives, in service, \$2250/BO. E Dave, 218-732-3306.

Sentry Systems FS12C w/2 CD interfaces, 8 players ea & computer, gd cond. C Gennaro, 906-932-2411.

Prophet Systems Wizard Ver 5 w/file server, (2) audio servers, (2) work stations, real time editor, digital r-r, (3) sat boxes & one spare, currently on support & in use, \$10,500/BO. G Hornung, 308-381-1430.

Sono-Mag MSP-12 12 chnl stereo automation system, 12 yrs in service, manuals & some spare parts & chips, BO. D Weer, 904-284-1111.

ANTEX STUDIOCARDS AVPRO...\$400. Also call for pricing on ANTEX DIGITAL AUDIO CARDS. 626-859-0213.

BUSINESS OPPORTUNITIES

PRODUCE Host your own
Call Ken Sperber 212-760-1050 radio show
Generate hundreds of qualified leads
50,000 W NYC radio station

CART MACHINES

WANT TO SELL

BE 900-5302-010 triple deck mono player in great cond, \$300; also single deck player model 3000, BO. D Weer, 904-284-1111.

ITC 3D stereo PB, gd cond, needs top capstan bearing; ITC WP/SP Premium series cart players, mono, 3 cue tones; Audicord DL, mono R/P, 3 cue tones; Audicord A series, mono PB, fair cond. C Gennaro, 906-932-2411.

ITC 3D, 3 deck, very clean, not used in radio environment, light prod studio demo use, w/manuals, BO over \$650, we'll pay UPS. Keith, fax: 603-352-8461.

WANT TO BUY

BE DC-10/30 disc trak. G McLintock, 615-255-1300/1377.

BOOST YOUR SALES

Advertise in the Classified Section ~
You'll be impressed with the results!

HE HALL Electronics
706 Rose Hill Dr. Charlottesville Va. 22901
804-984-4255 (Voice) 804-984-3299 (Fax)

This Month's Special !!
BSI Broadcast Software International
Broadcast Automation Software
JUST \$999 List
Turnkey Systems Starting at \$2995
Call or visit our web site for your discount price
sales@halls.com www.halls.com tech@halls.com
Circle (232) On Reader Service Card

CD PLAYERS

WANT TO SELL

Pioneer PD TM III 18 disk players, vgc. C Gennaro, 906-932-2411.

COMPLETE FACILITIES

Picture Perfect
Your 1000 Complete
Equipment Dealer

* Experienced Professionals
* RF and Studio Packages
* Personal Service *
New Stations and Rebuilds

Your Project is Important to Us

Atlantic Media Broadcast
Call - Rick Johnson -

* Toll Free *
888-744-6635
email - rick@cstone.net

NEW OR USED COMPLETE PACKAGES
STUDIO/STL/TRANSMITTER/ANTENNA OR ANY COMBINATION OF ABOVE.
-LEASE OPTIONS-
-EMERGENCY RENTALS-
-REMOTE BROADCAST RENTALS-
SCMS, Inc. (800) 438-6040
"You Know We Know Radio"

CONSOLES

WANT TO SELL

EV/Tapco 5212, 12 bal in, 2 out, working, \$100 +shpg. P Paquin, 508-385-0805.

Mackie 1604 mixer board, 2 yrs old, new still in box, never used, \$700. J Smith, 336-751-0758.

Schematic & manual for UREI 1681 Serial 188 8 chnl stereo bdct console. G Morgan, 423-886-3438.

Tascam M-3500-24ST rcdg console, factory recond by Tascam, 260 point patch bay in 6.5' oak console w/full length 32 meter bridge, 24 input chnls & 8 stereo chnls, 56 input capability, \$5500. Bill, 616-271-5275.

Wheatstone SP5 multitrack prod console in fair to gd cond, \$4500. J Evans, 207-942-3311.

Ampex AM10, 6x2 mixer, excel cond, \$295; Altec 1599A 6 chnl mixer, \$295. J Price, 214-321-6576.

BE BE5S250, \$1100; BE BE8S250, \$1700, w/manuals, on air now, going digital, sell soon. G Huff, 606-877-1326.

BMX-14, slide fader, stereo & mono outputs, clock & clock timer, vgc, \$5000 +UPS. J Bahr, 787-728-0364.

Roland M160 16 ch line stereo mixer, rackmount, +4 balanced out, \$550; Shure M68, M68FC, M677, \$150 ea, or will trade all for mikes or compressors. M Highes, 301-962-6823.

Logitek 12 stereo mixer. Mike, 800-588-7411.

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

Ampex MX-10, 4x2 rack mixer for parts or better cond. M Schackow, 605-374-3424.

Superior Broadcast Products

FM Antennas All Power Levels

500 watts to 20 Kw. per Bay
Stainless Steel Construction
Tuned and Range Tested
Priced as low as 395.00 per Bay
FM STL Antennas as low as 195.00
Contact Jimmie Joynt Phone 972/473-2577
800/279-3326 Fax 972/473-2578 800/644-5958
17194 Preston Rd. Suite 123-297 Dallas, TX 75248

CONSOLES cont...

Ampex MX-35, working or not. J Borden, 414-482-8954.

DISCO-PRO SOUND EQUIP

WANT TO SELL

Numark DM-1750 rack mount DJ mixer, 4 chnls (switchable), 6 band EQ & more, mounted in tabletop slant rack, nice cond, \$100. D Smith, 978-297-4856.

LIMITERS

WANT TO SELL

Audio Logic MT-66 stereo limiter w/gate, excel cond, \$175; dbx 163 (pair) overeasy limiters, great cond, \$150/pr. D Bailey, 214-343-0879.

JBL/UREI M712 stereo comp limiter, \$350 +shpg. M Schackow, 605-374-3424.

UREI LA-4 & 523 graphic EQ w/rack mount kit, BO. J Borden, 414-482-8954.

WANT TO BUY

Gates SA-39B for parts; Gates Sta-Level M5167, to make a pair; UREI LA-3, one or pair. M Schackow, 605-374-3424.

UREI, dbx, Collins, RCA, Gates, Universal Audio. T Coffman, 619-571-5031.

Gates Sta-Level limiter for parts or complete; Gates SA39B peak limiter for parts or better; UREI LA4 or LA3 parts to make pair. M Schackow, 605-374-3424.

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 972-271-7625.

MICROPHONES

WANT TO SELL

Astatic 77, excel cond, \$250. M Schackow, 605-374-3424.

Beyer 101 omni (2), 1 gd 1 needs work, \$350/both; Radio Shack Gooseneck (3), balanced cardioid, \$15 ea +shpg. P Paquin, 508-385-0805.

Comtek hand held & wand type xmtrs (15) for use w/Comtek rcvrs, 72 MHz & 170 MHz range, \$100 ea. R Barwig, 773-283-2820.

Comtek MR-72 & MR-182, 3 circuit boards for MR-72 xmtrs & 3 circuit boards for MR-182 xmtrs, \$150 ea. R Barwig, 773-283-2820.

Comtek MR-72 wireless mike system w/lav mike, xmtr & AC rcvr, \$250; Comtek MR-182 wireless w/lav mike, xmtr & AC rcvr, \$450. R Barwig, 773-283-2820.

Comtek PR-72B (10) personal rcvrs w/27 extra crystals of various freq, \$50 ea. R Barwig, 773-283-2820.

Crown SASS-P stereo mic, perfect cond w/case & manual, \$425. T Hoffman, 503-788-8841.

Astatic 77, large diaphragm dynamic mic, \$250 +shpg. M Schackow, 605-374-3424.

Neumann U-47 long body, VF-14 tube, orig psu cables, \$5800; Telefunken M221B 934B or C capsules, orig psu cables, \$2200/pr; AKG C-24, \$5800; Neumann U-48 VF-14 tube, \$5300; AKG D-25 orig stand mount, \$450. F Danner, 781-294-1218.

RCA 77DX ribbon mic in TV gray, late mdl w/block letter style RCA logo, excel perf & appearance, \$1200. J Peterman, 414-277-7678.

Shure Prologue 10HLC (3), new, \$39 ea; Prologue 12HLC, new, \$59 ea. M Hughes, 301-962-6823.

Telex WT-50 & WT-200 xmtr & mic, \$125 ea; tuner, \$150; Sennheiser K3U-ME40 condenser cardioid, \$135; EV 636, \$65; EV 654, \$85. J Price, 214-321-6576.

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

RCA 4AA mic, box camera style, used in 1920's, will pay well for it. Drago, 203-230-5255 (w) or 203-272-6030 (h).

Ribbons, condensers, dynamics, tube 1950-1990. T Coffman, 619-571-5031.

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 972-271-7625.

RCA 77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

MISCELLANEOUS

WANT TO SELL

ENGINEERS-HAMS
CHECK OUT MY WEB SITE
USED EQUIPMENT OF ALL KINDS
www.spacestar.net/users/radiorey/
715-268-2233

Arrakis 8 chnl switch extender w/power supply, \$100. J Smith, 336-751-0758.

National HRO-7R rcvr w/coils 1.7-30.5 MHz, pwr supply & speaker, \$375. E Reilly, 206-282-6914.

Sage EAS Endec, like new, \$1500. J Evans, 207-942-3311.

Russlang tape deck mixer console, designed for Otari 5050 but perfect stand for Mackie mixer, excel cond, \$75; OC White mic arms (2), \$35 ea. D Bailey, 214-343-0879.

RF Warning Signs
9"x 12" \$13.95
10"x 19" \$19.95
THE HALL Electronics (804) 984-4255
CAUTION
NO TRANSMISSION

Gates Criterion mono PB cart decks (2), gd cond; Gates Criterion stereo record electr, gd cond; Broadcast Tools USC-16 sat chan controller, like new; (2) Henry Telestor, new in box. C Gennaro, 906-932-2411.

Meissner FM receptor, very old FM rcvr operating on 41 to 50 MHz, small unit w/nice wood case, w/original box & rider notes, \$150. C Collins, 414-363-9205.

Theremin, pitch increases as hand nears antenna, great effects, \$50. C Collins, 414-363-9205.

UTC transformers "ouncers", variety of P/S Byer TR/BV35508, \$25 ea. J Price, 214-321-6576.

World War II transcripts of Duke Ellington Orchestra on (2) 90 min cassette tapes; war bond ads; news of war progress, \$30. C Collins, 414-363-9205.

ROTRON BLOWERS AND PLATE BLOWERS, new & rebuilt for Ekorn, Harris, CCA, CSI, McMartin, Goodrich Ent. 11435 Manderson St. Omaha, NE 68164 402 493 1886 FAX 402 493 6821

RECEIVERS & TRANSCEIVERS

WANT TO SELL

SCA RECEIVERS—ALL TYPES

Will work to meet your receiver needs
Professional / Table / Portable
Field Strength Meters
RDS / NOAA Weather
Reading Service / Ethnic / Data

DAYTON INDUSTRIAL CORP.

2237 Industrial Boulevard
Sarasota, FL 34234-3119
Tel: 941-351-4454 FAX: 351-6081
www.scaradio.com

Comstream ABR-202 sat rcvr Ku band w/90 day warranty, new, \$1450. J Katonah, 800-657-2346.

Scientific Atlanta 9640 C-band audio/video receivers, \$200. J Smith, 336-751-0758.

RECORDERS

WANT TO SELL

DAT Machine Service
Digital Audio Tape
Fast, expert repairs on all DAT recorder brands & models including ADAT and DA-88 Warranty Service on Most Brands
Over 3000 Machines Serviced!
New/Refurbished DATs Available Compare Our Rates!
Pro Digital Inc.
DAT Recorder Service Specialists
(610) 353-2400

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 pre-amps, \$300-400; MX10 mixers, \$795. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Ampex 440C 4 trk 1/2" w/servo & w/narrow gap heads goes out to 15 kHz at 3-3/4, \$950; Ampex 440C 1/4 w/servo, \$1000; (2) King 780 cassette loaders, \$2750 ea; King 790 loader, \$4000; Ampex 440C 1/2" w/servo, \$1000. J Bishop, 601-841-1444.

Audi-Cord E21 mono R/P, uncrated but never used, clean storage, \$350/BO. D Strahan, 281-479-1614.

WANT TO BUY

Old product literature, catalogs or manuals. M Hughes, 301-962-6823.

Used audio tape; 2-way active crossover. J Borden, 414-482-8954.

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, N.Y.N.Y 10003. 212-674-3060.

WANT TO BUY TUBES (SPARES AND PULLS: OLDER AF INPUT, DRIVERS AND MODS), TUBE PRE-AMPS, TUBE AMPS, MICROPHONES. MK ENTERPRISES 800-330-2004.

MONITORS

WANT TO SELL

Used Mod Monitors, McMartin & Belar. Many to choose from, tuned & calibrated on your frequency, full guaranteed. Goodrich Ent. 402-493-1886.

STUDER REVOX PARTS/SERVICE

Cassette-CD-Open reel
Capstan refurbishing, ALL BRANDS.
JM TECHNICAL ARTS
1515 Elm Hill Pike #203
Nashville, TN 37210 (615) 365-9030

MCI JH110A 1/4" 2 trk reproducer in rollaround console, excel cond, \$300. D Bailey, 214-343-0879.

CONSULTANTS

EVANS ASSOCIATES Consulting Communications Engineers
FCC Applications, Design, Field Engineering & Tower Detuning
Video/Data/Voice • Statewide Networks • Wide-Area Networks
EXPERTS IN:
TV • AM • FM • ITFS • MICROWAVE • PCS • FIBER
210 S. Main St., Thiensville, WI 53092 (414) 242-6000 FAX (414) 242-6000
Internet: http://www.evansassoc.com Member A.

Consulting Communications Engineers EMC Test Lab
• FCC Applications and Field Engineering
• Frequency Searches and Coordination
• AM-FM-CATV-ITFS-LPTV
• EMC Test Lab-FCC and European (IEC)
OWL ENGINEERING, INC.
E-mail: info@owleng.com 1-800-797-1338 Fax (612) 785-4631
8899 Hastings St NE, Minneapolis, MN 55449 (612)785-4115 Member AFCEE

T. Z. Sawyer Technical Consultants AM-FM-TV-LPTV
• FCC Applications & Exhibits • Frequency Studies
• Experimental Authorizations • Class Upgrades
• AM Directional Antennas • STL Applications
• High Power Antenna Arrays • Station Inspections
1-301-913-9287
FAX: (301) 913-5799 • 5272 River Rd. #460 • Bethesda, MD 20816

PC - SOFTWARE
AM FM TV Search Programs
Signal Mapping—STL Paths
RFHAZ—US Census PopCount
FAA Tower—Draw Tower
Doug Vernier
Engineering Consultant
1600 Picturesque Drive
Cedar Falls IA 50613
800-743-DOUG

System One Communications
Broadcast Constructors & Consultants
Houston, Texas
888-625-5649
Complete Turnkey Construction
Antenna Line Testing
AM Directional Field Work
AM and FM Applications
Tower Services
Studio Designs
Custom Studio Furniture

E. HAROLD MUNN, JR. & ASSOCIATES, INC.
Broadcast Engineering Consultants
AM • FM • TV
THE BROADCAST ENGINEERING CONSULTANTS
Box 220, 100 Airport Rd.
Coldwater, MI 49036
517-278-7339

GRAHAM BROCK, INC.
BROADCAST TECHNICAL CONSULTANTS
Full Service From Allocation to Operation AM FM TV AUX Services.
Field Work, Antenna and Facilities Design
Over 35 years engineering and consulting experience
912-638-8028
202-393-5133
www.grahambrock.com

MULLANEY ENGINEERING, INC.
Consulting Engineers
• Design & Optimization of AM Directional Arrays
• Analysis for New Allocation, Site Relocation, and Upgrades
• AM-FM TV LPTV
• Wireless Cable (MDS/MMDS/ITFS/OFS)
• Environmental Radiation Analysis
• Field Work
• Expert Testimony
9049 Shady Grove Court
Gaithersburg, MD 20877
Phone: (301) 921-0115
Fax: (301) 590-9757
email: mullengr@aol.com

dataworld
Market Analysis
Engineering Software
Ethnic/Demographic Data
Custom Full-color Mapping
Sales Marketing Packages
www.dataworld.com
800-368-5754
info@dataworld.com
fax: 301-656-5341

EMECOM COMMUNICATIONS
Consulting Engineer
AM-FM-TV-LPTV
912-890-2506
912-985-0864 FAX
MOULTRIE, GA.
www.emecom.com

DON'T GAMBLE WITH YOUR ADVERTISING DOLLARS!
Advertise in Radio World and reach 18,000+ broadcast professionals.
Call Simone TODAY!
703-998-7600

RECORDERS cont....

LONG-LIFE HEADS
call
SEQUOIA ELECTRONICS
1-(408) 363-1848
FAX 1-(408) 363-0857
SEQUOIA@AOL.COM

Sony TC WE805S, 3 cassettes, dual well, dual record, like new cond, \$225 ea +shpg. P Paquin, 508-385-0805.

Ampex 351 r-r from mid 60's w/tubes, gd cond, \$1300/BO. C Ford, 972-448-3336.

AUDIO DECKS: Otari MTR10, mono 1/4" \$750; MTR10 2 trk 1/4" \$1000; MTR10-4 4 trk 1/2" \$3000; MTR12 4 trk 1/2" \$3000. **NEED REPAIR:** MTR-10 mono 1/4" \$500; (2) MX70 8 trk 1" w/remote \$2500; MTR10 2 trk 1/4" \$500. **CONSOLES w/automation (BO):** (2) Soundworkshop Series 34b 28 modules (32 input frame), Soundworkshop Series 30 22 modules (32 input frame). 212-586-3503.

Ampex 354-2 stereo tube rcdr in console, excel cond, \$1000; Ampex 351 transports, BO; Ampex 440 stereo in console w/Ampex 6 chnl mixer, excel cond, \$750; Ampex 440C in console servo motor 4 speed, excel cond, \$995; MCI JH110 stereo in console, excel cond, \$495; MCI JH110B stereo in console, \$750; MCI JH110B 4 trk 1/2" in console, \$1000; Otari MTR10-2 stereo in console, excel cond, \$1750; set of new Ampex 8 trk 1" heads, \$750; Ampex 16 trk 2" heads, new, \$350 ea; MCI electr stereo set, \$150; Otari CB-109 auto locator, new. J Price, 214-321-6576.

Ampex PR-10 tube r-r, 7.5 & 15 ips, BO. J Borden, 414-482-8954.

Crown Ampex SX 824, Ampex 960, booth gd cond, Ampex tube set, extra parts included, w/manuals, speeds 3.75-7.5 r-r, BO. MG Morris, 212-505-9187.

Pioneer RT-701 r-r, 3 motor, 3 head direct drive, perfect cond, mounted in open counter top style rack, \$300; TEAC W-500R dual cassette recorder, Dolby B NR, high speed dubbing & more, brand new in box, \$100. D Smith, 978-297-4856.

PR-99 play only (5), all w/tone encoder cards & manual, \$500 ea. D Weer, 904-284-1111.

Revox A77 stereo R/P w/rack mount, play head gd, rec head worn, working, fair cond. C Gennaro, 906-932-2411.

Tascam 32 2 trk r-r, 1/4", 1.5 ips, great cond, just tested, tweaked & calibrated, \$750. M Hughes, 301-962-6823.

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.

WANT TO BUY

Ampex 351-354 electr & (2) Ampex MR70 electr & stereo heads, 4 trk erase head. J Price, 214-321-6576.

Marantz PMD 221/222, dead or alive. L Houck, 830-537-5494.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Ampex PR10 tape recorders. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

REMOTE & MICROWAVE

WANT TO SELL

MORE EQUIPMENT **RENTAL EQUIPMENT**
COMREX Vector, Hotline, ISDN codecs
TELOS Zephyr, Zephyr Express, digital hybrids
MUSICAM Prima 120 and 230
Silver Lake Audio Remote Audio Packages
516 763-1776 Mixers
fax 516 763-1750 Microphones
internet: silverlakeaudio.com
MORE EXPERIENCE

Marti R-10, STL10, STL transmit & receive, STL mono, gd cond, \$1600; Gentner VRC-2000 command relay & remote, \$900; Marti AR-10, RPT-15, chnl 161.640 & 161.670, \$1800. J Smith, 336-751-0758.

Micro Controls STL xmtr/rcvr, gd for back-up, not type approved, need some work, \$500. J Evans, 207-942-3311.

WE RENT
TELOS ZEPHYR
CCS "Prima" Codecs
COMREX
Frank Grossstein Audio/Video Consultants
3-line extender
610-642-0978

Moseley PCL 505 STL rcvr, \$350. J Evans, 207-942-3311.

Moseley PCL 6010 TX/6020 RX, both work fine, out of service, \$5000; Moseley DSP 6000E 2 chnl encoder, works fine, not in service, \$1900. T Nelson, 507-696-8618.

Comrex 2XP 2-line encoder, \$650. Tom, 1-800-860-9771.

Telos-Zephyr mono TX ISDN, \$4000. H Stohl, 412-854-5492.

WE RENT FOR LESS
Hotlines FM Exciters
Zephyrs STL's
Nexus FM Pwr Amps
Audio Test Equipment
If we don't have it, we will get it!
SCMS, INC. (800) 438-6040
"You Know We Know Radio"

Vodavi Starplus, 1428 digital telephone system, configured to 8 line ports & 126 station ports, max expansion 14x28, 2 digital LCD speaker telephones & 9 digital enhanced speaker telephones, \$3900; ITT 801 telephone system, older but works, \$500. Ms Sharp, 316-856-3794.

SATELLITE EQUIPMENT

WANT TO SELL

Channel Master 6218 1.8 meter Ku band sat dish AZ/EL, new, \$325; Ku PLL sat dish LNB, new, \$405. J Katonah, 800-657-2346.

Prodelin 3.7 meter, 41 dB gain, polar mount, \$400 ea. J Smith, 336-751-0758.

Wegener 1806-03 single chnl receiver, BO; Wegener 1600 Series-50, modules 1624, 1622, 1645, 1646, 1608-21, 1684, 1646, 1683-08, 1605-12, gd cond, BO. E Dave, 218-732-3306.

Zephyrus 304 sat rcvr (2), mint cond, BO; Wegener DR-185 in excel cond, \$1500/BO. E Dave, 218-732-3306.

Scientific Atlanta AD 4595 Sedat, excel cond, ready to go, \$3700. R Herrick, 909-584-5245.

SOFTWARE/ DATABASES

WANT TO SELL

RadioSoft
RF Mapping Software
109 W Knapp Ave.
Edgewater, FL 32141
888-723-4695
www.radiosoft.com

INEXPENSIVE PC SOFTWARE
for Radio Broadcasters
Traffic, Billing, Accounting & Music Scheduling
(941) 643-3689
www.aba-software.com
email: demo@aba-software.com

STATIONS

WANT TO SELL

Two FM's up & running, Central Minnesota. S Nestor, 320-634-5358.

WANT TO BUY

AM or FM station in New England area, non comm or comm, no station to small, will consider partnership. M Cardillo, 401-942-8341.

Network looking for stations! dark, brokered, AM & FM, fax details to programming: 954-735-0370.

STEREO GENERATORS

WANT TO SELL

Wilkinson S6-E-1 stereo generator, \$400 +shpg. J Bahr, 787-728-0364.

Complete used broadcast equipment solutions.



Tackle all your used broadcast equipment problems with the Harris Used Equipment Department. We buy, sell, and trade quality used equipment.

Call or visit the website at
www.broadcast.harris.com/used-eq

next level solutions

HARRIS Communications

1-800-300-0733
www.harris.com/communications

TAPES/CARTS/ REELS/CD'S

WANT TO SELL

3M, Maxell, Ampex, metal reels, also some plastic 10.5", all in so so boxes, \$60/all (15) +shpg. P Paquin, 508-385-0805.

Wall mount cart racks (4), new in box, each holds 20 carts, \$25/all. D Smith, 978-297-4856.

TELEPHONE EQUIPMENT

WE BUY AND SELL BUSINESS TELEPHONE EQUIPMENT. DOMINION TELECOM. 800-998-3281.

TEST EQUIPMENT

WANT TO SELL

Racal Dana 9303 power meter, 0-2 GHz, new in original box, \$475. N Macrae, 702-386-2844.

Crown IMA dist analyzer w/extra rcdr bias patch panel meters; Tektronix digital multimeter DM150A & DM502A, \$150 ea; Eico 150 solid state signal tracer, \$100; HP 353A 100 dB attenuator, \$65; Hickok tube tester 1575, \$200; BK Precision Dyna-Jet 707, \$200. J Price, 214-321-6576.

Delta TCA 40 EXRHV w/pick-up coil TCT1HV, 5-2 MHz 40 A, perf cond in original fitted foam carton, \$1300. G Garus (pager 661-321-7682).

Racal Dana 9303 power meter, 0-2 GHz, new in original box, \$475. N Macrae, 702-386-2844.

WANT TO BUY

Bird watt meter. Call John or Tim, 717-948-9136.

TUBES

WANT TO SELL

FOR THE BEST PRICE & 24 Hr service on transmitting tubes & sockets/parts, new & rebuilt call Goodrich Ent. at 402-493-1886 day or night, FAX 402-493-6821.

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

CORNELL-DUBILIER MICA CAPACITORS
FROM STOCK

JENNINGS VACUUM CAPACITORS
FROM STOCK

JENNINGS VACUUM RELAYS

SURCOM ASSOCIATES
2215 Faraday Ave., Suite A
Carlsbad, California 92008
(760) 438-4420 Fax: (760) 438-4759
e-mail: link@surcom.com web: www.surcom.com

...country, top 40, news, urban, talk, jazz, the classics, mixed bag...

RADIO! The beat goes on!

CROUSE-KIMZEY OF ANNAPOLIS
tops in broadcast equipment
1-800-955-6800
ask for Kathleen
kkannapolis@worldnet.att.net

SATELLITE EQUIPMENT

WANT TO SELL

Channel Master 6218 1.8 meter Ku band sat dish AZ/EL, new, \$325; Ku PLL sat dish LNB, new, \$405. J Katonah, 800-657-2346.

Prodelin 3.7 meter, 41 dB gain, polar mount, \$400 ea. J Smith, 336-751-0758.

Portable Audio Generator

The RX-11 ToneJack is a battery operated, hand-held portable audio generator.



FEATURES include:

- 1 Hz - 29,999 Hz (1 Hz steps)
- Sine and Square wave outputs
- RS-232 controllable
- Store and recall 10 user frequencies
- Log sweep from 50 Hz to 20 kHz
- Tone burst (1 mS to 29.999 seconds)

SLP \$229.00

FOR MORE INFORMATION
800-645-1061

CONEX ELECTRO SYSTEMS
1100 Carolina Street, Bethlehem, PA 18020
212-764-2222 FAX 212-764-4222
www.conex-electro.com

Quality Power Tubes

3CX10.000H3	4CPX800A	5CX1500B	SV572-3
3CX15.000A3	4CX1500A	572B	SV572-10
3CX15.000A7	4CX1600B	6550C (See SV6550C)	SV572-30
3CX15.000H3	4CX3500A	6A57G	SV572-160
3CX20.000A7	4CX5000A	6BM8	SV6550C
3CW20.000A1	4CX5000R	6D22S	SV6L6GC
3CW20.000A7	4CX7500A	6L6GC (See SV6L6GC)	SV811-3
3CW20.000H3	4CX10.000D	6N1P	SV811-3A
3CW20.000H7	4CX12.000A	811A	SV811-10
3CW30.000H3	4CX15.000A	812A	SV811-10A
4CX250B	4CX15.000J	833A	TH5-4
4CX250BC	4CX20.000A	8161R	TH5-6
4CX250BT	4CX20.000B	8560AS	TH6-3
4CX250R	4CX20.000C	EL86	TH6-3A
4CX350A	4CW10.000A	EL34	YC130/9019
4CX350AC	4CPW10.000R	EL509	SK300A
4CX400A	4X150A	SV83	SK1300
4CX800A	5CX1500A	SV300B	SK1320

Watch this list GROW!

- Manufactured in Russia's largest power tube factory •
- Generous warranty based on high quality • Honest prices based on quality at low cost • Check our Stocking Distributors for best price and delivery

www.svetlana.com

Headquarters: 256-882-1344 Fax: 256-880-8077 • Engineering: 650-233-0429 Fax: 650-233-0439

TUBES cont....

D & C Electronics Co.

NEW TUBES

We have the alternatives for all your needs, at the lowest prices, direct from our stock!!!

Svetlana

EIMAC, SVETLANA, PRO-TEK®, EEV and many others.
(352) 688-2374
PH: (800) 881-2374
FAX: (352) 683-9595

SE HABLE ESPAÑOL
WE EXPORT

VISA / MASTERCARD ACCEPTED

ECONCO

Quality Rebuilt Tubes

Approximately 1/2 the Cost of New

Coll for Our Price List

800-532-6626
530-662-7553

FAX 530-666-7760

Circle (230) On Reader Service Card

AMPEREX, EIMAC, RCA, SVETLANA 3CX400A7/8877, 3CX3000A7, 3-500ZG, 4CX250B, 4-400, 4CX400A, 807, 833C, ETC. Westgate 800-213-4563.

TUBES, Eimac, Svetlana, 800-430-6683, ams@hard-to-find.net Fax: 905-844-6263 www.hard-to-find.net

POWER EIMAC YOU CAN TRUST

ISO 9001 Certified

The Reliable Manufacturer for

NEW POWER TUBES

Triodes
Tetrodes
Pentodes

NEW SOCKETS & REPLACEMENT PARTS TUBE REBUILDING

Worldwide Availability

Made in U.S.A.

CALL 800-414-8823
Int'l (415) 592-1221
Fax (415) 592-9988

Visit our Web Site at <http://www.eimac.com>

Circle (229) On Reader Service Card

TURNTABLES

WANT TO SELL

Rek-O-Kut Ronoine Jr (2), 33/45 rps TT's, \$100 ea +shpg. P Paquin, 508-385-0805.

Dual 1228 33 & 45 rpm w/pitch control, \$50. C Collins, 414-363-9205.

Technics SL 1500-MK2, complete & ready to use, digital readout model, nice cond, \$250. D Smith, 978-297-4856.

WANT TO BUY

Technics SL-1200 MKII, used in gd cond, BO. J Burdick, 414-308-4333.

TURNTABLES, LIMITERS, RECORD CUTTING MACHINES. 612-869-4963.

Advertise in

Radio World

For Details Call (703) 998-7600

TODAY!

TRANSMITTERS

WANT TO SELL

OFF THE AIR? EMERGENCY BACK-UP RENTALS

FM Exciters - STLs -
FM Pwr Amps - Antennas -
Studio & Test Equipment

SCMS Inc (800) 438-6040
"YOU KNOW WE KNOW RADIO"

Energy-Onix Legend 1000W w/freq adjustable exciter (30W), out of service, excel cond, \$3900/BO. A Stamat, 732-845-9362.

Gates BC-1G 1 kW AM w/spares on 1360 kHz, removed from service 2/99, crated for shipment, in Virginia, excel cond, \$1500; Gates FM-1B 1 kW xmtrs, gd cond w/mono solid state exciter, in Oklahoma, \$2000. J Cunningham, 580-265-4496.

Harris Quest 1,000 2 yr old, 1 kW solid state FM on 103.9, excel cond, \$8500. Al, 831-373-2250.

USED: FM/AM Transmitters, RPU's, STL's, FM Antennas, Consoles, Processing, etc.

CONTINENTAL COMMUNICATIONS

3300 Chippewa, St. Louis MO 63118
1-800-664-4497
FAX 1-800-700-9427
contcomm@fiastl.net

Nautel AMPFET MD-1, 3 yrs old, 1 kW AM on 1570 kHz in perfect cond, avail now. R Miller, 808-572-5534.

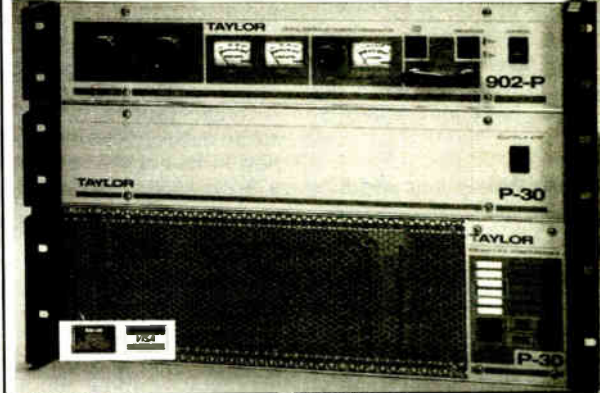
Bext Lex 25 FM exciter 88-108 MHz 2.5 W max, like new, \$1000. R Herick, 909-584-5245.

CCA 1000-D 2 kW FM xmtr; Harris 2.5K, 2.5 kW, no exciter, needs work, \$3000 +shpg; RCA AM 50 kW Ampliphase, \$20,000. J Bahr, 787-728-0364.

CSI FM 3000E single phase xmtr upgraded to 5,000 kW in 1993, \$7500; BE FX-50 exciter, \$1500. Ms Sharp, 316-856-3794.

Harris FM-1G 994 648300, 1 kW xmtr, runs well, may need some work, \$1000/BO. D Curley, 1-800-660-9298.

TRANSMITTERS



FM RADIO Including Stereo Encoder

1Watt	\$1,138
30Watt	\$1,499
300Watt	\$3,174
600Watt	\$5,960
1KWatt	\$8,716
2KWatt	\$11,900
4KWatt	\$20,741

Taylor Bros. (O.M) Ltd
Orlando FL
Freephone (1) 877 329 2669
Freefax (1) 877 329 2670
Fax Int. 407 363 1922
European Sales office Oldham England
(44)161 652 3221

TV NTSC PAL, OR SECAM

1Watt	\$1,114
2Watt	\$1,664
4 Watt	\$2,138
20 Watt	\$3,880
40 Watt	\$5,046
100 Watt	\$6,206
200 Watt	\$9,874
400 Watt	\$13,171
800Watt	\$18,295
1KWatt	\$22,900
2KWatt	\$22,900

TAYLOR
Now in the USA

DB Electronics KA-1500/PM300, 1.5 kW, single tube w/solid state 300 W stereo exciter, on air 14 mos only, w/manuals, tune to any freq, \$4000/BO. D Weer, 904-284-1111.

Jones/Tepco J-316 M, rated for 10 W output, currently on 94.7 FM & output is 95.9 FM, \$2000/BO. G Croniser, 315-376-6518.

Harris 1983 MW-50-C 50kW AM, daytime use only, excel cond & ready immed, \$30,000. J Weitzman, 202-683-3536.

RCA BTA-50H2, 50 kW AM, complete but will sell all or parts. all offers entertained, will sell for scrap at end 6/99. R Meyers, 305-264-5963 or email: jrmeyers@bellsouth.net.

REBUILT TRANSMITTERS

Call **ARMSTRONG TRANSMITTERS**
Ph: 315-673-1269
Fax: 315-673-9972

Harris FM-25-K xmtr. Mike, 800-588-7411.

WANT TO BUY

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

SERVICES

SIMPLE CONNECTION

Prewired Racks & Console Harnesses

Connect to the Turnkey Distributor...

BROADCAST RICHMOND

E-mail broadcast@infocom.com
Tel 765-966-6468 Fax 765-966-5505
www.broadcast-richmond.com

TRANSCOM CORP.

Serving the Broadcast Industry Since 1978

Fine Used AM & FM Transmitters and Also New Equipment

For the best deals on Celwave products, Andrew cable and Shively antennas.

100 W FM 1985 Harris FM100K	1 KW AM 1979 Harris MW1A
2.5 KW FM 1974 Harris FM 2.5H3	
2.5 KW FM 1984 Continental 814R1	
2.5 KW FM 1976 Collins 831D	
3 KW FM 1975 CSI FM3000E	
3.5 KW FM 1986 Harris 3.5K	
5 KW FM 1988 Harris FM 5K1	
5 KW FM 1983 Harris FM 5K	
5 KW FM 1980 Harris FM 5K	
5 KW FM 1982 Continental 816R1	
5 KW FM 1967 Collins 830E	
10 KW FM 1967 Collins 830F1	
10 KW FM 1962 RCA BTF 10D	
25 KW FM 1981 Harris FM 25K	
25 KW FM 1981 Harris FM 25K	
5 KW AM 1982 Harris MW5A	
5 KW AM 1980 CSI T-5-A	
50 KW AM 1978 Continental 317C-1	
50 KW AM 1982 Harris MW-50B	
50 KW AM 1981 Harris MW-50B	

2655 Philmont Ave #200, Huntingdon Valley, PA 19006
800-441-8454 • 215-938-7304 • FAX No. 215-938-7361

FOR INFORMATION AND THE LATEST PRICES...

VISIT OUR INTERNET SITE: WWW.TRCORP.COM
SEND YOUR E-MAIL REQUESTS TO TRANSCOM@TRCORP.COM

ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. 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 be aware that it takes one month for listings to appear. The listings run for two consecutive issues 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 _____

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 F. Recording Studio
 A. Commercial AM station K. Syndicator-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. Mtg. 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

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.

WTS WTB Category: _____
Make: _____ Model: _____
Brief Description: _____
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 lister.

Broadcast Equipment Exchange
PO BOX 1214, Falls Church, VA 22041 • Tel: 800-336-3045 • Fax: 703-998-2966

Circle (228) On Reader Service Card

EMPLOYMENT

HELP WANTED

Prophet Systems Innovations Tech Support opportunities

A position with PSI offers growth potential that is limited only by your drive to succeed. A degree is not required for this position as we value a good work ethic, the desire to do the job right and previous experience as being more important to success. Knowledge of DOS, Win3.1 and Windows95/98 a must, Novell Networking, LAN/WAN Experience a Plus. Computer Hardware Knowledge - Chassis to full running computer beneficial. Advancement, personal development, and knowledge enhancement opportunities available. Prophet Systems, a division of Capstar Broadcasting Partners, is the worldwide leader in broadcast digital automation and audio playback systems. We are currently upgrading our Audio Wizard for Windows software and branching out into delivery of audio and programming via the Internet and Satellite. We are also expanding into audio delivery and playback for the restaurant and entertainment industries. If you desire an exceptional working environment - where your ideas are taken seriously - and want to live in a small Midwest town that offers a low cost of living, good schools, little crime, and excellent outdoor recreational opportunities then we have the position for you. Please fax, mail or email your resume and salary requirements to: Prophet Systems Innovations Attention: Candy Spady, Human Resources 111 West 3rd Street Ogallala, NE 69153 Email: candys@prophetsys.com Fax: (308) 284-2382

Christian Radio KCBT Dallas/Fort Worth has immediate opening for broadcast engineer with a desire to serve. Great environment, competitive compensation, excellent benefits, opportunity to grow and develop. Rush resume to Mike Middleton, VP of Operations, POB 619000, Dallas TX 75261-9000.

Chancellor Media has two rare openings for a Market Engineering Manager. One in Cleveland and one in Cincinnati. Both positions will be responsible for creating a unified and market-wide engineering effort.

If you have great technical skills and are ready to lead our highly qualified team... If you are tired of your job and are ready for a career... If you are ready to make a move up...

Contact: Jeff Littlejohn - VP Engineering Chancellor Media 625 Eden Park Dr. #1050 Cincinnati, OH 45202 513-562-3066 Direct 513-562-3071 FAX



Chancellor offers Excellent Pay and Benefits. EOE

CHIEF ENGINEER needed for 6 station cluster in Central Pennsylvania. Experience must include RF broadcast engineering, computer software, hardware & network maintenance, digital audio delivery systems, transmitter maintenance & repair & multi-tower directional antenna tuning. Fax resume to: **Chris Tyler at Dome Media, Inc. at (717) 901-6729**

Radio Chief Engineer
4 station group including 50 KW directional AM. Analog/digital editing & RDS/Scott Studios automation systems, STL, RPU & satellite. Must be current with all FCC rules & Regs & Computer Literate. If you like home town living & are hands on reply with resume to: John Dunn, KCKN Radio, POB 670 Roswell NM 88202.

DJ willing to play mainly traditional country music. Must be able to cut good commercial. Call Bill Jefferson at WYTI Radio, Rocky Mount VA nights (540) 483-2264.

POSITIONS WANTED

Broadcasting school grad w/exp in live studio seeking position at your station, multi-task oriented, any position sought. Victoria, 405-681-9538.

CE position wanted, exper w/computer, xmtrs, automations, DCS, UDS, digital studios. R King, 541-269-9109.

Everyday guy with a license to be a celebrity, ratings, I'll get them, everyone's talking of "our" station & me as your #1 announcer. Lance, 580-883-2338.

The millenium bug could wipe out your virtual reality station; live, veteran talent could restore your genuine reality. Alex, 513-777-8423.

Young, energetic, humorous, trained broadcaster, recent grad, willing to travel & work hard for your station, knowledgeable & interested in all areas of radio. Heather, 405-495-2359.

CE position wanted, exp w/computers, xmtrs, automations, DCS, UDS, digital studios. R King, 541-269-9109.

CE/Computer Tech w/20+ yrs hands on eng exper seeks CE position in top 100 market; strong audio, computer networking & RF skills. Call 704-563-8676.

Talented broadcasting school grad interested in all facets radio business, willing to relocate, have loads of theatrical exper. Call Randolph, 405-670-1888.

ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
29	360 Systems	29	54	Global Data Inc.	88
20	Advanced Furniture Systems	50	20	Gorman-Redlich Mfg. Co.	15
20	Air Corp	110	45	Halland Broadcast Services	43
23	Aphex	23	17	Harris	17
19	Armstrong Transmitters	19	22	Harris	22
31	Arrakis	31	56	Harris	56
55	Arrakis	55	36	IBN Radio	38
6	ATI	6	37	Inovonics	37
5	Audio Broadcast Group	5	52	Inovonics	52
2	Audioarts Engineering	2	45	J Squared Technical Service	99
43	Autogram Corporation	70	43	JK Audio	59
46	Belar	46	33	Klotz Digital	33
45	Boston Financial & Equity	78	36	La Palma Broadcasting	-
20	Broadcast Devices, Inc.	20	41	Logitek	41
15	Broadcast Richmond	-	45	LPB	68
28	Broadcast Software Int'l (BSI)	28	27	Lucent Technologies	27
43	Broadcast Technology Company	109	44	Media Store	8
20	Broadcast Tools	120	25	Modulation Sciences	25
18	Broadcasters General Store	18	32	Musicam USA	32
10	BSW	10	35	Netia	35
4	Burk Technology	4	54	Nott Ltd.	98
20	Circuit Werkes	49	26	Orban	26
43	Circuit Werkes	58	39	PR&E	39
3	Clark Communications	3	45	PTEK	108
7	Comrex	7	43	Radio Design Labs	90
1	Continental Electronics	100	16	Radio Systems	16
20	Cortana	40	51	RadioSoft	51
21	Crown Broadcast	21	14	Scott Studios	14
13	Cutting Edge	13	45	Shively Labs	79
43	Davicom Technologies	36	43	Silicon Valley Power	60
11	Denon America	11	46	Sine Systems	12
54	Econco	119	47	Sonic Foundry	47
36	ESE	86	48	Syntrillium Software	48
45	Excalibur Electronics	69	9	Telos Systems	9
43	Freeland Products, Inc.	80	45	Videoquip Research	89
34	Full Compass Sound	34	63	Wheatstone	63
49	Furman Sound	75	64	Wheatstone	166
30	Gentner	30	24	Whirlwind	24
36	Ghostwriters	45			

Advertising Sales Representatives

US Southeast & Mid-Atlantic: John Casey, Nat'l Sales Manager 330-342-8361 Fax: 330-342-8362 email: jdcasey@compuserve.com
 US West: Dale A. Tucker 916-721-3410 Fax: 916-729-0810 email: RadioRUs@NS.net
 US Midwest & Northeast: Sandra Harvey 765-966-0669 Fax: 765-966-3289 email: ads4sales@aol.com
 Classified Ads: Simone Mullins 703-998-7600 x154 Fax: +1-703-671-7409 email: smullins@imaspub.com
 Germany, Austria: Dagmar Hänle +39-02-7030-0310 Fax: +39-02-7030-0211 email: 102521.2001@compuserve.com
 France: Silvia Di Stefano +33-1-45-48-42-17 Fax: +33-1-45-48-42-19 email: sdsimas@aol.com
 Europe, Africa, Middle East: Raffaella Calabrese +39-02-7030-0310 Fax: +39-02-7030-0211 email: 102521.2001@compuserve.com
 Japan: Eiji Yoshikawa +81-3-3327-2688 Fax: +81-3-3327-3010 email: callern@msn.com
 Asia/Pacific: Wengong Wang +852-2787-4727 Fax: +852-2787-4041 email: imashk@compuserve.com
 Latin America: J.O. Lima e Castro +55 (011) 3641-4511 Fax: +55 (011) 3641-4511 email: Limcas@uol.com.br

For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

REGIONAL PRODUCT MARKETING MANAGERS
BROADCAST TRANSMITTERS
LATIN AMERICA & SOUTHEAST ASIA

Richardson Electronics, LTD a worldwide distributor of electronic components, has two new and exciting opportunities for creative and technically-oriented individuals to join our team. One position will be based in a major city in South America and requires bilingual skills in English and Spanish or Portuguese. The other position will be based in either Singapore, Thailand or Manila and requires bilingual skills in English and Mandarin or Thai.

In this position, you will focus on increasing sales of Broadcast Transmitters in the region. You will support and train the existing salesforce as well as have direct customer responsibility. You will focus on key accounts, contribute to vendor/product strategies, and participate in sales meetings, trade shows and training seminars. Working with our customers and salesforce, you will design a system, supervise the installation and maintenance of broadcast transmitters, and assist in the technical areas where related to the sales function.

We require a technical background in selling or servicing Radio & TV Broadcast Transmitters, an Electronics Degree (EE or equivalent), and demonstrated ability to analyze customer requirements and to propose, sell and install transmitters. Experience in the respective region working with service dealers and the broadcast industry, and the ability to travel 50% are also required.

We offer an attractive salary, bonus and comprehensive benefits package.

You may find out more about Richardson Electronics at www.rell.com.

Please forward your resume, indicating your location interest, to:

Dept. #164 via Fax: 630-208-2554
or E-mail to: rac@rell.com

EOE M/F/D/V



Richardson Electronics, Ltd.

◆ READERS FORUM ◆

The old and the bold

Dear RW,

Thank you for the very good "Safety First" sidebar to the article by Charles S. Fitch ("Breakers and Entrance Panels." RW, March 31).

It reminded me of our former master electrician, Kent Kroneman, now retired, here at the Eccles Broadcast Center at the University of Utah. He always liked to say that there were two types of electricians — old electricians, and bold electricians.

'Nuff said.

Lewis Downey
Engineer
KUER(FM)
Salt Lake City

EAS discussion

Dear RW,

I think Bill Ashley should explain himself ("Ashley: QDI Should Explain

would not receive immediate and timely information would be while he's listening to his Spanish cassettes.

The purpose of local alerts is not to give the listener news after the fact, but to warn of impending danger.

For example, by the time Mr. Ashley sees an overturned chlorine tanker on the road ahead, it's a little bit late to be tuning the radio to find out what happened. EAS could warn him of the danger before he gets there, and perhaps save his life.

All this, without a special radio in every car, GPS or any other neat tricks. All it requires is the cooperation of the local broadcasters.

Delete Part II? I'd rather amend it to require (yes, require) broadcasters to participate in establishing a workable local emergency system. We're supposed to be operating in the public interest, let's do it!

Tim Mauch
Contract Engineer
Seattle

The purpose of local alerts is not to give the listener news after the fact, but to warn of impending danger.

Itself," RW, April 28).

How any engineer with over 40 years of broadcast experience can come to the conclusion that "EAS cannot work as intended" simply amazes me. All you have to do is look around and see the many successes EAS has had around the country, to see that it has saved countless lives already.

The only reason Mr. Ashley's "example" doesn't work, is that he assumes that each broadcaster is going to program the station's unit to only relay alerts for that station's community of license.

Those with no vision may very well do that. Here in the Puget Sound region, many broadcasters program their units to cover their entire coverage area. At my stations, I carefully programmed the units to relay every life-threatening alert for every section of the adjacent counties that listeners could possibly hear us in, even though we are satellite-programmed.

If the stations that Mr. Ashley mentioned all did that, then the only time he

Propagation points

Dear RW,

It was great to read W.C. Alexander's article about AM radio ("The Basics of AM Propagation," April 28).

Having grown up in North Dakota listening to KFYZ(AM) in Bismarck, I know the power of AM radio.

If you go to the site www.kfyz.com you'll see their Web page. Jacor recently purchased KFYZ(AM) and Y93 FM from Meyer Broadcasting for \$4.8 million.

That may seem like a lot until you understand that KFYZ has the largest daytime coverage area of any station in the United States. The transmitter and towers are eight miles east of Bismarck with an eight-ground conductivity. The main tower is 701 feet and is a self-sustaining one. The station can be heard in seven states and into Canada. That was my first full-time radio job, back on April 7, 1967. My cousin, Herb Leup, was the

Success By the Letters

Three broadcast suppliers are celebrating big birthdays this year: Broadcast Electronics with 40 years in the business, Pacific Research & Engineering commemorating its 30th anniversary and Radio Computing Services with a 20-year mark. It is a measure of the success of these companies that all of them are recognized widely by their initials.

From the days it introduced the first magnetic tape cartridge machine for radio in 1959, BE has focused on products for the radio broadcast industry. Today the company, based in Quincy, Ill., and Cleburne, Texas, offers conventional and solid-state AM and FM transmitters, analog and digital exciters, including the new Predator, Marti RPU's and STL's, and the AudioVault digital audio storage system.

PR&E, based in Carlsbad, Calif., was incorporated in 1969. The company started as a consulting and systems engineering firm, and in subsequent years moved into products including audio processors and cart machines.

PR&E now is well-known as a supplier of digital and analog consoles such as the BMX, AMX, Integrity, ProductionMixer and RadioMixer lines. A noted systems house, PR&E introduced its new AirWave digital console and QuikBilt II studio furniture at NAB99.

RCS, in White Plains, N.Y., built its success story around the Selector music scheduling system, giving program directors direct control over scheduling using the power of computers. Selector has been updated constantly since. Other offerings followed, like the Master Control digital studio, Linker schedule management system and RCS Airwaves traffic and billing system. RCS now offers a range of services including logging, research and talk show management tools.

Like the clients they serve, these broadcast suppliers have seen their boom and bust times, their new product successes and failures, and, in some cases, their changes of ownership.

But in this era of consolidation, when managers often complain of a paucity of suppliers that understand their radio-specific needs, it is nice to see companies with a long-term commitment. Continual service and support are what endear a company to its customers.

Radio World salutes these organizations that contribute to a healthier supplier marketplace.

— RW

chief engineer at the time, since retired. When I went from my home in Hazen, 75 miles northwest of Bismarck, I could listen to KFYZ all the way to the Brown Institute broadcast school in Minneapolis. Not bad.

B. Buchfink
Reier Broadcasting
Bozeman, Mt.

Dear RW,

What a nice article on AM propagation in the April 28 Radio World!

As an "old" radio buff who cut his teeth in radio by DX-ing the broadcast band, your article brought back some of the fondest memories of my youth, like staying awake late on those winter nights to capture that elusive 50 kW station on the opposite coast.

I've got a 15-year-old son who is just beginning to show a bit of interest in ham radio. He'll read the article tonight. Thanks for the memories.

Walt Woron/KJ4HE
Field Sales Engineer
Peerless Electronics Inc.
Marietta/Atlanta, Ga.

Industry attitude

Dear RW,

Dave MacLughlin's letter to RW in the May 12 Readers Forum couldn't have been more accurate. I appreciate his ability to accurately sum up the current industry attitude. And I appreciate RW's willingness to print it.

Hopefully those who have contributed to this current condition in the radio business will see themselves described in this letter and work to change their attitudes.

Mike Cady
Engineer
Learfield Communications
Jefferson City, Mo.

Write to Us

RADIO WORLD
READERS FORUM
P.O. Box 1214
Falls Church, VA 22041
radioworld@imaspub.com

—EDITORIAL STAFF—

Paul J. McLane	ext. 117	Editor
Sharon Rae	ext. 126	Managing Editor
Leslie Stimson	ext. 129	News Editor/Wash. Bureau Chief
Laurie Ann Cebula	ext. 198	Business/GM Journal Editor
Brian Galante	ext. 146	Associate Editor
Bernie Cox	ext. 183	Buyers Guide Editor
Thomas R. McGinley	—	Technical Adviser
Alan Peterson	—	Technical Adviser
Marlene Lane	ext. 128	Editorial Director/Assistant COO
T. Carter Ross	ext. 120	Editor-In-Chief (International)
Marguerite Clark	—	Editor (International), Milan
Christine Joaquim	ext. 138	Managing Editor (International)
Marcelo Morichi	ext. 171	Latin America Managing Editor
Karina Gerardi	ext. 137	Latin America Assistant Editor
Renata Beck	ext. 196	Latin America Assistant Editor
Peter Finch	—	Editorial Assistant, Milan

—EDITORIAL CONTRIBUTORS—

W.C. Alexander, James Careless, Harry Cole, Troy Conner, Ty Ford, Harold Hallikainen, Mario Hieb, Paul Kaminski, Peter King, Mel Lambert, Mark Lapidus, Carl Lindemann, Dee McVicker, Lynn Meadows, John Montone, Rich Rarey, Bob Rusk, Randy Stine, Tom Vernon.

Radio World

Vol. 23, No. 12 June 9, 1999

Telephone: (703) 998-7600 • Business Fax: (703) 998-2966 • Editorial Fax: (703) 820-3245
E-mail: radioworld@imaspub.com • Web site: www.rwonline.com

—ADVERTISING SALES REPRESENTATIVES—

Sales Mgr., US Southeast & Mid-Atlantic: John Casey	330-342-8361	Fax: 330-342-8362	email: jdcasey@compuserve.com
US Northeast & Central: Sandra Harvey	765-966-0669	Fax: 765-966-3289	email: ads4saesc@aol.com
US West: Dale Tucker	916-721-3410	Fax: 916-729-0810	email: dtucker@ms.net
Classified Ads: Simone Mullins	703-998-7600 x154	Fax: 703-671-7409	email: smullins@imaspub.com
Germany, Austria: Dagmar Hänle	+39-02-7030-0310	Fax: +39-02-7030-0211	email: 102521.2801@compuserve.com
France: Silvia Di Stefano	+33-1-45-48-42-17	Fax: +33-1-45-48-42-19	email: sdsimas@aol.com
European Sales Mgr., Africa, Middle East: Raffaella Calabrese	+39-02-7030-0310	Fax: +39-02-7030-0211	email: 102521.2001@compuserve.com
Japan: Eiji Yoshikawa	+81-3-3327-2688	Fax: +81-3-3327-3010	email: callem@msn.com
Asia/Pacific: Wengong Wang	+852-2787-4727	Fax: +852-2787-4041	email: imashk@compuserve.com
Latin America: J.O. Lima e Castro	+55-11-3641-4511	Fax: +55-11-3641-4511	email: Limcas@uol.com.br

NEXT ISSUE OF RADIO WORLD JUNE 23, 1999

For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review: send to the attention of the appropriate editor.

—ADMINISTRATION & PRODUCTION—

Stevan B. Dana	President/CEO
Carmel King	VPI Group Publisher
Chuck Inderrieden	CFO
Eric Trabb	Sales & Marketing Director
Lisa McIntosh	Production Director
Jeff Fisher	Production Manager
Kathy Jackson	Ad Traffic Manager
Christopher Duerk	Senior Graphic Designer
Dwayne Boyd	Publication Manager
Vicky Baron	Showcase Coordinator
Anastacia Stormetta	Classified Coordinator
Alex Frosini	Graphic Artist
Heather Harris	Marketing Manager
Sheryl Unangst	Circulation Director
Robert Green	Circulation Manager
Steve Berto	Accounts Receivable

Radio World (ISSN: 0274-8541) is published bi-weekly by IMAS Publishing (USA), Inc., P.O. Box 1214, Falls Church, VA 22041. Phone: (703) 998-7600, Fax: (703) 998-2966. Periodicals postage rates are paid at Falls Church VA 22041 and additional mailing offices. POSTMASTER: Send address changes to Radio World P.O. Box 1214, Falls Church VA 22041. REPRINTS: Reprints of all articles in this issue are available. Call or write Michael Crossett, P.O. Box 1214, Falls Church, VA 22041: (703) 998-7600; Fax: (703) 998-2966. Copyright 1999 by IMAS Publishing (USA), Inc. All rights reserved.

—Printed in the USA—



DON'T BE FOOLED.

DON'T LET THE TRADITIONAL LOOK FOOL YOU!

This new audio console from Wheatstone has the most advanced DIGITAL FEATURES available on the market today! How about **serial control** of all switch, fader and (8-character) source display settings—for true integration with routers and automation systems? Four stereo mix busses with simultaneous digital and analog outputs? Multiple mainframe sizes? Dedicated phone modules with DSP generated mix-minus for easy control of two to four callers?

BUT DON'T STOP HERE: optional DSP equipped modules allow programmable ducking with gain reduction and master/slave selection, digital input attenuation, pan/balance, 4-band sweep EQ (plus sweep high pass), and compressor/limiter with threshold, ratio, attack, release and makeup gain—all on *each* input!



A meterbridge **router controller panel** can run our new Wheatstone rackmount switcher for hundreds of additional inputs. The totally modular hot-swap design accepts both analog *and* digital inputs. Dual metering is simultaneous VU and full scale digital peak. Add a PC based **setup program** for quick configuration of all displays, mutes, tallies, machine starts and mix-minus assigns (once set the PC is removed for console stand-alone operation) and you begin to see the *power* that lies behind this intuitively simple control surface.

SOUND LIKE SOMETHING YOU'RE LOOKING FOR? Give us a call here at **Wheatstone** and ask about the brand new **D-600 DIGITAL AUDIO CONSOLE**—our sales engineers would love to tell you more!

 Wheatstone Corporation

600 Industrial Drive, New Bern, North Carolina 28562 (tel 252-638-7000/fax 252-637-1285/email: sales@wheatstone.com)

Three Great Product Lines... One Industry Leader!

Big, medium or small market, digital or analog, Wheatstone has the console to fit every need and budget.



Wheatstone Corporation

Major market broadcasters know: Wheatstone has the complexity and flexibility for stations who demand more in a console. Top engineering spells top performance.

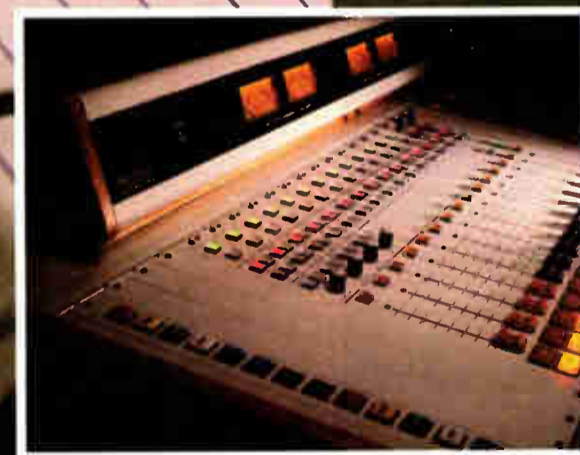
D-600 Digital Radio Console



AUDIOARTS ENGINEERING

The perfect balance between high technology and control features, Audioarts offers Wheatstone strength and quality with cost-effectiveness through clever engineering.

R-60 Analog Radio Console



AUDITRONICS

The broadcast pioneer with rock solid engineering, experience and a reputation that thousands of stations have depended on for more than 30 years.

NuStar Digital Radio Console

The industry's best audio consoles for radio and television.

 Wheatstone Corporation

Phone: 252-638-7000 • Fax: 252-637-1285 • E-Mail: sales@wheatstone.com