

**Christian Radio,
Big Business**

Religious broadcasting is not just 'preach-and-teach' anymore.

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Class B-Zero?

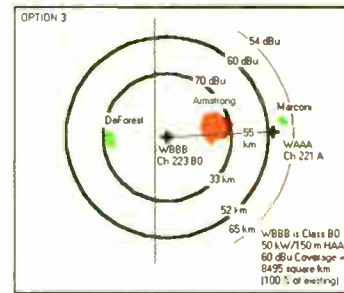
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Radio World

The Newspaper for Radio Managers and Engineers

November 10, 1999



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STUDIO SESSIONS

▼ RW writers try new audio processors from dbx and Symetrix, and noise removal software from Dart. In this issue.



Visit RW Online at www.rwonline.com

NEWS MAKER

CD Radio Builds Complex To House 18 Studios, HQ

NEW YORK CD Radio Inc. is putting finishing touches on its new headquarters in New York. From here, it hopes to change the way Americans listen to their radios.

The 100,000-square-foot complex, which includes 15,000 square feet of studio space, is scheduled to be completed by Thanksgiving. In January, CDR plans to launch the first of its three satellites that will deliver subscription digital audio service in late 2000.

CDR engineers and other technical personnel are grappling with substantial

engineering problems. They must build the airchain for 100 channels of service, launch and manage a small satellite fleet, create a terrestrial repeater network to serve areas where the satellite signal may be blocked, transport the signal to and from the satellites and design receivers capable of receiving CD Radio's L-band signal.

The company, which relocated here from Washington, D.C., occupies the 36th and 37th floors of the McGraw-Hill building in the heart of the Times

See CD, page 5 ▶



CD Radio's Mark Kalman in one of four digital production studios.

Photos by Leslie Stimson

WWW.RADIOHOF.ORG

JIM DUNBAR
NEWS ANCHOR

RADIO HALL OF FAME 1999

Welcome to The Hall!

Jim Dunbar and five other radio legends enter the Radio Hall of Fame.

See Page 40

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◆ NEWSWATCH ◆

Merger Valued at \$23 Billion

The new, bigger Clear Channel Communications is expected to divest about 125 radio stations to comply with ownership rules.

Clear Channel plans to buy AMFM (formerly Chancellor Media) for \$16.58 billion in stock, plus the assumption of debt for a total deal valued at \$23 billion. Under the agreement, AMFM stockholders would get 0.94 Clear Channel shares for each AMFM share they own. The combined entity would be called Clear Channel Communications.

The group would have more than 950 stations post-merger, before divesting where necessary. The deal is subject to regulatory review. It combines Clear Channel, the third-ranked radio group in terms of revenue, with the number-one group AMFM, according to The Wall Street Journal. Number two is Infinity Broadcasting Corp. Infinity is controlled by CBS, which plans to merge with Viacom.

MMBS Fate Uncertain

ARLINGTON, Va. Congress has

informed the FCC that proceeds from the auction of TV channels 60-62 and 65-67 must be in the U.S. Treasury by September of next year. Previously, the spectrum was not to be auctioned prior to Jan. 1, 2001. The channels are to be given up as TV transitions to digital.

The decision throws into limbo a proposal by the Consumer Electronics Manufacturers Association to the FCC to reserve that spectrum for a new service called Mobile Multimedia Broadcast Service. The service envisions multichannel audio delivery, with data capacity and robust mobile reception.

The decision to move up the auction date "has the effect of congress meddling in bandwidth allocations," said CEMA spokesman Matt Swanston.

As far as MMBS, he said, CEMA is studying its options and has not decided what the next step would be.

CEMA had been asking its members to support the proposal, as other services are vying for the same spectrum. It had planned a meeting to discuss MMBS in December. Whether that would still happen was uncertain at press time.

The proposed MMBS service uses a similar modulation scheme to the Eureka-147 DAB system used in other parts of the world. According to CEMA, MMBS offers greater data throughput and higher quality multichannel sound than Eureka, IBOC and SDARS, and

See NEWSWATCH, page 3 ▶

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NuStar

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AUDITRONICS

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Antex Sues AudioScience

by Randy J. Stine

GARDENA, Calif. A pair of soundcard manufacturers are prepared to go to court in an ownership dispute over source codes used in the audio cards they manufacture.

Antex Electronics has filed suit in federal court against AudioScience, alleging copyright infringement, breach of contract, misappropriation of trade secrets and several other claims. A total of seven claims were filed. The suit seeks unspecified monetary damages. One of the defendants is a former Antex employee.

Unfounded?

AudioScience executives said the charges are unfounded.

The suit centers on who has the rights to source codes that enable the companies to write software drivers for their digital audio adapter boards. The soundcards encode and decode audio streams for playback as part of a PC-based digital audio storage system.

"It's a classic intellectual property case," said James Antrim, Antex president and CEO. "It centers on the source codes for software drivers we produce. The source code is the basis of the driver."

Antrim described the drivers as a layer of software between the machine function and the operating system. The drivers contain the commands that allow the computer and soundcard to communicate properly with each other, allowing the user to set different volume levels, mix different channels, and record and play audio.

"The driver is elaborate and is critical to the soundcard because the card won't even run without it. We feel our driver has been compromised in this case," he said.

The suit claims that AudioScience is using source codes Antex helped develop and has copyrights to. Antrim would not comment on similarities between the two source codes.

The suit, filed in the U.S. District Court for the Central District of California, also named three AudioScience executives as defendants: Richard Gross, president; Stephen

Turner, vice president of engineering; and Andrew Elder, director of software engineering.

Gross is former vice president of sales for Antex. He left the company in 1996.

Another defendant in the case is Electronic Design Associates and its president, Howard Jelinek. EDA is a software engineering company. Turner and Elder are former consulting engineers to EDA.

Founded in 1996 and based in New Castle, Del., AudioScience manufactures digital audio products.

AudioScience soundcards are used by Scott Studios and Prophet's NexGen

AudioScience and EDA recently entered into a strategic development agreement to develop audio compression and processing algorithms for new soundcards based on the new Texas Instruments C6000 DSP family.

"We believe that EDA is the author and owner of the source codes Antex is suing us over," said Turner.

Turner said he did briefly work on Antex software while working as a consultant to EDA. He worked mostly on hardware development. He called the lawsuit by Antex frivolous.

"Our architecture is totally different. We worked for nearly a year developing our soundcard from scratch," he said.

Gross said it appears to be more a fight between EDA and Antex.



Stephen Turner

"No way. The agreement ceased in 1997," said attorney Michael Obrand. "If it were still effective, why hasn't Antex paid any royalties (to EDA) in over two years? Both parties agreed to part ways," he said.

Obrand said Antex has since failed to keep pace with product development and has lost market share. He called the suit "bogus."

"Antex has tried to register for the copyrights on these source codes and has failed. They can't show they have the copyrights. It was EDA who did most of the research and development. Antex just brought the products to market," Obrand said.

Obrand said EDA owns the intellectual property in this case.

In the lawsuit, Antex has asked the presiding judge for declaratory relief, which enables the judge to decide who owns the rights to the source codes developed by Antex and EDA under their joint development agreement.

EDA and AudioScience currently have a licensing agreement that gives AudioScience the right to use EDA core software also used by Antex.

As the lawsuit enters its discovery phase, Antrim is hoping for a quick conclusion. But he also said he is patient.

"Software drivers take a long time to do, a long time to de-bug and are fairly complex. It really is at the heart of our entire business," he said. "Our whole business is at stake here. We'll ride it out as long as it takes."



Antex Headquarters

Digital systems. Antex told **RW** it does not release customer information.

"We are certainly hurting Antex's market share and that doesn't sit well with anyone. They're vindictive," said Gross. "There is no foundation for the lawsuit. We haven't done anything wrong technically at this stage."

Gross said AudioScience has used a different digital signal processor platform than Antex.

"Everything at Antex was developed in a product family from Texas Instruments. Everything we've done has been Motorola-based. We did that so there would be no questions asked. It's really two completely different languages," he said.

"If it turns out EDA has the right to license the source code, there is no case. We appear to be stuck in the middle right now," he said.

Beginning in 1987, Antex and EDA worked on software projects through a joint development agreement. According to court documents, Antex and EDA agreed to jointly develop and market digital audio cards.

Whether the agreement is still in effect is a point of contention. Antrim said the agreement still exists. However, EDA's lawyer in the case disagrees.

NEWSWATCH

► **NEWSWATCH**, continued from page 2 would be free to the listener. CEMA contends that the bandwidth of the service opens the door for digital services, including telematics, car navigation and alignment with Internet formats (**RW**, Oct. 27).

FCC to Study Merger Reviews

WASHINGTON As the biggest radio groups continue to get bigger, the FCC is forming a team to scrutinize the agency's merger review process. FCC Chairman Bill Kennard said, "The goal will be to expedite the review process so that issues arising in even the most complex transactions may be resolved within definite time periods."

FCC General Counsel Chris Wright will head the team, which

plans to begin its work in January.

Legislation that would limit merger reviews to no more than six months is pending in the Senate.

CP Auctions Net \$57.8 Million

WASHINGTON There were 91 winning bidders in the FCC's first closed auction of broadcast construction permits. The auction closed Oct. 8 after 35 rounds of bidding and raised nearly \$58 million in net high bids for the U.S. Treasury.

CPs for pending competing applications that were auctioned included FM, FM translator, TV and low-power TV. After accounting for so-called bidding credits, or discounts in some cases, radio net bids ranged from a high of just over \$5 million to a low of \$12,000.

Down payments were due Oct. 26.

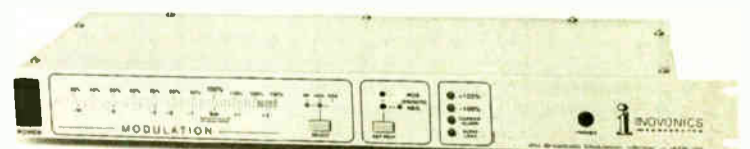
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Ohio's Radio Technology Corridor

A recent trip through Ohio allowed me to stop in on some friends of the radio industry.

Telos Systems/Cutting Edge makes phone interface equipment and processors for broadcasters, including the popular Zephyr codecs and Omnia on-air processors. Its 50 employees work in a six-story converted garment factory, located in a funky industrial neighborhood in Cleveland.



The high ceilings and exposed brick walls reminded me of a cool New York City loft apartment.

Managing Director Mike Dosch and the staff showed me around and talked about the company's growth.

"Our goal is to be an international company," Dosch said. "One-third of our business is overseas now, but ... 90 percent (of that) is in Europe." Dosch, who joined Telos earlier this year after leaving PR&E, sees big opportunities in Asia and South and Central America.

Tech trends

On the technology side, expect more from Telos in the MP3 arena, a natural outgrowth of the Zephyr line as well as

Captions:

Mike Dosch of Telos inspects ZephyrExpress codecs and ISDN guru Rolf Taylor enjoys his pay-phone (note banana phone in rear). Right: AudioTechnica's AT4047/SV microphone; Tony Bagnato of AT tests a 4033 mic in the anechoic chamber.

Telos' relationship with the coding developers at Fraunhofer-Gesellschaft.

The tech trend in radio, Dosch said, is hardware consolidation.

"We think there will be a convergence of discrete categories — consoles, processing, telephony. Computers and networking are driving that." Dosch sees the industry moving toward a single platform that combines functions.

Net connections

The Internet, Dosch said, will drive many of the decisions we make, and connectivity will be key.



"Every product we're coming out with now has an Ethernet connection," he said. "I think this company 'gets' the Internet. Radio doesn't, yet. ..."

"Imagine a connector on every processor, and a manufacturer database that can query the processor. Would you like to know how others are using the product? You can send software updates, and learn information for new product development."

Telos/Cutting Edge also is watching the debate about digital radio.

"We're positioning the processors to take advantage of that, and working with all three IBOC proponents to make sure our products address their needs," Dosch said, adding that he thinks at least two of those proponents may soon merge forces.

Dosch is a big fan of his new boss, Telos founder Steve Church, who was out of the country when I visited.

"Steve is without a doubt the smartest guy I've ever worked with. It's even intimidating at times. He sees things others don't."

Telephony remains a central mission at Telos. New products this year include the TWOx12, a self-contained 12-line on-air phone system with two digital hybrids (Telos says it is the only talk show system that connects directly to ISDN BRI phone lines); the Series 2101 Digital Talk Show System, a larger-scale, multi-caller system that also connects to digital lines; and the Omnia ToolVox Digital Microphone Processor, taking the Omnia name in a different direction. Expect to see "Omnia" used more widely as the line-up grows.

I also visited with Cutting Edge founder Frank Foti. I'll tell you about that conversation in an upcoming issue.

Down the road

Not far from Cleveland is the lovely town of Stow, Ohio, home of Audio-Technica U.S., where Paul Hugo, Karen Emerson, Jeff Simcox and Michael Edwards showed us around the impressive manufacturing and test facilities.

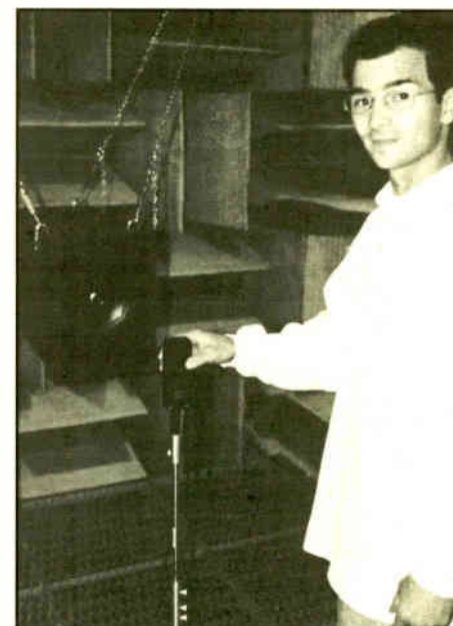


The company was established as a U.S. distributor for AT-brand phono cartridges, but has grown since 1972 into a manufacturer of wired and wireless microphones, cables, headphones and mixers. (Yes, they still make turntable cartridges too.)

From the Editor



Paul J. McLane



It expanded its facility about 18 months ago, and now has nine screen rooms for wireless testing, as well as two anechoic chambers, where every one of its 40 Series microphones goes through quality control.

We can expect to hear more from AT about its new cardioid capacitor microphone, the AT4047/SV. The company thinks it has potential in critical radio applications, thanks to its warmth and vintage condenser sound. The retail price is \$695. We'll review it soon in Studio Sessions.

To learn more about these companies, visit them on the Web at www.telos-systems.com and www.audio-technica.com

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CD Radio Complex Nearly Done

► CD, continued from page 1

Square-Rockefeller Center area. CD Radio gutted the space it occupies, and is installing broadcast studios, satellite tracking and control equipment, and offices.

Mark Kalman is vice president of CD Radio's National Broadcast Studio. He knows a thing or two about radio and big facilities, as a former engineering executive for ABC Radio Networks and SW Networks.

RW News Editor/Washington Bureau Chief Leslie Stimson talked with Kalman about the challenges of building the 18-studio digital complex.

RW: In handling your air sound, what is the difference between what CD Radio is doing and a traditional radio station/network?

Kalman: It's not necessarily a traditional radio story, because we're breaking a lot of new ground here. We're going to be doing plus or minus 100 channels of programming, 50 of which are going to be originated from here; and some number of non-music channels are probably going to be one way or another, partially produced here and totally integrated here. ...

There are different challenges when you're designing a facility that perhaps has eight radio stations that are individually focused, with some amount of commonality of plant, but essentially are competitors to each other in the marketplace — as opposed to integrating 100 radio stations under one roof, that have commonality and have a shared requirement for not only transmission facilities but for content.

RW: How many unknowns are you facing?

Kalman: Hopefully we don't have many more unknowns at this point. ... If any unknowns existed at the beginning of the project, you start with "Where do you locate this thing and why?"

I came somewhat late to the game, so as part of this story I'd like to incorporate Steve Uckerman's participation. Steve is senior director of broadcast engineering, and he was brought on very early to resolve some of the unknowns.

The first challenge CD Radio had was where to locate the operation. It was determined (they needed) ... accessibility to talent on the programming side as well as the entertainment side. So you've got NBC across the street, you've got CBS over there, you've got ABC over there, Fox is right across the street over there, and Howard Stern is in the building

behind the wall. ...

When I was in charge of engineering back at ABC, the things we had to deal with were essentially newsmakers and some level of entertainment. Here you've got potentially 50 channels of different entertainment. ... A representative of each of those channels could show up simultaneously. The facility has to be ready to handle anything.

RW: Talk about an acoustical challenge, with the different kinds of music and talk!

We're starting off with 15,000 hours of recordable material online on the digital audio storage system, so that's 3-1/2 terabytes of storage.

Kalman: There's 50 channels that are non-music and 50 channels that are music. ... We've got 50 offerings of music to any depth you'd want within any of those genres... you may have three different jazz channels ... but on top of that you've got the ability to share content from across channels. ...

Maybe there's some interview with B.B. King on a blues channel. The full content from that interview may appear on one of our non-music channels that may deal with the history of the blues.

Digital design

RW: Do you have 100 separate studios?

Kalman: No. It's anticipated that we are going to handle most of these challenges with automation.

RW: Is your system fully digital?

Kalman: Yes. This is because it's a total digital plant, soup-to-nuts digital, digital other than ones and zeros coming out of your mouth after your voice hits the microphone, it's all digital.

The reason that was chosen, as opposed to a hybrid plant or a total analog plant, (is that) total analog is probably suicide nowadays.

RW: What software package are you using to handle the digital editing and storage?

Kalman: Prophet Systems. That's their NexGen system.

NexGen in this environment is talking to everything. It's talking to our routing switcher. It's talking to our audio consoles. It's talking to our level control systems, our Telos Zephyr codecs, our high-speed CD rippers and the Internet.

We're going to be high-speed ripping CDs, which will require the system to go out to the Internet to get the data on the CD. There's a database called CDDB, CD database, and it has information on every record ever recorded, as Robert Kline used to say. And that information will come back and be presented on a screen for your selection of which cuts you want to take off the CD and then proceed to high-speed rip the CD.

RW: Your music library will be on the computer system?

Kalman: There will be walls of CDs

and electronic press kits and other storage media. We're starting off with 15,000 hours of recordable material online on the digital audio storage system, so that's 3-1/2 terabytes of storage. CD Radio is using HP servers on a 1 GB (1000 base T) backbone.

RW: Tell us about the design and build process. After the site was chosen, what were some of the challenges?

Kalman: The challenges, of course, are the allocation of the space. Coming into

something as large as this, you have to determine how many studios do you really need, what do they have to be equipped with, what you think you're going to be up against in the creation and

See CD, page 6 ►

CD Radio Tech Facts in Brief

- Three custom Loral FS-1300 satellites
- Four custom tracking antennas for uplinking in North America
- Four custom tracking antennas for satellite control from South America
- 15,000 square feet of studio and technical space
- Over 150 miles of cabling
- Completely digital facility

Facility includes:

- One central equipment room housing 90 racks of support equipment
- One satellite control/TT&C room to operate and maneuver satellites
- Eight digital on-air control rooms
- Four digital production studios
- Four talk interview studios
- Two multi-purpose rooms
- Thirty-one music programmers' consoles
- Rooftop VSAT, C & Ku band transmitting and receiving satellite antennas
- Digital routing and intercom
- Digital automation system including:
 - 3.5 terabytes of digital audio storage
 - 112 output channels
 - 62 workstations
 - Lucent Technologies digital compression technology

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Corrections

The Sept. 29 sidebar "LCD vs. CRT" reported the price of the Apple Studio Display to be \$1,999. Apple has updated its Web site (apple.com) with a lower MSRP of \$1,299.

The phone number for Webcast Solutions on page 24 of the Oct. 13 issue was a fax. For information about the company, call (415) 284-9999.

The Sept. 15 Readers Forum referred to Shel Swartz as the program director of WRKO(AM) in W. Palm Beach, Fla. Swartz is program director for the Web site called WRKO, The BIG 68 Remembered.

Kalman in the Satellite House

► CD, continued from page 5
production of the product.

You look at flexibility, you look at your equipment complement and what you can do with it. ... You look at the versatility you build into each of the rooms so that whatever comes along ... One minute, Elton John could be doing a piano solo in your performance studio, and then in the next minute you could be doing a radio drama with a dozen people in the room.

RW: What other mission-critical hardware was chosen?

Kalman: Aside from the multiple levels of redundancy that are built into the digital audio server system, there is the more mundane generator and UPS, which were top-of-the-line units for the application.

On the satellite and transmission side, we are using high-end ATM switches, redundantly coupled to get our signals to the uplinks, custom multiplexers for compression of our signal and custom modulators for uplink. The multiplexers and modulators are being designed and built by Lucent.

The choice of an uplink site was critical and somewhat problematical because of the amount of RF in the New York City area. We want to be good RF neighbors and make sure that we don't interfere with any of the existing sites in the area. We chose an uplink site that both met the interference criteria and also had

multiple paths into it to allow us to have diverse routing of our data to the site.

We also had to deal with a wide field of view at the uplink, site since our antennas are constantly moving. Most broadcast installations are "set 'em and forget 'em." We require a 200-degree range of azimuth and elevation.

More than one prime

RW: Did you have a master contractor?

Kalman: It was a number of contractors. ... This was a tremendous integration job. A company called the Systems Group in Hoboken is doing the documentation and integration of the facility.

Everything that you would think about a traditional broadcast environment, up to the transmitter, is being handled by the Systems Group. They also took care of AV requirements in the conference rooms and things like that.

Our uplinks are being installed by Globecom Systems Inc.

On a grand scale, we have a prime contractor for the studio integration, a prime contractor for the uplink integration, a general contractor for the physical plant, the walls, and then representing the company there's a construction management company.

RW: That's a lot of people to coordinate.

Kalman: A typical day for me is coming in, getting status on facilities onsite, each individual subsystem, our uplink facility,

having to interact with the other vice presidents for various requests, having to interact with the marketing department for things like this (interview) and tours, having to go to brainstorming meetings about what the whole offering is going to be, and so forth.

RW: Let's get back to the studio.

Kalman: Not only is it probably the first all-digital facility using AES audio, but

it's more like a video plant than an audio plant from the infrastructure and distribution perspective.

Within the AES bit stream, there are user bits. We're using those for transport of our data that will appear on the dashboard on the front plate of the receiver. So not only will you be getting the music, but you're getting the data that appears on a readout (artist, title, etc).

Instead of a separate path for the data and the audio through the facility, we are routing it all together on one plug using an AES standard.

See CD, page 7 ►

CD Radio

CD Radio (NASDAQ:CDRD) is building a subscription-based, satellite-delivered digital audio broadcasting system.

One of only two companies licensed by the FCC in 1997 to develop such a system, CD Radio has formed strategic alliances with technology companies to build out the necessary infrastructure. The company aims to deliver customized programming on up to 100 channels, 50 of them devoted to commercial-free music.

Satellite Transmission Network

Content will be up-linked to three custom-designed satellites, now under construction by Space Systems/Loral. The signal will then be broadcast to receivers in subscribers' vehicles.



A variety of receiver systems are under development including adapters for existing units, new three-band radios and factory-installed receivers — all of which will be configured to receive the CD Radio signal as well as FM and AM transmissions.

Essential components of the receiver design will include a display unit and controls, and a small satellite antenna.

CD Radio satellites will be deployed in inclined elliptical orbits

that ensure elevation angles of 60 degrees or greater over the continental United States, allowing for maximum line-of-sight from the satellite to radio receivers. A series of approximately 100 terrestrial repeaters are being erected in urban and mountainous areas to augment the satellite signal and ensure unobstructed coast-to-coast reception for U.S. motorists.

Technology/ Manufacturing Partners

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Lucent Technologies
Panasonic
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Space Systems/Loral

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C-Span
Hispanic Radio Network
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► CD, continued from page 6

RW: What compression technology are you using?

Kalman: We were allocated a certain amount of bandwidth in the S-band — 12 1/2 MHz. If you do the math, that's not a lot of bits. Without getting into the exact numbers, we obviously have to use compression technology to squeeze all of these channels into allocated bandwidth.

Lucent is developing the compression technology for us. We're using a custom flavor of PAC.



CDR will use Orban audio processors for its 100 channels.

RW: And you want to pay attention to how many times you compress and decompress the signal...

Kalman: Right, exactly. We didn't want to get into any noise pickup or any other problems typically associated with an analog plant. So we're going to be very fussy with quality control. ...

We are very aware of the pitfalls you could fall into in a server-based environment that's totally automated and we're being very careful to make sure that what comes out of the spigot is going to sound like live radio. ...

All of our interim storage is linear. We're not going through multiple stages of compression. There will be compressed storage at a high bit rate so that the ultimate compression will not cascade. In order to achieve that, all of the interim steps of production will be linear.

We're using linear storage as opposed to any compression algorithms. We're not using MiniDisc, for instance. We're not using any non-linear recording device. Our work stations are the NT platform of ProTools, which is linear.

Processing

RW: What kind of processing are you using?

Kalman: The product we're using is the Orban 6200 DAB processor — the Optimod without the exciter. ... We will have a hundred of them. There are 50 of them here right now. They're going to repackage the (second 50) into one rack unit high.

RW: What kind of digital consoles did you choose?

Kalman: Wheatstone D-600. We worked with Wheatstone to get their product to where we felt it was acceptable for our application. ...

We were concerned about the console architecture and the metering within that architecture, so that what a person in the control room saw was exactly what's

being represented in the digital word which is being stored, so that you don't exceed your headroom capacity.

Wheatstone came through and did a nice job of integrating both, a more traditional VU-type movement and also showing what is called dBFS (dB full scale) so that you won't exceed the number of bits you have to record digitally.

You could always take something, record it digitally and normalize the level so you have the right level on it, but if you exceed the number of bits you have, what do you do then? We wanted to make sure that one range on there never got exceeded. So we're operating at 20 db below full scale as our normal operating recording (level) to give us 20 db of headroom.

It's a plant standard. Some choose 12, some choose 18. We're being fussy.

RW: Are you ready to launch the first satellite?

How many broadcasters have had the pleasure of working with an astronaut to do orbital analysis?

Kalman: Jan. 17, 2000. The first just came out of what's called thermal vac, where they heat it up to the environment it will be exposed to in outer space when the sun is on, and when the sun is off, they freeze it

down to the environmental temperature of outer space and they see how it reacts.

RW: What redundancies do you have built into your systems, in case of failures?

Kalman: Right now we have 35 floors below us. As they said in the space program, failure is not an option here.

The digital audio storage system has approximately 169 work stations. Of those, there are 112 playout channels, and then a bunch of workstations distributed throughout the facility, in the studios and channel programmers' offices and music coordinators' offices and management.

All of that is tied together with an AES digital routing switcher from NVision ... with 512 inputs and 512 outputs. Essentially any of these workstations can be programmed as an outgoing

See CD, page 10 ►

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GUEST COMMENTARY

'B-Zero' Plan Would Offer FM Site Flexibility

by Mark Humphrey, CPBE

At the foundation of the success of a radio station are its technical facilities, which provide the signal — the ability to serve the local market.

If — and only, if — the coverage requirement is satisfied, the station's team must also deliver appealing pro-

gramming, manage its sales force effectively, and develop brilliant promotional strategies before it can attain the pinnacle of success. But unfortunately, many FM stations still crave the basic need of full market coverage because of transmitter site restrictions imposed by the FCC.

The distance-based commercial FM

allocation plan, in effect since 1962 when the FCC acted upon Docket 14185, was chosen for simplicity over reality. It is based on several assumptions, such as uniform terrain in all directions, perfect omnidirectional antenna patterns and normal propagation conditions. There also is an implicit assumption that suitable FM antenna

sites are actually available at locations meeting the spacing requirements.

But site availability has become increasingly limited by local zoning regulations, environmental policies, aeronautical considerations, terrain factors and increasing demand for tower space from other services, particularly in the densely populated regions designated as FM Zones I and I-A.

The allotment of hundreds of "Docket 80-90" stations also eliminated much of the margin for incumbent stations to relocate. Although some FM broadcasters are perfectly satisfied with their present transmitter sites, many others could improve their service if reasonable flexibility were offered.

Contour protection

In 1989, the FCC responded in part to these concerns by introducing Section 73.215, the so-called "contour protection rule." While this permits some short-spacing — if contour overlap is avoided — a new table of absolute minimum distance limits was arbitrarily issued.

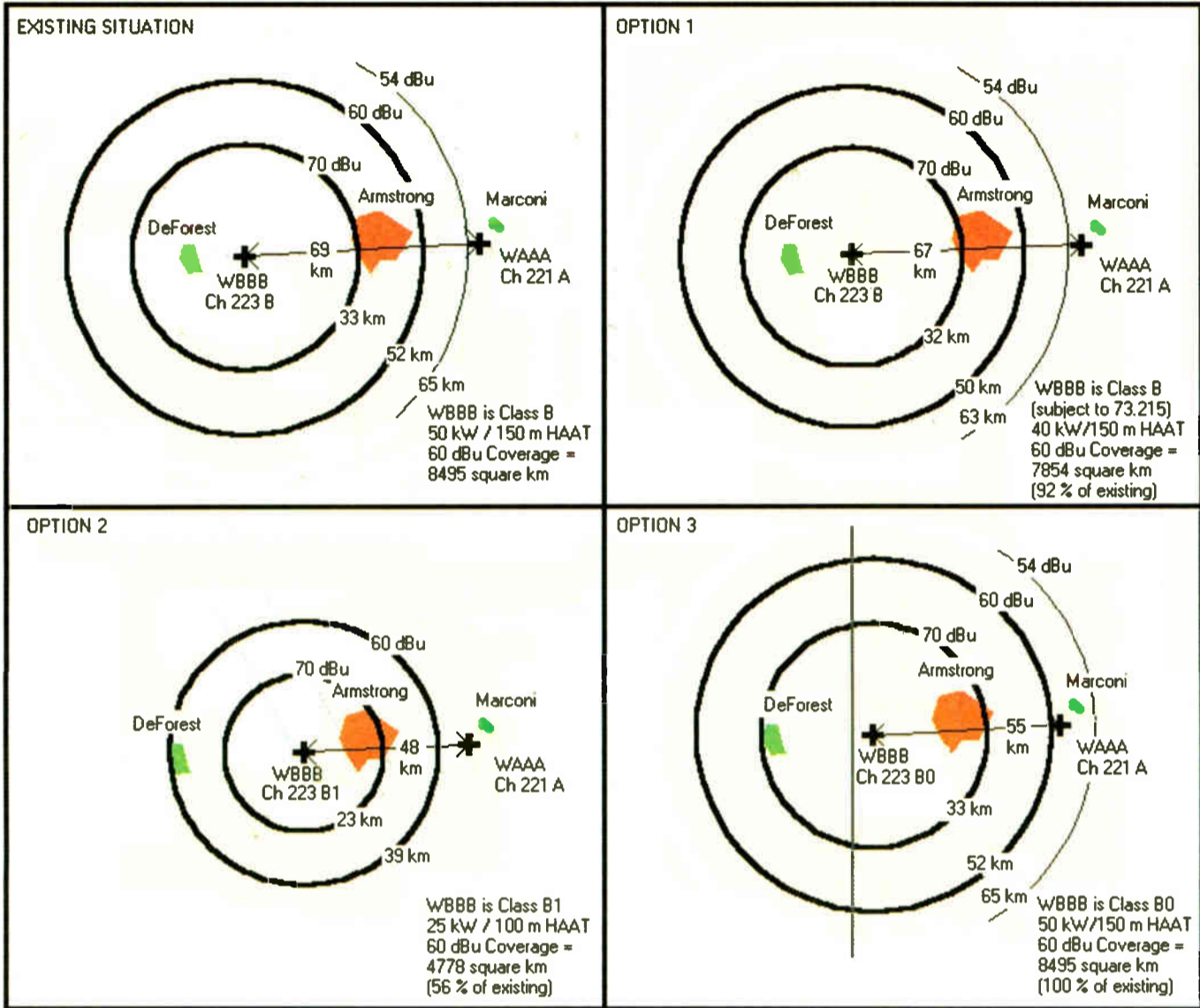
These separations have since been strictly enforced, despite the fact that some earlier case-by-case waivers permitted shorter spacings. Last year, the commission proposed a "negotiated interference" plan as a provision of MM Docket 98-93, (RW May 12, 1999) a proceeding still under consideration. This could allow a proponent to receive a small amount of interference within its protected contour by voluntary agreement, but rigid minimum spacings would remain in effect.

While all non-commercial FM stations are normally protected to the predicted 60 dBu (1 mV/m) contour, and commercial Classes A, C, C1, C2, and C3 also receive protection to that established level of primary service, there are two exceptions. Class B commercial stations are generally protected to a radius of 65 kilometers, or 40 miles — the distance to the predicted 54 dBu contour — and Class B1 facilities are protected to an intermediate level of 57 dBu.

The reason for this anomaly isn't clear, but it appears to stem from suggestions made by two parties — CBS and WQXR — in their Docket 14185 comments. Citing their local situation, they mentioned that the distance to the outer edge of most of the New York urbanized area ranges "35 to 40 miles" from midtown Manhattan, where most FM transmitters are located.

These comments apparently prompted the FCC to designate an arbitrary 40-mile radius of protection for all future Class B stations. Ironically, none of the commercial FM facilities in New York City have ever been fully protected at that distance because most were authorized in the 1940s and '50s, when 60 dBu contour protection was the standard for all classes.

Similar situations prevail in southern California, congested regions of the Midwest and throughout the Northeast Corridor. For example, here in Philadelphia, every Class B station receives interference within its 54 dBu contour from at least three — and in one case, seven — distant stations. But if 60 dBu primary service covers the urbanized



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Circle (91) On Reader Service Card
World Radio History

CD-R Ready for Satellite Rollout

► CD, continued from page 7

on-air channel and be routed to any particular on-air channel. So from a first-level perspective, we've got what's called RAID-5 storage, meaning that if any disk drive dies, it doesn't matter. ... Behind that, there's a fully redundant server, the main server, so you've got RAID-5 twice.

Each of these playout stations that are associated with on-air channels will hold four days' worth of programming.

Additionally we're anticipating having a mini-server system out at the uplink, so if this place should explode, we'll have at least the music channels running out there.

RW: How about from here to the uplinks in Vernon Valley, N.J.?

Kalman: We're connected by fiber out of this building into a Sonet ring. The fiber goes all the way out to the uplink. The Sonet ring automatically re-routes the signal in another direction in the event of a path failure.

One of the challenges that we faced was coordination of the frequencies that are assigned to us for the uplink. If we were using fixed satellites, it wouldn't be a problem, but we have inclined orbit satellites, which means we're tracking them.

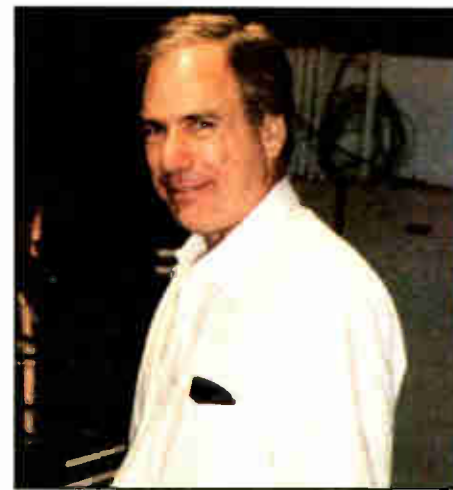
The challenge we have there was coordinating. It's a shared band. The uplink is in the Auxiliary Broadcast Band, which

is what ENG crews use (for two-way communication) — 7 GHz. ...

One of the requirements in that was redundancy of transmission path to the site. What we found, believe it or not, is that there is one building in Manhattan where everything goes through. It's 60 Hudson Street. Every path off of this island that we looked at went through this building. So we found a site that had connectivity — not only with fiber but with microwave and VSAT.

Special considerations

RW: What special considerations did CD Radio face in building a digital audio facility?



Kalman in a Rare Moment of Rest

Kalman: Essentially everything is different. All interconnection is using coax and BNC connectors — which are fairly alien to an audio plant — to carry AES 75 ohm, also not typical, through the facility.

The entire plant is locked to "audio black," or silence, so that there are no switching problems. We paid extensive attention to standard levels since you don't have any margin for error when you run out of bits.

We are paying a lot of attention to quality control and use of compression algorithms, because the final product will be transmitted compressed. Because of the number of channels we are transmitting, we have designed and incorporated sophisticated AES monitoring systems to alert us to abnormal operating conditions.

RW: Can you walk me through the audio air chain?

Kalman: (In) the normal audio air chain there is obviously a programming process that goes on with automation. And various elements are input, voice tracks, music, jingles, promotional material, channels, commercials. ...

After that's all in the digital audio storage system, it goes through a router, and the router goes through digital processing, and that digital processing feeds our head-end multiplexer, and the head-end multiplexer is interconnected to our uplink with various digital circuits and then goes up to the satellite.

RW: What would be interesting for our readers to know about the uplink?

Kalman: It's never been done before. We are controlling three inclined orbit satellites ... controlling them from here. ...

We're going to have three antennas that are programmed for the telemetry, tracking and control application. TT&C for the antennas is very interesting in that we can only see any two of our satellites for 16 hours a day from here, and the TT&C is being done in South America.

So we're connected from here through Loral's worldwide network to South America. We're getting ranging data from South America and talk to the satellites from South America. We're putting in four 11-meter dishes, two in Panama and two in Ecuador.

RW: How is what you're doing with satellites different from what a typical radio network does?

Kalman: (A) typical radio network uses some amount of space from a satellite provider ... a GE or whatever, and uses some amount of bandwidth. We have custom satellites designed for this application. It's a bent pipe system, meaning we go up at our frequency and

See CD, page 11 ►



OPTIMOD-6200

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is 5Hz or 20kHz, the OPTIMOD-6200 sounds better in the real world where it counts.

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■ A Harman International Company

► CD, continued from page 10 come down at our assigned frequency. We are using proprietary time and space diversity to ensure the signal gets to the end user uninterrupted by terrestrial blockage.

Also it's designed for a moving vehicle as opposed to a fixed antenna. These are not insignificant challenges.

On the satellite side, much of this stuff hasn't been done before, so we continue to knock down new issues as they arise. I don't believe that any broadcasters have had to deal with a three-satellite constellation in highly elliptical orbits requiring antennas to prediction-track their location to uplink signal.

I wonder how many broadcasters have had the pleasure of working with a real live astronaut on their team to do orbital analysis or have had the experience of working with an incredible team of people who are building and launching the satellites.

RW: What happens if one of your satellites turns away from the earth or you can't track it for some reason?

Kalman: We would be wounded but not out of business. If we only had two birds operating, there would be service outages for periods of the day, but we wouldn't be totally off the air. Having said that, we also have a ground spare that we're anticipating will probably be in orbit.

CD-R Gear Sampler

Wheatstone D-600 digital consoles (12)

Orban 6200 DAB processors (100)

NVISION 512x512 AES router

Prophet Systems Innovations NexGen digital audio automation system with 170 workstations

360 Systems Digi/cart audio storage and playback units (24) and Short/cut audio editors (12)

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RW: You have a floating floor. Is that in the performance studio?

Kalman: It's in every studio.

But what's interesting about that particular studio is that it's a double height, two-story-high, glass-enclosed studio. That's one of our performance studios.

The other one is more traditional. The glass that we used was imported from England. It's a glass called Pilkington glass, and it's a structural as well as an acoustic glass. We had to figure out how to suspend the glass at the traditional reflection angle for a studio at a five-degree angle, so that we maintained a reasonable acoustic space with all of that glass. We had to suspend the ceiling with RPG Diffusers and acoustically isolate the inner room from the outer room.

So the floor is floating, the walls are

sitting on the floor, and the ceiling is sitting on the walls and the ceiling is acoustically isolated from the building with a bunch of mason isolators.

RW: Why so much attention to isolation?

Kalman: Buildings in Manhattan sway. You get high winds. We're up on the 36th floor. Typically, unless you're in an older building in Manhattan, the slab construction isn't that great. So you've got noise transmitted through the floors from tenants on other floors. You design these things to minimize vibration impact into the room. All of our studios are designed as floating floor studios.

RW: You've got two performance studio.

Kalman: Yes. There are a total of 18 rooms. Sixteen have equipment in them, and two of them are performance spaces.

RW: Switching to programming, how you use jocks?

Kalman: There will be a combination of live and live-to-digital-storage, meaning the system affords them the ability to hear segues, to interact with the music.

One of the nice things about the digital age is that if there's a dance music talent in Denmark that we wanted to use, we could have them e-mail in voice tracks and interact with the system, and we can integrate that into programming.

RW: Can the jocks switch studios?

Kalman: If Pat St. John, for example, is working in this studio here, today, and there tomorrow, why can't his settings follow him? We're working on getting this out to a database so whatever studio you're in, you'll just log in

See CD, page 12 ►

A challenge from the greatest critic of the OPTIMOD-FM 8200 - the guy who invented it.

ON AIR



"Version 3.0 is more than an upgrade. It can take your station's signature to the next level of competitive sound. Listen to it side by side with any audio processor in existence; then, let me know what you think. Good or bad, every e-mail sent to me will be answered by me, personally. bob@orban.com."

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BOB ORBAN is known for his critical ears. In the seven years since we introduced OPTIMOD-FM 8200, perhaps no one has logged more hours listening to the best and worst in digital audio processing. Even critics have called his knack for creating louder, punchier, artifact-free sound "a gift." But make no mistake. With 30 years of experience in audio, it's Bob Orban's expertise that is written into every layer of the new Version 3.0 software. It gives you a level of audio technology that no other processor in existence can match.

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CD-R: Big Digital in the Big Apple

► CD, continued from page 11 and your settings will come up.

We have several smaller studios where jocks can come in and cut their airshifts. They can do a week's worth of shows in about an hour and a half.

RW: What special challenges have you had to solve because you're doing a satellite service?

Kalman: There's the answer that people don't normally think about because it's out of the realm of challenges to broadcasters this minute. That is the utilization of the compression algorithms for our final product.

Every step of this design had in mind that there was going to be severe compression in the transmission chain. So, every decision we made, as in "no MiniDiscs" and "no detrimental compression before the final output," (was) based on the desire to keep it pure. That would be an overriding consideration ... and will continue to be (one) if we are using archival material or things that perhaps are only available on vinyl and have to get input to the system.

We're going to be very conscious of any effects or any anomalies that might be exhibited because of the use of non-traditional compression.

RW: Is there a master control area?

Kalman: There is no traditional master control. There's an equipment room with

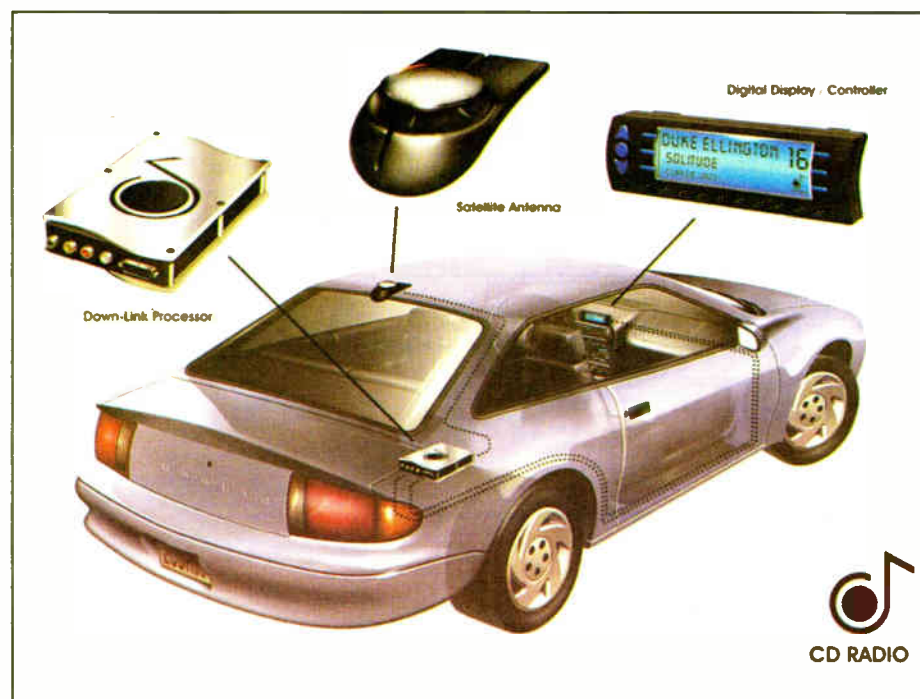
about 88 racks of equipment and then there's what we're calling our TT&C room with our satellite control facilities.

All of the monitoring of the place is computer-based, so we will have a central monitoring station and will be staffed 24 by 7 on the satellite side and on the maintenance side.

We're not defining roles here in tradi-

tion of engineering and operations and is a co-founder (along with chairman and chief executive officer David Margoese) of the company.

RW: Down the road would it make sense to make a receiver that gets every format — analog, IBOC, SDARS, the Internet ... so consumers don't have to repurchase?



CDR is exploring various receiver configurations.

tional hierarchy. We're looking for multi-talented people. Somebody on the maintenance staff may also be multitrack recording or going out and doing a field job or whatever. But the satellite people will be specialized.

RW: What are CD's plans for the receive antenna?

Kalman: There are a number of options being explored right now, which are basically incorporated into the roof of the car. ...

You could build it in as part of the roof. There would be a number of options as far as reception, as far as installation of the receiver in your car — an FM modulator approach, a fully integrated aftermarket unit and an OEM installed product in your new vehicle.

RW: When are you likely to achieve receiver interoperability with XM Radio, the other licensed satellite service?

Kalman: We certainly have the goal of interoperability and we're working with XM Satellite to reach that goal. It's not a simple question. We have the patents on this system. We have the patents on our transmission system. We feel we have superior transmission system. Ford obviously feels the same way.

RW: How is the engineering department organized?

Kalman: We have four vice presidents in the engineering department. I am responsible for the National Broadcast Studio and the uplink. We have another vice president who is responsible for the design and implementation of the terrestrial network, Mark Gaudino. We have another vice president who is responsible for the satellites, S. Paul Sharma, and another vice president who is responsible for design and implementation of the receivers, Michael Bergman.

Robert Briskman heads the engineering department as executive vice presi-

dent of engineering and operations and is a co-founder (along with chairman and chief executive officer David Margoese) of the company.

Texas Instruments has a chip right now with downloadable algorithms on it for all these MP3-type devices and other stuff. So it's not out of the realm of possibility that you'll be able to, even over-the-air, download a particular algorithm to get a particular type of service. There's probably no question that at some point there will be two-way service from the car.

I also have an opinion on how much of this really belongs in the car. My right hand goes over here, my left hand over here ... and there's a vehicle in front of me and a vehicle on the side of me. I want to get to where I want to go without too much distraction.

RW: How far down the road could we see those receivers?

Kalman: I honestly believe at this point (that) the Internet is a bandwidth issue. The Internet in the car as a mobile environment ...

Are these people giving you this air time for nothing? The last time I looked at my cellular bill it was pretty hefty. So I don't understand where this bandwidth is suddenly going to come from to give you Internet radio, with the quality that we're delivering. You can barely get 56k in your house right now. That's over a wire.

We are delivering a satellite-delivered signal with terrestrial enhancement for those areas where you can't see the satellite. That is seamless coast-to-coast continental United States coverage. Show me a cell phone that delivers that to you.

To answer your question, I don't think it's going to be too far off if, first of all, the IBOC people can get their act together and prove that it works and that it makes sense for them. There's another issue, and these are only my personal opinions — I don't understand the finan-

Mark Kalman

Mark Kalman is vice president of CD Radio's National Broadcast Studio in New York City.

From 1995 to 1998, he was vice president of engineering and new technology for Sony's SW Networks, a radio and Internet content provider.

Prior to SW, he was general manager of operations and engineering for the ABC Radio Networks. He worked at ABC for 12 years. During that time, he managed the national operations staff and was responsible for the design and implementation of new studios, including digital audio and automation systems.

Kalman also served as engineer in charge for various Olympic and national political convention coverage. From 1975 to 1983, Kalman worked for the NBC Radio Network as engineering projects manager.

Kalman holds an engineering degree from the State University of New York.

cial incentive for a radio station to put the same product on digitally and analog. I just don't understand why you'd spend the money to do that and then wait for the receivers to get out there. It's not as if there's a new revenue stream to do it.

RW: Just because it sounds better ...

Kalman: We are not going to knock out the classic rock station in New York. We're going after the blues market, the vocal classical listener, whatever we have to offer in our hundred channels. We're going to those people who feel they're not being served right now.

So any model you use, it's a different revenue model. If you're basing your revenue on ads on your channels, our music channels are not going to have commercials. It's a subscription service.

RW: Do you want to put your service on the Internet at all?

Kalman: We will have heavy Internet involvement. What that will be, I don't necessarily want to talk about. It's not necessarily streaming audio.

RW: As a veteran of the traditional radio industry, do you feel like a revolutionary, or a turncoat, being part of this new service that could overturn so much of what radio is doing?

Kalman: I feel that this project is the next logical step for me. I got into radio for, among other things, the excitement, freedom and creativity the medium offered.

Over the years, money became the driver and the medium became more homogenous, fewer risks were taken. The CD Radio environment will allow the excitement and creativity to coexist with the financial return. We'll be able to serve those members of the American radio audience who are not recognized by radio.

We don't feel that our mission is to overturn what radio is doing, but to give the mobile marketplace additional choice. NPR and PBS create programming that is different from commercial broadcasters and coexist, there's no reason to believe that the same thing won't happen with us.

BUSINESS DIGEST

Sale of CRL Final

TEMPE, Ariz. The sale of audio processing manufacturer Circuit Research Labs to a Tempe businessman has closed.

"Everything that needed to transpire to complete the sale has," said Gary Clarkson, former majority owner and co-founder of the company.

The new majority owner is Jay Brentlinger. He owns several Phoenix-area radio stations and has an engineering background (**RW**, Aug. 4).

"I'm honored to be leading the hard-working professionals at CRL into the future," Brentlinger said.

The company has recently added several employees to its sales and marketing staffs. CRL currently has 16 employees.

CRL's shareholders voted earlier this year to sell the company or dissolve it after the company lost money five out of the past six years.

After shutting down production earlier this year, CRL resumed production of its current product line in June following Brentlinger's offer to buy the company.

The sale followed the death of co-founder Ron Jones in 1998. Clarkson and Jones formed the company in 1974.

— Randy J. Stine

WPLY Urges a Class B-Zero

► **SITE**, continued from page 8
area from a well-placed site, signal problems are minimized.

Here at WPLY(FM), we've concluded that the best antenna location in our market is the Roxborough antenna farm, where 15 FM and nine TV stations are now based. Another local station moved there from an outlying site under an FCC waiver, and the resulting coverage improvement overcame many former service impairments caused by terrain and receiver-induced intermodulation ("WXTU Recommends Tennaplex," RW, May 5, 1986).

At Roxborough, WPLY would install a directional antenna to prevent new interference to neighboring facilities. But our proposed site falls 3 km short of the Section 73.215 absolute minimum separation to an adjacent channel Class A station, built in the 1970s on the Jersey shore. As a result, WPLY would receive minor interference at the eastern edge of our proposed 54 dBu contour.

Create Class B0

Then we realized an interesting fact.

If WPLY were located in FM Zone II — for instance, in the Southeast — our 50 kW facility would be designated as Class C2, and we would receive interference protection to the 60 dBu contour, rather than 54 dBu.

Under that classification, WPLY could relocate to Roxborough in compliance with existing spacing rules. From the start, our 54 dBu contour has never been fully protected, so we would gladly accept 60 dBu protection if this allowed operation at our market's premier antenna site.

So we have proposed a simple revision to the FCC Rules: Any commercial Class B station requiring additional freedom to relocate should have the *voluntary* option to accept 60 dBu contour protection. We suggest a new

designation, Class B0 ("B-Zero"), but these stations would observe the existing Class C2 spacings listed in Sections 73.207 and 73.215 of the FCC Rules.

Most important, no existing Class B station would be *forced* to reduce its protection *involuntarily*.

Case study

To better understand how our "Class B-Zero" proposal could assist a Class B station wishing to relocate, consider the case of WBBB in the fictional metro market of Armstrong.

If approved, our 'B-Zero' plan could put your signal on a solid footing and help you over the hurdles.

"B-93," as it's known, is an imaginary 50 kW FM station licensed to the community of DeForest, about 35 miles (60 km) west of the city of Armstrong. WBBB's existing transmitter site is several miles east of DeForest, where it also provides primary service to Armstrong and nearby suburbs. An interstate highway between the two cities was built about 20 years ago, so an increasing number of DeForest residents commute to work in the large buildings in downtown Armstrong.

But indoors, they can't receive their favorite station, WBBB, because its signal just doesn't quite have the strength to penetrate those big concrete and steel walls. The problem worsened after desktop computers, fax printers and other microprocessor-based equipment

came into widespread use, due to RF noise leaking from those machines.

People also complain that WBBB sounds "garbled" along a certain stretch of the highway while they pass next to an antenna farm where a few of the market's competitors are located. Their extremely strong signals are causing receiver-induced intermodulation which overrides WBBB's relatively weak signal.

And there's another complication. The TV station that rents tower space to WBBB is planning to install a UHF antenna for its new digital transmission

facility. Due to structural limitations, the FM antenna lease must be terminated at the end of year.

However, B-93's chances of quickly erecting a new 500-foot tower appear bleak because the "DeForest County Concerned Citizens" historically delay construction of wireless towers in that picturesque area.

There are several existing towers available for rent in Armstrong County, several miles to the east, and the owner of WBBB would like to move to one of them, in response to these changes in market conditions. But in the late 1980s, WAAA, a new "Docket 80-90" Class A station on a second-adjacent channel, began operating in the village of Marconi, about 20 miles beyond Armstrong. WAAA's present site is only 69 kilometers from WBBB, the minimum spacing allowed by section 73.207 of the FCC Rules.

Option 1: WBBB first considered the Section 73.215 "contour protection rule," but this would open only a 2 km margin to the east. Even worse, B-93 would be required to reduce power to avoid overlap of its 54 dBu protected contour with WAAA's 94 dBu interfering contour. Any signal improvement gained by moving this short distance would be offset by the power cutback. Those minimal results appeared hardly worth the effort or expense.

Option 2: Under present rules, B-93 has just one alternative — a "one-step" downgrade to Class B1, with a limit of 25 kW at 100 meters. While this option would allow WBBB to move as close as 48 km to WAAA, nearly half of its primary coverage area would be lost. In fact, from any site offering a signal improvement in downtown Armstrong, WBBB would fail to maintain its mandated 70 dBu coverage over DeForest, and this wouldn't pass muster with the FCC.

Option 3: Our "B-Zero proposal" would give B-93 another choice — and solve its problems. By voluntarily accepting 60 dBu contour protection, WBBB could apply for the Class B0 designation, retain its 50 kW facilities,

and move 14 km (9 miles) east in accordance with the existing Class C2 separation requirements.

Voluntary option

An omnidirectional antenna could be installed on an existing tower 55 km west of WAAA. From this site, WBBB would continue to provide 70 dBu coverage to its principal community — but would improve its signal in downtown Armstrong by nearly 10 dB, resolving the listener complaints. Although WBBB would receive some new interference from WAAA within its 54 dBu contour, its signal strength near Marconi would increase significantly, providing improved service to that area.

Note the vertical line in the Option 3 map, and suppose the left side falls within FM Zone I, and the right side represents FM Zone II. Under present FCC rules, by simply moving its 50 kW transmitter facility across the line, WBBB's designation would have changed, *by default*, to Class C2 — in effect, Class B0.

We ask the obvious: Shouldn't broadcasters be given this voluntary option without leaving Zone I?

Our studies also indicate potential benefits for existing Class B1 stations seeking a power increase. In some locations, certain B1 facilities could upgrade to 50 kW Class B0 operation where they can't quite meet the full Class B spacing requirements.

If you're interested in learning more about our proposal, you have concerns or want to offer your support, I invite you to visit our B-Zero Forum, on the Web at www.wply.com/b-zero.htm

Perhaps you're unhappy with your present coverage, or you've just received notice that you're about to lose your antenna lease due to DTV displacement.

If approved, our "B-Zero" plan could put your signal on a solid footing and help you over the hurdles, so your station emerges as a winner.

■ ■ ■

Mark Humphrey is director of engineering at WPLY(FM) in Philadelphia, an associate member of AFCCE and chair of SBE Chapter 18.

For more information, contact him at (610) 565-8900 or by e-mail to mark@y100.com

RW welcomes other points of view.

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Workbench

Radio World, November 10, 1999

Survive an SA Receiver Failure

John Bisset

Most everyone is aware of the shortage of Scientific Atlanta satellite receivers and parts. Figure 1 provides an option to keep a second receiver running should the power supply fail.

Although not recommended by SA for long-term use, back feeding the voltage from the test points into the defective supply does work. Make sure you have unplugged the defective supply from its AC source. Tinned zip cord fits into the DC voltage "sample" jacks, and the beefy supply doesn't seem to mind running two receiver chassis.

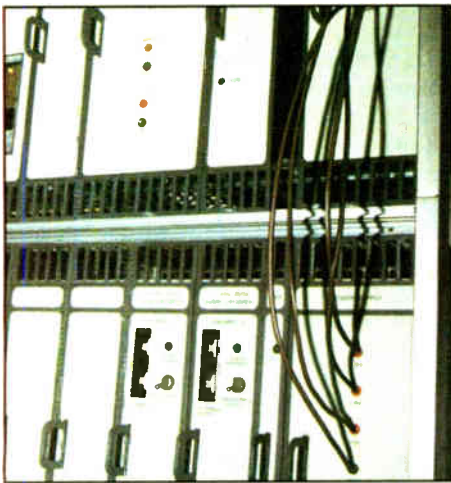


Fig. 1: Backfeeding DC Into a Scientific Atlanta Receiver Power Supply

The electrolytics are the most likely cause of failure in the SA power supplies. Plan on keeping some replacements on hand, and change them once every five to seven years. To minimize your repairs, "shotgun" all the electrolytic capacitors, not just replacing the ones that are bad.

As you remove the supply module, take it outside and use a can of clean compressed air to clean out all the dust. You'll be amazed at the dust build-up. The dust doesn't help heat sinks dissipate heat, which will also lead to eventual failure.

Thanks to John Tiedeck, a contract engineer in Pennsylvania and Delaware, for providing the maintenance information and the picture.

★ ★ ★

Don't you love it when ground isn't ground? Lightning does too, as you can see in Figure 2.

On this mountaintop site, the lightning tried to find ground through the electric distribution panel. Before your site gets zapped, carefully inspect how it is grounded. With stations being bought and sold, there's no telling what kind of engineering has preceded you, so assume nothing. That includes that one of your predecessors didn't run 110VAC

in Belden 8451!

This is a good time to check your system grounding. Start with the transmitter. If your rig uses an external power supply — both need to be tied into the station ground system (see Figure 3). In addition to the transmitter, are coaxial cables grounded before they enter the building? Is there a common ground for the transmitter site? If copper strap is used, is it intact?

If ground cables are used, check the connections — they need to be tight to work.

★ ★ ★

Speaking of tight connections, pray that the AM feed to your tower doesn't look like Figure 4 on page 18. In addition to being loose, the rust and corrosion that has built up under the paint isn't helping things either.

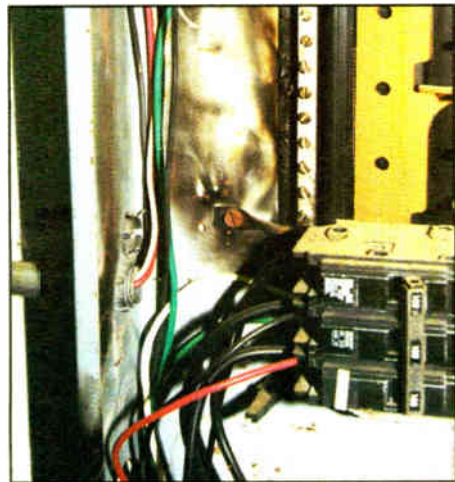


Fig. 2: Check grounds carefully, even in electrical distribution panels.

To make matters worse, this tower is a part of a directional array. The array parameters were all over the place, and it's no wonder. Just remember I²R losses can occur anywhere.

★ ★ ★

Aaron Bishop from Boston University's station came up with an inexpensive way to link the fiber optic outputs of Sony's TCD-D7 DAT machine and the MZ-R50 MiniDisc. Ready-made cables can run \$40-\$50, and making your own is not that hard. For stations on a budget, this is a godsend.

Aaron buys a length of fiber optic cable from a local electronics store. You can get whatever length you desire, but keep in mind, lengths longer than six feet may require a booster.

The first step is to take a used ball point pen — throwaway Bic pens are great for this application. Take the pen apart to get to the plastic ink reservoir tube inside. Snip off about one inch of

clean empty reservoir tube. Insert the fiber into this tube.

Using electrical tape, wrap it around the other end of the tube. The idea is to wrap

enough layers of tape that a firm, tight connection is obtained when the tube is inserted into the optical digital port of the MZ-R50. To maintain a good, reliable digital lock, you will need a tight connection.

To mate your cable with Sony's component (consumer) decks, like the

See WORKBENCH, page 18 ▶

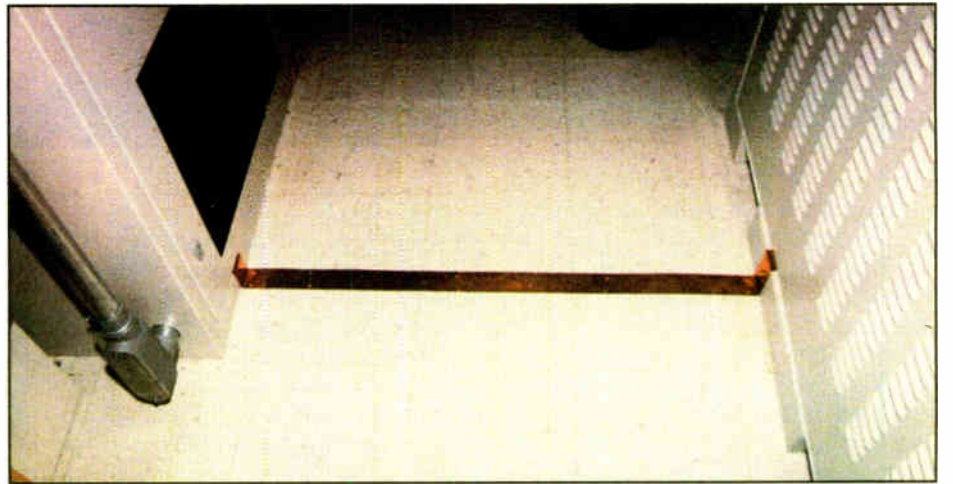
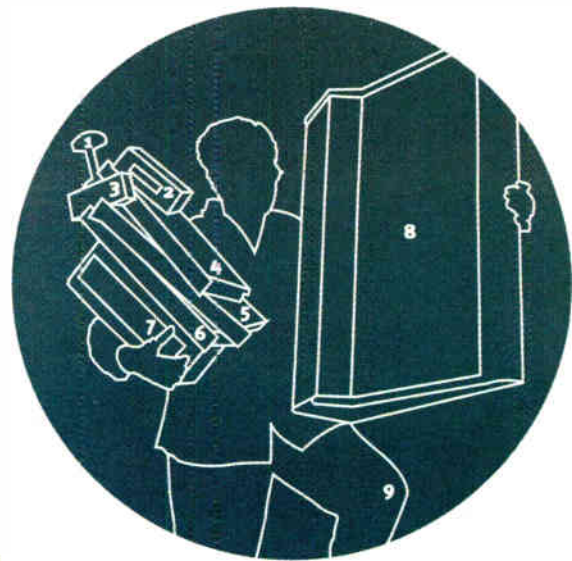


Fig. 3: Ensure that transmitters and their power supplies are grounded properly.



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USER REPORT

Tucson Station Chooses Klotz

John Decker

When Capstar decided to consolidate our Tucson stations into one building early last year, we were faced with many decisions. One of these centered on choosing the right consoles for our new facility.

More important, though, was the decision on the general technology for all the new equipment. Fortunately, I had a plan in mind, which stemmed from an encounter a couple of years back.

At the NAB show in 1996, I came across the Klotz Digital equipment and discovered its Vadis digital audio platform and DC model mixing consoles. I was intrigued the first time I saw them. The DC layout seemed straightforward for operators, and I recalled the flexibility of the Vadis platform. The Klotz approach also reduced plant wiring considerably as compared to the analog projects I had been involved with.

In my mind this made the equipment great for radio, because of all the usual programming and promotions departments' last-minute "technical" requests. Of course, I moved on to look over the other exhibits at the show, but the idea of this type of platform system remained in the back of my mind for future reference.

Jump ahead to 1998: We had two buildings, each of which accommodated two

of the stations. The plan was to consolidate our four stations, KWFM-FM, KRQQ(FM), KNST(AM) and

to provide the flexibility and technical capability the four stations would require. I was certain we would need more capa-



Klotz Digital at Work

KCEE(AM), into a new facility. Soon the time came to purchase equipment for the new plant: we already made the decision to leave our 10-year-old Audiotronics analog consoles behind. The old consoles had given many years of good service, but their condition had deteriorated.

Another important decision for the new facility was to create a digital plant, not only for the sake of digital audio but

bility than we had had in the past.

After looking at several options, we decided on the Vadis platform and DC consoles from Klotz. Why the Vadis and DC?

First, our install would be much faster, since most of the plant wiring would be reduced to a simple Ethernet line and a fiber optic cable connecting each control room with our rack room. We used the fiber optics to connect all the audio, and the Ethernet line to connect all the DC consoles as well as other controllers, such the main rack room PC.

Second, now that all four stations were to be in the same facility, we had a requirement to share audio sources all around the plant. This turns out to be a function which is part of the Klotz system. In addition, our entire plant would now be based on a digital audio

"backbone," providing an improved audio signal and eliminating problems typical with many analog cable runs.

I realized too that any future audio sources or destinations would be digital, and the Vadis provides for this as well as our current analog I/O.

Purchases

We purchased five DC consoles: one for each of the four on-air control rooms, as well as one for our news production control room. Vadis platform card cages are located in these rooms, as well as in the rack room for centralized sources and outputs to the various transmitters.

Our entire plant would now be based on a digital audio 'backbone.'

The air talent finds the DC consoles simple to operate. They can put any source in our plant on any fader of the console they are using with a simple LCD button panel in the meter bridge. The sources on each fader, bus assignments and even related mix-minuses for the console can be easily recalled for shows such as morning drive, remote broadcast, etc.

The ability for the operator to call up any source to a fader is great, because each operator prefers a different arrangement of sources on the console for their shift.

Machine control in each room or to the rack room for the various devices such as our Prophet Systems is an integral part of the Klotz system. Local logic for things such as on-air lights or triggers for

See KLOTZ, page 20 ▶

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Check Grounding Before the Winter

▶ WORKBENCH, continued from page 17



Fig. 4: Check towers for loose connections, rust and corrosion.

JE510, visit a good stereo retailer and obtain several of the plug/covers for the optical jacks. If you talk to a service person, and offer to buy them, you might just get the little plastic plugs for free.

Carefully drill the appropriately-sized hole in the plug, and glue the fiber in place. The total cost for the do-it-yourself cables is less than \$20.

■■■

John Bisset has worked as a chief engineer and contract engineer for more than 30 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 to jbisset@harris.com

WIRED FOR SOUND

A Whole New Category of Cable

Steve Lampen

I moved not too long ago. And, when I ordered additional phone services in my new home, I followed the installer around, just out of curiosity.

As I suspected, he was installing my new phones on Category 3 cable. Now why would someone as cost-conscious as the phone company be installing cable capable of carrying 16 MHz network data on my telephone?

Category 3 is twisted-pair cable that falls under the specifications set up by the Electronic Industry Association and the Telecommunication Industry Association. The basic specification is EIA/TIA 568A. (There's also a second standard, 568B. Shades of AES: pick any standard, we've got lots of them!)

The original spec covered Category 3, with a bandwidth of 16 MHz. But Category 4 soon followed with a bandwidth of 20 MHz, as did Category 5 with a bandwidth of 100 MHz. Because of the similar bandwidths of Category 3 and 4, the latter has virtually disappeared from the map.

EIA/TIA, in the meanwhile, are hard at work on an enhanced version of Category 5 called Category 5e, and also on future specs for Category 6 and 7. So anyone telling you that they have cables which are Category 5e, 6 or 7 had better have the word "proposed," since none of these standards exist yet. Category 5e is getting close, however.

How we got here

So why in the world would the phone company put in Category 3? And why would you, a radio/audio engineer, be interested in these network cables, sometimes called premise or premise/data cables?

You had better be interested, because the way things are heading now, you may be using just this kind of cable to ship everything around. And by everything. I mean analog audio, digital audio, machine control, computer data ... virtually any signal you want to send.

Most of these premise/data cables, in the United States at least, are UTP, unshielded twisted pairs. Should anyone think that the cable manufacturers are stuck in the dark ages while the equipment gets faster and faster, one might consider Category 5 (100 Mbps @ 100 MHz). If someone had told you 20 years ago that we would have a common twisted-pair cable that could handle 100 MHz of bandwidth for 100 meters (328 feet), they would have been ushered into the loony bin.

We couldn't make a twisted pair that could do 1 MHz until the arrival of "twin-ax" cable. It was the twin-ax design that started a revolution in paired cables, a revolution which led eventually to UTP. The problem was impedance. Once you pass 1 MHz, impedance of a cable becomes somewhat important. If you remember our (ad nauseam) discussions in past issues about wavelength, a 1 MHz signal have a wavelength of 300 meters (984 feet) and the "critical cable distance" of one-quarter wavelength would therefore be 246 feet.

Could you have a computer cable running 246 feet? Of course you could. The

problem was that twisted pairs are inherently unstable in terms of impedance. A few feet, when the cable is stretched, flexed or otherwise manhandled, it

The way things are heading, you may soon use this kind of cable to carry virtually every kind of signal.

While the cable might be its chosen characteristic impedance for the first would be some other impedance. This variation is called "impedance toler-

ance," meaning the expected variation around the desired value.

Original twisted pairs couldn't maintain an impedance tolerance of even 30 percent (i.e. the cable impedance varied +/- 30 percent either size of the desired value). Many are even 50 percent variation or more.

Because impedance variation in analog audio is meaningless (a quarter wavelength at 20 kHz is 2.25 miles!) nobody cared. At 1 MHz, a 30 percent or 50 percent variation mean that a significant percentage of the signal energy would be reflected back to the source (called "Structural Return Loss", akin the VSWR in a transmission line).

It was for this exact reason that twisted pairs were rejected as a medium to carry computer data in the 1950s. Instead they

See CABLE, page 20 ►

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Where Cable Categories Came From

► CABLE, continued from page 19

chose coax cable. Even poor coax cable has an impedance tolerance of 10 percent, and good coax cable can be as tight as 2 percent! That's a whole lot better than any paired cable.

It wasn't until the late 1960s that twin-ax came into being. In these

noise themselves.)

The next step in evolution of paired cable was IBM Type 1. This is a perfect example of a cable designed by scientists and engineers, and not by installers or end-users.

It was long known that the ideal impedance for lowest signal attenuation

set for something easier to emerge.

And that new cable came from the "telco" standard, which was 24 AWG, solid, unshielded pairs. Like any existing system, this telco cable came with its own baggage. First is the gage size, 24 AWG. This is a significant factor that limits performance and distance.

There's a reason ...

And the reason we're stuck with 24 AWG is because of the connector, called

an RJ-45. If you haven't played with these already, they look suspiciously like the RJ-11 connectors on your phones, fax machines and modems.

In our next installment, we will have further details on Category cables, connectors, and why anyone in audio should be interested.

■ ■ ■

Steve Lampen is technology specialist, multimedia products for Belden Electronics Division in San Francisco. His book "Wire, Cable, and Fiber Optics for Video and Audio Engineers" is published by McGraw-Hill.

Twin-ax design started a revolution in paired cables that led eventually to UTP.

designs, the conductors in the twisted pair were "precision twisted" and then surrounded ("packed") with materials to keep them in their configuration.

A twisted pair

This resulted in impedance tolerance in the +/- 20 percent range, not bad for a twisted pair. While still not in the league with coax, twin-ax did provide balanced lines with common-mode noise rejection, which was beneficial in locations with EMI or RFI problems. (And a lot of computers back then generated a whole lot of

was 150 ohms. So IBM Type 1 is 150 ohms. In order to have reasonably low resistance loss, they chose 22 AWG solid wires. As you are now aware, choosing those two numbers, plus a choice of plastic, essentially determined the size of the cable. And it was *big!*

IBM Type 1, with two shielded pairs, has a diameter 0.295 inches by 0.430 inch. This was just too unwieldy, and concerns about size and flexibility were the primary complaints. Add to that a clever "hermaphroditic" connector, which was equally huge, and stage was

Digital Choice in Tucson, Arizona

► KLOTZ, continued from page 18

remote devices such as RPUs in the rack room can all be controlled from each console.

The logic associated with each source actually follows the source to the fader on which it appears on any of the DC consoles. This really simplifies operational issues for us.

The customer service and technical support from Klotz have been excellent. Klotz personnel were here when the first installation was completed and helped out with last-minute problems or changes, most of which were configuration-related and easily corrected. Mainly, changes consisted of the details we didn't consider at the planning stage. After installation, of course, a certain operator function or engineering requirement would arise which was addressed on site by Klotz.

Because Klotz provides an integrated system of multiple control room mixing, logic commands, audio format conversion, routing, networking, and so on, the learning curve on the technical side is a bit steep, but

well worth it for the flexibility and capability the system provides.

The operators find the DCs easy to use and installation is quite fast. I would recommend to engineers considering Klotz to detail as much about their requirements, input sources, outputs and such during the planning stage.

I also recommend that engineers have a good idea of what they want their new plant capability to be, since the Vadis digital audio platform and DC mixing consoles can be configured to meet most any requirement.

■ ■ ■

John Decker is with Pacific Star Tucson in Arizona.

This article was written to appear in our Buyer's Guide section on On-Air Consoles, but did not reach us in time for that issue. It is printed here as a service to our readers.

For information about Klotz Digital, contact the company in Georgia at (678) 966-9900, visit the Web site at www.klotzdigital.com or circle Reader Service 93.

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Citadel Chooses Scott

Citadel Communications Corp. chose Scott Studios Corp. as the sole supplier of on-air digital audio delivery systems for its 119 stations and its future acquisitions.

"We thoroughly investigated all of the competitive digital air studio systems and decided upon the best one," said Larry Wilson, CEO of Citadel Communications, in a statement released by both companies.

"While no system or manufacturer is 100 percent flawless, it became obvious to us that Scott Studios is the very best."

Upon completion of pending transactions, Citadel will own or operate 124 radio stations in

23 mid-sized markets such as Providence, R.I.; Salt Lake City; and Albuquerque, N.M. Scott Studios said it has placed

5,046 digital audio workstations in 2,202 U.S. radio stations. It said nine of the 10 top-billing groups have Scott Studios systems.

For information, contact Scott Studios

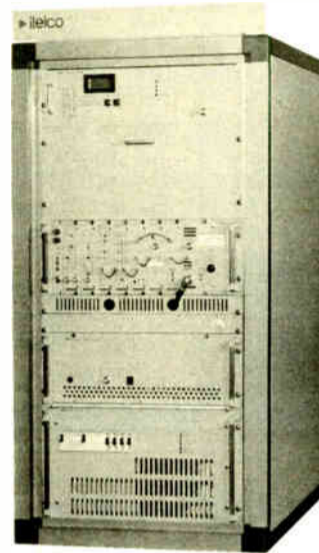


Dave Scott, left, and Larry Wilson

in Texas at (800) SCOTT-77, visit the Web site at www.scottstudios.com or circle Reader Service 103.

CKNW Selects Itelco for DAB

Itelco supplied two 200 kW DAB transmitters to radio station CKNW of Vancouver, B.C. Installed in two locations in the Vancouver area, the new transmitters will provide DAB transmission services for the WIC Radio Network's CKNW(AM) and Rock 101 FM stations, in addition to Shaw Group's CKLG-73 AM and CFOX FM stations. CKNW selected the Itelco transmitters because of their redundancy features, modular construction and affordability, Itelco said.



CKNW installed the transmitters in two locations one at a 3,000-foot elevation site on a mountain overlooking Vancouver, and the other atop a building in Burnaby, east of Vancouver.

For information, contact Itelco in Colorado at (303) 464-8000 or circle Reader Service 113.

Three Angels Network Plans Facility

3ABN, the Three Angels Broadcasting Network, selected RDA Systems Inc. to design and install its new radio network facility.

The organization, which is a global Christian television broadcaster, plans to have its new radio network on the air by the end of this year. The studios and the 3ABN Radio Technical Operations Center will be wired and tested at RDA's facility in St. Louis prior to delivery.

The AudioVault audio management system from Broadcast Electronics is a central part of the facility. It will provide assistance with live programming, and permit program automation during the remainder of the broadcast day. The Audioarts RD-20 digital console from Wheatstone was selected for the primary control room.

RDA Systems provides consulting and systems integration services to the radio, TV and cable industries.

For information about RDA, call the company in Illinois at (314) 872-8222, visit www.rdasystems.com or circle Reader Service 123.

Classic FM Orders Five Optimod-FM 8200s

London-based classical music station Classic FM recently ordered five Orban Optimod-FM 8200 audio processors. The sale was handled by Harris Studio Products, the U.K. distributor of Orban processors.

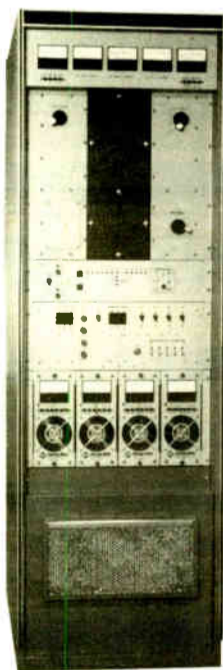
"Classical music is notoriously difficult for processors to handle because of the range of frequencies," said John Sullivan, Classic FM head of engineering.

See WBW, page 26 ▶

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READER SERVICE NO. 70

Get to Know Tube Terminology

James G. Withers

In the Oct. 27 issue, I wrote about the lineage of vacuum tubes, describing in general how tubes are constructed and some basic terms used with power tubes. Now we will see how those tubes are used in current tube-type broadcast transmitters, and what broadcast engineers need to know when they come across one.

Power tetrodes are by far the most common type of tube still found in FM broadcast transmitters, although many AM transmitters, and some FM types, use triode tubes. Still others, although not many, use pentodes.

Most high-power tubes are ceramic body tubes. Ceramic is much more tolerant of heat than is glass, which means that the tube dimensions can be smaller and still handle the power levels found in broadcast transmitters. This is important, because size is directly related to the maximum operating frequency of the tube.

The tube number provides information about the performance of the tube.

Ceramic power tubes operate very well into the low VHF range (up to 250 MHz), but lose efficiency rapidly higher than that. Most glass tubes, being physically larger, max out below 100 MHz. Maximum operating frequency is due in part to interelectrode capacitance — the elements in the tube begin acting like vacuum dielectric capacitors, and affect tube operation at higher frequencies.

How to read a tube number

The nomenclature of power tubes is standardized, sort of.

In the 3CX, 4CX and 5CX series tubes, the first number stands for the number of active elements, the CX means the tube has a ceramic body, and the final numbers denote the power, in watts, that the plate can dissipate as heat.

Glass tubes are a different story. Originally, the first number denoted the filament voltage, and generally this is still true. The second number (usually a letter, actually), stood for the application in which the tube was used: "R", for example, meant the tube was a rectifier. The meaning of the final numbers varied by manufacturer, and the whole system pretty much fell apart decades ago.

Ceramic tubes are actually quite rugged, and will absorb more than their rated power on the plate for a while, but the price is dramatically shortened life.

According to my Eimac spec sheet, a 4CX15000A, a common power tetrode, can make up to 36.5 kW output. Keep in mind that this is usable output power, as opposed to power burned up as

heat from the plate.

In the case of the 4CX15000, then, the 15000 actually refers to the maximum amount of unusable power that can be carried off the plate as heat. For example, if a tube is operating with a plate voltage of 7,000 volts and the ammeter is reading three amps of plate current, the power generated by that voltage and current combination is 21,000 watts ($3 \times 7,000 = 21,000$). This is called the plate input power.

If the tube is a 4CX15000, it can only dissipate 15,000 watts of power from the plate as heat; the remaining 6,000 watts had better be coupled to the antenna as RF output power, or the tube

will burn up. Not immediately, maybe, but soon enough.

As a side note, a transmitter actually running in this condition (21 kW plate input power with only 6 kW output) would be grossly out of tune.

Efficiency

The efficiency of a 4CX15000 — the plate output power divided by the plate input power — is typically in the 55 to 65 percent range, so with 21 kW of plate input power, the tube should be making about 14 kW output power, with the remaining 7 kW dissipated off the plate as heat. In the above example, though, the efficiency would be very low, at 28.5

percent, and an indication of a serious tuning problem.

Some power tubes have filaments that double as cathodes. These are called directly heated cathodes. Basically, the filament is coated with a material with an abundance of electrons which, when heated, get so energetic that they "boil" off.

The 4CX5000 is like this. In some other tubes, the filament heats up a separate cathode, and the cathode, in turn, boils off the electrons. The 4CX250B is a case in point. The only difference, in practice, is the way the tube is connected in the circuit. The final operation is the same.

From a connection standpoint, all tubes must have a current path from the plate circuit back to the heated

See TUBES, page 25 ▶

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Tales of Tetrodes and Triodes

► TUBES, continued from page 23

cathode in order for the circuit to be complete, and current to flow. With a directly heated cathode, a center tapped filament transformer provides the return current path from plate to cathode.

The filament transformer provides the low voltage/high current AC needed to heat the tube. The center tap is transparent to the AC power, but provides the necessary DC ground on the cathode/filament to complete the plate to cathode return circuit through the high-voltage plate power supply. In an indirectly heated tube, the cathode itself (not having any filament voltage applied) is hooked to ground.

There are plusses and minuses to each method, but again, the result is the same.

In most cases, the control grid of a high-power RF amplifier tube is used to input the signal that will be amplified. (There are, of course, always the few exceptions. In some cases, the input is connected to the cathode.)

In addition to being a tuned RF circuit, the grid also includes a DC circuit, used to place a bias voltage on the tube. (Again, occasionally, the cathode is biased, rather than the grid, but the result is the same.)

As mentioned last month, DC fixed bias is used to "fix" the tube at a specific point on its characteristic operating curve. Typically, the transmitter manufacturer will choose the point that allows the highest operating efficiency, coupled with an acceptable amount of distortion in the amplified waveform.

Protection

Fixed bias also serves the useful function of protecting the tube in the event the input RF drive is lost. In power tetrodes, it is the control grid that acts as a current limiter. Remembering the diode, a tube without a grid simply conducts when the cathode is heated and a high positive voltage is placed on the plate.

If RF drive to the grid is lost in a power tetrode, and there is no fixed bias, the tetrode acts like a diode, and the plate current will be whatever the plate power supply can provide, which is to say, maximum. Because there is no input signal, it follows that there will be no output signal, so the plate input power will be maximum and the output power (and efficiency) will be zero.

If the plate overload does not trip, the tube will certainly be destroyed, probably the socket will go as well, and maybe even the plate supply will cook. Fixed bias prevents this from happening by throttling the tube conduction rate back to a sustainable level, even if drive is lost. This idling state is also known as the tube's quiescent operating point.

Although the approach is not recommended, tetrodes will operate quite well with no bias, provided that the drive is never lost. This is because the input signal causes current to flow in the grid circuit. This current is developed across a resistor connected between the grid and ground.

Again using Ohm's Law, current flow through a resistance means there is a voltage potential across the resistor. This voltage on the grid is known

as self bias. The value of the grid circuit resistor is chosen to provide the correct amount of self bias to the tube when adequate drive is provided. Triode power tubes act differently to these circumstances.

In my experience all triode tubes, in FM transmitters at least, are connected in a grounded grid fashion. This means the control grid is connected directly to ground, and the input signal is fed to the cathode. With the grid always grounded, there are no over current problems if drive is lost, but a different problem must be addressed. If drive is placed on the cathode of a grounded grid triode while no plate

voltage is applied, the grid will absorb the drive and will quickly draw enough current to destroy the tube.

For this reason, there are protection circuits built into grounded grid transmitters preventing the application of drive until the plates are turned on.

The screen grid circuit, absent altogether from the triode transmitter, is still fairly simple in a tetrode transmitter. Its sole function is to make the tube amplify more efficiently. As mentioned last time, a positive voltage amounting to 10 or 20 percent of the plate voltage is placed on the screen.

(Some transmitters, notably the high-powered Collins G Series, substi-

tute a negative voltage on the cathode for the positive voltage on the screen; and then grounding the screen. Different polarity voltage applied to a different element of the tube, but with the same result.)

The positive screen voltage can be derived from the plate supply, using a series of taps on the plate transformer, or it can come from a separate power supply. Again there are advantages and disadvantages to each, and I have seen both methods used.

We will complete our discussion of the basics of tube construction and practical implementation in modern broadcast transmitters next time.

■ ■ ■

Jim Withers is vice president of engineering for Pacific Broadcasting. Send him e-mail to jim@koplar.com

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New Books on Digital, Microwave

Here are a couple of books that caught our eye in recent weeks. They may find a home in your technical library.

"Digital Techniques in Broadcasting Transmission" is by Robin Blair, a consultant in broadcast and satellite technology who worked for more than 30 years with Telecom Australia.

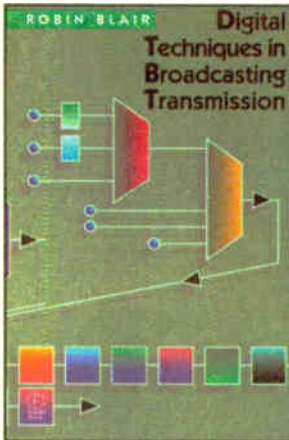
Focal Press touts this as a practical reference guide that broadcast engineers need to make the transition from analog to digital.

"Digital techniques have been used in TV and sound studios for years, with quite spectacular success," Blair writes in his introduction. "Now the time has

come to introduce digital techniques into the transmission chain. However, few people engaged in that side of broadcasting have had much exposure to the basic principles and techniques that underlie digital transmission systems."

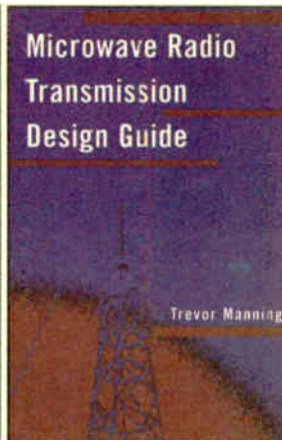
Blair aims to fill the gap with a book on the theory of digital transmission and its application in radio and TV.

This is not a math book, but there's plenty of meat for the technically savvy reader looking for an education. Topics include basic digital transmission, the effects of radio propagation, transport streams, forward error correction, audio compression and coding, video compression, 8-VSB, COFDM, satellite systems and applied engineering discussions.



The softcover, 208-page book includes 60 simple illustrations.

If you are following developments in DTV, IBOC, Eureka and satellite radio, this is recommended reading. To order, call (800) 366-2665 or send e-mail to



custserv@bh.com and ask for ISBN# 0-240-80366-3. List price is \$34.95.

A bit farther afield is "Microwave Radio Transmission Design Guide" by Trevor Manning.

This hardback aims to provide expert instruction for the planning and design of microwave radio transmission systems.

For anyone planning SDH/SONET broadband networks, backhaul for mobile radio networks, utility networks and wireless local loop nets, this book would be handy. While it

travels far from the topics of normal interest to radio station staff, its discussions of digital radio equipment and fading problems will be helpful to anyone working with STL systems.

This book is technical, with substantial math and case studies. It is well-written and illustrated, although an occasional spelling error creeps into the graphics ("digital" and "Gaussian").

"Microwave Radio Transmission Design Guide" is 231 pages and retails for \$69. For information, call Artech House at (781) 769-9750 and ask for ISBN# 1-58053-031-1.

— Paul J. McLane

Citadel Selects Scott Studios as "the Best" Digital System



Larry Wilson (at right), CEO of Citadel Communications Corp., shakes hands with Dave Scott as Citadel standardizes on Scott Systems for its 124 stations and future acquisitions.

Citadel Communications Corp., one of America's top 10 radio groups in 1998 revenues, selects Scott Studios Corp. as its sole supplier of on-air digital audio delivery systems for its 124 radio stations and future acquisitions.

"We thoroughly investigated all of the competitive digital air studio systems and decided upon the best one," says Larry Wilson, CEO of Citadel Communications. "Our regional Presidents and Vice Presidents of engineering and programming spent nearly a year analyzing different options. While no system or manufacturer is 100% flawless, it became obvious to us that Scott Studios is the very best. Their long history of excellent service commitment, the quality of their digital studio products and competitive pricing were our primary reasons for selecting Scott Studios."

Dave Scott, CEO of Scott Studios Corp. says, "It's an honor to be Citadel's sole digital audio vendor and take their other brands as trade-ins on our new equipment. Our systems are designed by announcers, for announcers."

"Of Scott's 61 employees, 43 are former jocks and PDs with 700 years collective radio experience. Competitors work more from the engineer's perspective, although we have 20 former chief engineers on staff also. Scott Studios' digital fits DJs like a glove."

After adding five Oklahoma City stations and other pending transactions, Citadel will own or operate 124 radio stations in 23 mid-sized markets such as Providence, Salt Lake City and Albuquerque.

Citadel is well known across the country for attaining topnotch competitive programming success, and the addition of Scott Studios announcer friendly technology will help Citadel announcers deliver superior information, entertainment and service to their 8,000,000+ weekly listeners.

Citadel's stations are not the only ones who choose Scott: More U.S. radio stations use Scott Studios' than any other digital system, with 5,046 Scott digital workstations in 2,202 U.S. stations. Nine of the ten top-billing groups have Scott Systems.

Scott Systems are the easiest to use! They're intuitive, straightforward, simple, yet the most powerful!

Scott Studios is famous for our uncompressed digital systems at a compressed price, (but we work equally well in MPEG and MP3). Scott Studios' audio quality is the very best and plays on laptops or PCs with ordinary sound cards. We pre-dub your startup music library free. Your PD can auto-transfer songs digitally in seconds with a CD-ROM deck in his or her office.

Scott gives you industrial quality 19" rack computers, but nothing is proprietary: functional equivalents are available at computer stores. You also get 24 hour toll-free tech support! Scott also lets you choose your operating system: Linux, Novell, NT, Windows, DOS or any combination. You also choose from three systems: Good, Better, Best. One's right for you!

The Scott System 32 (pictured at the upper right) is radio's most powerful digital system. Your log is on the left side of the LCD touch screen. Instant access Hot Keys or spur-of-the-moment "Cart Walls" are on the right with lightning-quick access to any recording. Phone calls record automatically and can be edited to air quickly. You can also record and edit spots or voice tracks in the air studio or go on the air from production.

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8:15:38A On-Air 2	R-E-S-P-E-C-T Aretha Franklin :11/3:30/F HIT HM9834 8:15 The Queen of Soul!	1-2-3 Len Barry L 7/7 4p N 7/10 2a	409 Beach Boys L 7/1 5a N 7/8 10p	96 Tears ? & Mysterians L 6/27 2p N 7/8 5p
Start 3	Ferry 'Cross the Mercy Gerry & the Pacemakers :17/4:13/F HIT HM2608 8:18	A Beautiful Morn. The Rascals L 7/8 4p N 7/12 7a	A Day in the Life The Beatles L 7/6 11a N 7/12 8p	A Groovy Kind of Mindbenders L 7/4 2a N 7/12 7p
Start 3	Home Depot Q: Better at Home :00/0:30/F COM DA2214 8:22	A Hard Day's Nite The Beatles L 7/2 3a N 7/8 3p	A Little Bit Me, A Monkees L 7/2 7p N 7/13 8a	A Little Bit o' Soap The Jarmels L 7/5 5p N 7/13 6a
Start 3	McDonald's Q: Prices may vary :00/0:06/F COM DA2215 8:22	A Lover's Question Clyde McPhatter L 6/29 5a N 7/13 9a	A Summer Song Chad & Jeremy L 7/2 8p	A Teenager in Lov Dion & Belmonts L 7/4 3a N 7/13 6p
Start 3	Bob's Bargain Barn Q: Sale Ends Saturday :00/2:45/C COM DA1234 8:23	A Thousand Stars Kathy Young L 7/2 9p N 7/13 4p	A Town 'Wout Pity Gene Pitney L 7/2 10a N 7/13 3p	A Whiter Shade of Procol Harum L 7/1 3p N 7/13 7a
Start 3	Cool 105 Fast Jingle Q: Cool 105 :00/0:30/F JIN DA4315 8:23	A World 'Wout Lov Peter & Gordon L 7/4 10a N 7/12 11p	Abraham, Martin & Dion L 7/1 9p N 7/20 10p	Act Naturally Beatles L 7/2 2a N 7/14 3p
Stack	Artists	Time	Year	Cat.
Auto	Back	Forward	Pre-view	:04
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z				

The Scott System is radio's most user-friendly. You get instant airplay or audition of any song simply by spelling a few letters of its title or artist. You see when songs played last and when they'll play next. You also get voice tracking while listening to music in context, hot keys, automatic recording of phone calls and graphic waveform editing, all in one computer!

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(800) SCOTT-77

Who's Buying What?

► WBW, continued from page 21

"One critical test is for sharp transients so we used the same piece of piano music on all of them, and the Optimod achieved a far more natural sound than any of the others," he said.

Classic FM will have digital control over the functions of the 8200 processors to help shape the on-air sound of the station.

For information from Orban, contact the company in California at (510) 351-3500, visit the Web site at www.orban.com or circle Reader Service 143.

Hubbard Signs Up With Continental

Hubbard Broadcasting Inc. signed a preferred manufacturer agreement with Continental Electronics Corp. for the purchase of digital television and radio transmission equipment.

Hubbard placed its first order under the agreement for the purchase of a 40 kW version of CEC's SpectraStar LDMOS digital television transmitter.

The broadcaster, operates 10 TV stations in Minnesota, New Mexico, and New York and two radio stations in Minnesota.

For information, contact Continental in Texas at (800) 733-5011, fax to (214) 381-3250 or circle Reader Service 4.

"Who's Buying What" is printed as a service to our readers who are interested in how their peers choose equipment and services. Information is provided by suppliers.

Companies with news of unusual or prominent sales should send information and photos to: Radio World Managing Editor, P.O. Box 1214, Falls Church, VA 22041.

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Final Limiter Sample Rate	256 kHz	128 kHz	48 kHz (virtual 192 kHz)
# of Audio Processing Bands	5	5	4
Available in colors	yes	no	no
Warranty (parts & labor)	3 years	1 year	2 years
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KEYBOARD CONNECTION

Digital Copiers Come of Age

Barry Mishkind

It seems we always need to find space on our desk for something new that is supposed to make us more productive. This is as true in radio as in the wider business world.

A new computer, larger monitor, printer, electronic telephone ... the list goes on. We just accumulate things. That is, all of us except the pointy-haired manager with the empty desktop.

Go ahead, admit it. Sometimes it looks just as if a junkyard was picked up in a tornado and deposited right in the middle of your office or den. I'm as guilty as anyone.

And even with all that equipment, when we need a copy of something, most of us still have to trundle down the hall to the copier room. Or down the street. Copiers of any real usefulness were just too expensive.

Perhaps you are fortunate enough to have a flatbed scanner (and room for it), but the process of scanning and printing a page, especially with an inkjet, can be laborious, time-consuming, expensive (the ink) and in the end, not really satisfying. Similarly, each of the "all-in-one" copiers have severe limitations ranging from being single-sheet fed to

the quality and cost of inkjets.

As I surveyed the clutter that enveloped me, I began to understand ever more clearly the meaning of that famous phrase: "Space ... the final frontier." The solution seemed simple, something like a "personals" advertisement: Digital Copier Seeks Laser Printer. Object: Marriage.

Xerox WorkCentre

Earlier this year, office supply stores and TV ads began showing off a new line of copiers from Xerox, a company whose name arguably is inseparable from photocopiers. The WorkCentre copiers merged the optics of copying with digital technology, and the whole is much more than its parts.

In using the Xerox WorkCentre 105f for the past several months, I find it hard to decide which I like better: the enhanced copier functions, the laser printer function, or the fact that I can have both of them on my desk in less

space than most of my previous laser printers. Clearly, the marriage of the digital technology to the optical machine works.

Because the unit was designed first as a copier, let's start our focus with that function. By using digital technology, Xerox was able to reduce the number of moving parts and increase the capa-



Business Hardware:
The Xerox WorkCentre 105f

bilities. In addition to increased reliability, the WorkCentres can deliver a copy reduction and zoom range from 50 to 200 percent. Speed is a fast 10 pages per minute (ppm).

Another benefit of the digital technology incorporated in the WorkCentre is the ability to copy pictures with better fidelity. The machine is programmed to render proper contrasts for pictures with less degradation of resolution.

Equipped with a 250-sheet paper drawer, a 50-sheet bypass tray, and a 30-sheet automatic feeder, the Xerox 105f will handle anything from a memo

"standby mode." However, unlike most copier standby modes I've experienced, this one returns to "ready" very rapidly, in just a few seconds. There is almost no waiting.

Regarding consumables: the WorkCentre uses a larger-than-normal toner cartridge (rated at about 6,000 copies), so you are not always running out of toner. And it features a "toner saver" setting to stretch things even further.

Xerox has definitely put together a solid support package for the WorkCentre. The "Without-Worry" warranty runs for three years. It includes on-site service and unlimited toll-free support. Where needed, a program for a Customer Self-Repair Kit or an Overnight Exchange Service is provided to ensure your downtime is kept to a minimum.

The Xerox WorkCentre is a great way to bring the benefits of a copier and the quality of a laser printer into the studio wing or other offices, at the size and price of just a good laser printer. You will also find that several WorkCentres will also reduce the line in the copy room.

File tip

On another topic, regular readers will know that one of the important parts of computer maintenance is making backups. One of Murphy's Laws states that

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If you're running an independent contractor business, this copier may be for you.

to a picture to a book. All in all, it is a very nice copier that would make a fine addition to a small office/home office. Other models range from smaller units to one handling two drawers and double-sided printing/copying.

A printer, too

But the real attraction, to me, was the laser printer function. At home, a copier is nice, but not a necessity. Having them both for the cost of a good laser printer and much less desk space than two units is great.

As a laser printer, the Xerox WorkCentre does a fine job, with an output of 8 ppm with true 600 x 600 dpi resolution. It can handle paper, envelopes, transparencies, labels and card stock.

Xerox includes a printer control program that controls not only the typical orientation, paper size and tray concerns, but also will allow you to change the contrast and brightness of the printer output.

While easy to use, the printer control panel does require understanding the concept of this dual-use machine. Because the WorkCentre was designed first as a copier, most of the front-panel buttons are related to the copier functions. Those don't affect printing functions. And the printer control panel does not affect the copier functions.

One of the nicer features shared by both functions is a powersaver function. When you don't use the unit, it goes to

any important information not backed up eventually will be caught in a lost cluster, corrupt file or, worse, a burglary.

A thief who takes your computer could take your valuable work as well.

Some complain that floppies are no longer capable of doing any serious backup. Indeed, files can often exceed 1.4 MB. Removable media are now available in 100 MB, and even GB sizes. Still, this requires that you actually have them handy, and stored in a safe, yet accessible place. That may make them subject to theft, fire or other disasters.

On the other hand, a good way to protect your critical files is available to almost anyone with an Internet account. Better, it usually costs nothing: most ISPs provide some free space to users for storage of personal files. Even the free e-mail services often include a decent allocation of storage space. Check it out.

So, in order to have safe storage with quick access, take those mission-critical files, and set up a schedule where you upload them to your "Web space" on a regular basis. If your computer flames out or is stolen, you'll be glad you did.

Barry Mishkind is busy backing up his files, and hopes you are, too. Got a horror story? Let him know via e-mail to barry@broadcast.net



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Kids & Radio
See Page 37

Radio World

Resource for Business, Programming & Sales

November 10, 1999

Word of God Is Booming on Radio

Steve Sullivan

Christian radio is not just for Sunday-morning shut-ins anymore — it has become big business.

"About four out of 10 adults across the country listen to Christian broadcasting during a typical week," said David Kinnaman, director of research for the Barna Research Group of Ventura, Calif., which espouses family values.

In a July 1998 study, Barna found that 75-80 million adults in the United States are weekly listeners to religious programming.

The "mom-and-pop" owners who were prevalent in Christian radio's early days are evolving into — or being replaced by — savvy business operators. While the goal is still to spread the message of the Gospel, owners also recognize the tremendous revenue potential presented by the huge audience.

Commercial growth

According to statistics provided by the National Religious Broadcasters, of the more than 12,000 radio stations in operation at the end of 1998, more than 1,500 of them aired Christian programming.

E. Brandt Gustavson, president of the NRB, has been involved with Christian radio since 1954, when he was a college student in Minnesota.

"In the past there were a limited number of Christian stations, with a good number of them non-commercial in nature. Through the years there's been a full development of commercial, religiously formatted stations, and that's a major, major change."

NRB statistics show more than 1,200 full-time Christian stations in operation going into 1999, a 7-percent increase above full-time stations broadcasting the format in 1988.

"Generally speaking," said Gustavson, "I don't believe there's any religious dif-

ference between the commercial and non-com stations. The only difference is how they get their funds to carry on their work. There is, of course, the profit motive in the commercial enterprises. But both of them have to get enough money to be able to do their work."

Dick Bott, president and CEO for the privately owned Bott Radio Network, is typical of an owner who has changed with the times. Bott bought his first station in Salinas, Calif., in 1957. In 1962, he sold that station in order to buy a station in Kansas City, Mo.

"I did not think that Salinas at that time was a large-enough market. If you

know you're going after a niche market — just a slice of the pie — 10 percent of 200,000 is only 20,000 and that's not enough of a market potential. But 10 percent of a million people — now you've got something to work with in order to be viable with specialized programming."

Bott did not start with intentions of becoming a multiple-station owner. But that changed in the 1970s when his son decided to enter the broadcasting business.

"You've got to grow if the next generation is going to have a place to fulfill themselves," Bott said. "We went out and bought a station in Oklahoma City, then

See CHRISTIAN, page 43 ▶



E. Brandt Gustavson

Top-10 Winning Bids in FCC Construction Permit Auction

The FCC's first "construction permit" auction closed Oct. 8, with 91 winning bidders promising to pay the agency a total of \$57.8 million.

"As a result of this auction, numerous communities across the United States will have new broadcast stations in their area," said FCC Chairman William Kennard in a statement following the end of the closely watched event.

The auction method for dispensing new spectrum is intended not only to raise money but to reduce the time involved in the application process; the FCC considers the new system a significant improvement. Congress gave the FCC authority to use auctions as a licensing mechanism for broadcast services in 1997.

"Within a matter of weeks, long-pending permits for new broadcast stations have been quickly auctioned," said Tom Sugrue, chief of the Wireless Telecommunications Bureau.

RW will provide a closer look at the results of the auction in an upcoming issue. Until then, we thought you would like to know "Who paid what, for where?"

Winning bid total (in millions)	Name of winning bidder	Location of FM license
1. \$5.05	Arizona Lotus Corp.	Oro Valley, AZ
2. \$3.25	Fairview Radio Inc.	Fairview, PA
3. \$2.34	Liberty Productions	Biltmore Forest, NC
4. \$1.83	Richmond Broadcasting Inc.	Ettrick, VA
5. \$1.68	Outlook Communications Inc.	Mukwonago, WI
6. \$1.57	Ronald K. Bishop	Will amstown, WV
7. \$1.56	TSB II Inc.	Wellington, CO
8. \$1.05	Gregory D. Gentling, Jr.	Rapid City, SD
9. \$1.03	Outlook Communications Inc.	Lexington, IL
10. \$1.01	Simmons Family Inc.	Brigham City, UT

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GUEST COMMENTARY

Dating Service Meets Its Match

Why Radio Advertising Is a Great Buy for Direct-Mail Companies

Paul A. Falzone

Advertising can be a make-it or break-it move for a business, but merely opening up the company checkbook for media buys is not enough.

To reap the full potential and rewards of radio airtime requires not only savvy and strategy, it also entails an understanding that the rules of the road may be far different for every business and owner.

Radio & direct mail

Case in point: With my company, The Right One, radio has played an important part in our overall strategy to build public awareness of, and confidence in, our personal introduction service. We also find that radio advertising supplements and supports our direct-mail efforts.

By contrast, Together, with which we merged in April to form the world's largest introduction service, relies almost exclusively on direct-mail campaigns.

The same business, the same company, but very different approaches to media advertising.

Radio is a very effective medium because it is portable. People can take it with them on their portable stereos, or

travel with it in their cars. One of the biggest advantages to radio advertising may be that, by nature, it sorts the population into neat demographic clusters.

Talk radio, as a general rule, will attract an educated and upscale audience. Sports radio gathers a predominately blue-collar male listener. Adult-oriented, soft-rock stations grab an older, usually female, listener. Top 40 reaches a broad audience that skews young.

You have to ask yourself whom you are targeting and pick the right format to fit that mold.

Such targeting is crucial for our business, which relies on having balance among our membership. If we have too many young men and not enough women in a comparable age bracket, for example, we will have a difficult time finding compatible matches for them.

If this is the case, a good radio buy at a station that attracts a similar age group of female listeners can achieve the needed equilibrium to keep everybody happy.

Having the right type of commercial is also key. If you are looking to attract that "news-radio" demographic of mature professionals, the copy should be of the "just the facts ma'am" variety, stressing professionalism and track

record. A younger audience will respond better to something a little more flashy and hip.

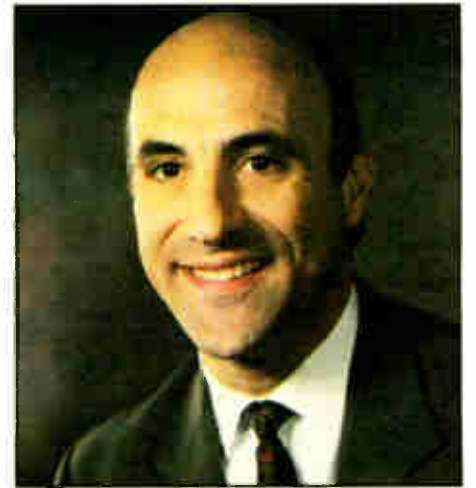
There are two approaches to radio buys: heavy frequency and the prestige purchase.

You can either saturate the airwaves with your ads as much as you can or be more selective and pay the bigger cost of being part of drive time or on a popular syndicated program with blockbuster ratings. We have taken both routes, usually hitting the listener with our spots as much as we can at first, to build awareness and pummel our message into them.

Then, once that catchy jingle is committed to memory or that clever tag line can be repeated word for word, we cut back on the frequency to tap into the wider exposure that high ratings will procure.

An analogy might be shooting a rifle. The former approach is akin to spraying buckshot, hitting as many targets as possible. The latter is the equivalent of very carefully and deliberately taking aim at the bullseye.

One of the great benefits of radio is that there is immediacy, and not just in terms of listener response. In most cases, radio airtime is relatively inexpensive and almost always available. If you have the money, a phone call in the



Paul A. Falzone

morning can have your spots running by lunchtime. Another big advantage is that you can have a full 60 seconds to lay out your message and make the case why customers should consider your business. Even though television offers the benefit of visuals, your message will have to be presented in half the time, in 30-second spots.

In our continuing quest to attract attractive members for our dating service, we will continue to spin the dial.

■ ■ ■

Paul A. Falzone is CEO of The Right One and Together Dating, personal introduction services based in Hingham, Mass. For information about The Right One, call (800) 818-DATE or visit the Web site www.therightone.com

STATION SERVICES

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

Top-10 Trucker Hits

Riding the lonesome highways can be a little less forlorn with the new countdown hour of the top 10 songs on the Midnight Cowboy Trucking Network.

"This is one hour of the most-popular songs, hosted by Bill Mack, the favorite radio personality for truck drivers," said Richard G. Lanahan in a company statement about the new feature. Lanahan is the president of the Transportation Finance Group of the Associates, the sponsor of the "Associates Driver Appreciation Hour."



Richard Lanahan, left, and Bill Mack

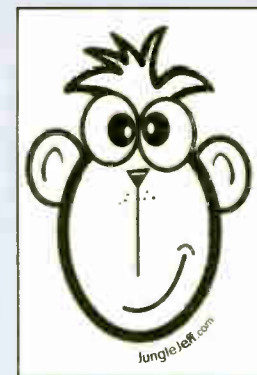
The Grammy award-winning Mack was recently nominated for a Marconi Award for the weekly show that he produces from his home station WBAP(AM) in Dallas/Fort Worth, Texas.

The Midnight Cowboy program provides information and entertainment to truck drivers and fleets running on America's highways every Tuesday night from midnight to 5 a.m.

For more information contact Margot Miller in Texas at (817) 695-3583 or circle Reader Service 24.

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For more information contact Greg Wilfarth in California at (619) 350-9566, via e-mail GregW@Ubrandit.com or circle Reader Service 34.

"Remember that time is money."

— Benjamin Franklin

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The 'Babe' Joins SportsFan

Her Cancer in Remission, Nanci 'The Sports Babe' Donnellan Finds a New Radio Home

Scott Fybush

A year ago, the Fabulous Sports Babe was on top of the sports radio world. With a new contract at ABC Radio Networks and clearance on almost 200 stations, Nanci Donnellan's life couldn't get much better.

Instead, it took a turn for the worse.

The first woman to host a national radio sports show found out she had breast cancer.

"I was like the poster child for a mammogram," said the talk host, whose first experience with the procedure was when she received her diagnosis.

After months of cancer treatment, Donnellan is in remission — and entering a new phase of her career.

"My life changed considerably a year ago, and I think after coming home and doing the show from home while undergoing treatment, my priorities changed," she said.

Donnellan is entering a new phase of her career.

Home, in Donnellan's case, is Tampa, Fla. That's where "The Fabulous Sports Babe" was born one day in 1988 during another broadcast. She was laid up with a bad back from a tennis injury. Returning from a break, she invited the audience to "spend the afternoon in bed with a fabulous babe," and the name stuck.

The Babe's opinionated persona and top-name guests soon came to the attention of the networks, and within a few years the show was based in New York and invading the traditionally all-male domain of sports radio from coast to coast.

Home work

But Donnellan kept a home in Tampa, and that's where she returned throughout her treatment, sometimes for the week-end, sometimes for longer periods while confined to bed.

"It got to the point where I felt like I was living in Tampa and just commuting to New York for the week, and that's when I knew I needed to change," said Donnellan, who broke ways with ABC in September and began searching for a new home base for the "Global Babe Radio Network."

"Everybody wanted me to go to New York or to go to L.A.," she said, with one exception: the SportsFan Radio Network.

The Las Vegas-based network was willing to let Donnellan make Tampa her home base, and in late September, she launched her new show on SportsFan from the comfort of studios at Tampa's WQYK(AM), an Infinity-owned station.

"They're great to me," she said. "I can't complain; they're building studios for me down here."

"The feeling is mutual," said SportsFan General Manager Jay Clark. "It brings us a premiere talent, somebody who is rejuvenated and has drive," he said.

The addition of the Babe has yet to bring SportsFan new affiliates.

Schedule competition

Most of the stations that carried her ABC show now run Tony Kornheiser's ESPN show, the current ABC offering, in the 10 a.m. to 1 p.m. (Eastern) slot the Babe once occupied. A few were

lured away by another sports network, One-on-One, which offers Chicago sports columnist Jay Mariotti.

Several, like AMFM-owned KFXN(AM) in Minneapolis, have found room for the new Babe show, albeit on a delayed basis. Still others have gone local, like WDFN(AM) in Detroit and WHTK(AM) in Rochester, N.Y.

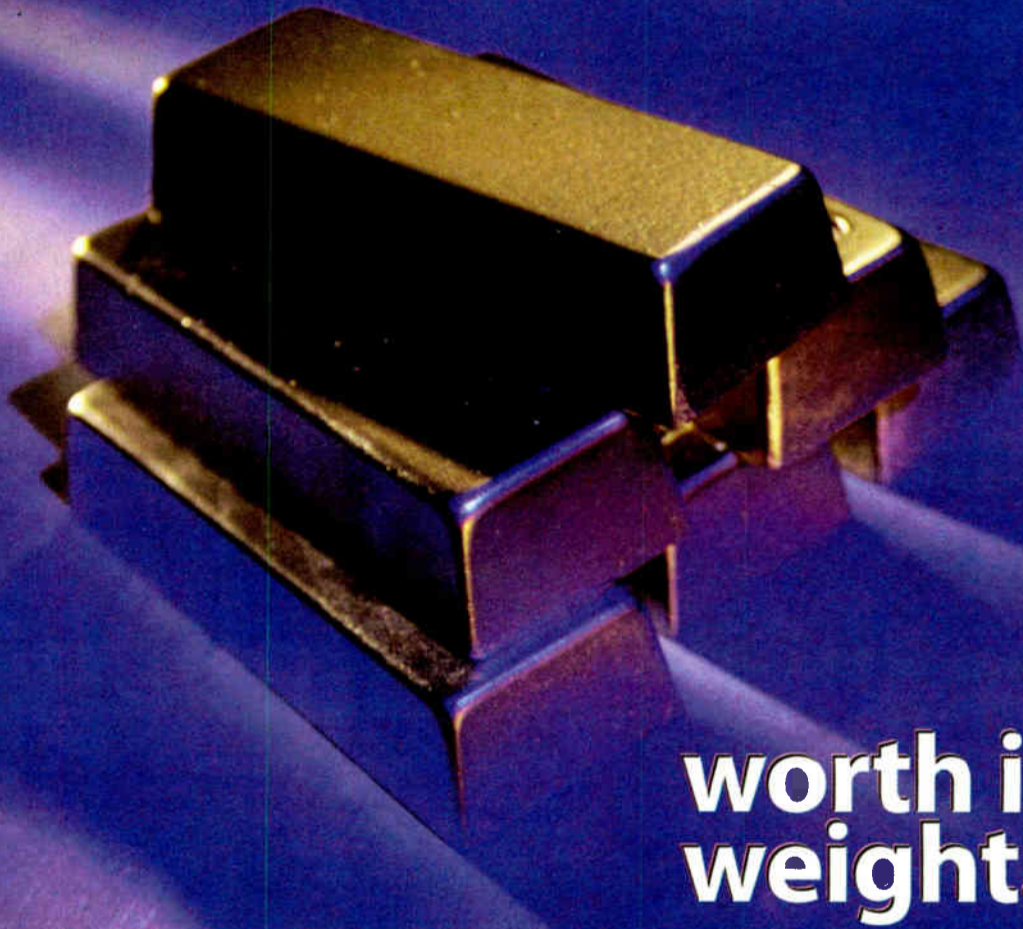
"The Babe always had the best guests, but she never did anything for us in ratings," said WHTK Operations Manager Jeff Howlett, who now uses a local host to fill the gap between ESPN's morning show and Premiere Radio's Jim Rome.

See BABE, page 47 ▶



The Sports Babe, Nanci Donnellan

PSi Academy—



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"John Marquis' (PSi Director of Training) PowerPoint presentation, and subsequent course materials, were unexpectedly clear, concise and totally professional. I was very impressed by the training facilities. A company that makes that much of a concerted effort to provide the highest level quality training, and who has committed the time, personnel and resources to do it right, speaks volumes about their commitment to their customers."

Jeff Hugabone, Chief Engineer, WTIC, CBS - Hartford, CN

"John was a great instructor. He knew what parts to slow down through and how to read his audience. Since the instruction is all hands-on, you really felt like you were retaining what you were learning. The grand slam though, was when he got to the system's voice tracking capabilities. He introduced it in such a manner, that an entire room full of radio guys were blown away! He knew just how to address the areas that were of importance to us."

Mark Williams, Production Director, WPOC, Clear Channel - Baltimore, MD

"I was completely impressed by the training offered by Prophet. Both the facilities and the course itself were absolutely first rate. I was able to return to the station and immediately utilize what I had learned. We are in a transition now with the AudioWizard™ handling 100% on the AM side, and about 50% on our FM - and PSi has been with us every step of the way. Even the PSi people regularly go through the in-depth training, to constantly stay on top of the latest features and functions. I really appreciated the attention to detail they put into the class, our comfort and the depth of the knowledge they imparted. It also enabled me to connect names and faces with customer service and tech support there in Nebraska - so now when I call, I know who I'm talking to - and they know me."

Ken Lovejoy, On-Air Personality, WIKX - Clear Channel - Punta Gorda, FL

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ONLINE RADIO

Net Rolls On as Radio Stands by

Kim Komando

In early September, Arbitron and Edison Media Research released their "Internet Study III," subtitled "Broadcasters vs. Webcasters: Which Business Model Will Win?"

The name itself is misleading, because the results of the study suggest that in many ways, radio and the Internet do very well at complementing each other. Although the study makes it clear that radio is not exploiting the online medium to the fullest extent possible, it's equally clear that cyberspace really does represent a virtual land of opportunity.

'Netizens'

The study involved about 3,000 people and was done in two parts, with roughly half the respondents participating in each part. The first part was an online survey of so-called "Netizens," Net citizens who professed to be regular users of streaming media.

The second portion was a telephone survey of Arbitron's spring 1999 diary keepers.

Some of the general findings of the study are hardly startling.

For example, Internet usage as a whole is up from last year. In general, people are spending less time doing other things in favor of surfing the Net.

The big loser here was television, with 35 percent claiming that the Net has cut into their TV time.

The percentage listening to less radio because of the Internet was considerably smaller at 16 percent, but still noteworthy.

Here's a statistic that your station or show advertisers and sales staff should find interesting. According to the study, 29 percent of Americans who have

Internet access have visited a Web site that they heard advertised on the radio.

Arbitron claims that this translates to about 31 million people. I can tell you from personal experience that one of the biggest challenges in launching an online venture is getting the word out into the real world. It takes a lot more than just online promotion.

This study suggests that Internet startups are prime targets for radio advertising. On "The Kim Komando Computer Show," more than half of our national advertisers are just that — "dot-coms."

The study also split this last statistic into two parts, those who have listened to

tened to a radio Webcast in the last month (10 percent) and who had listened to one in the last week (only 4 percent).

The study showed that the demographics of online radio listeners are quite favorable. With more than a third of online users not even aware that radio Webcasts exist, and only a fraction of online users tuning in to them on any regular basis, it seems clear that radio stations need to do more to promote their online activities.

Instead of taking an "oh, by the way, you can listen on the Internet, too" approach, radio stations should proactively work to make their online content

Radio stations and shows have an edge right now, because when people think of 'listening,' they automatically think 'radio.'

Webcasts of radio content, and those who haven't. Broken down this way, 41 percent of online radio listeners have visited a Web site that they heard advertised online, while 24 percent of non-online radio listeners have done the same.

This suggests that Webcasting adds value to advertising — value that should command higher rates.

Radio-free Internet

There's just one problem. The study also showed that only about two-thirds of those with Internet access realize that they can listen to the radio via the Internet. Sure, two-thirds of all Internet users represent a big number, but so does one-third.

Online radio listening has shown big gains since Arbitron's 1998 "Internet Study II."

Last year, only 18 percent of online users stated that they had listened to online radio programming. This year, the percentage jumped to 30 percent. However, that's not quite as promising as it may seem. That's 30 percent of online users who have ever listened to a radio Webcast.

The survey also asked who had lis-

tened to a radio Webcast in the last month (10 percent) and who had listened to one in the last week (only 4 percent).

Radio stations and shows have an edge right now, because when people think of "listening," they automatically think "radio." We have decades of radio broadcasts to thank for that.

However, radio isn't the only streaming media game on the Internet. If radio stations and shows don't seize the opportunity now, other streaming media sources could well supplant radio in the minds of online users who want to "listen" over the Internet.

It may seem obvious, but to attract listeners to your Webcasts, you need to first attract them to your Web site. That means in addition to your Webcast, your site needs content that draws listeners in and keeps them there. The new buzzword for content that helps attract and retain online visitors is "sticky content."

Developing sticky content, however, isn't as easy as it may seem. For example, the study indicated that the Web sites for 75 percent of all stations in the top-100 American markets have pictures of and information about their on-air personalities.

In fact, this is the single most common radio Web site feature. Yet, in rating the



importance of various radio station Web site features, online radio listeners put this sort of stuff at the dead bottom of the list.

The most popular Web site feature is community information. Yet this is the second most common feature — at 60 percent — on radio station Web sites.

For the second and third spots, listeners and station diverge widely again. Online listeners rated concert information as their number-two concern. However, that is only the eighth most common feature, with just 50 percent of the major-market stations delivering the goods.

Third on the online listener wish list is the title and artist for each song played. Yet, only 32 percent of major-market stations offer this service on their Web sites, putting it at 13 on the list.

Just a couple of years ago, the thinking was that any Web site is better than no Web site at all. Well, those days are gone forever. Web sites have become more sophisticated and online users have become more savvy.

When people visit your site, their expectations will be higher than ever, and will be even higher in the future. Today it's really true that having no Web site at all is better than having a poor one. One false move and you could drive away valuable online listeners forever.

Don't create a Web site that's loaded with easy content — host photos and biographies, for example. Learn what your online listeners want and expect from your site, and invest the resources to fulfill those wants and expectations.

All indicators show that radio stations and shows are poised to play a major role in the evolution of online streaming media — if they don't blow it.

Kim Komando hosts a computer talk radio show syndicated by WestStar TalkRadio Network on more than 300 talk radio stations. For information, call (602) 381-8200 ext. 201 or send e-mail to affiliaterelations@weststar.com

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Children's Day Pursues Awareness

Robert Rusk

Children in the African nation of Gambia took a different approach to kids' programming when they became newscasters for a day on the government-controlled radio and television service. Instead of reading school lunch menus, the youngsters presented a lineup of serious topics, including their attitudes on wife-beating.

It was one of the memorable moments during last year's International Children's Day of Broadcasting, organized by UNICEF.

The event encourages young people to make a difference in remarkable ways — from Colombia, where the Children's Movement for Peace campaigned for an end to the country's guerrilla conflict, to Zambia, where young counselors advised their peers in the fight against HIV/AIDS.

Radio programs for children are particularly effective in the Third World, where television plays a far less important role. Radio presentations have carried essential information on disease prevention, nutritional advice, environmental awareness and other relevant topics.

Agents of change

Its sponsors hope the 1999 International Children's Day of Broadcasting — Sunday, Dec. 12 — will showcase the inspirational courage, creativity and drive of youth.

With more than 2,000 radio and television stations expected to take part, it will provide an opportunity for children to shape their vision of the world as they experience it in their communities.

The goal of the day is to transform children from passive observers of mass media to active participants.

William Hetzer, chief of the Internet, broadcast and image section, division of communications at UNICEF, said, "It's extraordinary to see that each year more broadcasters are taking seriously the intent of the United Nations Convention on the Rights of the Child — especially in relation to access to media."

The convention, ratified by nearly every nation, includes fundamental rights for children, such as the right to freedom of expression; the right to give and receive information; and the right to voice opinions through the media of their choice.

In the United States, according to Hetzer, several television networks (including the History Channel, Nickelodeon and the USA Network) participate in the International Children's Day of Broadcasting.

Radio's involvement, however, is difficult to track.

Hetzer said, "It's harder for us to deal with radio. In television we have materials to give stations, but we don't have materials for radio. Radio is much more local-oriented. We have tried over the years to do radio specials, but they proved totally uninteresting because they never fit anyone's format."

In addition, Hetzer said, it is hard for UNICEF to track broadcasters' participation unless stations report that they took part in the event.

To encourage the involvement of U.S. radio stations, Hetzer invites the

major group owners to take the lead and produce programming that could be distributed to owned and operated stations.

"We would love it if owners would create content for distribution to their stations," said Hetzer.

Sharing

UNICEF does not pay for production costs, nor would the organization pay for the programming itself. But UNICEF would be eager to act as a clearinghouse and share the programming with as many English-speaking stations as possible throughout the world.

"As long as the programming was created six to eight months in advance,"

Hetzer said, "it could be an innovative approach to take us to the next stage of the International Children's Day of Broadcasting."

As more broadcast technologies emerge, UNICEF feels that "children cannot be left on the sidelines of the information revolution."

The International Children's Day of Broadcasting, an event now in its eighth year, gives a voice to those who have traditionally been "excluded and marginalized."

Hetzer said, "More and more programs are giving children the opportunity to take to the airwaves and speak out about issues that concern them.



Kids around the world will participate in ICDB.

"For example, in Canada, children have faxed, e-mailed and called participating stations on the day with questions ranging from race relations and

See UNICEF, page 38 ▶



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UNICEF Reaches Out for Radio Kids

► UNICEF, continued from page 37 international understanding to how they can directly get involved in helping children in less-fortunate situations," he said.

"When young people take an interest in these issues now, they will be better-equipped to actually solve these problems in the real world when they grow up."

Strong support

The Canadian government-owned CBC is a strong supporter of the event.

In 1997, for example, "The World This Weekend" on CBC Radio One featured a piece titled "Too High a Price: The Human Cost of Child

Labour." It focused on children in developing countries who have been exploited to make products like cheap sneakers and expensive rugs.

In another segment, "Olympic Heroes," sports-related questions were addressed, including: How did these athletes get their start? The answers came from Canada's best athletes, as they prepared for the 1998 Winter Olympics in Nagano, Japan.

For more information on this annual



The ICDB brings young people to the airwaves.

event, log onto the Web site www.unicef.org/icdb

Robert Rusk is a regular contributor to Radio World.



CartWorks Names New Sales Manager

Michael McCulloch has been appointed to the position of sales manager for CartWorks/dbm Systems Inc.



Michael McCulloch

McCulloch, a 22-year broadcast veteran, has on-air, engineering, sales, management and ownership experience.

CJDS Reorganizes Sales Department

Columbine JDS Systems Inc. has announced the appointment of Nancy J. Pennica to the role of vice president of sales. Pennica will be based at the company headquarters in Denver.



Nancy J. Pennica

The company has also promoted Lorie Callahan to the position of sales manager for broadcast products, Dan Levitt to sales manager for engineering products, and David Jones to sales director in charge of cable network sales.

CJDS offers technology solutions for the advertising buying/selling process within electronic media markets.

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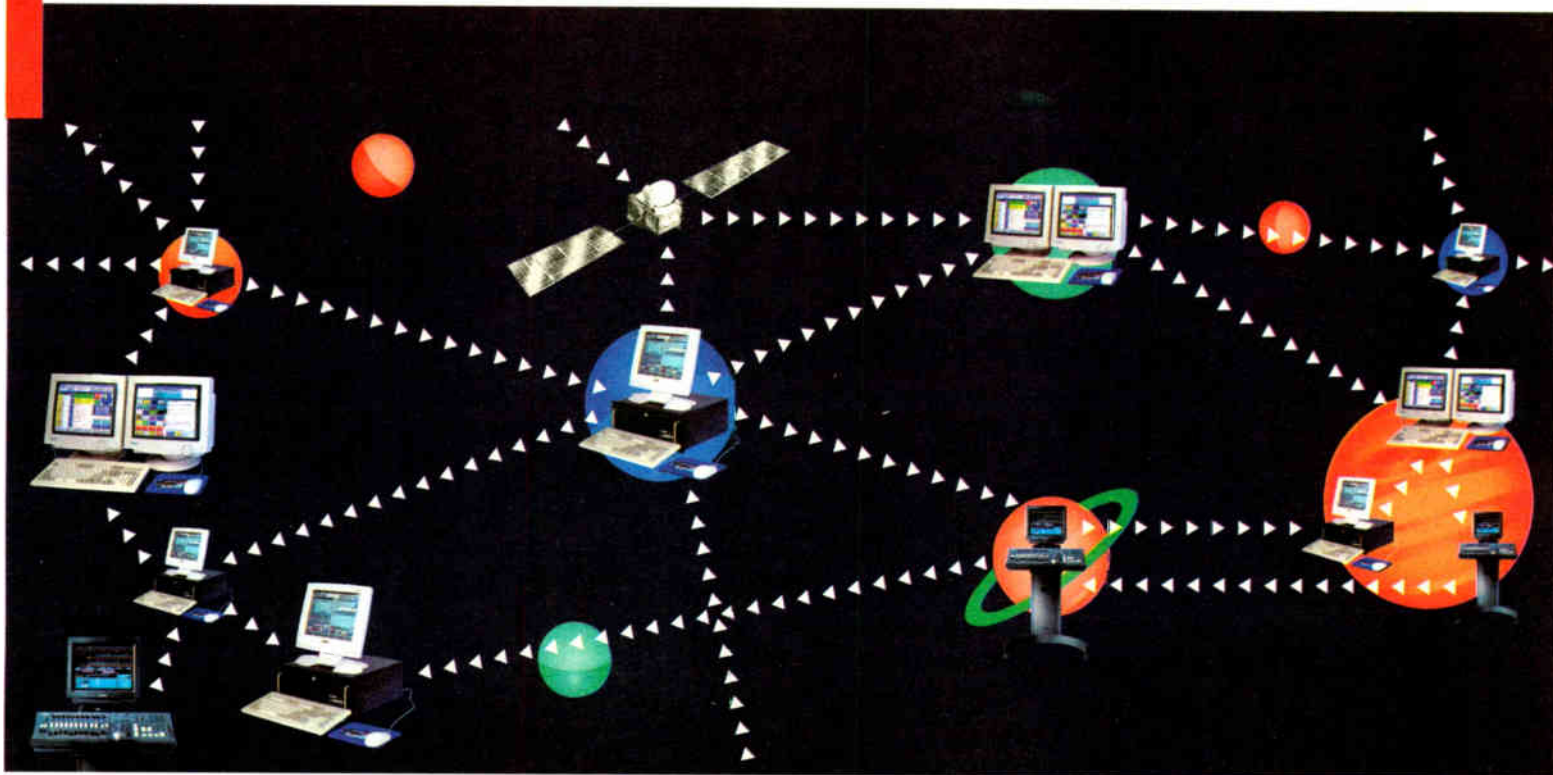
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1999 Radio Hall of Fame Inductees

The Museum of Broadcast Communications will honor six radio legends on Nov. 20, 1999, with a black-tie ceremony at the Chicago Cultural Center, naming the luminaries to its Radio Hall of Fame.

This year's inductees include singer Kate Smith, personality Rick Dees, newsman Jim Dunbar, comic actor Gale Gordon, talker Bruce Williams and L.A. legend Robert W. Morgan.

The induction ceremony will feature host and master of the ceremony Casey Kasem, who is a member of the Hall. Westwood One's Jim Bohannon will return as announcer, and music for dancing will be provided by the George Frances Orchestra.

WABC(AM) New York, WGN(AM) and WLS(AM) Chicago, KOGO(AM) San Diego and more than 50 other stations have signed on to carry the broadcast.

Starting with the class of '99, each Radio Hall of Fame inductee will be honored with a trading card issued by the Hall. Throughout 2000, the Hall plans to issue cards for each inductee.

Each card features a photo of the inductee, the category and year of induction and a brief bio on the back.

RW presents the class of 1999 ...



BRUCE WILLIAMS
TALK SHOW HOST

1999

Bruce Williams
1999 Inductee

Currently heard on over 400 stations of the Westwood One Network, Bruce Williams entertains and informs by using his experience in business and public service to find solutions to problems brought to him by his listeners across the country.


Williams grew up in East Orange, New Jersey. After serving with the Air Force in Korea and earning a degree in education from Kean College, he became active in politics, education and business in New Jersey.

In 1975, Williams found another way to serve the public by hosting *At Your Service* on WCTC/New Brunswick. This was soon followed by his second show, *Bruce Williams at Large*.

Williams then set his sights on reaching a larger audience, and his persistence paid off. In 1978, he was hired by WJCA/New York, and three years later, he joined NBC's *Talknet*, and his national reputation began to grow.

Williams has authored four books, and he writes the "Smart Money" column, which appears in over 600 newspapers.

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GALE GORDON
COMIC ACTOR

1999

GALE GORDON
1999 Inductee

Gale Gordon was born in New York City on February 2, 1906, the son of actress Gloria Gordon. His first radio appearance was at KFWE/Los Angeles in 1926. In the next decade he played mainly supporting roles on dramatic shows like *Tarzan*, *Gangbusters*, & *Death Valley Days*, although in 1935 he did play the title character in *Flash Gordon*.

Gordon's first comedy performance on radio was on *The Joe E. Brown Show* in 1939, but he didn't find a part he could sink his teeth into until 1941 on *Fibber McGee and Molly*. As *Wistful Vista's* Mayor La Trivia Gordon would delight audiences by frequently getting his words mixed up and then "blowing his top."

In 1948 he assumed the role for which he is best known, as the tyrannical principal on *Our Miss Brooks*. Whether denouncing *Walker Denton* in a voice that was drier than saltines or attacking *Connie Brooks* with one of his patented outbursts of outrage, *Chaigood Conklin* was truly a character listeners loved to hate.

One of radio's surest laugh-getters, Gordon by the late 1940's was one of radio's busiest actors. He appeared regularly on *The Great Gildersleeve*, *The Halls of Ivy*, *My Favorite Husband*, and *The Perry Singleton Show and Junior Miss*.

Gale Gordon died on June 30, 1995.

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KATE SMITH
SINGER

1999

KATE SMITH
1999 Inductee

After achieving success on Broadway and in vaudeville, "The Songbird of the South" made her radio debut in 1931. Even on Kate Smith's first show, her theme song of "When the Moon Comes Over the Mountain" and her opening and closing lines, "Hello, everybody" and "Thanks for listening" were already in place.

Kate Smith was born May 1, 1907, in Greenville, Virginia, and was once described by *Time* as "The First Lady of Radio."

During the 1930s, she became radio's number one attraction, due not only to her evening show but also because of her appearances on *Kate Smith Speaks*, a popular weekday show where she offered homespun advice on current topics.

In 1938, she introduced Irving Berlin's "God Bless America" to the country, and it became known as her song. Smith made over 2,000 recordings - 19 of which sold over a million copies. During WWII, her on-air appeals for war bonds topped \$600 million.

The *Kate Smith Hour* featured music, but it also was a variety show introducing new talent, such as *Abbott & Costello* and a teenager named Henry that became *The Aldrich Family*. Smith's final radio program aired on Mutual in 1958.

Kate Smith died on June 17, 1986.

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RICK DEES
NETWORK PERSONALITY

1999

RICK DEES
1999 Inductee

As host of *Rick Dees Weekly Top Forty*, Dees is heard on over 400 stations across the country and 70 countries worldwide. In addition, he is the immensely popular host of *The Rick Dees Morning Show* on KISL/Los Angeles, where he has dominated radio since 1982.

In a city known for its legendary radio personalities, Rick Dees is one of the most successful. Dees is more of an entertainer than a music presenter, for his shows are filled with bits of "inspired madness" that make listening to his inventive interruptions almost as enjoyable as hearing the music he plays.

His lively on air presence is a major reason why Dees received 15 consecutive "Radio Personality of the Year" awards from *Billboard*.

Dees was raised in Greensboro, North Carolina, and earned a degree in TV, Radio, and Motion Pictures from the University of North Carolina. When challenged by a fellow student to audition for a radio show, Dees accepted, won the job, and has been on the air ever since.

While serving as morning personality at WHBQ/Memphis in the 1970s, Dees recorded the parody "Oisco Duck" which sold over six million copies.

Dees is the recipient of *The People's Choice Award* and has been awarded a star on the Hollywood Walk of Fame.

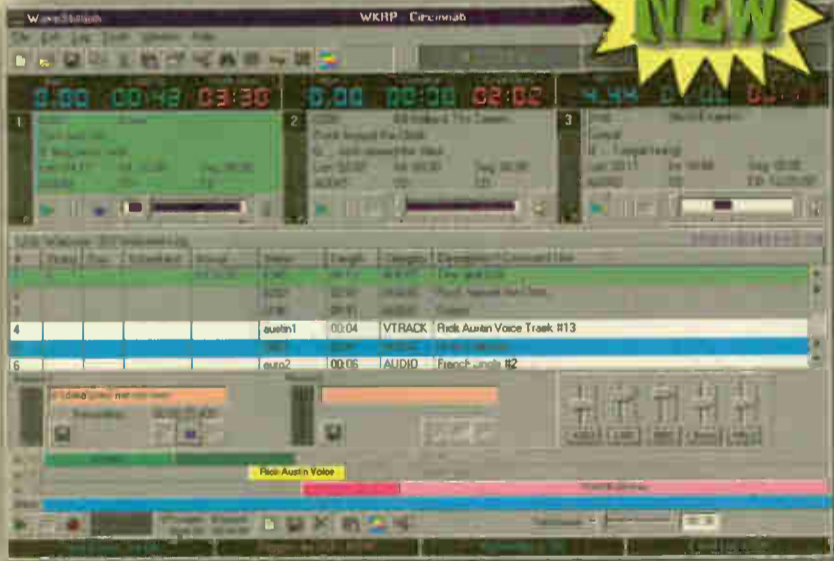
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See HALL OF FAME, page 46 ▶

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Jim Dunbar Enters Radio Hall of Fame

Bill Mann

Jim Dunbar will be the first San Francisco Bay Area radio personality inducted into the Radio Hall of Fame by the Museum of Broadcast Communications. Characteristically, he was self-effacing and erudite upon hearing the news.

"I am, as Winston Churchill once described political rival Clement Atlee, 'a modest man with much to be modest about,'" Dunbar said in his well-modulated tones.

Dunbar has been morning co-anchor since 1974 at San Francisco's top-rated ABC station KGO(AM). He was elected to the Hall in a poll of 4,500 radio executives and broadcast historians.

The Michigan native and five other radio luminaries will be inducted in Chicago on Nov. 20. Fellow honorees are Rick Dees, Bruce Williams, and the late Gale Gordon, Robert W. Morgan and Kate Smith.

Dunbar's name may be less familiar to U.S. radio listeners, but he has had a remarkable career in the Bay Area - and even before.

KGO Program Director Ken Berry described Dunbar as "one of the first multimedia people in this business."

Dunbar came to KGO as program director in 1963 from ABC station WLS(AM), where he was morning

man on that dominant Chicago rocker.

At KGO, Dunbar soon became an air personality again, and later, the market's top-rated morning man, a local TV news anchor, and co-host of a morning show on KGO-TV for over a decade with former Miss America Nancy Fleming.

Dunbar's achievements as KGO's program director will be remembered after he retires. Although Dunbar downplays his role in changing KGO's format to news talk in 1964, KGO exec Berry said, "Jim totally gets the credit. KGO's ratings were awful when he arrived as PD, and he's the one who decided to blend news and talk."

Dunbar jokes, "When I came here, Yellow Cab dispatchers had more listeners than KGO did."

Because of Dunbar's format switch, the 50,000 watter has an eye-popping unbroken string of 21 years without once losing an Arbitron ratings period in listeners 12+. No other top-10 market station has ever done that.

Dunbar heaps praise on his "KGO Morning News" co-anchor of 20 years, Ted Wygant.

"He's the best broadcast newsman I have ever heard," Dunbar said.

The radio station itself is an award-winner. It recently took the NAB Marconi Award for best major-market station.

See DUNBAR, page 42 ▶



Jim Dunbar

More Truth in Advertising



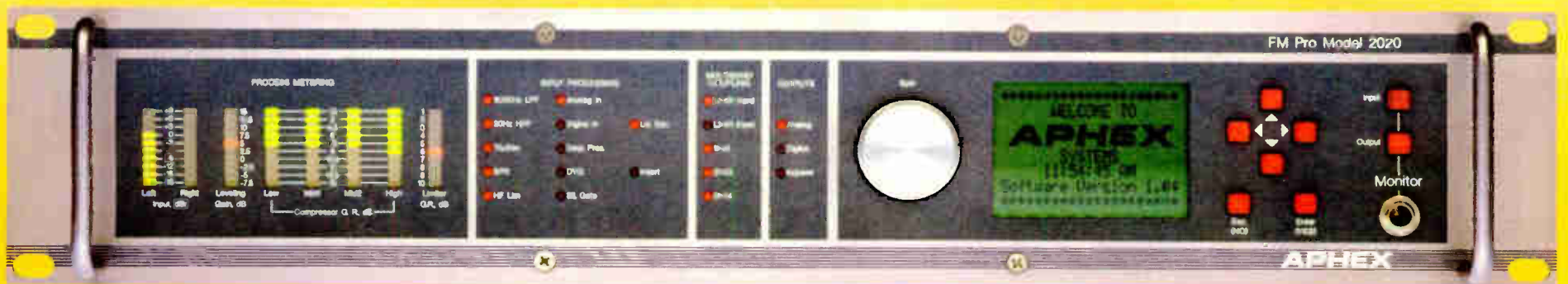
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Dunbar's Decades at the Top

► DUNBAR, continued from page 40

Dunbar carries an elegance from a bygone radio era. He explains how he sees his role: "Waking up people and introducing them to the collective calamities of the day. Reading the news is an act of contrition."

But it's all done, when appropriate, with humor.

"You have to be engaging, and you have to be competitive," said the radio vet, a Michigan State University alumnus who returned to deliver a series of lectures on radio at his alma mater in October at MSU's School of Communications.

Berry clearly admires Dunbar, who has become a Bay Area institution.

"Jim's the nicest guy I've ever met in

radio," said Berry. "I think the key to his on-air success is his superb timing. I would compare his use of pauses to Jack Benny's."

Dunbar began his broadcasting career at WKAR(AM) in East Lansing in 1952 doing commentary on MSU football broadcasts. After a stint in the Army, Dunbar worked nights and weekends at WHDH(AM) in Manhattan, Kan. He then became a DJ at Detroit's legendary WXYZ(AM).

In 1956 he went to New Orleans as PD and morning-drive jock at WDSU(AM), and thence to WLS, which he joined in 1960 as assistant PD and morning personality.

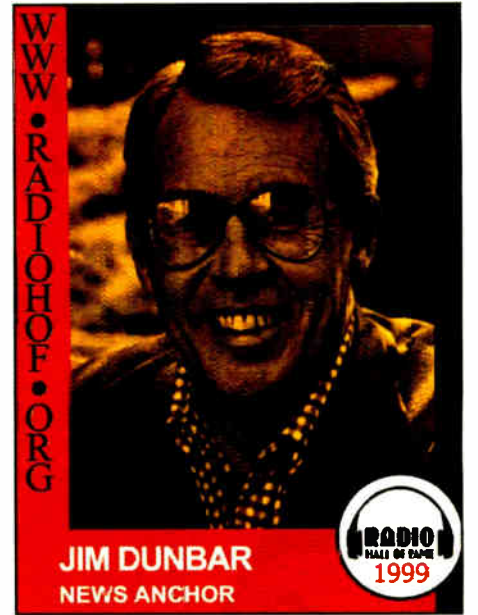
WLS became the dominant station while Dunbar was there — just as KGO

was to do later. Dunbar's magic obviously followed him to the West Coast.

Dunbar, who just turned 65 on Oct. 4, explained why he left WLS in 1965.

"I'd just turned 30 not long before, and I didn't want to spend the rest of my life being a DJ, playing Patti Page and Pat Boone records. I got paranoid about doing rock radio in my 30s. We were a legendary rock station then — WLS owned the Midwest. But when the chance came to go out to San Francisco, it was an engaging prospect I couldn't resist."

Not only were KGO's ratings low when Dunbar arrived to take over KGO, but the powerful KSFO(AM), then owned by Gene Autry and led by legendary morning



Jim Dunbar

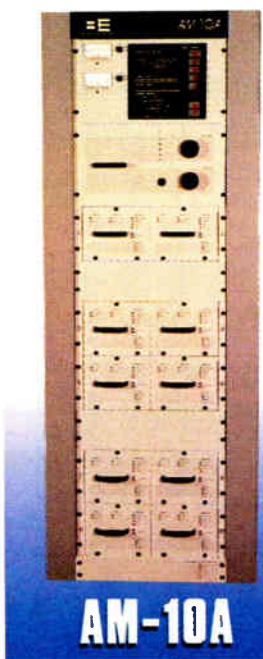
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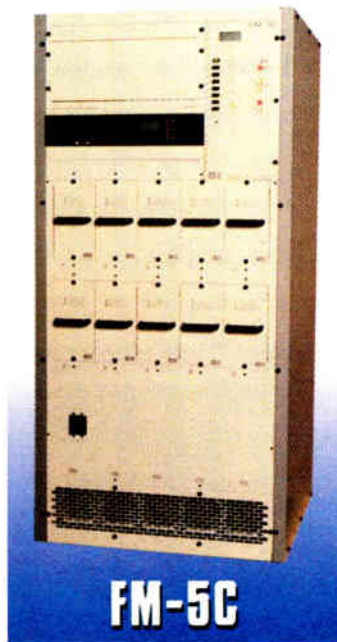
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Solutions for Tomorrow's Radio

man Don Sherwood, seemed invincible.

"I was terribly impressed," Dunbar said. "It was more than a promotional phrase — in those days, KSFO really was 'The World's Greatest Radio Station.'"

Some in San Francisco radio were surprised that Dunbar was chosen before Sherwood as the first San Francisco inductee into the Hall.

Dunbar mentioned Sherwood, former KSFO(AM) DJs Bobby Dale, Dan Sorkin, the late Al "Jazzbeaux" Collins and then-KCBS(AM) personality Dave McElhatton as among a group "more deserving of induction than I."

In those days back in the early '60s, Dunbar recalled, "KCBS was doing both news and talk, but it was, for lack of a more delicate phrase, a somewhat flaccid version. So I decided KGO would adopt it in a more beefed-up version. News and talk was really the only option we had."

Dunbar said he'd left Chicago vowing not to do air shifts again; he was ready for the move into the executive suite.

"But our budget was so modest we didn't have money to hire air talent, so I ended up doing a talk show for a couple of years."

Dunbar would do TV from 6 to 9 a.m., then race upstairs from Channel 7 to do his 9-to-noon radio air shift.

"It was crazy."

Dunbar then moved back to morning drive, and Wygant's arrival soon after caused the AM show to take off in the ratings.

"I think Ted and I sound like a couple of guys who like each other. And we do," Dunbar said.

KGO(AM), KCBS(AM) and, more recently, Howard Stern affiliate KITS(FM) have bounced in and out of the top morning spot in San Francisco, with KGO winning the ratings battle most of the time over the past 20 years.

Dunbar will mark two more milestones next summer.

"I've just signed a contract through June, 2000," he said, chuckling. "I'm just hanging on by my fingertips. It will mark either my 50th or 51st year in radio — I can't remember which," Dunbar said.

Dunbar also revealed to RW that, as of June, he will no longer be coming into KGO's studios and will be leaving as the "KGO Morning News" co-anchor.

"I'm getting a broadcast line put in my home," he said, "and I'll be doing commentaries."

"We're thrilled Jim will be a continuing part of this radio station," said Berry. Especially considering the key role this Hall of Famer has played in KGO's success.

The Word of God Is Big Business

► CHRISTIAN, continued from page 31
we went to St. Louis and Fort Wayne, Ind., and it grew from there."

Today the Bott Radio Network comprises 16 stations. Many of those stations are stand-alone operations, but several of Bott's smaller-market stations are following an industry trend toward consolidated programming and administrative operations.

These smaller-market stations air a network feed from the company's Kansas City hub. A computerized programming system at the hub also inserts market-specific news, weather, announcements and commercials for each station.

Leading the charge among today's publicly traded Christian ownership



Dick Bott

groups is Salem Communications Corp. of Camarillo, Calif. Including stations it is negotiating to buy, Salem has 52 radio properties, making it the eighth-largest station owner in the industry.

Salem also owns programming syndicator Salem Radio Network; OnePlace.com, a Christian Web site; and religious-music magazine publisher CCM Communications.

of Salem's other stations, these three are not small-market operations.

Most of the company's holdings lie outside the Bible Belt, with clusters in major markets such as New York, Philadelphia, Cleveland and Denver.

"We look for stations where we see a way to make it work financially relative to what we've paid for it," said Epperson, who serves as Salem's chairman. "The other thing is whether there is a need there for our programming consistent with our mission, which is to serve the broad, evangelical Christian community."

Epperson said that one of the positives he has seen over the years is that Christian radio has become more widely accepted in the advertising community.

"They see us not as something unusual, but as a normal way of broadcasting. We have natural advertisers like Christian bookstores, but there are others like automobile dealers, stores, services, Internet sites and just about anybody who's not offensive to our core audience."

Since the IPO, Salem's financial performance has been consistent, if unexceptional. The stock (SALM on NASDAQ) was initially offered at \$22.50 and traded as high as \$31 in early September. For the most part, the stock has hovered between \$26 and \$28.

The company reported a \$3.5 million loss for the quarter ending June 30. Salem officials attribute the loss to a one-time stock grant charge associated with the IPO.

Paul Sweeney, a media analyst with Salomon Smith Barney in New York, one of the investment firms that underwrote Salem's IPO, said in an August report that even with the loss, Salem's performance was in line with expectations.

Sweeney noted that net broadcasting revenue was up almost 11 percent over the same quarter in 1998. Sweeney also said that while the acquisition environ-

and SermonSearch.com.

Another group that is pegging its financial strategy to the Internet is the privately owned Catholic Family Radio (CFR). The group, which is based in San Diego, is headed by President and CEO John Lynch.

Fundraising

To start CFR, Lynch raised \$50 million from investors such as Domino's Pizza founder Thomas Monaghan and former Fidelity Magellan Fund money manager Peter Lynch (no relation). Catholic Family Radio began broadcasting on seven stations in January 1999, and now owns 15.

"We made a reconciliation that we'd be a for-profit entity, and that it was okay to do a lot of good and make a little money," said Lynch. "We plan to go public because a huge part of our strategy is the Net." Catholic Family Radio's Web site at www.catholicfamilyradio.com launched Oct. 4.

"Our site provides a center for the Catholic community, with all kinds of information from what it takes to get married, to information on the saint of the day. Of course we have audio streaming so you can hear our stations and past commentaries we've aired," said Lynch.

Perhaps even more than Salem's



John Lynch

OnePlace.com, Catholic Family Radio's site emphasizes e-commerce.

"We kept hearing from clients and potential advertisers that there's no place out there for national distribution of Catholic goods. It just made common sense for us to start the Catholic Family Superstore before someone else did," said Lynch. CFR's Superstore features Catholic religious items and products with the Family Seal of Approval.

"Our goal and vision is to own stations in 40 of the top-50 markets, and then to have network affiliates in markets 50 and above. We ultimately want to have 100 markets out there broadcasting Catholic Family Radio. If every spot we

See CHRISTIAN, page 45 ►

Who Listens to Christian Radio?

	Preaching and Teaching only	Christian Talk and Music only	Both Preach/Teach and Christian Talk/Music	Never any Christian Radio
Women	6%	8%	19%	68%
Men	8%	11%	26%	55%
Men & Women	7%	9%	23%	61%
Catholic	3%	9%	11%	77%
Protestant- Mainstream	7%	12%	20%	61%
Protestant- Non-mainline	9%	12%	38%	41%

Source: National Religious Broadcasters

Salem was founded in the mid-1980s when Christian radio veterans Stuart Epperson and Edward Atsinger merged their holdings, creating a group of about a dozen stations.

The company grew to include more than 40 stations when it went public this past July, raising just over \$140 million. Officers for the company have indicated that the funds will be largely used to fuel further station acquisition.

And since the IPO, Salem has been aggressive in buying stations. During one spree in August, the company announced plans to buy three stations — two in Atlanta and one in San Diego. Like most

ment is tighter in the industry overall, Salem is still finding selective opportunities that meet their acquisition criteria.

While many in the Christian radio industry consider the Internet chief among competitive threats, Salem has embraced the Web.

"We think it will develop into the ultimate communications vehicle," said Epperson. The company operates OnePlace.com, a site that combines streamed programming, user interactivity and databases of Christian information. There are also three Christian e-commerce channels within OnePlace.com — the ChristianSuperstore.net, SonicPlace.com

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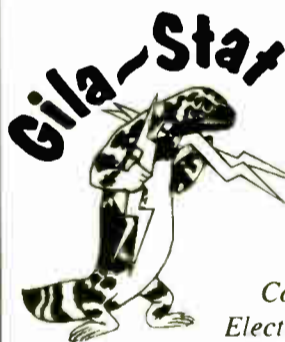


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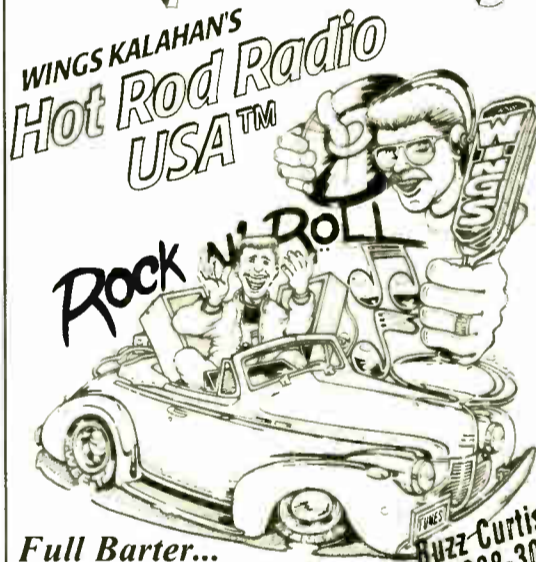
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The New Faces of Christian Radio

► CHRISTIAN, continued from page 43
run on the radio could bring Catholics and non-Catholics to the Superstore on our Web site, it may be more valuable than selling into Ford Motor Company.”

Lynch said making money is important, but like its Protestant counterparts, Catholic Family Radio has a message to spread, even if its programming doesn't sizzle with evangelical fervor.

“Our message exposes people to Catholic family values, with the assertion that our country will be a little better place in which to live if people live by these teachings.”

Those stations not able or willing to leverage the potential of the Internet generally see it in competition with their broadcast signal. Not only can listeners pull in audio streams from stations outside their local markets, but often network or syndicated programs air on the Internet at the same time they air on local stations.

er audience leans toward preaching and teaching. The NRB's Gustavson suggests that talk and music may be the vehicle for drawing in younger listeners.

“There are approximately 400 stations that play contemporary Christian music almost full time, with a few programs like ‘Focus on the Family’ inserted into their programming. Those stations attract considerably younger audiences. There's also quite a bit going on in children's programming and we have youth evangelists who are very involved in producing call-in shows for teens.”

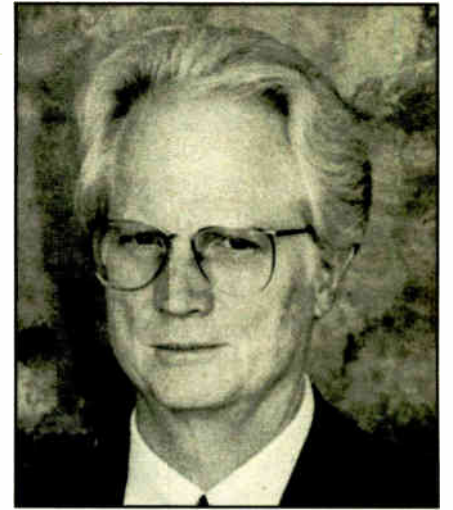
Bott reinforced the concept of carefully constructing programming to attract specific, advertiser-attractive audiences for stations. He said many stations used to air whatever sort of programming they could sell advertising for.

“If you do what we used to call ‘dollar-a-holler’ programming, you're going to have an unconstructed format and you're not going to have a well-gathered audience. But if you carefully put your programming together, you'll have a listening audience that reflects an interest in that programming.”

Even though business is booming, many within the industry accept the success with a sense of caution.

“Christian radio is today much broader in outreach, but in some cases it's lost depth,” said Bott. “If expansion of your outreach is at the expense of your core, then you are going to end up being something different than what you started out to be.”

“The most important thing we have is not our microphones, transmitters or location on the dial. It's our message,” said the NRB's Gustavson. “We're going

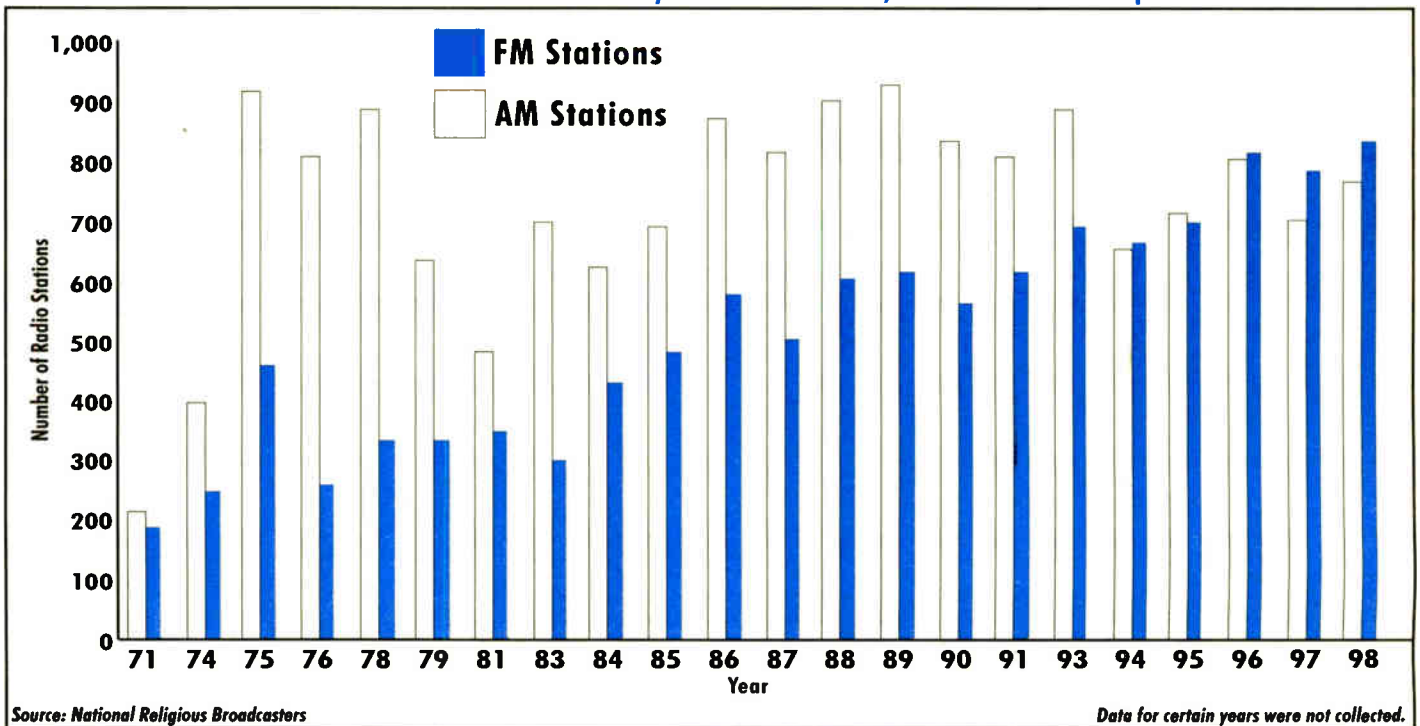


Edward G. Atsinger

to have to keep finding ways, with the bright people we have working in these stations, of getting our message across. Because we feel it's one of the only hopes for our nation.”

Trends in Christian Radio Station Ownership

While Christian FM Stations Increased Steadily From 1971 to 1998, AM Station Ownership Has Fluctuated



Stuart Epperson

The Net isn't the only thing causing anxiety for some Christian radio owners. The FCC is considering allowing a new class of low-power broadcasters, which would create more competition for listeners in some communities. Religious broadcasters are watching those developments closely.

However, at the top of their list of worries is the composition of their audience. Audience composition profiles compiled by the Katz Radio Group show that the median age for a Christian radio listener is 54, with women making up more than 60 percent of the audience — not exactly the demographic profile that excites advertisers.

“Christian radio listening, in general, is very much a common activity of today's older generation,” said Barna's Kinnaman. “If you look at people in their 70s and 80s, two-thirds of them say they listen to Christian radio in a given week.”

“Among people in their 50s and 60s, it's roughly half who listen. Among people who are baby boomers in their mid-30s to their mid-50s, about one-third listen to Christian radio. When you get to the baby busters — that is those who are 18 to 34 — only about one-fourth of this demo are Christian radio listeners. I think people who are in charge of programming and program development need to consider is, ‘Are there ways in which we're not reaching out to today's younger Christians?’”

Christian radio formats fall into two broad categories — “preaching and teaching,” and “talk and music.” The old-

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BEXT

'Babe' Makes a Run With SportsFan

▶ **BABE**, continued from page 35

"The Babe is very talented and very knowledgeable, but she is also an acquired taste for some people," said Boston-based consultant Donna Halper, who points out that sports radio is still largely a "male preserve," despite the inroads being made by women like the Babe and Suzyn Waldman of WFAN(AM) in New York.

"A woman who knows as much as a man about sports and wants to talk sports with the guys can find herself in a very awkward position," Halper said.

Success on SportsFan?

Even so, she thinks the Babe can find success on SportsFan, "if she gets some promotion."

Rich Wood of the WOR Radio Network in New York agrees.

"I've been very impressed with her," he said, "and I'm not even a sports person."

Wood said the Babe's time slot hurts her chances for success, since it falls in morning drive on the West Coast and during late morning in the East, when most sports fans are at work.

SportsFan is trying to make matters easier for West Coast affiliates by offering a reread of the show from 1 to 4 p.m. Eastern.

Further complicating matters is the cross-ownership between many sports networks and their stations. Disney now owns its ESPN Radio affiliates in Pittsburgh and Chicago, both former Babe affiliates. One-on-One Sports owns its outlets in New York, Boston and Los Angeles, among others. And Premiere, which syndicates Rome's afternoon show, is owned by Clear Channel.

Clark said there's still an opening for his network.

Bring in the ratings

"When Premiere owns stations, they're always going to suggest that their program should be on, but if the independent programmers can make a

compelling argument that we can bring in the ratings, we're going to win that battle," he said.

touched," said Robert Unmacht, editor of the trade newspaper M Street Journal.

The Babe herself said she's not wor-



The victory may come from smaller stations, though.

"SportsFan is likely to be willing to deal with weaker outlets and smaller markets that ABC wouldn't have

ried about affiliate count right now.

"I just go in and do the show," she said, pointing out that the break from ABC and its 24-hour ESPN Radio service actually makes it easier for pro-

gram directors to add her show by itself if they want to.

Leaving ESPN behind has also freed the Babe to expand her already wide roster of guest commentators.

"It doesn't have to be just ESPN anymore," she said. "We're getting more CBS people, more Fox people on the show now."

Whatever happens now, Donnellan said she's comfortable being where she is.

"I've done network radio, I've done television, I have accomplished everything I can possibly do," she said.

For SportsFan, there's still much to accomplish.

"We have a renewed commitment to bring SportsFan to the next level," said Clark. And he expects the Babe to do that.

im·i·ta·tion \ im-ə-'tā-shən \ adj.

1: Resembling something else that is genuine and of better quality. 2: not real.

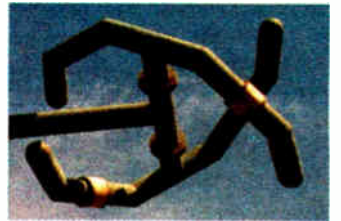
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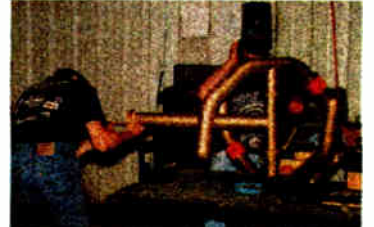
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ABC Says Babe Decision Mutual

Why did ABC part ways with the Fabulous Sports Babe? The network and the talk host agree it was a mutual decision.

"The network wanted to go in one direction, and she wanted to go in another," said ABC spokeswoman Michelle Bleiberg, who said the Babe and the network disagreed on the show's format and pacing. Bleiberg said the Babe was on some 90 stations when ABC agreed to release her from her contract in September, and the network was pleased with her ratings and carriage.

But an executive at a rival network, who asked not to be identified, said the loss of affiliates such as WDFN(AM) Detroit and ABC-owned WMVP(AM) Chicago made ABC willing to end the contract.

— Scott Fybush

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Studio Sessions

Product Guide



Page 52

Radio World

Resource for Radio Production and Recording

November 10, 1999

FOCUS ON AUDIO PROCESSING

Rack, Console or DAW: DSP Picks

Alan R. Peterson

The well-dressed production room of today has the digital power to warp, shape, stretch, reverberate, mutilate and otherwise sculpt audio like modeling clay.

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ty of choices for everyone.

Only 10 years ago, the best effect some radio production rooms could achieve was simple tape echo, available in only two exciting speeds.

Better production rooms might have been outfitted with an equalizer, a compressor and perhaps a reverb unit. Many studios in the late 1980s were festooned with blue Orban para-graphic EQs and spring reverb boxes.

Radio rooms

The big-money radio rooms had an Eventide Clockworks Harmonizer, an Ursa Major digital reverb and individual

or inside the very console that forms the heart of the room.

"A computer and soundcard today sound better than the digital studio of 15 years ago," said Bob Ellison, president of Syntrillium Software. His company makes Cool Edit Pro, a 64-track DAW program with more than 30 built-

in stock effects.

"Radio people want the heavy hitting basics, such as reverb and compression," he said. "They are always looking for the right filter to make their voices big. Now a very popular feature is 'Stretch' to fix recordings that fall short."

DAWs on both the Mac and PC platforms include some forms of processing, from the elaborate features found

See AUDIO, page 56 ▶

FOCUS ON AUDIO PROCESSING

Audio Processing for Y2K: Less Is More

Ken R.

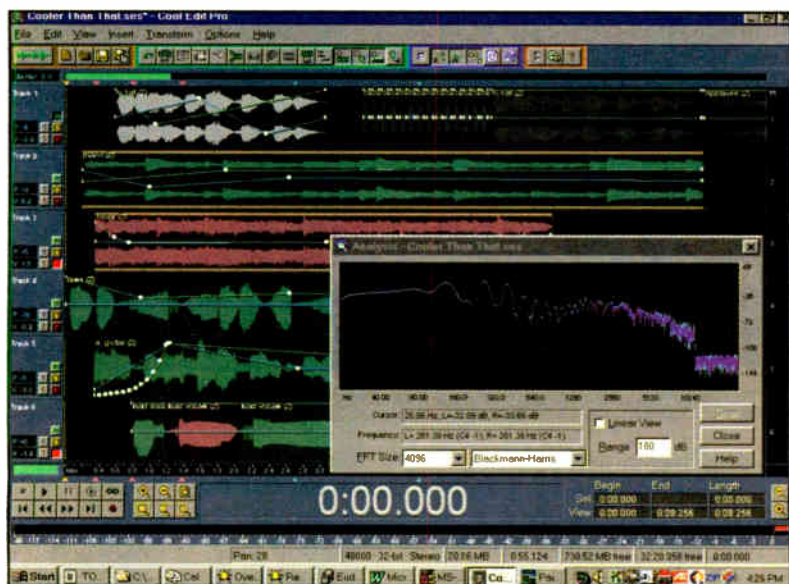
How did audio processing for radio get to where it is today? Step back with me in time to 1953.

A musician named Les Paul was not only creating designer guitars, he was inventing recording technology. By reducing the speed of a tape recorder from 15 ips to 7-1/2 ips, he was able to record intricate guitar parts. When the tape was played back at normal speed, he sounded like a virtuoso.

kicks" were joining the disk jockeys on the air in short order.

In 1963, studio technology was still in its infancy as the Beach Boys and Motown groups dominated the AM airwaves. Natural reverb chambers and giant metal plates were all the rage in recording studios. Many top-40 stations began to sound like they were broadcasting from inside a giant can, as listeners to large-market radio stations might have believed.

Another early effect was "slap back"



Software users alter audio with on-board effects, like those offered by Cool Edit Pro.

perfect 29.5 seconds. In spite of the ability to create layers of sonic skyscrapers, radio producers still utilize good old reverb, compression and EQ in much of their work.

Signal processing used in radio production has never sounded better and has never been easier to set up. Whether you like your sizzle in a dedicated box, DAW or mixing console, there are plen-

dbx noise reduction modules on the multitrack reel machine.

Today's production room is a marvel of digital technology. The effects used to make a compelling and elaborate production might come from a heavily embellished workstation packed with processing power, a few dedicated outboard effects in a rack and a single PC propped up in a corner



A small box like the Yamaha SPX1000 can do what a rack of gear did 40 years ago.

A few years later Ross Bagdassarian, a.k.a. David Seville, tried this trick with voices, and The Chipmunks were born. Radio station DJs know they had the ability to do this too, so chipmunk "side-

tape echo. This was accomplished by mixing the delay return, which occurred between the record and playback heads, from a tape deck. Elvis and Jerry Lee

See PROCESSING, page 55 ▶



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PRODUCT EVALUATION

A Big Bang for a Little Box

Michael Parks

When is bigger not necessarily better? With today's technology, why have "big" when you can have it all and have it small?

Such is the case with the Symetrix 301 compressor/limiter, in which you get all the features you need in a small, compact unit. The moment I unpacked it and started tinkering with it, it brought back some memories.

When I got out of college, instead of making payments on my student loan, I went down to the local stereo equipment store and bought myself a system with the *biggest* set of speakers they had in stock.

my big bad speakers, which I still have.

Other than the automobile industry, it seems the real challenge facing designers and engineers today is not just to come up with something "better." It has got to be "smaller."

Which brings us to the latest little gem from the engineers at Symetrix.

Size doesn't matter

For more than 20 years, Symetrix has been putting out audio processing equipment. Its latest contribution is the Symetrix 301 Low Distortion Comp/Limiter. It is the "low distortion" that is the big feature in this little unit.

The 301 is just a little bigger than a computer CD ROM Drive, occupying

301 allows for compression without added distortion from the process.

"No matter how much you compress the signal, there's no buildup of noise. In fact, you can squash the daylights out of the audio signal, but you won't get that grunginess that you had with other compressors."

He is right. I hooked up this unit in our production studio, and took it on the road to tape a syndicated travel show at the local convention center.

In both instances, it really did everything it says it can do, and that I needed it

to do, especially at the remote broadcast.

At past remotes, I usually had to keep a constant eye on the mic levels from the host and her guests. This time I let the 301 do it for me.

'Auto pilot'

I even put the 301 on "auto pilot" using the automatic attack and release control. It worked fine. In fact, when dubbing the show into our Enco digital audio delivery system at the studios from my DAT and MiniDisc, a couple of people noticed how great it sounded for a remote recording.

The 301 is a basic unit. The controls allow the user to adjust the attack, release, threshold, ratio and output.

See SYMETRIX, page 55 ►



The Symetrix 301

There was no way this dude was going to listen to Kansas albums on some small set of speakers. Rock on!

Now, instead of saving money, I am being frivolous, ready to plunk down cash for this hi-tech surround sound system with teeny tiny little speakers, because they sound so much better than

only half the width of one rack space. It is a single-channel unit that gives you the ability to apply compression, to smooth out dynamic levels, or to apply limiting, when you need hard-line control over signal levels.

According to Steve Kawasaki, director of sales and marketing of Symetrix, "The

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PRODUCT EVALUATION

dbx Quantum: DDP on Steroids

Ken R.

The Quantum by dbx clearly is the big hootchie mama of all-in-one mastering boxes!

Let me explain how I got to that conclusion.

Manufacturers often spend a lot of R&D resources developing a piece of equipment with dazzling features. Then, having made investments in these knockout gizmos, the manufacturer puts some of this stuff into its lower-priced models.

operation, along with sample rate conversion, normalizing and much more. Cramped into one rack space, it can perform all these processes at once in real time.

For those fond of the old "tape saturation" sound, dbx recreates it, calling it tape saturation emulation. It sounds pretty good.

Whether the digital source is AES/EBU or S/PDIF and at any sampling rate, Quantum will speak the language. It is the "Type O" of mastering boxes.



The Sexy Quantum by dbx

This is seen over and over again in expensive reverbs and their newer, smaller cousins or in music keyboards and their module-only versions. In this case, the process went the opposite direction.

Earlier this year, I reviewed the DDP, the first digital processor by dbx. It has analog and digital inputs and cool meters that let the user see every function. The DDP has several bands of digital EQ, great compression, excellent gating, de-essing and other wonderful features for \$599.95 suggested retail price.

However, the software is klugey, and the factory presets are awful. It is frustrating spending hours reading obscure paragraphs buried in the manual.

In that review, I predicted that when dbx worked out the bugs, the next version would be a monster.

It's here and it's called Quantum. The company smoothed out the rough edges and added enough features to qualify it as a certified mastering processor. It is pretty awesome.

Yo, what it is

The Quantum is the first box by dbx to offer sampling rates up to 96 kHz 48-bit digital signal path and up to 24-bit digital output.

It has five bands of EQ, four bands of gating, compression and limiting in true stereo or dual mono

Geoff Lissaman, dbx product development specialist, said, "It's the big brother of the DDP." Does Quantum have enough features to cost approximately four times more than the DDP? Read on and decide for yourself.

What is the difference?

The DDP processor offers digital I/Os with an optional card, but on Quantum they are standard.

Lissaman said, "On the software level, Quantum does a better job with multiband stuff including compression, limiting and gating."

"There's an internal splitter with four floating crossover points for each of the features." This means that a low bass note in the program material can be processed separately so it won't suck down your whole mix.

The normalizing feature was usually only available in high-end software. By defining the area of the mix that you want to maximize in volume, the Quantum will bring it to 0 decibels full scale.

Other improvements over little brother DDP are the sample rate conversion, two additional bands of EQ, and more control over compression and limiting.

Lissaman said, "While the DDP runs on a single 80 MHz chip, Quantum runs on five 100 MHz chips."

See QUANTUM, page 51 ►

PRODUCT EVALUATION

Dart Pro 98 Suite Cleans Up

Carl Lindemann

Dart Pro 98 is a sophisticated suite of audio processing routines that cleans up a wide variety of noise and interference without introducing major processing artifacts.

Most digital tools designed to record and manipulate audio work fine, as long as the source material is good. The GIGO (Garbage In, Garbage Out) rule applies with any data processing.

The first step to creating a quality end-product is to control the sound-gathering process. It is a lot easier to fix audio on the front end than on the back, but that is not always possible.

Working under adverse field conditions can be problematic. Noises that crept into the sound chain can be missed when recorded and later discovered.

There is also the challenge of working with archival sound stored on various types of analog media.

Diagnosis

Sophisticated diagnostic tools enhance the program's power, which allows users to examine audio files in detail to help them identify, isolate and then remove problematic elements. Dart Pro 98 can open a new window on old audio, or retrieve recordings that might otherwise be lost.

Dart Pro 98 is marketed mainly to people looking to digitize old LPs into CDs. Its consumer use only touches the potential for audio professionals.

In addition to the audio processing capabilities, it is a recorder, editor and a CD burner. These functions are fairly self-explanatory and can be mastered quickly.

The audio processing interface takes

a little more getting used to. At first look, it seems confusing, but the "online tour" included on the program disk and the comprehensive manual sort things out quickly.

The program has three major elements.

A thin overview window shows the complete sound file with the position of

markers, blocks and other notations placed to indicate problem areas.

The sound file window shows the waveform and includes a small "info" window giving data such as the length, sampling rate and so forth.

Last, the Binary Window gives access to the various decisions made to manipulate files.

The standard windows menu and tool bars key into the various functions you can apply to the files.

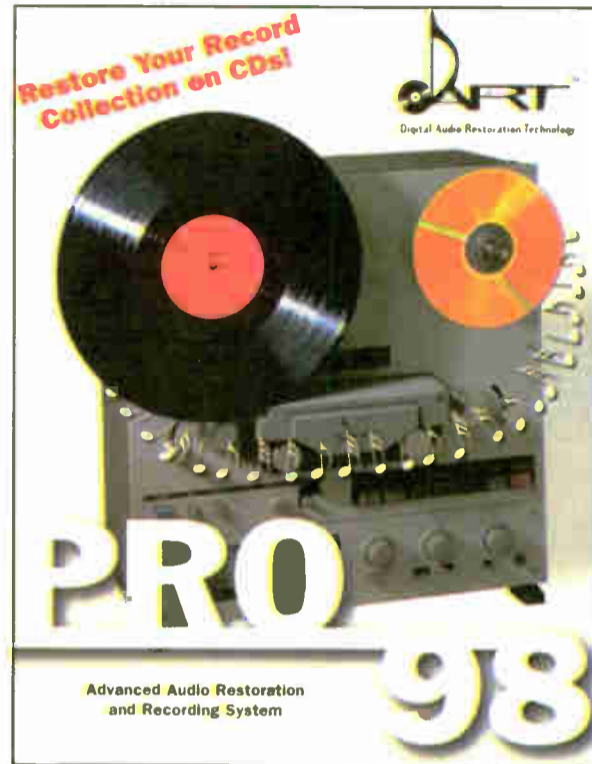
There are two major pull-down menus — "Toolbox" and "Restore."

Toolbox accesses a familiar pallet of EQ, filters and fades found on many audio production packages.

The EQ has 10-bands starting at 31.5 Hz and doubling in each band up to 16 kHz. The faders can alter the frequency +/- 15 dB, and a master gain control sets levels. As with Dart's other processing options, the sound file can be played in a continuous loop while adjustments are made to it in real time.

The sample rate converter will also alter the "RPM" of a recording, like a pitch control with a far greater range of adjustment. For an example, a 78-RPM record can be played at 45 or 33 RPM and then altered if no turntable that plays 78s is available.

See DART PRO, page 53



▶ QUANTUM, continued from page 50

Another difference I like between the Quantum and the DDP is that the Quantum features mostly stereo setups, whereas the DDP dual-mono setups was cause to make me want to tear out whatever hair I have left.

Two levels, no waiting

Through trial and error, manufacturers discovered that most end-users do not want to wade through a lengthy manual. Impulsive types like myself expect to plug it in, push a few buttons, then soar with the eagles.

Quantum understands. By selecting the wizard option, the "push-and-play" type of users answer a half-dozen or so short questions about preferences. Then the unit runs through about 22,000 possible combinations and loads a special preset.

Quantum and the little brother DDP share a clever metering scheme. One can watch the left and right input and output of the limiter and at the same time and check the downward gain reduction of the gate. I love being able to see all this information at once without scrolling around.

Product Capsule:
dbx Quantum Digital Mastering Processor

Thumbs Up

- ✓ "Wizard" operation for non-power users
- ✓ Talks to any equipment, bit rate, sampling rate, even MIDI
- ✓ Precise control of many parameters
- ✓ Even the manual is pretty darn good

Thumbs Down

- ✓ Digital to analog converter is very good but not pristine
- ✓ Type IV saturation can add unwanted artifacts
- ✓ Equalizer is not as flexible as an outboard unit
- ✓ Multi-band processing requires time and experience to set up properly

For more information contact the company in Utah at (801) 568-7660, check out the Web site at www.dbxpro.com or circle Reader Service 53.

or digital mastering, bridging a workstation to your DAT machine, A/D conversion and sample rate con-



Quantum's Back Side

One can select multiband or broadband compression, gating, limiting and EQ. As expected, it is possible to save the settings and recall them easily.

You can get incredibly detailed in tweaking the Quantum.

For example, in just the multiband compression area of Quantum are the following parameters in each of four bands—On/off, over-easy or soft-knee, threshold from -0.60 to 0 dB, ratio of .75 to infinity, gain, attack, hold and release. Did I mention the user could adjust all of these for each channel individually or globally?

There are also MIDI parameters. The user can set up any controller and Quantum will control the same parameters in all presets.

Quantum can be used for analog

version. If they could teach this thing to water the plants...

This box may be overkill for many radio station applications. It is deep, solid and the features are probably too extensive for most. For recording studios, mastering facilities and sophisticated production departments, this is the real deal.

A few points are listed in the "thumbs down" capsule, but these are minor. Most involve a little patience and practice to overcome. The price is steep at \$1,999.95 retail, but the Quantum is amazing at any price.

Ken R. is a jingle producer with IDs running on hundreds of radio stations. He would like someone to buy him a Quantum for Christmas. Reach Ken c/o RW.

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- Bob Hamilton, News Radio Star

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- Dave Olive, Radio and Production, May 1997

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Sharp's \$199 MiniDisc Recorder

Sharp Electronics introduced an ultra-slim portable MD recorder, the MD-MT15, with a suggested retail price of \$199.



The unit includes an AC adapter, RCA-to-mini cord headphones and carrying bag.

The unit can run on two nickel metal hydride rechargeable batteries providing up to 7-1/2 hours of recording time or two AA batteries. It has a Sampling Rate Converter, optical line-in and stereo minijack mic input.

The unit can automatically pause

for silent passages when no sound is detected for three seconds or longer. The automatic time feature places track IDs at fixed intervals.

The unit can record in 2x extended monaural mode, and play back extended recordings at twice normal speed.

Editing functions enable users to move the playing order of tracks, erase any or all tracks, divide one track into two, and combine two sequential tracks into one after making the initial recording. The user can create 100-character alphanumeric titles with the new jog dial to make titling easier. The unit has a 10-second shock buffer.

For \$250 retail, Sharp also offers a limited quantity of the MD-MT20. This unit comes with a wired remote control with a clip-on attachment that contains Play, Pause, Stop, Cue, Review, X-Bass and Volume functions and displays track numbers and titles. It has 40 seconds of buffer. Both units have a clamshell styled loading mechanism.

For more information contact the Audio Division at Sharp Electronics in New Jersey at (800) BE-SHARP, visit the Web site at www.sharp-usa.com or circle Reader Service 23.

Adaptec Licenses Arboretum Technologies

Adaptec will include audio enhancement and restoration processes from Arboretum Systems in forthcoming CD-burning software products.

The company said it would include Arboretum DSP technologies in Toast 4

Jaroslaw. "Arboretum Realizer brings back much of the impact, vibrance and separation that's lost to compression, in a way the user can easily control."

Realizer uses pro recording algorithms to solve the sound quality problems of low-bandwidth Internet music.

Adaptec®

Deluxe, SoundStream and Easy CD Creator 4 Deluxe.

Adaptec pointed to Arboretum's new Realizer digital signal processing technology, which improves the sound quality of MP3 files and other audio formats. Toast 4 and SoundStream 1.0 include the Realizer.

"It's a well-known secret that MP3 music doesn't sound as good as CDs," said Arboretum CEO Georges

It runs on Pentium, PowerPC and 56000-series processors and is offered to hardware and software manufacturers for OEM licensing.

For information and shareware plug-in versions, visit the Web site www.arboretum.com/realizer

For information about Adaptec CD-R software, call the company in California at (408) 945-8600, visit the web site at <http://cdr.adaptec.com> or circle Reader Service 33.

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Omnia Moves Up The Audio Chain

After the success of its Omnia line of on-air signal processing products, Cutting Edge/Telos introduced the Omnia ToolVox, its first processor to go between the mic and the board.

The unit starts with an analog pre-

The sophisticated dynamic range control can "punch up" a talent's voice. The noise gate reduces background noises.

The unit offers presets that can be accessed simply by the talent. Adjusting the parameters is reserved for qualified staff by a network-friendly remote control.



amp and protection limiter. It then converts the audio to digital with a 24-bit A/D converter.

Available algorithms are, in order, phase rotation, an AGC, three EQ sections, dynamic range control, de-essing and reverb.

The AGC has a slow attack and release to compensate for whether the personality is talking or not, the talent's voice level and position relative to the mic.

Presets can be automated to coincide with shifts and are easy to access off the network, so the same presets can be used in different studios.

Retail price is \$1,980.

For information about the Omnia ToolVox, call the company in Ohio at (216) 241-3343, visit the Web site at www.nogrunge.com or circle Reader Service 43.

Eventide Introduces Orville

Eventide has introduced its latest Harmonizer, the Orville, with a suggested retail price of \$5,695.



The unit has two DSP processors for independent A/B configuring for two simultaneous four-channel or stereo effects.

The unit supports four digital and analog I/O simultaneously with its "anything to anything" routing capability. Providing 96/24 sampling, the unit can store up to 174 seconds of audio.

New features include the UltraShifter, for creating pitch-shifted vocal harmonies octaves above the root using natural timbres, and the FourSidedVerb, for 5.1 applications.

The unit is backward-compatible

with almost all older memory cards. Future software upgrades will be available over the Internet and on PCMCIA cards, which can also be used for additional storage.

For information about Eventide's Orville, call the company in New Jersey at (201) 641-1200, visit the Web site at www.eventide.com or circle Reader Service 153.

Dart Pro Makes Things Quieter

► DART PRO, continued from page 51

"RPM" can work with some less-conventional archived material, like 80-RPM Edison Diamond Discs and 125-RPM Brown Wax Cylinders. Reel-to-reel material recorded at an odd rate due to equipment malfunction can be reprocessed to correct for that error.

The "Find Pattern" tool is handy for cleaning up pops and tics from vinyl. A scratched record will exhibit a repetitive pattern. When records are translated into linear, digital form, you have to search along the sound file to find where these repetitive disturbances crop up.

Scratch sound

The "Find Pattern" tool samples one scratch sound and then mark where it appears. It is similar to the way a word processor highlights a single word throughout a text. Once these are identified, they are removed easily.

The Restore menu gets to the heart and soul of the Dart Pro 98. DeClick removes impulsive disturbances like pops and tics and DeHum targets harmonic disturbances.

DeClick has control settings for adjusting the level of processing and the detection threshold. DeHum works with a standardized model of the hum typical

recording was polluted with a nasty 60-cycle hum. Dart Pro 98's DeHum managed this well, by removing the repetitive pattern. The interview was revealed, and the program introduced only some minor alterations in the overall sound, which was impressive.

I tried Dart Pro 98 on two problematic recordings.

First, I had a phone interview rendered useless because the line was not grounded to the simple phone patch used, which I missed in monitoring. The

recording was polluted with a nasty 60-cycle hum.

Dart Pro 98's DeHum managed this well, by removing the repetitive pattern. The interview was revealed, and the program introduced only some minor alterations in the overall sound, which was impressive.

The only problem was the program required a good deal of processing power. Running this on my 233mmx laptop took a bit more than half the time needed to play back the whole file. A faster computer is definitely recommended.

The next project was a bit more challenging.

I interviewed a subject in less-than-favorable circumstances at a convention. My usual field recorder was out for repairs, so I was using a \$30 cassette with internal microphone. The intention was for intelligibility when comparing it with my notes, not for broadcast.

The next handicap came from not having a quiet interview space. We sat down in a café with a high level of ambient noise.

Finally, I loaded this tape through the integrated soundcard on my laptop, which is a dubious proposition that added another level of hum.

As earlier, removing hum was easy, but isolating and removing the ambient sound was tricky. I managed to find a break in the interview to get a sound print and then subtracted the noise.

Depending on the fine-tuning, I could remove the ambient noise to a greater or less degree. The more radical the removal, the more it affected the interview.

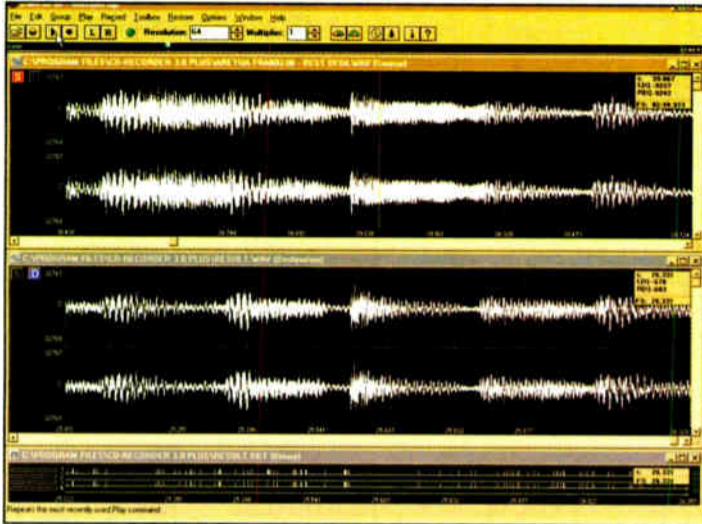
I was able to tweak it to increase intelligibility. It managed to dredge up some words that had been lost in the muck, but it was not magic.

I was not able to make it seem as if we had conducted the interview prop-

erly in a quiet space with a better recorder and mic combination. By the same token, I am confident that an old hand who had mastered the "tweaks" could have managed an even better restoration.

Dart Pro 98 is a powerful tool. It is easy to get a handle on the most obvious functions, but audio restoration is an art. Achieving expert user status will take a good deal of practice and critical listening. Dart Pro 98 has the depth to support whatever level it is taken to.

The price for the program is \$399.95 and can be downloaded from the Web site at www.dartpro.com



Screen Shot of Dart Pro 98

The first step to creating a quality end-product is to control the sound-gathering process.

to recordings. A user can adjust the frequency and bandwidth of the hum, with the default setting of 60 cycles.

DeNoise and DeHiss have similar functions of removing broadband noise, but go about it in different ways.

DeHiss works like DeHum with a standardized noise model. DeNoise operates by first taking a "noise print" of the file to identify the problematic pattern. This is simply done by highlighting a place in the passage without any program audio in the sound file window and the program analyzes the noise. Then the program eliminates it from the entire recording. Noise prints can be labeled, stored and filed for future reference.

With all these tools, the preview option allows tweaking of the settings before applying them to the entire file. If used on a fast Pentium II 300MHz+ type system, this can be done in real time.

Tools are enhanced enormously by the system's spectrum and spectral ana-

Product Capsule:
Dart Pro 98

Thumbs Up


- ✓ Incredible flexibility
- ✓ Excellent analysis tools

Thumbs Down


- ✓ Could use more presets and off-the-shelf noise reduction routines to help novice users

For more information contact the company in Minnesota at (800) 799-1692, check out the Web site at www.dartpro.com or circle **Reader Service 63**.


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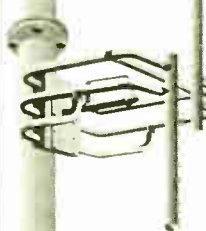
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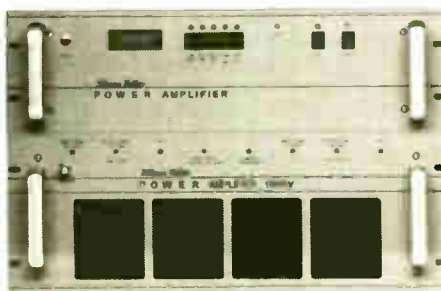
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ext. 154

A Wise Use for a Half-Rack

► SYMETRIX, continued from page 50

There is an over-ride switch that engages the automatic attack/release mode. The settings are factory presets intended for general use and will sound good on most material.

That is the only control, but in a lot of cases, not much else is needed.

The 301 can be set up with the XLR I/Os or removable terminal block connectors. The unit comes with a power supply, which connects by a DIN plug.

Kawasaki said, "Symetrix built the 301 for broadcasters, but is (also) recommending this unit for paging on telephone systems to help control changing input levels from different users."

Though I had no urge to do so, the manual warns to not remove the chassis, noting there are lethal voltages inside.

Other than that scary warning, the manual is quite a useful tool.

Product Capsule:

Symetrix 301 Low Distortion Comp/Limiter

Thumbs Up

- ✓ Compact size
- ✓ Clean sound
- ✓ Low price
- ✓ Good for utility studios or for those extra mics that need some processing

Thumbs Down

- ✓ Only basic controls

For more information contact Symetrix in Washington at (425) 787-3222, check out the Web site at www.symetrixaudio.com or circle **Reader Service 83**.

For those who need a quick lesson on the basics of compressors and limiters, the manual offers a neat tutorial that is easy to read and understand. You can learn about dynamics of sound and processing plus learn how to use the 301 to achieve the best sound.

The first page suggests you read the manual cover to cover. It is less than 20 pages and well worth the time.

The 301 is cost-effective, retailing at \$249 suggested retail price. This makes it perfect for those studios where you have more than one mic and need some basic compression and limiting.

This is the least expensive unit in the Symetrix line. As Kawasaki said, "It also has the coolest circuitry."

The Symetrix 301 offers a lot of compression and limiting power in a very small box.

■■■

Michael Parks is creative director at Dame Media, Harrisburg, Pa. Reach him c/o RW.

The Effects Are in the Software

► PROCESSING, continued from page 49

Lewis were big users of it. It remained popular in the 1960s on surf records, which gave guitars that distinctive sound. Radio stations caught on to this trick and used it in its commercials and promos.

In November 1959, the novelty record "The Big Hurt" by Toni Fisher caught the ear of programmers and production people. What gave the record an unusual sound was a new technique called flanging.

This effect was done by having two tape recorders cued up with the same recording on each, starting them at the same time. By lightly resting his hand on the flange, the metal case used to hold together the reel of tape to the hub, the engineer would vary the speed of one machine until it was in synch with the other. As one source went slightly ahead in time, an unusual whooshing sound was heard as the two audio sources went in and out of phase.

A few 1960s psychedelic tunes featured a touch of backward guitar or drums, such as The Beatles used on the guitar solo of "I'm Only Sleeping" in 1965.

Multitrack recording soon allowed overdub of instruments with separate compression and EQ. At this point, stations were still using mono equipment because the cost of multitrack gear was prohibitive.

The early 1970s found groups like Chicago and, later, Earth, Wind & Fire using heavy compression on brass and rhythm sections to make songs "pop" out of the speakers. In those years, the hits were played on AM, which was very forgiving of hiss, noise and scratches. FM was a sleeping giant about to awaken.

Between 1970 and 1979, music gradually moved to FM. When the FCC decreed that all car radios must receive both bands, radio stations were obliged to deliver a cleaner sound. The older, noisier gear had to be replaced.

Increasing sophistication

During the late 1970s, the new processing toy was the digital delay. The first units were crude, but it allowed one to sound like Darth Vader or the Cylons from Battlestar Galactica. Due to the fairly low price, it was ubiquitous in hit records and spots.

The mid-1980s brought digital sampling and with it the popular stutter as in "m-m-m-more m-m-m-music." Max Headroom was television's sultan of stutter.

The 1990s ushered in a more realistic and natural sound. Many rockers are recording without reverb or effects. Their songs are stark and amazingly clear in contrast to the souped up hits of the last few decades.

Technology slowly makes its way to from the multimillion-dollar recording studios down to the production rooms of radio stations across America. As artists experiment and push the boundaries of recording, jarring new sounds become a just another part of our daily lives. Prices on the hottest equipment tumble.

Those cheap, improvised effects are gone, replaced by digital workstations and outboard boxes. RW wanted to find out what gadgets production directors are lusting after for the year 2000.

Jason Alexander, production director at urban station WOWI(FM) in Norfolk, Va., likes to keep things simple. "I like recording voices flat and letting the on-air processors supply compression," he said. Alexander uses a Roland DM800 eight-track DAW with several plug-ins.

"We'll occasionally use a Yamaha SPX990 digital multi-effects processors patched into our workstation for a filtered phone effect. We also have a Yamaha SPX1000 digital processor for those stut-

KQV(AM) in Pittsburgh still uses tape and razors. According to Production Director Greg Damjanovic, "If I want an effect on the voice, we use tape echo. It's low-tech but it works."

Damjanovic would like to move from his Tascam BR-20 two-track reel-to-reel machine into a digital workstation when budget allows. Other vintage equipment at KQV includes a McCurdy SA-137A board in the production room.

One heritage AM station that is changing with the times is Clear Channel station WLW(AM) in Cincinnati. At the production helm is John Beattie, who also works his magic for sister station WCKY(AM).

"We use Digidesign ProTools for everything," said Beattie. "We use its high-pass filter for our phone effects, the echo and reverb plug-ins. I also use the time compressing function to adjust spot length when things come in from other sources."

WLW also owns a Symetrix 628 Voice Processor, but most work is done within the workstation. "We still go through an analog board here, and I'd like to be completely digital like WEBN upstairs." At WEBN the software allows the user to look at the audio details on one monitor and the editing processes on another.

Another Clear Channel station is KNIX-FM in Phoenix, Ariz. Head of the production team is Scott Fisher, who has a voice that immediately lets you know he is a production man.

"I've been here three years and we use ProTools and the Orban Audicity for everything. We like the ease of the plug-ins," Fisher said.

"There are so many choices out there that it's overwhelming. Because of my lack of time, I would like to just have factory presets. You can tweak them if you like, but if the defaults settings are good, they would probably be used most of the time." Fisher said.

■■■

Tell us about the devices you use to process audio in your production studio. Send e-mail to pcogan@imaspub.com



Products like the Orban Audicity now incorporate powerful processing tools.

ters, but we don't overuse them. We don't want the listener confused," said Alexander.

What about lasers and other effects in promos?

"Those things are fading. The explosions and quick 'booms' are popular in the urban format, but the majority of our promos are very simple. You can keep it simple but still be creative so the listener understands what you're saying," Alexander said.

Alexander would like to move up to the Orban Audicity audio workstation, which he used at a former place of employment. "The Roland DM800 multitrack recorder is a bit hard to use, but within 20 minutes you can master the Audicity."

Believe it or not, some stations have yet to dive into the digital waters.

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Hardware Turns Into Software

► AUDIO, continued from page 49

in Digidesign ProTools and the Ensoniq PARIS, down to the simplistic Reverse and Normalize functions of Fast EDDit. In between are editors that exploit the limitless possibilities of DirectX and VST compatible plug-in effects processing. Sound Forge, WaveLab, the SAW product line and others are such programs used by radio producers.

A great deal of signal processing is now included in hardware directly on the audio interface or soundcard for PC-based audio work. A notable example is the Yamaha DSP Factory audio interface that places extensive mixing

and signal processing capabilities on a card that drops into a stock PC.

A less-expensive example would be the MediaTrix 3DXG soundcard, with only simple two-channel analog I/O, but a full complement of reverbs, choruses and delays built on. The card often retails for less than \$150.

New effects

The dedicated Orban Audicity workstation now comes with version 3.0 of its internal DSP functions, placing high-quality reverb, compression and a host of new effects right in the same device as the recorder, editor and mix panel.

The hardware contributes as much to the sound of a processor as the firmware that make it tick.

Geoff Steadman, Orban product manager for editing systems, also noted radio's preference for the basics. "Compression, reverb, filters — there is a class of user that likes having things all in one unit."

Steadman recognizes that once an effect is done in software, there is nothing left that is unique.

"There is a trend today that says the effects themselves have become commodities. Ten years ago, a company such as Lexicon had the reverb market sewn up. Now reverbs have become commodities."

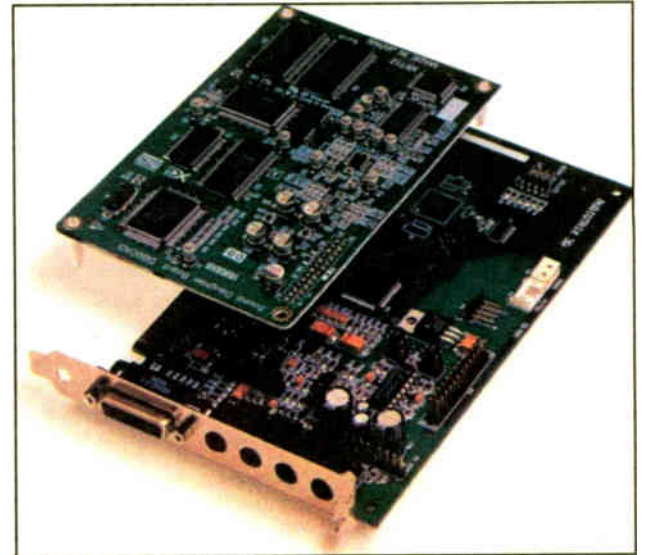
The ability to change the length of a promo or commercial to fit a certain time window put the original Eventide Harmonizer on the map some years ago. Many radio production people today erroneously refer to the process as *harmonizing*, no matter the manufacturer of the device in use. The term is trademarked by Eventide.

Gerry Griffin, sales manager for Eventide, said, "The 3000S Harmonizer used to control the capstan of tape recorders and change the pitch accordingly. There are not a lot of capstans left to control today."

The latest version of the Harmonizer, The Orville, has two DSP engines for multi-channel operation and is considered much more powerful

than the 4000.

There is still a future for rack-mount processors. Ellison said, "There is a definite use for outboard boxes: real-time manipulation of sound" — an opinion seconded by Griffin as well as Peter Chaikin, director of marketing for Alesis Studio Electronics.



DSPs like the MediaTrix 3DXG soundcard enhance processing abilities.

"An engineer can walk into any studio, see a Harmonizer in the rack and immediately dial in the settings they know are right rather than hunt through a workstation," said Griffin.

"Standalone products are not going away," said Chaikin. "We still sell them like crazy."

According to Steadman, himself the owner of a classic DeltaLab Effectron delay, "Outboard boxes are fast and familiar, and users like the speed of the controls. They aren't going to be disappearing overnight."

In the case of microphone processors, real-time control over parameters is very necessary. Often, a specific sound is arrived at by experimentation and by ear.

Another reason you will still see dedicated processor boxes around for some time to come is that many companies feel the full experience simply cannot be experienced on a floppy disk. The hardware contributes as much to the sound of a processor as the firmware that make it tick.

The notion that a reverb algorithm will create identical sounds on differing brands of soundcards may not be an accurate one.

Griffin said, "Folks don't give up their best stuff when reducing it in software. We don't feel we could provide Eventide quality when we compromise on hardware."

His advice: "Never replace a good piece of hardware with a software product."

■■■

Al Peterson is an RW technical adviser and former editor of Studio Sessions.

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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, knobs and software upgrades.

Least favorite piece of equipment: Anything that ships with a "Preliminary" manual or requires more than one factory "mod kit."

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 (Covetrad-era transistor radios, tuning fork Accutron watches).

Pets: Two cats, Buster and RF (Radio Frequency). RF was found abandoned at a transmitter site, natch.

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 columns: I enjoy Paul McLane's "Earwaves" 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 "GM 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 duplexer which allows Cumulus' SRW Tallahassee AM (WHBT) to successfully duplex with another SRW station only 80kHz away (Great bandwidth)

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24	Musicam USA	www.musicamusa.com	241
54	NICOM	www.nicomusa.com	188
44	Nott Ltd.	www.tjantenna.com	100
10	Orban	www.orban.com	111
11	Orban	www.orban.com	121
44	Pacer Productions	www.hotrodtradiosa.com	110
58	Pike's Peak Satcom	NOT AVAILABLE	210
16	Prime Image	www.primeimageinc.com	161
35	Prophet Systems Innovations	www.prophetsys.com	72
44	PTEK	NOT AVAILABLE	140
53	QEI	www.qei-broadcast.com	242
54	Radio Design Labs	www.rdlnet.com	180
17	Radio Systems	www.radiosystems.com	171
54	RDA Systems	www.rdasystems.com	160
18	Register Data Systems	www.registerdata.com	181
59	RF Parts	www.rfparts.com	240
54	River Communications	sales@riverc.com	170
46	RR Productions	www.radioinfo.com	101
43	Satellite Systems	www.satsyst.com	152
26	Scott Studios	www.scottstudios.com	261
54	Shively Labs	www.shively.com	150
38	Sierra Automated Systems	www.sasaudio.com	102
54	Silicon Valley Power	www.svpa.com	190
46	Sine Systems	www.sinesystems.com	182
59	Svetlana Electron Devices	www.svetlana.com	250
51	Syntrillium Software	www.syntrillium.com	232
9	Telos Systems	www.telos-systems.com	91
37	Terion Inc.	radio@terion.com	92
59	Transcom Corp.	transcom@trcorp.com	220
54	Videoquip Research	www.videoquip.com	189
63	Wheatstone	sales@wheatstone.com	3
64	Wheatstone	sales@wheatstone.com	13

Everyone Wants to Own a Convertible!



It doesn't matter what's under the hood...

So... How About a Convertible Radio Console?

Our New WHEATSTONE A-5000 gives you the **best** of both worlds. Order it from the factory now as a topnotch ANALOG on-air console. Then later, when you're ready, switch it out to DIGITAL! That's right, this new design accepts modules from our top-of-the-line D-500 and D-600 consoles, allowing it to be converted from analog to digital in the field!

Think of it: no new studio furniture, *no rewiring*—all your existing studio connections simply replug. And while we're at it, no re-training your staff either. A painless switchover on your own timetable, right in your own facility! If you need a new radio console *now* but aren't quite ready for the Big Switch, then check out our new A-5000—you'll like what's under the hood!



 Wheatstone Corporation

A Word to the Competition

 *Wheatstone
Direct*

SPEED
LIMIT
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MOVE OVER.

AND A WORD TO THEIR CUSTOMERS

WE KNOW loyalty is a good thing, but the broadcast industry has changed dramatically in recent years, with some winners and some losers.

If you haven't looked at Wheatstone lately, it's time you checked out our new product line. Wheatstone has grown with the industry; in the last 3 years alone we've developed 5 digital and 9 analog consoles, plus a digital AES router that can integrate smoothly with our consoles and your automation system. We've constructed a brand new high-tech manufacturing facility

in New Bern, North Carolina, taking full advantage of the latest robotics and laser fabricating machinery.

All this self-funded—25 years of continual growth, profitable every single year; a responsibly managed company with a long term view.

Isn't it time to re-assess your suppliers?

SO... While our competition has been busy cashing in their chips, Wheatstone's been getting bigger and better, developing the **products** you need today, and the **support** you can count on tomorrow.

CALL WHEATSTONE—DIRECT.

 *Wheatstone*

600 Industrial Drive, New Bern, North Carolina 28562
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