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**IDC Deploys at Westwood One**

The network chooses its next-generation satellite receiver.

Page 16

**Many Hands, Great Work**

Thanks to 126 authors and 2-1/2 years of labor, the 10th edition of the NAB Engineering Handbook is out.

Page 4

# Radio World

\$2.50

The Newspaper for Radio Managers and Engineers

May 9, 2007

**INSIDE**

**STUDIO SESSIONS**

▼ Ty Ford gives a listen to the beyerdynamic TG-X 48.

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▼ Huskies via ISDN and sat-phone: A live broadcast from the outskirts of Maine.

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**NEWS & ENGINEERING**

▼ Workbench and the DaysAgo Digital Day Counter.

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▼ Who's Buying What?

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**HD RADIO**

▼ Larry Langford says it's time to get serious about the last link in the AM system.

Page 20

▼ HD Radio processing has a lot in common with conventional approaches, but does differ.

Part 22

**OPINION**

▼ To 'diddlers' who seek new AM technical standards, Ed De La Hunt has a message: Leave us alone.

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Are you in Leslie's loop? Click on The Leslie Report at [radioworld.com](http://radioworld.com)

## Ku-Mobile Could Revive Retired Satellites

by Michael Lawton

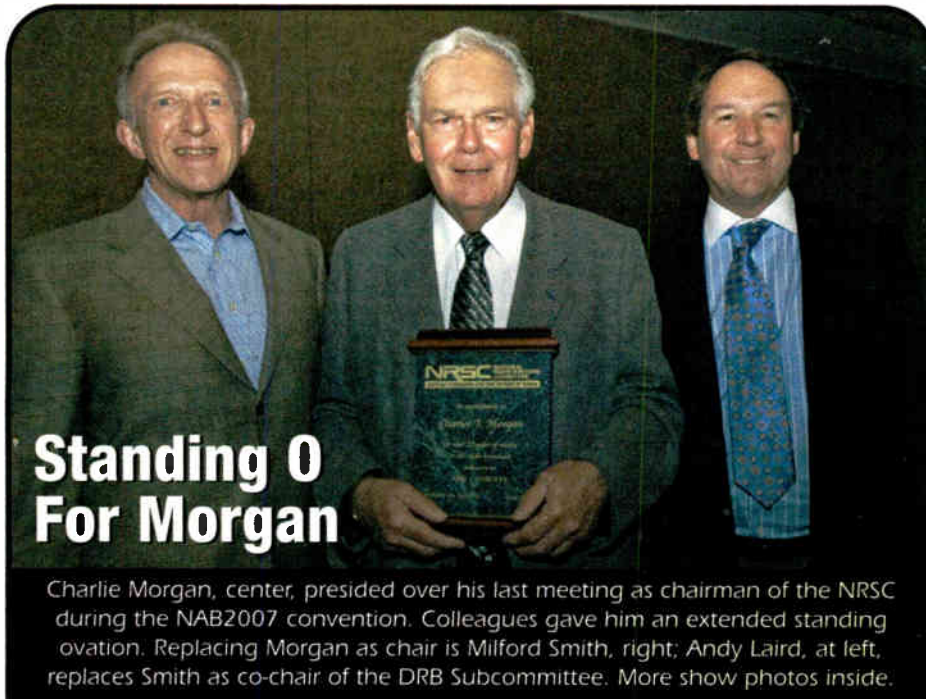
**COLOGNE, Germany** A German consortium has found a new angle for satellite radio: Using old satellites to deliver file-based programs to listeners in their cars.

Not only does this solution allow for broadcasting to mobile users without the

need for terrestrial repeaters, according to proponents; it also allows users to determine their own program preferences.

The European Space Agency, which promoted the project with nine partners, said its team has designed a flat, mobile antenna built into a car roof. The antenna receives Ku frequency band signals from

See KU-MOBILE, page 3 ▶



### Standing O For Morgan

Charlie Morgan, center, presided over his last meeting as chairman of the NRSC during the NAB2007 convention. Colleagues gave him an extended standing ovation. Replacing Morgan as chair is Milford Smith, right; Andy Laird, at left, replaces Smith as co-chair of the DRB Subcommittee. More show photos inside.

## Cull a Blog for Research? Not Yet

*Radio Researchers Skeptical About Using Internet Chatter*

by Randy J. Stine

**NEW YORK** Some consumer researchers are making noise about the inventive ways they use the Internet as a kind of unending focus group.

Radio researchers have mixed reactions about whether anecdotal online research can be applied to radio successfully. Nevertheless, research techniques are diversifying, experts agree; it behooves broadcasters to think about whether they can learn more about their audience from the Internet.

Some television program producers surf the Internet checking out blogs and chat rooms looking to glean inexpensive feedback on what viewers think of their shows. Advertisers now know that negative online chat can directly impact sales

See RESEARCH, page 8 ▶

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# NEWSWATCH

## News Roundup

**CAMBRIDGE SOUNDWORKS** is shipping its SoundWorks Radio 820HD stereo table radio. It can decode multicast signals and features dual alarms, an auxiliary input to connect other audio sources, such as an iPod or MP3 player, and a stereo headphone jack. It retails for around \$300.

**APPLE** will offer individual songs and albums from the EMI Group digital music catalog on iTunes without Digital Rights Management software. The Consumer Electronics Association

applauded the announcement, as did consumer group Public Knowledge. For \$1.29 per song, tracks from EMI will be offered at 256 kbps AAC encoding. The tracks will be sold free of digital rights management software.

**TECH ADVOCACY:** NAB formed a technology advocacy program to facilitate development and commercialization of digital technologies that radio and TV stations can use. The multi-year, multi-million dollar effort is named NAB FASTROAD, for Flexible Advanced Services for Television and Radio On All Devices. It will coordinate with NPR Labs, MSTV and other broadcast technical programs.

**NO MORE IMUS:** CBS dropped "Imus in the Morning." The show had been carried on 61 stations and distributed on Westwood One. President/CEO Leslie Moonves called himself and others "deeply upset and revulsed by the statements that were made on our air about the young women who represented Rutgers University in the NCAA Women's Basketball Championship with such class, energy and talent."

**IBS:** The Intercollegiate Broadcasting System launched an Internet radio network aimed at student radio with supplier Backbone Networks Corp. A proof-of-concept pilot project involving 25 schools starts this month.

**SURROUND:** Neural Audio Corp. said Classical Public Radio Network has begun broadcast and Internet streaming of 5.1 Neural-THX Surround-encoded classical recordings. The CPRN classical library now has some 3,000 Neural-THX Surround encoded works. Neural Audio said it is now able to provide a library of more than 16,000 surround tracks in all musical genres.

**FM AND IPODS:** iPod owners Want FM tuners, according to a study by rock format consultants Jacobs Media. It asked those who still don't own one if they intend to do so in 2007. Nearly half said they are very or somewhat likely to take the plunge. One in 10 expressed a strong likelihood to buy one. The study asked about the most important new feature that consumers desire in their next personal MP3 player. These respondents want an FM tuner (33 percent). Four in 10 Apple iPod owners make this choice, according to Jacobs.

**WNYC** has kicked off a campaign to raise \$57.5 million, much of it to finance a move to a new home this fall in Lower Manhattan. The station also said a \$6 million gift from the Jerome L. Greene Foundation is the largest gift ever to a public radio station. It will name a street-level broadcast and performance space after the late real estate lawyer and philanthropist.

**KAGAN BOUGHT:** SNL Financial acquires Kagan Research and plans to integrate Kagan's analysis into its online information service this year. SNL Financial provides business info to investment banks, money managers and corporations. Kagan provides financial data and forecasting for broadcast TV and radio and other sectors.



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# Ku-Mobile

► Continued from page 1  
existing satellites, saving ESA from the cost of launching new satellites.

The agency and its partners worked on the system for more than three years. A challenge was that the satellites used by the system were designed to broadcast television signals to large, fixed dish antennas. For use in cars, they needed a new approach to achieve an antenna that they say can be built in easily by car manufacturers.

The prototype system has been tested and found to work, though it will be some time a while before it is commercially available.

## Direct contact

"Satellites usually have to be taken out of service, not because they cannot broadcast any more," said Erich Lutz of the German space agency, which developed the packet-based transmission system and organized the reception tests.

"The problem," said Lutz, "is that they run out of fuel to power the motors that keep them exactly in [their orbital] position. That is no good for reception by a fixed dish on a house roof, but it is no problem for the dish on a car, because it has to follow the satellite anyway."

Time on these end-of-life satellites is relatively cheap, consortium members say,



The European Space Agency said its team has designed a flat, mobile antenna built into a car roof.

decided to send packets of data and to reconstruct the packets within the receiver.

## Several streams

Audio is encoded using aacPlus and divided into files that are delivered as separate data packets. After reception by the user, the files are cached, with material lost due to reception problems retrieved from redundant packets sent with a short delay.

As soon as all the packets that make up

patterns, which favor personally tailored programming. "Listeners are able to select whether they want more news or more music," said Runde. "They can choose to leave out the sport or select world music rather than pop."

For Deutsche Welle, the challenge was to tailor its existing output to the technology. "We could not broadcast our usual half-hour current affairs program in one go," said Runde. "We had to break it up into



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and they stay in orbit until the satellite operator is ready to replace them. "There are always several available," said Lutz, "and when one is ready to be removed, we can send an instruction to the dish to select another."

**Time on these end-of-life satellites is relatively cheap, consortium members say.**

But satellite radio signals may be blocked by tall buildings, trees or other obstructions. That's why Sirius Satellite Radio and XM Satellite Radio back up their transmission system with terrestrial repeaters.

Satellite radio in the United States transmits on S-band. Ku-band transmission may be an issue, detractors say, for two reasons: There is no industry standard and geostationary satellites can have poor coverage in Europe.

This is why instead of transmitting programming streams, the German consortium

a complete program arrive, the user can play it, usually just minutes after origination, the proponents say. Received signals can also be stored for later playback.

In addition to the audio files, the satellite also sends separate files with instructions for program reassembly. Several streams can be multiplexed simultaneously, in which case a multiplex configuration file must also be transmitted.

Proponents, including BMW and Deutsche Welle, dubbed the new system Ku-Mobile, because it uses the 11 GHz Ku-band.

A BMW X5 SUV and a Mercedes-Benz E-Class auto both fitted with Ku-Mobile receiving equipment drove around Europe in January to prove the concept.

## Listening trends

The results of the project were presented that same month to an audience at the European Space Research and Technology Centre in the Netherlands.

Wilfried Runde of German foreign-service broadcaster Deutsche Welle, which provided programming for the project, said that the idea of mobile reception throughout Europe via a single satellite has attractions. Deutsche Welle prepared four music selections for the test.

But the system also fits current listening

smaller units and send each bit separately. We were interested to find out if it would be assembled again properly."

By sending more data packages than necessary for a continuous broadcast, the system can bridge gaps caused by breaks in reception. "We can have some spare science pieces, for example," said Runde, "which can be played if the listener has recorded an interest in science."

The technology means that programming, although not reception, can continue in tunnels or underground parking lots.

But it is not necessary to listen to the programming in the context intended by the broadcaster. For example, listeners could intersperse news bulletins or other program segments between tracks from their CD or MP3 player.

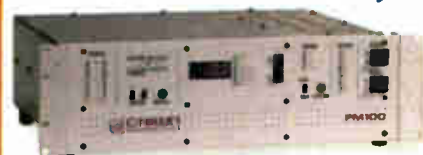
Data packages can deliver more than just audio material. The system allows for the transmission of program-associated data or independent files, such as maps or software updates for automobiles.

Though there have been no market tests, one of the aims of the project was to demonstrate commercially attractive applications that could eke out additional years of life for decommissioned telecommunications satellites.

Leslie Stimson contributed to this story.

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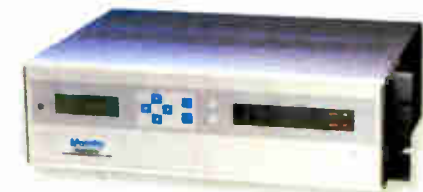


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# 'What You Need to Know to Do the Job'

*Tenth Edition of Engineering Handbook Reflects a 'Digital Technology Sea Change'*

It's a whomper, all right.

A *whomper* is something big enough to be called a *whopper* and heavy enough to go *whomp* when it lands on your desk (at least according to me).

The Tenth Edition of the "NAB Engineering Handbook" qualifies. This is the first edition in eight years and its release, delayed a year by the scope of work and time required, was a highlight of the recent convention.

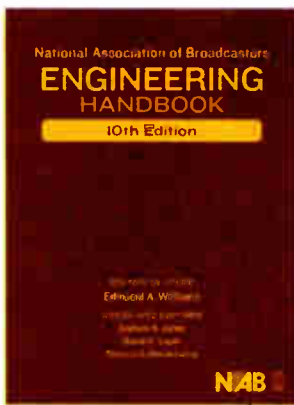
The book is an industry classic, marketed as the definitive guide to broadcast engineering for radio and television, and past editions have lived up to the billing.

A joint publishing effort of NAB and Focal Press, the new version provides detailed information for novices and experts about the entire broadcast chain; it is a compilation of the work of 126 authors. The book (with searchable CD) fills out 104 chapters in 2,150 pages, or 35 percent more than the Ninth Edition; it retails for \$199 and sells for a bit less via the NAB Store and for association members.

NAB named Ed Williams, retired from PBS, as editor-in-chief, with Graham Jones, David Layer and Tom Osenkowsky serving as associate editors.

At PBS Williams was involved in digital television broadcasting transition issues for public broadcasting stations. Jones is director of communications engineering at NAB, where he works on advanced television issues and standards. Layer is director of advanced engineering in the Science and Technology Department of NAB. Osenkowsky is a broadcast engineering consultant.

The four told me they wanted to make this edition special, updating all its chapters rather than carrying over information



from previous editions.

"The scope of the handbook project was to address all current technologies that broadcast engineers encounter in their daily activities," Osenkowsky said. "The station that has a computer

automation system, standby tube transmitter and solid-state digitally controlled transmitter has a technology span exceeding half a century. The goal was to adequately address all of these technologies, emphasizing the present.

"Solid state has replaced tubes in transmitters. Computers have replaced reel and cart machines. Satellites have replaced telephone landlines," he continued. "Much has changed over the years."

## From the Editor



**Paul J. McLane**

Osenkowsky is an RW contributor, and while RW is not involved in the handbook, I'm proud of how many of our writers appear, including Skip Pizzi, Ty Ford, Mike Starling, John Lyons, Cris Alexander and Harold Hallikainen, not to mention the many suppliers and industry newsmakers whose names you'll recognize from our industry news coverage.

The editors did most of their work via e-mail and FTP file transfers, including correspondence, drafts of chapters, editorial work and the hundreds of photos, drawings, graphs, maps and charts. Fittingly, I used e-mail to learn more about this project. Williams, Jones and Layer replied as a group. Here are excerpts:

*Why should engineers be interested?*

Radio broadcast engineers should be especially interested in the Tenth Edition because of the substantial updating of existing chapters and multiple new chapters devoted to radio station production, automation, program acquisition, digital transmission and the emphasis on digital technologies throughout the broadcast chain.

The Tenth Edition is a major overhaul of the previous editions mainly because of the emphasis on digital technology and IT-based systems. Our motto was to provide "what the broadcast engineer needs to know to do the job." We think we achieved that objective.

*Is it affordable for most engineers?*

Emphatically, yes. If a broadcast See HANDBOOK, page 23 ▶

NAB ENGINEERING HANDBOOK

<b>SECTION 2: TECHNICAL MANAGEMENT AND SAFETY</b>		<b>SECTION 4: RADIO TRANSMISSION</b>	
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The pace of the NAB (or Las Vegas) catches up with an attendee near the entrance to the North Hall.

Photo by Jim Dyck



VP of RF Systems Tim Bealor talks to attendees at the Broadcast Electronics HD Radio Seminar. Topics included the status of the HD Radio rollout and a look ahead at conditional access, electronic program guides and other services.

Photo courtesy Broadcast Electronics



Dan Braverman and Gerrett Conover set up the Radio Systems booth. Exhibitors in a newly configured North Hall talked about themes including expanded IP capabilities, more choices in HD transmitters and streaming opportunities.

Photo by Jim Dyck



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OMNIA PROCESSING  
Multi  
FM

Photo by Robin Cates

Linear Acoustic is now part of the Telos Group after the two announced a merger. Linear President Tim Carroll is shown with Omnia Audio's Frank Foti.



# NAB2007 Show Photos



NAB President/CEO David Rehr said the term terrestrial radio 'sounds like it either involves aliens or is something from a bygone time — which we are not.' He called on broadcasters to 'reframe and rebrand' without losing the local angle.



In Ibiqity's suite at the Hilton, Jeff Detweiler demonstrates features of an HD-capable radio to Mark Garrett, assistant director of technology for Tri-State Public Radio.

## HD Radio Circulator

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### Meet Some Real-World Super Heroes...

Mark Ericson and the WOKQ morning team, along with Steve Vanni from Technot, recently used ACCESS to deliver a three hour remote from the top of Mt. Washington. For mere mortals, this would have been an impossible task. The height, the weather, the distance – all conspired to prevent a successful remote. But because they carried ACCESS, they became real-world super heroes.

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- Boston, MA: Zakki Wyde Concert—Ozzie Osborne's Guitarist Plays for WAAF at a Listener's Workplace!
- Lynn, MA: Toys for Tots—Remote on the Move
- Boston, MA: Car Dealerships at Christmas. ACCESS Delivers
- UK: ACCESS on VSAT—A Clever Solution From Our Friends in the UK
- Cancun: Sunrise Over IP
- Brockton, MA: Minuteman Communications Always Gets Their Man... um... I Mean, Their Remote!
- Alpena/Tawas City, MI: Are You Tired of STL-Over-the-Public-Internet Stories Yet?
- Dallas: The Ticket
- Amarillo, TX: You Gotta Do What You Gotta Do
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# Research

► Continued from page 1

and some of them insert themselves into such chats to elicit positive spin, according to recent accounts by the Associated Press and The Washington Post.

Radio research companies told Radio World that using the Internet as a research tool poses risk and possible reward.

"Seems to me that radio lives locally and this kind of Internet tracking involves more national mediums," said Mark Ramsey, president of Mercury Radio Research. "Further, the most vocal component of the Internet buzz base is the one that tends to be least relevant to radio. They are often people who are only on the fringes of topics."

While online surveys and music research are becoming more commonplace, consumers typically take charge on blogs and message boards, said Ed Shane, founder of Shane Media.

## Vague demographics

"Radio stations that embrace blogs, podcasts and peer reviews can tap the essential interactivity of the Web. However, we have little idea of what the demographics are, which leaves you very little solid data," Shane said.

Most radio researchers contacted by RW agree that the lack of demographic

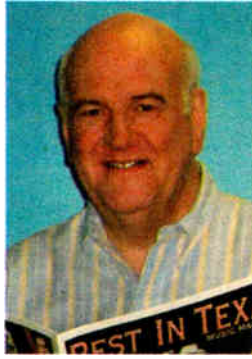
control over a focus group as widespread as the Internet results in failure to maintain a valid sample.

"Internet research is very prone to influence by people who want to make a point, assaulting a blog or message board with comments to show their strength," said John Lund, president of Lund Media Research.

He said questions about random samples and whether controls are in place to make sure no single person can participate a thousand times and sway online results leaves most radio researchers skeptical of such data.

Despite its deficiencies, some researchers view the Internet as just another tool that can be used to solicit data, said Keystone Focus Research President Bob Harper.

"There is a lot of change swirling around consumer research right now and radio is no different. While a more controlled setting is still preferred, I believe radio man-



Ed Shane

agers should pay attention to what they hear, no different than reading the diary comments from Arbitron or watching local media chat boards. Overall, these things can give you good ammunition for a better study," Harper said.

A drawback to Internet buzz, Harper said, is that feedback typically comes from people on the edges of an issue, those who love or hate something or someone.

results," Henderson added.

Just as audience measurement for radio listening is undergoing dynamic changes, such as Arbitron's Portable People Meter, radio research methodologies will also become more varied and diverse, the experts agree.

"Knowing and understanding your audience is still the ultimate goal regardless of the circumstances and the processes of data analysis," said Lund.

**Internet research is very prone to influence by people who want to make a point, assaulting a blog or message board with comments to show their strength.**

— John Lund



John Lund

"You won't hear from most of the people who listen or watch a show but still count as part of the audience, who are not as passionate about it," Harper said.

Yet, at least one radio research group company executive believes the Internet is redefining the meaning of qualitative research.

"We have moved into a whole new era, not just a paradigm shift, but a paradigm leap. As agree rates and responses rates drop and the percentage of landline phones has plunged, the Internet will offer some opportunities but many challenges as well," said J. Michael Henderson, president/CEO of Research & Ratings International. "We support the use of the Internet for research and testing, but with reservations."

## Research techniques growing

Again the question comes back to "how to control the sample," Henderson said.

"Theoretically you can set up a chat room or blog focus group, but only very general questions can be used and of course, these forums would be wide open to attack by a competitor looking to skew

New technologies will offer inventive methods for audience research, Lund said, but maintaining the integrity of qualitative and quantitative research and validating the audience research process are just as important today as they were 40 years ago.

"You still need to know what you are asking and who you are asking it to ... with the desired demos and listening habits," he said.

Buzz Knight, vice president of programming development for Greater Media, said the Greater Media stations have an active Web presence and look at the Internet as a means to extend the relationship between station and listener.

"The Web offers another chance to utilize that relationship to gain knowledge. We are continuously reviewing the research opportunities, but also understand we have to do it in a responsible manner. We have our eyes wide open, but compared to a year ago, we are far more intelligent as to the ways to harness the Internet," Knight said.

Clear Channel Communications declined to comment on its Web strategies for this article. "The company's research strategies are proprietary and viewed as a competitive advantage," according to Sanda Coyle, senior vice president of strategic marketing.

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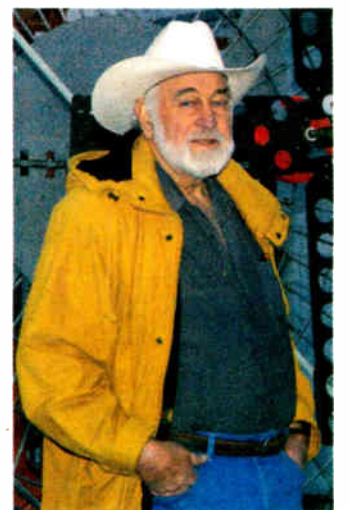
## Edmiston of SWR Dies

Thomas L. Edmiston, president of SWR Inc., died in April. He was 77.

According to his family, Edmiston served in the Navy during the Korean War. After an honorable discharge he started a tower rigging business with his father-in-law, George Kim. That business later became Thomas Edmiston and Sons.

In 1989 Edmiston sold his shares to son Charles and the company became Edmiston Tower Erectors. The father became president of Systems With Reliability Inc. (SWR) after the family purchased it from Jack Kruger in 1989; the firm, based in Ebensburg, Pa., makes FM and TV broadcast antennas, rigid transmission line and components.

"With his passing, the broadcast industry has suffered a tremendous loss and a true pioneer of his day," the statement read. A replacement as president has not been named.



Edmiston is shown in a photograph from November 2006 outside the company plant in Pennsylvania.



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World Radio History





Radio World, May 9, 2007

Past columns are archived at [radioworld.com](http://radioworld.com)

# Time and the Broadcast Engineer

by John Bisset

Time. In this business, it can control us. If time gets out of hand, it can destroy us.

Case in point: When was the last time you cleared your air conditioner condensate drains? It's normal for algae to build up in these drains and eventually plug them. The result might be a wet floor, wet studio or wet transmitter, in the case of air handlers mounted in the ceiling.

Remove the screw-on "clean out cap" as seen in Fig. 1 and force compressed air — from your mouth or an air compressor — to eliminate the algae plugs and clear the line.

Once the line is clear, you can prevent future clogs by adding an anti-algae tablet or a small amount of bleach to the drain pan.

Anti-algae tablets are available from most air conditioning contractors or online at [www.aeiservice.com/store.asp](http://www.aeiservice.com/store.asp). Open the online catalog, click on Humidifier Water Panels and Accessories and scroll down to item number AAT, a 12-pack of anti-algae tablets for \$18.

If you've ever had a studio or transmitter flood, you'll recognize these tablets as cheap insurance. Air Excellence Inc. is located in Midlothian, Va.

\*\*\*

Our time theme continues. Aaron Read, the technical director for Lichtenstein Creative Media's "The Infinite Mind," has a twist on the use of the DaysAgo Digital Day Counter. He saw this device on the über-fabulous blog "Lifehacker."

The counter is a nifty little device that will display how many days have passed since it was reset. It comes in suction-cup and magnetic mount models, two for \$10 plus \$3 shipping. The only limitation is the device will only display up to 99 days, but that's still pretty useful.

It was designed to show how old your leftovers are in the refrigerator, but these compact timers can be handy for reminding you how long it's been since you've done, well, anything that's regularly done on a scheduled basis.

Monitor when you last took a day off, backed up data, maintained the transmitter, cleaned master control or logged EAS.

Stick one on the back of each transmitter or air intake duct as seen in Fig. 2. You'll get a visual reminder of when to change the air filters.

Buy the Digital Day Counters online at [www.howmanydaysago.com](http://www.howmanydaysago.com).

Aaron also recommends that *Workbench* readers add [www.lifehacker.com](http://www.lifehacker.com) to your daily blog list. Checking out the site is a good assignment for your assistant, too. It's loaded with useful tips for improving your productivity to technical ideas, software and everyday life suggestions.



Fig. 1: Keep the condensate drain clear to avoid floods.



Fig. 2: Use a Digital Day Counter to keep tabs on when to change filters.

I visited and saw an off-the-wall, "why didn't I think of that" idea. Use the empty plastic spindle and cover that a stack of Optical CDs or DVD-Rs comes in to transport a bagel sandwich. The spindle pokes through the bagel hole and keeps the bagel stuffing intact, and the plastic top snaps into the spindled bottom! This site is a real find for readers who enjoy this column.

Aaron Read can be reached at [areadlcm@gmail.com](mailto:areadlcm@gmail.com).

\*\*\*

R.C. Woolfenden is operations director for WFAX(AM) in Falls Church, Va., a



Fig. 3: Enter our Caption Contest before the end of May.

suburb of Washington and right down the road from Radio World's offices.

R.C. ran into a little computer program that might be of interest to you. One of the station's computers controls both the transmitter and the switching software for their Unity 4000 satellite receiver; it started experiencing clock drift recently.

The computer operates with Windows XP Pro. R.C. had the Internet time check feature enabled, which automatically resets the clock. However, this feature only resets once a week; R.C. couldn't find a way to increase the reset frequency. With the drift that they were experiencing, a reset once a week was not enough.

It was important to keep the clock

accurate in order have the Unity 4000 switch audio channels on time, and to have power levels on the transmitter switch on time.

R.C. went to [www.download.com](http://www.download.com), a very handy site where you can locate various types of software quickly for download, free and paid.

At the site, R.C. found a time synch software package, YATS32. With this, he is able to reset the clock over the Internet as often as every 30 minutes!

The software is a bit user-difficult, but not impossible. It even keeps a log of its actions so that you can see that actions the software takes.

The software even reports on the time drift, so you know exactly how bad it is without intervention. And the cost, \$20, plus two years support for another \$6, is certainly cheap enough. The best feature is you can test it free for 30 days.


This Web site is a great place to find spyware, anti-virus, firewall and many other software solutions. With free and paid options, and immediate downloads, it is a great toolbox for both engineers and IT people — especially when you have a "fire" to put out.

R.C. Woolfenden can be reached at [wfax@wfaxam.com](mailto:wfax@wfaxam.com).

\*\*\*

We're taking entries in our caption contest. Look closely at Fig. 3 and e-mail your best caption before the end of the month to [jbisset@bdcast.com](mailto:jbisset@bdcast.com). We'll print the most creative captions soon.

John Bisset has worked as a chief engineer and contract engineer for 38 years. He is the northeast regional sales manager for Broadcast Electronics. Reach him at (571) 217-9386, or [jbisset@bdcast.com](mailto:jbisset@bdcast.com). Faxed submissions can be sent to (603) 472-4944.

Submissions for this column are encouraged, and qualify for SBE recertification credit. 



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A remote broadcast from Mount Washington in New Hampshire using Comrex gear aired on WOKQ(FM), engineered by Steve Vanni of TechNet. The remote used the Comrex Access codec via a microwave connection to the Internet. "This was a location from which it would have been impossible to deliver a high-quality remote a year ago," Kris Bobo of Comrex stated. ...

SonicPool in Hollywood completed radio promo projects for ABC Daytime Television and for independent films. The post facility has provided mixing and sound design for spots promoting the likes of "One Life to Live," "The View," "All My Children" and "General Hospital." For client Blink, SonicPool mixed radio spots promoting feature films including "Babel" and "An Inconvenient Truth." ...



Patrick Bird and John Frost are sound designers/mixers with SonicPool.

As FM privatization continues in India, Broadcast Electronics said SUN TV and four other broadcasters ordered transmitters recently for 57 new frequencies. Its representative in the market is Technomedia Solutions. SUN TV ordered 38 of the BE FM systems for its Kal Radio Ltd. and South Asia Ltd. operations. ...

Jampro Antennas won a contract to provide Broadcast Consultants India Ltd. with broadband multi-frequency FM antennas, combiners and RF components. The equipment is to be used as part of Phase II of the plan by the Indian government to build a shared infrastructure for 240 private FM stations.

Separately, Jampro said WZUU(FM), owned by Forum Communications Inc., installed a model JMPC antenna, part of an upgrade to move the license to Mattawan, Mich., change frequency and hike power. WTI(X)(FM) in New Orleans placed an order for a Jampro model JHPC eight-bay antenna and a Frequency Matched Tower to replace an antenna damaged during Hurricane Katrina.

KYAL(FM) ordered a Jampro JHPC antenna. It serves the greater Tulsa market with talk/sports; the owner is Adonai Radio Group. Jampro also received an order for three medium-power "Penetrator" FM broadcast antennas from CNMG, radio and television arm of the Caribbean New Media Group in Trinidad and Tobago. And WUFM(FM), flagship of the RadioU Network, bought several JLST translator antennas as part of an expansion involving five construction permits. The units will serve in Ohio at W254B in Springfield, W271AO in Mt. Vernon, W263AX in Circleville and W270AT in Dayton. Jeff Orr is consulting engineer. ...

Small Tree Communications installed a 24-port ES4524D Edge-corE switch at WWIB(FM), an AC Christian station in Chippewa Falls, Wis. The company said the switch alleviates a bottleneck affecting workflow in six studios. It provides Gigabit Ethernet switching for bandwidth-intensive networks. "With WWIB's

connection points limited by its previous switch to 100 Mbps, Small Tree recommended using the ES4524D to increase connection speeds by a factor of 10 or 1000 Mbps," the supplier stated. ...

Harris sold two HD Radio transmitters to Greater Media station WJJZ(FM) in Philadelphia. The installation includes FlexStar equipment for multicasting. Main and backup ZX2000T transmitters are outfitted with the Harris Web Remote module for control and monitoring, and a Harris main/alternate controller for switching. The package will be delivered in two integrated rack systems.



A remote broadcast from Mount Washington for WOKQ(FM) used Comrex gear and was engineered by Steve Vanni of TechNet, who snapped the photo of talent Mark Ericson.

Separately, Harris Corp. said North Texas Radio for the Blind, a service of Reading and Radio Resource of Dallas, took delivery of three Harris NetWave digital on-air consoles. The upgrade was funded in part by a grant from the U.S. Department of Commerce. Studio renovations were by Broadcast Works Inc. ...

Dalet Digital Media Systems said 2NUR FM, a community station at the University of Newcastle in Australia, implemented Dalet to digitize its production and on-air facilities. ...

Musicrypt Inc. said deliveries of music tracks using the Web-based Digital Media Distribution System in the United States increased 500 percent from the first to the fourth quarters of 2006, with 219,000 deliveries in the final three months of that year. Songs delivered to stations and groups included content from Beyonce, Neil Young, U2, Tony Bennett and Red Hot Chili Peppers. ...

Genelec said XM Productions/Effanel Music chose its 8200 Series DSP monitoring systems for use in the 49th Annual Grammy Awards. A 5.1 surround audio broadcast was handled by XM/Effanel. ...

Netia said its Manreo line of content management software is being used by Radio France to control internal audio flows among studios and enable simultaneous mixing from workstations in different studios. Separately, its Radio-Assist digital audio software programs is being used to launch a radio project within the South Kivu region of the Democratic Republic of Congo. Radio Concordia was established to provide religious programming for the region while raising the profile of the area's poor. ...

ScheduAll said Shoreline Studios, a sound studio in Santa Monica, Calif., is using the ScheduAll EDGE resource management system to schedule projects. ...

Sports radio broadcast engineer Peter Grosskopf chose Sennheiser Evolution Wireless products for RF



A 24-port ES4524D Edge-corE switch was installed by Small Tree Communications at WWIB(FM) in Wisconsin.

microphone systems. Grosskopf is an independent contractor in upstate New York; he has used the system for covering NFL and college games, NHL playoffs in Detroit, Stanley Cup playoffs in Buffalo and other events. ...



Peter Grosskopf uses the Sennheiser Evolution 135 wireless system covering sporting events in upstate New York.

Europa FM and Radio 21, owned by French company Lagardere, are using Axia IP-Audio equipment and Element modular control surfaces in new on-air and production facilities broadcast via a national network heard throughout Romania. Zenon-Media brokered the sale and provided automation. ...

RCS Inc. said it provided the technology behind GCap Media's launch of Mi-Xfm, a "personalized online player" branded by parent station Xfm and Microsoft's Xbox in a cooperative project launched in December in the United Kingdom. ...

Sandusky Radio Seattle is using Lucid GENx6-96 Word/Super Clock Generators from Symetrix to synchronize 14 studios. George Bisso is DOE of the cluster. "Because of the demands of satellite delivery where everything has to follow time to the second, we needed all of our systems to follow precise clocking to a 44.1 house standard," he stated. ...



Crawford Denver Chief Engineer Ed Dulaney, left, and St. Louis CE Rick Sewell look on as Keith Peterson makes wiring connections to the KLTT Wheatstone Generation-5.

Wheatstone said its audio networking systems were chosen for three Crawford Broadcasting facilities. A system was picked for installation in Birmingham, Ala. Gear included five G-6/16 control surfaces and prewiring, five Satellite studio cages and one Wheatstone Bridge. Five stations broadcast from there.

In Detroit, the three-station cluster took delivery of a system of three Generation 6/20 control surfaces, a Wheatstone Bridge, a Satellite studio cage and prewiring. In Denver, a networked audio system shipped last summer to the four-station AM cluster; it includes four Generation 6/16 control surfaces, one Bridge router and prewiring. The four stations transmit HD Radio signals.

RRSat Global Communications Network signed a three-year agreement with Asia Broadcast Satellite to broadcast the Three Angels Broadcasting Network to the Asian market.

RRSat is based in Israel. The network will be carried on the Southern Ku-band beam of the ABS-1 satellite. David Rivel is CEO and founder of RRSat.



# “My Number One Codec Rental is Zephyr Xstream”

-Steve Kirsch, President Silver Lake Audio



Rack 'em and stack 'em! The Silver Lake Audio Crew pictured from left to right: Steve Kirsch, Ken Stiver, Kirby Miovac and Jay Shoemaker

“When ISDN equipment rentals began in the early 1990s, we started with an equal number of different companies’ codecs. Today, Silver Lake has over 100 Zephyrs in stock, ten times more than any other brand.” says Steve Kirsch, owner of Silver Lake Audio.

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WorldRadioHistory



# Charting the Digital Music Changes

## How Will Radio Be Affected By Recent Shifts in the Music Industry?

In case you haven't noticed, there have been a number of groundbreaking moves in digital music of late. The traditionally close business relationships between the music and radio industries have prompted some to ask how these changes might affect the emerging digital radio market.

Good question — let's discuss. First, we'll review the issues.

### DRM-free digital music

After some prompting (and perhaps cash) from Apple, EMI was the first of the four major record labels to agree to distribute digital music downloads without digital rights management (DRM) content protection applied.

For an additional 30 cents per song — which likely represents about a 50 percent increase in the record-label royalties — Apple iTunes is selling unprotected versions of EMI songs (still no Beatles, however).

These unprotected songs are provided at 256 kbps AAC, in contrast to the 128 kbps AAC of the DRM'd versions. Albums are offered at the higher bit rate without DRM at no price premium. (Note that both versions of all music will continue to be available.)

Besides being freely playable and copy-able, this means that such songs purchased from iTunes will now be

playable on other AAC-supporting devices besides iPods.

While this may seem a downside for Apple — since it makes most of its revenue in this space from sales of iPod hardware, not iTunes music purchases — it helps the company in its current battle with European regulators, who are most concerned with the non-interoperability or "lock-in" that the exclusive arrange-

ment between the iTunes service and iPod player represents. (In this respect, it also doesn't hurt that EMI is a Euro-based record label.)

The deal EMI has arranged with Apple will likely be struck with other online music stores, and it could soon be matched by other labels, as well. The latter point is particularly important, and it remains to be seen whether EMI becomes the vanguard or the sucker in this movement.

The other labels have stayed fairly silent at this writing, but the few comments that have emerged do not indicate

that the other (mostly larger) labels are ready to follow EMI's lead. Nevertheless, you can bet they'll be watching what happens closely.

### Royalty flush

Meanwhile, as you've also no doubt heard, the Copyright Royalty Board has raised the hackles of both Internet and over-the-air radio broadcasters in the United States with significant increases in royalty rates for music played by online radio services. Industry reaction to this

**If the CRB rates remain as they are currently set, Internet radio won't die — it will just come largely from offshore.**

has been vocal and has caused a review process to be undertaken by the CRB.

Regardless of the outcome of that review, this process is a clear example of the darker side of the statutory license approach, wherein an uninvolved (governmental) third party unilaterally can change the business model of an industry overnight.

If the new rates stand, U.S. terrestrial broadcasters may curtail or abandon their Internet radio offerings. This implies that they will lose share in the online radio space to offshore services.

## The Big Picture



Photo: Gary Hayes, BBC

by Skip Pizzi

U.S. on-air broadcasters are hit especially hard, since at least some U.S.-based Internet-only radio services could relocate outside the country, but terrestrial broadcasters could only do so by establishing separate offshore facilities, which is unlikely to be a viable or cost-effective strategy for them.

The sad irony here is that American musical artists, particularly non-established ones, will likely suffer from this, because Internet radio presents such a variety of music.

But the CRB places more weight on what it hears from the RIAA and major labels/artists, and at this moment in history, the dramatic loss in revenue the major labels are experiencing is foremost on their minds, so any opportunity to recover cash from other venues is pushed to the limit. In this case, they may have gone too far.

Unlike the digital music download environment, there is little worry from the

See MUSIC, page 15 ▶

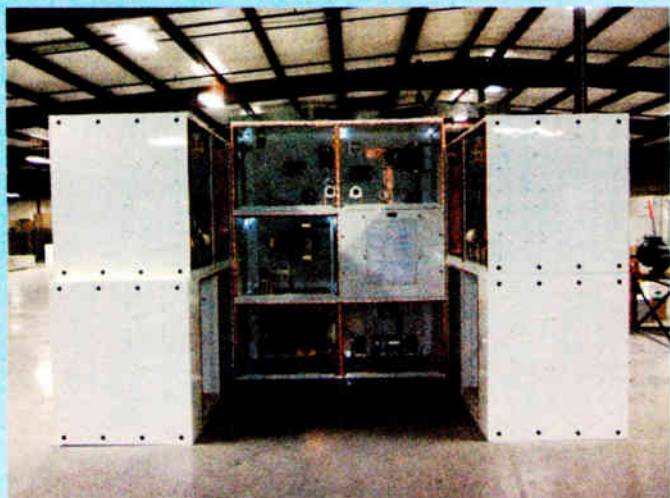
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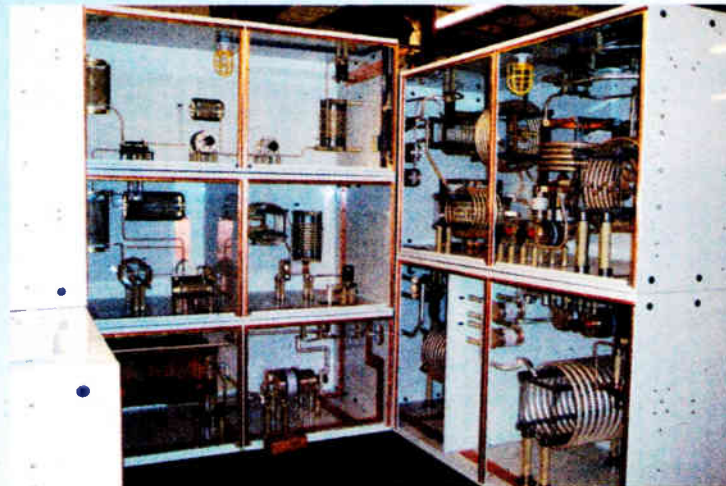
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# Music

► Continued from page 14

music industry about content protection in Internet radio. The changes they are pursuing here are strictly business, in that they feel that Internet radio is established and a viable industry segment. In the labels' view, since their music is the chief draw of listeners to these revenue-producing online streams, service providers should pay up.

Further, since there is no scarcity in online radio, the labels are not concerned that some service providers may shut down as a result, calculating that if this were to happen, net royalty returns would still increase overall under the new rules.

Terrestrial radio walks a fine line here.

On one hand, the predicted contraction of Internet radio music services resulting from higher fees will reduce competition to over-the-air radio. Yet the terrestrial

**This is the darker side of statutory license, wherein a governmental body can change an industry's business model overnight.**

operators would also be themselves subject to the increased fees for their own online services, which are becoming increasingly important to them.

Add to this the strategic opportunity cost of fighting the record industry on this point, when potentially more important negotiations loom (more on this below). Thus while some broadcasters have spoken out against the new rules, the cumulative outcry from the sector has not been as strong as some feel it could be.

## Impact on radio

What does this all mean for digital radio? Unfortunately, nothing good.

First, while the move to drop DRM might indicate a liberalizing of policy from the labels, don't make the mistake of equating "no DRM" with "free."

EMI is counting on the premise that it will increase sales revenue with the higher priced, DRM-free music, and this will offset any additional losses from the easier redistribution of unprotected content (it's no worse than CD ripping in this respect).

The latter assumption likely also rests on the realization that every free copy made does not necessarily represent a lost sale, but it does potentially provide at least indirect promotional value for the artist and label.

EMI is also well aware that most songs in its library are already available free via P2P sites, but those are typically not captured at the high quality level offered by 256 kbps AAC (not to mention the security risks inherent in P2P music downloads).

So the label is banking on the fact that the twin carrots of higher quality and increased interoperability/security will trump the stick of DRM — at least for those who would even consider paying for the music in the first place. It will be

interesting (to the entire industry) to see if these assumptions are borne out by results.

Back to radio, though, an important part of this equation to the labels is that at least the *first* access to content at this quality level is paid for — and at a premium. This could actually lead to even greater emphasis on digital radio's *not* becoming a venue for free copying at relatively high quality (HD Radio's HDC codec is considered to provide somewhat better quality than AAC at a given bit rate).

Thus any hopes that the move away from DRM downloads equates to reduced likelihood of a future "audio flag" or other content protection mandate for digital radio are unwarranted. In fact, by this analysis, there could be *increased* pressure for such regulation soon.

Finally, it should be noted that once the dust settles from the current CRB battle over Internet radio, the board will be right back at it, considering whether to change the rates for satellite radio; this process will probably begin in late summer or fall 2007.

What happens after that is anyone's guess, but it is possible that the CRB could then take on the idea of revising *terrestrial* radio royalties, given that digital radio is now becoming established.

Remember that today terrestrial radio pays only composer royalties to songwriters, but pays no recording royalties to labels or artists under its unique statutory license. This status has remained intact for decades, given that the terrestrial radio marketplace is considered mature and stable.

The change represented by the emergence of digital radio provides an opportunity to challenge this status, and thereby creates an opening for proposal of new royalties — at least for the new digital terrestrial signals. The intrinsically higher quality of these signals could also provide a basis for raising royalties to counter the assumed increase in lost sales from off-air recording of digital terrestrial broadcasts.

It's becoming obvious that nearly every move from this day forward in the digital music space could have some future impact on digital radio, either directly or indirectly. Broadcasters therefore are advised to take careful note of these proceedings as they play on.

*Skip Pizzi is contributing editor of Radio World.*



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FIRST PERSON

# IDC System Deploys at Westwood

*Radio Network Makes Choice of a New-Generation Satellite Receiver*

by Conrad Trautmann

The author is senior vice president of engineering and technology for Westwood One Inc.

The advertisers in our sports products — NFL, NCAA, NHL, golf — wanted the ability to regionalize their commercials by geographical area.

The decision was made back in the summer of 2005 to purchase and install satellite distribution equipment that would allow regionalization of those advertisements or copy — “copy splitting” — in time for the NFL football playoffs at the end of the year and the NCAA men’s basketball tournament in March.

We only needed to deploy in the top 50 markets, which required us to run a mixed system, continuing to operate the legacy Starguide system for all markets 50 and higher. The Starguide II system that Westwood One uses did not have the capability to do the copy splitting.

The timing of this decision gave us only a few months to decide on which system to select, purchase and deploy. Fortunately, we had been talking with all of the satellite vendors in anticipation of finding a replacement system for the Starguide II. When we were faced with the decision and short timeline, much of our research was done.

**Desired features**

We began by creating a list of what we expected to see in a new-generation receiver.

Ten years after the design and deployment of the first Starguide receivers, tech-

nology has come quite a long way. IP satellite transmission, new and more efficient audio algorithms, affordable high-density storage and broadband Internet are just a few of the things that are available to us that were just a dream 10 to 12 years

ago. Those things were definite factors that influenced our design criteria.

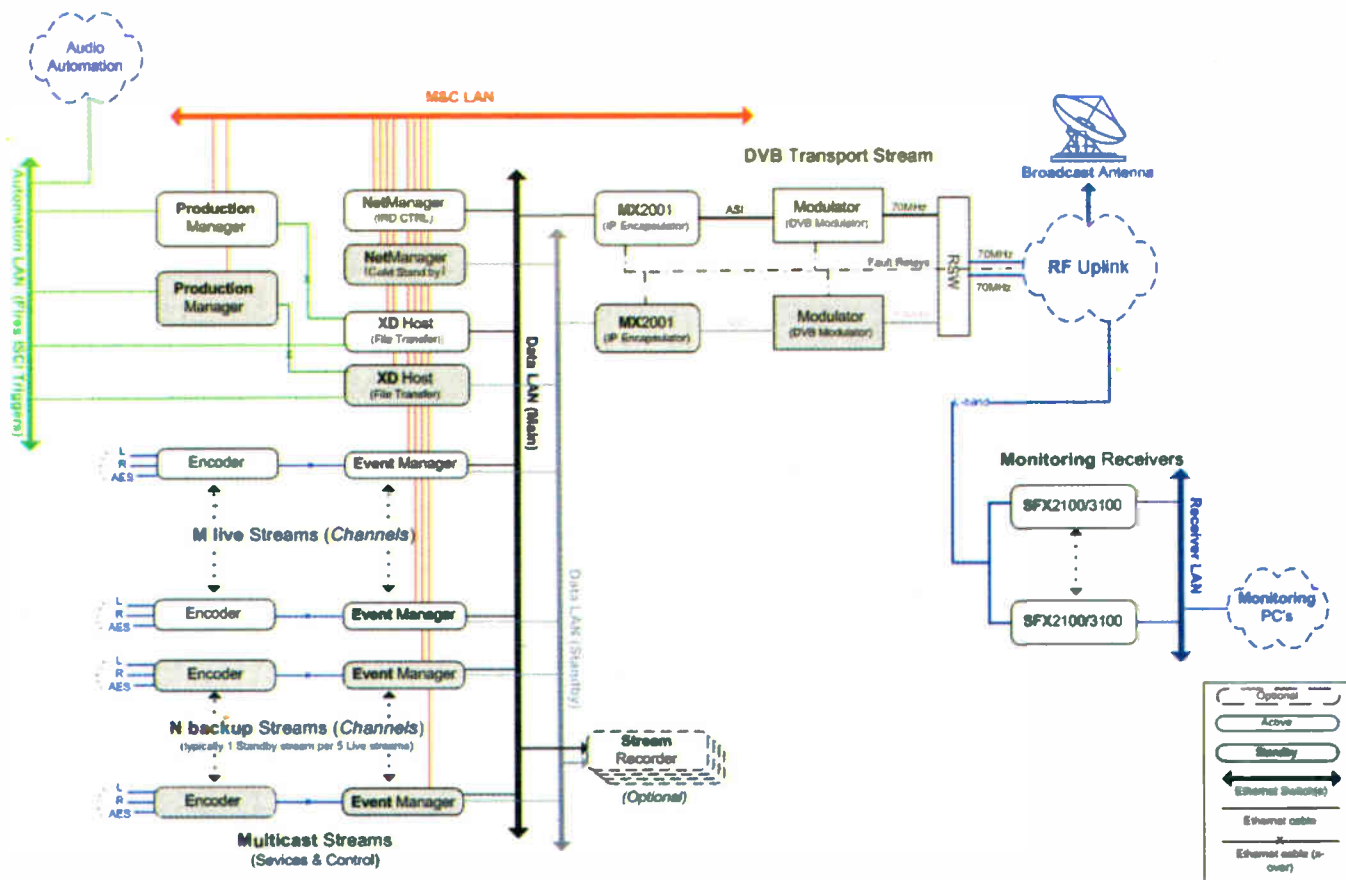
Top on the list was to have the latest audio algorithm available and the ability to update the codec we use for transmission as needed.

With the Starguide, the system is locked into MPEG Layer 2 for transmission and only the bit rate is variable. Anything below 96 kbps per mono chan-

nel creates a noticeable degradation of the audio. AAC sounds much better at lower bit rates, making the system sound better and more bandwidth efficient. In addition, our tests with Ibiqity’s HDC codec show minimal transcoding effects using AAC.

Next, we needed the ability to send audio files to the receivers and play those files in place of the satellite stream (store and forward). This gives you the ability to do the copy split.

File storage in the form of a hard drive in the receiver to store long-form programs and commercials was a must. We also required an easy interface at the head end in



IDC Block Diagram of Westwood One Transmission System



Westwood One Network Master Control. Shown: Joseph Janikian.

order to manage which receivers stored and played that audio. It is no small feat to keep track of and manage what stations will play what audio. A user-friendly interface to program the copy splits was needed.

In addition, we needed a system that could trigger the splits without our producers of the sporting events having to think about or worry about doing anything.

A connection to a wide-area network and the Internet was a necessity in this age of digital file transfers. This would allow a station to access what was on the receiver’s hard drive via their own audio LAN. An additional feature we considered was allowing stations to trap and play back programs as they wished, similar to how people use a TiVo in their homes.

Monitoring and control of the receiver via a Web interface was needed to ease access to the device for programming or changing channels if it were stored in a rack room or at a tower site. We wanted the Internet connection to allow reporting back to the head end to confirm files were delivered and played successfully.

We envisioned the ability for the receiver to fail over to the Internet for program reception in the event the satellite signal was lost as well. Also, as the Internet quality of service (QoS) continues to improve to carry things like Voice over IP and other streaming applications, our new system needed the capability to transmit over the Internet.

We needed the ability for the receiver to have at least eight relay triggers per channel



# IDC

► Continued from page 16

for station automation, as opposed to the two per channel we have on the Starguide. Most talk shows and station automation systems just need a station ID tone and a local commercial start tone. But for sports distribution, especially baseball, tones for end of game, rain delays and re-joins, more triggers are needed.

We wanted the option of having a receiver that would be able to do six simultaneous streams out at once. The challenge for the design of the new receiver is that all six streams also need to be able to copy split, inserting stored audio off the hard drive on any of those six streams.

A robust RF section in the receiver was necessary and one that would work well in the 2 degree spaced congested skies we're dealing with now.

With HD Radio gaining ground, another important feature we needed is the ability to transmit program associated data (PAD) to our affiliate stations. PAD contains title and artist information for stations to transmit over their RBDS or HD data streams.

Remote control of the receiver needed to be able to be done by the front panel, through a Web interface and through a serial connection to be driven by an automation system.

### Due diligence

We spoke with Wegener, Comstream, Starguide, X-Digital, ICP and IDC to see what hardware and head-end systems they had to offer, and got an idea of how much it would cost. We also spent a lot of time speaking to existing customers of these companies to get a sense of what had been deployed, how it worked and how well the support was.

**IP satellite transmission, new audio algorithms, high-density storage and broadband Internet are now available to us but were a dream 10 to 12 years ago.**

Let me say that the companies mentioned have great products and true strengths in what they do. However, we had some very specific needs that needed to be met fast. While all were willing to design and modify their systems, we felt only one had a product that already met our needs; that was International Datacasting Corp.

IDC had already been working with National Public Radio on the design and deployment of a new system for NPRSS. A lot of the design considerations we wanted already were designed into IDC's latest receiver, called the SuperFlex. The Datacast XD head-end system coupled with the SuperFlex receiver provided us with the features on our wish list.

One big challenge IDC helped us figure out was how to trigger the split copy to play during a live sporting event. Using metadata transmitted through the IP



IDC SuperFlex SFX3101

stream of the ENCO DAD32 system we use, IDC wrote an application that uses that metadata to tell the receivers to play the appropriate commercial.

The head end consists of two full racks of equipment: audio encoders, multiplexor, IP encapsulator and satellite modem.

In order to make it easy for our existing affiliates to pick up the new carrier, we put up a carrier on the same transponder (15) on the same satellite (AMC-8). To do this,

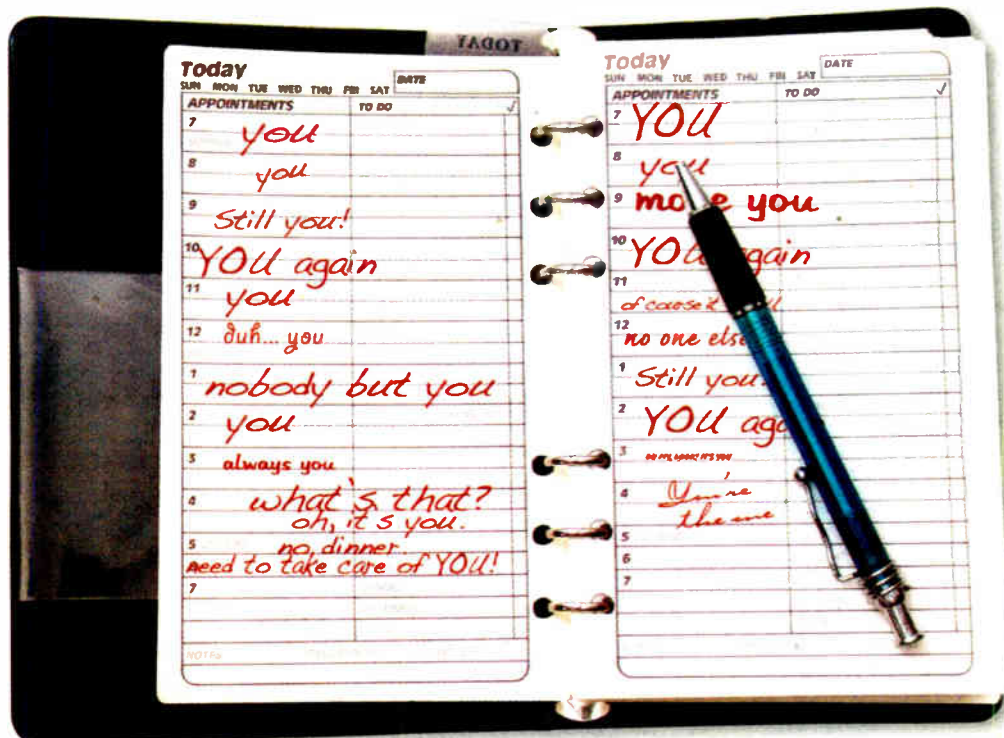
we combined the IDC system into the same uplink system that transmits our Starguide carrier.

The biggest challenge we faced with the deployment of the new receivers was getting them installed and tested at the stations. We sent 75 receivers out to stations in mid-December of that year with hopes that we would be live with all stations for the Super Bowl.

We found that even though stations had

installed the new receivers, they were still using the Starguides. Many stations don't have full-time engineers on-site to do the installations. We had to assign a Westwood One staff member to contact all 75 stations, reach their engineer and stay in close contact with them through the installation process. Our satellite services person would answer installation questions or refer engineers to IDC in the case of more difficult problems, then ultimately run tests to confirm that the receivers worked.

Our system has been on the air now for over a year and has proven to work well and deliver to our expectations. The audio sounds great using the AAC algorithm. IDC just released to us the next generation of the SuperFlex, which has two audio streams out in a single-rack-unit space. We'll be testing that at selected affiliate stations next. ●



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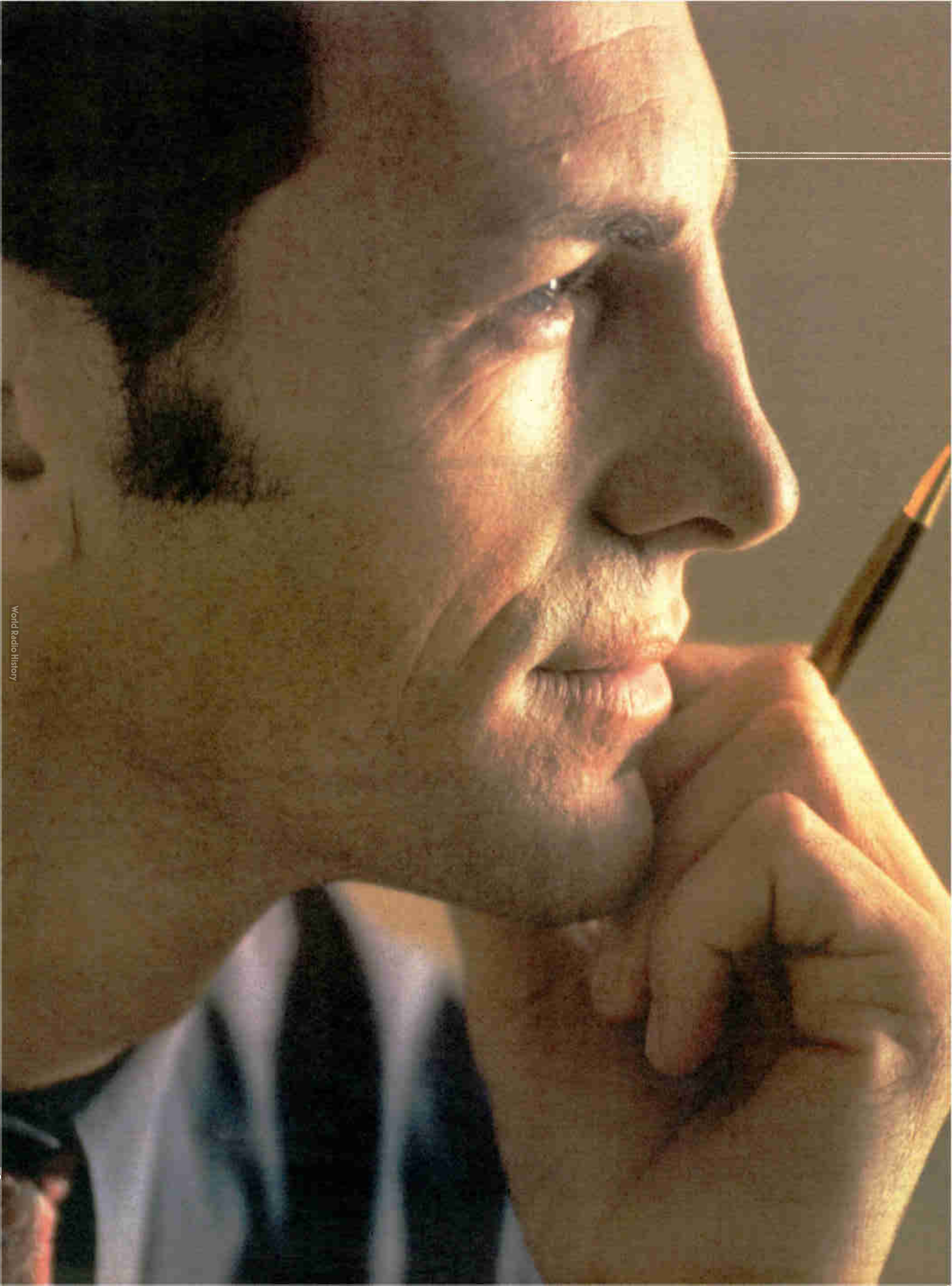
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# HD Radio News

Radio World

Covering Radio's Digital Transition

May 9, 2007

GUEST COMMENTARY

## What's Behind AM Receiver Performance?

by Larry Langford

While engineering is my first love, I spent most of my years in the radio business earning a paycheck as a pretty good investigative street reporter, but even those skills have not helped me to answer a basic question concerning AM radio.

We have all read the stories about bandwidth. Purists tell us that AM can sound as good as FM if the bandwidth is allowed to be 15 kHz. Well we all know that will never happen again, allocations being what they are.

But some serious work was done on the matter. In the 1980s the NRSC developed the now mandatory 10 kHz cutoff, which in practice is actually 9.6 kHz.

The rationale was to set a standard receiver makers could use to allow the widest possible response with the best compromise for adjacent-channel interference reduction. The standard was voluntary but later became mandatory.

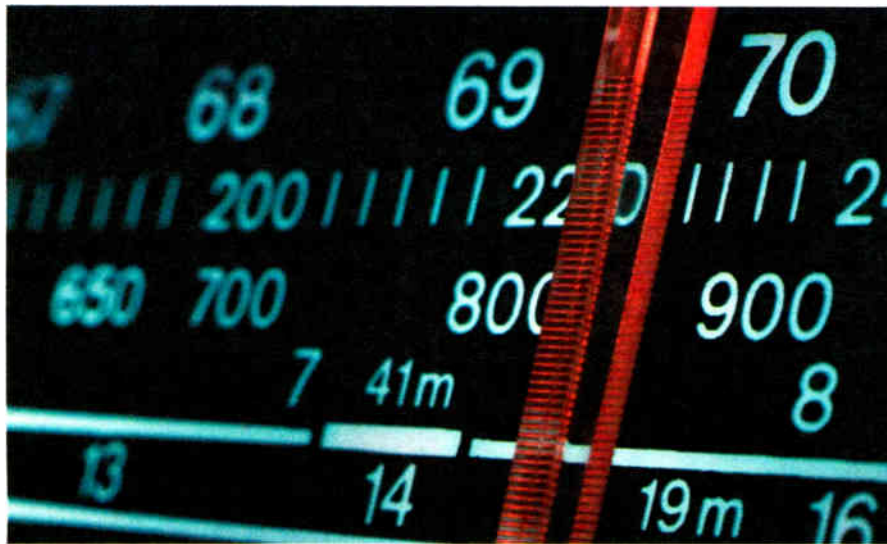
Every AM station in the United States abides by it, thus ending the days when AM transmission audio response was not predictable. That was more than a decade ago, but if you go into any Best Buy or Wal-Mart or car dealership and sample their radios you will see that just about every single one still has the same front-end performance they did before the NRSC standard was even being talked about.

The big question is why?

### AM bandwidth issues

I have read for years that AM bandwidth has been held down because of complaints about adjacent-channel interference. Let's nip that in the bud. The NRSC mask virtually eliminated that as an issue.

The 10 kHz restriction allows just about any radio to be able to separate stations 20 kHz apart in normal listening situations with no spatter heard. If the NRSC radios



had been built and failed to stop the adjacent-channel noise, I would understand the industry going back to narrowband.

But the radios were never built. The few wideband radios out there do perform very well and are able to show good selectivity even in wideband mode. Has the FCC since been bombarded with citizens complaints about adjacent-channel noise?

Does anyone know anyone who has ever written to Sony or Delco or Panasonic in the last 10 years to complain about bandwidth being too wide and excessive interference — other than impulse noise?

Where are all these complaints? Why were NRSC-standard radios never mass-produced? Where is the rationale for not making them based on "complaints"?

Complaints or no complaints, why did manufacturers not implement the NRSC response or even anything close to it? Who designs these radios anyway?

I am willing to bet that most AM radios are based on no more than one or two chipsets that have become the standard for Asian manufacture of radios for America. It seems that only one or two suppliers of these building blocks would have to improve the design for these changes to be seen in most of the AM radios made for this country.

Some contributors to industry trade publications have

done response studies on several AM radios and yes, bandwidth is pretty sorry, with most being several dB down at even 3 kHz. Even so-called professional-grade monitor radios have sick analog response that barely beats a telephone on high end.

Some engineers on the broadcast side advocate further reduction of transmitted bandwidth to better match the performance of the "typical" radio. While this sounds like the tail wagging the dog, it would be acceptable if the master planners come up with a better chipset that is actually flat to 5 kHz and then cuts off sharply.

This would sound much better and still leave room for IBOC. But the receiver would have to really be flat in its bandpass, not rolled off starting back at 2 kHz!

**The people who make radios need to get their heads out of the sand and maximize performance to even half of the transmission standards adopted many years ago.**

First, let's be clear, this has nothing to do with IBOC hash interference since that problem occurs on the main carrier frequency of a station whose adjacent is using IBOC. Narrowing bandwidth on the receiver will not stop that kind of interference from being heard.

But we do understand that receive bandwidth must be limited. Keep the station's own IBOC signals from being heard on analog radios.

Okay, I can already hear some readers crying about cutting bandwidth to 5 kHz and how that is such a terrible thing. If we *actually* have a flat band pass of 5 kHz on the receive end you would be most impressed with the sound, even with a 5 kHz transmit standard.

The fact is that most radios will produce something past 5 kHz, even 7 kHz, but it's so low that it's not worth talking about. These same radios generally *start* rolling

See AM, page 22 ▶

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## Radio World's HD Radio™ Scoreboard

The HD Radio Scoreboard is compiled by Radio World using information supplied by iBiquity Digital Corp., the HD Digital Radio Alliance and other sources. Data reflect best information as of mid-April. This page is sponsored by Broadcast Electronics. HD Radio is a trademark of iBiquity Digital Corp.

### HD RADIO AT CITADEL

Citadel owns 165 FMs and 58 AMs. Its merger with the ABC Radio business of Disney is pending.

Market	Freq.	Station	Market	Freq.	Station	Market	Freq.	Station
Albuquerque, NM	96.3 *	KBZU-HD1	Harrisburg, PA	105.7 *	WQXA-HD1	Providence, RI	640	WULS-HD
	96.3-2 *	KBZU-HD2		105.7-2 *	WQXA-HD2		104.9	KKWD-HD1
	103.3 *	KDRF-HD1		102.3 *	WCAT-HD1		104.9-2 *	KKWD-HD2
	103.3-2 *	KDRF-HD2		102.3-2 *	WCAT-HD2		100.5 *	KATT-HD1
	93.3 *	KKOB-HD1		99.3 *	WNRX-HD1		100.5-2 *	KATT-HD2
	93.3-2 *	KKOB-HD2		99.3-2 *	WNRX-HD2		99.7 *	WSKO-HD1
	99.5-2 *	KMGA-HD1		107.7 *	WIVK-HD1		99.7-2 *	WSKO-HD2
	99.5 *	KMGA-HD2		107.7-2 *	WIVK-HD2		105.1	WULI-HD1
	92.3 *	KRST-HD1		99.1 *	WNML-HD1		105.1-2 *	WULI-HD2
	92.3-2 *	KRST-HD2		99.1-2 *	WNML-HD2		106.3	WVKX-HD1
Allentown, PA	100.7	WLEV-HD1	Little Rock, AR	98.7 *	WOKI-HD1	106.3-2 *	WVKX-HD2	
	100.7-2 *	WLEV-HD2		98.7-2 *	WOKI-HD2	630	WPRO-HD	
	96.1	WCTO-HD1		101.7 *	KVLO-HD1	92.3	WPRO-HD1	
	96.1-2 *	WCTO-HD2		101.7-2 *	KVLO-HD2	92.3-2 *	WPRO-HD2	
	Baton Rouge, LA	94.1 *		WEMX-HD1	92.3 *	KIPR-HD1	101.1	KBER-HD1
		94.1-2 *		WEMX-HD2	92.3-2 *	KIPR-HD2	101.1-2 *	KBER-HD2
		93.7 *		KRDJ-HD1	920	KARN-HD	93.3 *	KUBL-HD1
		93.7-2 *		KRDJ-HD2	102.1	KOKY-HD1	93.3-2 *	KUBL-HD2
		103.3 *		WCDV-HD1	102.1-2 *	KOKY-HD2	98.7	KBEE-HD1
		103.3-2 *		WCDV-HD2	107.7 *	KLAL-HD1	98.7-2 *	KBEE-HD2
106.5 *		KQXL-HD1	107.7-2 *	KLAL-HD2	101.9 *	KENZ-HD1		
106.5-2 *		KQXL-HD2	102.9 *	KARN-HD1	101.9-2 *	KENZ-HD2		
Birmingham, AL		690	WSPZ-HD	102.9-2 *	KARN-HD2	107.5 *	KKAT-HD1	
		1070	WAPI-HD	98.5 *	KURB-HD1	107.5-2 *	KKAT-HD2	
	99.5 *	WZRR-HD1	98.5-2 *	KURB-HD2	94.7 *	WNAS-HD1		
	99.5-2 *	WZRR-HD2	103.5 *	WRBO-HD1	94.7-2 *	WNAS-HD2		
	94.5 *	WYSF-HD1	103.5-2 *	WRBO-HD2	97.7	KWIN-HD1		
	94.5-2 *	WYSF-HD2	98.1 *	WXMX-HD1	97.7-2 *	KWIN-HD2		
	107.7 *	WUHT-HD1	98.1-2 *	WXMX-HD2	99.3 *	KJOY-HD1		
	107.7-2 *	WUHT-HD2	98.9 *	WKIM-HD1	99.3-2 *	KJOY-HD2		
	100.5 *	WRAX-HD1	98.9-2 *	WKIM-HD2	95.7 *	WAQX-HD1		
	100.5-2 *	WRAX-HD2	105.9 *	WGXK-HD1	95.7-2 *	WAQX-HD2		
Buffalo, NY	103.3 *	WEDG-HD1	105.9-2 *	WGXK-HD2	105.9 *	WLTJ-HD1		
	103.3-2 *	WEDG-HD2	970	KESP-HD	105.9-2 *	WLTJ-HD2		
	96.9	WGRF-HD1	103.3	KATH-HD1	93.1	WNTQ-HD1		
	96.9-2 *	WGRF-HD2	104.5 *	WGFY-HD1	93.1-2 *	WNTQ-HD2		
	104.1 *	WHTT-HD1	104.5-2 *	WGFY-HD2	107.5 *	KHYT-HD1		
	104.1-2 *	WHTT-HD2	103.3	WKDF-HD1	107.5-2 *	KHYT-HD2		
	Colo. Springs, CO	98.9	KKMG-HD1	103.3-2 *	WKDF-HD2	99.5	KIIM-HD1	
		740	KVOR-HD	105.5	WQGN-HD1	99.5-2 *	KIIM-HD2	
		Columbia, SC	98.5	WLXC-HD1	106.7 *	KKND-HD1	97.5	KSZR-HD1
			105.3	WHTS-HD1	106.7-2 *	KKND-HD2	97.5-2 *	KSZR-HD2
105.3-2 *			WHTS-HD2	102.9 *	KNEZ-HD1	92.9 *	WNGS-HD1	
96.9			WLAV-HD1	102.9-2 *	KNEZ-HD2	92.9-2 *	WNGS-HD2	
96.9-2 *			WLAV-HD2	96.9 *	KQOB-HD1	97.9 *	WBSX-HD1	
94.5			WTNR-HD1	96.9-2 *	KQOB-HD2	97.9-2 *	WBSX-HD2	
94.5-2 *			WTNR-HD2	97.9 *	WULS-HD1	97.1 *	WBHT-HD1	
107.3 *			WKLO-HD1	97.9-2 *	WULS-HD2	97.1-2 *	WBHT-HD2	
107.3-2 *	WKLO-HD2		98.9 *	KYIS-HD1	93.7 *	WSJR-HD1		
			98.9-2 *	KYIS-HD2	93.7-2 *	WSJR-HD2		

(\* stations are listed as coming soon.)

#### The HD Radio Bottom Line

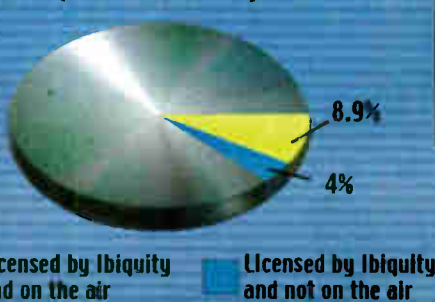
Total Licensed: 1,791  
On the Air: 1,236

#### Last Month

Total Licensed: 1,691  
On the Air: 1,218

#### Market Penetration United States

13,857 AM & FM Stations (excludes LPFMs)



#### Number of FM Stations Multicasting:

565

#### Last Month:

561



## HD CONVERSION DIGEST

# HD-R Processing Trickier Than Analog

by W.C. Alexander

*Cris Alexander is director of engineering for Crawford Broadcasting. This is one in a series of tips about HD Radio implementation. The series is archived at radioworld.com.*

HD Radio audio processing has a lot in common with conventional broadcast air processing, but the HD path processing does depart considerably.

In an ideal world, the HD Radio audio path would not be processed at all. We would feed unprocessed audio and allow the listener to enjoy the full dynamic range and spectral balance of the source audio that the producer intended. But that's not the world we live in.

Were we to do that, we would find that when our HD Radio receivers made the transition from analog to digital, the perceived audio level would drop and the digital audio would lack "punch." Listeners would have to turn up the volume to hear in mobile or noisy listening environments. Competitors who do process their digital path audio would have an immediate leg up.

The world in which we live and operate requires us to process our HD Radio audio to some extent, and while we don't need all the clipping that we use in our analog audio paths, we do need something. Processor manufacturers including Omnia and Orban have provided for this. For station engineers trying to make things sound right, we need to know a few things.

## Adjust output level

FM stations generally have it easier. With FM HD Radio stations, it is possi-

ble to use most of the same audio processing chain used for the analog signal path for the HD Radio signal path. The station can use all the wideband AGC and multiband limiter/compressor stages in both paths.

Where we can depart is in the output section. In the analog world, we use clipping, composite or otherwise, to generate loudness and maintain absolute control over peak modulation. A byproduct of clipping is distortion. The final clipper setting is always a compromise between

loudness and distortion.

In the FM HD Radio world, we do not have the requirement for absolute peak modulation control, and because we do not operate in real time, there is no rea-

**In an ideal world,  
the HD Radio audio  
path would not be  
processed at all.**



The processing paths of an AM station are shown on this screen shot of an Omnia5.EX.

son why we can't take advantage of that and "look ahead" a few cycles. We can make instantaneous advance adjustments in the output level to maintain loudness and level control.

By using common processing for both the FM and HD audio paths right up to the clipper and look-ahead limiter respectively, the station can maintain its signature sound on both paths. The only real

processing challenge for the engineer, then, is to match the FM and HD-R levels so that the transition from analog to digital in receivers is seamless.

On the AM side, things get a bit more complicated. The AM and HD Radio audio paths are considerably different. We deliberately band-limit the AM path to 5 kHz, but there is no such requirement for the HD-R path. Generally speaking, the AM band limiting in audio processors is smoother than the "brick wall" 5 kHz limiting in the Ibiqity Digital up-converter.

The limitations and aggressiveness of the AM HDC coder do require us to pay attention to what we feed it. Source material, particularly speech, with excessive highs will produce a lot of coding artifacts.

The best way to handle this is to eliminate unneeded high-frequency content prior to the HDC coder. Band-limiting talk format source material to 12 kHz in the processor is an excellent way to keep things clean while maintaining very pleasant HD Radio demodulated audio.

*What have you learned about converting to HD Radio that would help other readers? Write to crisa@crawfordbroadcasting.com.*

## AM

► Continued from page 20  
off at about 2 kHz.

If we could hold the response flat from 1 kHz to 5 kHz it would make a major difference. Motorola had that idea a few years ago.

Back in 2003, Motorola sent out a lot of paper about a brand-new AMFM chipset that was destined to turn the receive world on its ear. It was called Symphony and promised to bring DSP processing to the average receiver.

FM range was predicted to increase dramatically and AM would be reborn with variable bandwidth, flat response and digital filtering. We were supposed to see these

radios in automobiles by 2005. Well?

For reasons I cannot explain Symphony was not adopted. It was supposed to be virtually as cheap as the systems already in place but with so much more to offer. What happened? Looks like it never made it to market although Motorola was bombarded with requests for chipset samples.

## The Big Lie

As I mentioned, we have been told for years that AM radios remain so narrow because of all the complaints about noise. Well I say hogwash.

I own a 2001 Ford Crown Vic with a stock radio that has one of the best-sounding AM sections ever heard. I measured the audio on it and it's good to about 4.8 kHz where it's down 5 dB. It takes a nose-dive after that but sounds great — all

while having a very tight front end.

I can sit 20 miles from 50 kW WLS at 890 kHz and hear my 1 kW WGTO(AM) at 910 kHz hitting me with under .5 millivolt more than 80 miles away with no interference from WLS! That to me is more than acceptable performance and it sounds good.

However my other car, a 2004 Ford Crown Vic, also equipped with a stock radio, sounds like crap with a measured audio response of about 2.3 kHz.

Why did Ford go backwards on performance? I dare them to show me any complaint letters about the radios in the 2001 models that forced them to narrow the 2004 so much. Yes, it's a big mystery to me.

## Simple nudge

You would think a simple nudge from the FCC would help. Years ago I co-wrote a petition to ask the FCC to implement a minimum standard for AM performance; see [www.geocities.com/amstereo2001/fccpetition.htm](http://www.geocities.com/amstereo2001/fccpetition.htm).

The petition went nowhere. Where was the NAB on that issue? Until we get serious about the last link in the AM system, all the talk about cutoffs, pre-emphasis, bandwidth narrowing and the like will be just that: talk.

The people who make radios need to get their heads out of the sand and maximize performance to even half of the transmission standards adopted many years ago. The NRSC had manufacturing representatives at the table when the 10 kHz standard was adopted, but not one of them changed their radios to take advantage of the new cutoff that eliminated first-adjacent monkey chatter.

If the people at the table would not do it, how can we expect others to follow? All the improvement on the transmitter side means nothing if we cannot mandate even a minimum standard of performance for mass-produced receivers, be it 5 kHz or not.

*Larry Langford is the owner of WGTO(AM) and WDW(AM) in southwestern Michigan. Reach him at LarryLangford@aol.com.*

*RW welcomes other points of view to radioworld@imaspub.com.*

## Happy Birthday Radio!



Radio grew up  
with  
**JENNINGS inside**

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Tell us about your favorite radio history fact and you will automatically be registered to win a Vintage Radio. Visit us at [www.jennings-tech.com](http://www.jennings-tech.com).



In 1906, Reginald Fessenden became the first person to broadcast words and music over radio waves



# Handbook

► Continued from page 4

engineer uses the handbook to solve just one major problem or provided a solution to an engineering issue, then the book will have paid for itself, perhaps many times over.

By spending some time reading related chapters in addition to those of particular interest to a broadcast engineer, the additional knowledge will be instrumental in improving the standing of individuals and advancing careers.

### When was the project started?

Initial work began by NAB staff late in 2004. The editor-in-chief was on board by December. Many of the authors were contacted, contracted and began writing in 2005 and 2006.

Because most of the authors had day jobs, yet we wanted their expertise, it was necessary to allow enough time for them to do the work in their "spare" time. Final editorial versions were determined late in 2006, final editing completed in early 2007 and the book was printed in time for the NAB2007 convention.

### What was the hardest part?

Working with 126 authors — some chapters had more than one author and some wrote more than one chapter — with different writing styles to produce 104 chapters that required several rounds

**There are so many new technologies, we found we needed many new chapters.**

of editing and review. Dealing with engineers who were experts in their subject and wrote things to be understood while not always grammatically correct or with appropriate style. [Ed. Note: Tell me about it.]

Also, the publisher's copyeditors needed considerable oversight, as they were dealing with unfamiliar subjects and sometimes changed the meaning of the author while trying to improve the grammar and style. Another challenge was maintaining a high quality of graphics for the figures while working with a thousands images in many different formats.

### What trends or new content do you find most notable for radio?

The digital technology sea change in nearly every facet of broadcasting. We added 24 new chapters to the Tenth Edition and removed or consolidated seven from the Ninth Edition.

New chapters for radio include NRSC Analog and Digital Standards; Worldwide

Standards for Digital Radio; Planning Radio Transmitter Facilities; FM RF Transmission Lines; AM & FM IBOC Transmission Systems and Equipment; Audio & Video Over IP Networks and Internet Broadcasting; Tower Lighting and Monitoring; STL Systems for AM-FM-TV; and Managing Workplace and Environmental Hazards, in addition to those already radio-specific chapters.

### How did you decide who would write? Were they paid?

When practical we asked the authors of the Ninth Edition to update their chapters. If that was not possible we obtained new authors to update or rewrite a specific chapter.

There are so many new technologies, we found we needed many new chapters. We looked for experts that we knew our-

selves or, based on their reputations or publications, just called them up and asked. Most seemed flattered to be considered as an author for the "NAB Engineering Handbook."

Each received an honorarium and a copy of the handbook.

### How do you keep the content unbiased?

All authors were retained as individuals, not as company representatives. We asked authors associated with vendors to include all relevant technologies including those from other manufacturers, although mention and examples of products from their own companies was allowed as examples of current implementations. We sometimes offered suggestions to authors on subject areas we felt needed development.

This policy worked well and any occasional bias was picked up and corrected by the editors.

In addition, broadcast engineers are a pretty savvy group and can determine for themselves what is needed. Reading a chapter is only the first step in a learning process that leads to making a technical product decision. It is up to the engineer to conduct additional research as may be needed.

The handbook is a comprehensive and easy-to-read resource that provides the broadcast engineer with the basic knowledge of a subject.

We'll write more about the handbook in future coverage. I welcome your comments and reviews of this engineering resource as well. Write to me at radioworld@imaspub.com.

the professional broadcaster's choice for

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WorldCast Eclipse



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Configuration and control of the WorldCast Eclipse is straight-forward and simple thanks to APT's powerful and intuitive Codec Management System (CMS). Offering extensive real-time management of multiple codec units, the CMS enables alarm monitoring, logging and performance monitoring as well as configurable user and audio profiles.

To see the full functionality of CMS, download a trial version from [www.aptx.com](http://www.aptx.com).

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# You're looking at a complete audio-over-IP routing system.

(Just add Cisco.™)

**Administer this** • The beauty of the Web is that you can get information anywhere. Same thing with Axia: you can set up and **administer an entire building full of Axia equipment** – audio nodes, consoles, virtual routers, whatever – from your own comfy office chair. All you need is a standard Web browser (PC or Mac, we like 'em both). Put an Internet gateway in your Axia network and you can even tweak stuff remotely, from home or anywhere there's a Net connection. Mochachino, anyone?

**Automation station** • Wouldn't it be cool to have a **self-monitoring air chain with silence-sense** that can fix problems, then e-mail a status report? To be able to switch your program feed from Studio 'A' to Studio 'B' with one button? Or build custom switching apps and scheduled scene changes based on Boolean logic and stacking events? PathfinderPC software does all these things and more. But unlike HAL 9000, it doesn't talk back to you.

**Ether Net** • Hardly a month goes by without a story concerning someone getting knocked off the air by STL frequency interference or bandwidth reductions. There's also the headache of trying to add HD Radio™ program streams to already maxed-out transmission links. Luckily, Axia clients have a way around this particular roadblock: they've been using Ethernet radios from well-known manufacturers like Orthogon, Dragonwave and BE to construct a link between the studios and the transmitter that operates *above* the crowded 950 MHz band. Put an Axia AES/EBU Audio Node on both ends of that link and before you can say "Look! Up in the sky!" you've got an Ethernet STL, with room for multiple channels of program audio plus backhaul. And that's **uncompressed 48 kHz, 24-bit audio** — without nasty compression artifacts that degrade your lovingly-tweaked audio chain. Add a couple of Axia GPIO nodes to the mix, and your new STL link can carry remote control commands for transmitter and processing gear, too.

**Brains in the box** • The typical radio jock cares for studio equipment about the same as a five year old cares for a puppy: haphazardly, if at all. That's why we **took the CPU out** of our Element modular console and put it in here, with the power supply and GPIO ports. That means a greatly reduced chance of being taken off the air by a Coke spilled into the board. C'mon, don't you have better things to do than trying to dehumidify circuit boards with a hair dryer?

**That's cool** • Noisy fans in studio equipment? That's a major *faux pas*. You won't find a fan in any Axia Audio Nodes — they're designed to run **cool and silent** (unlike your morning show talent).

**Let it grow** • Growing your business computing network is easy: just add more PCs and hook them to the Ethernet switch. But with broadcast routers, adding more capacity usually means buying another frame, installing more I/O cards, pulling more discrete cable through conduit that's already full to the brim... Hope you've got stock in Grecian Formula! But since IP-Audio networks use standard Ethernet, **adding more capacity to an Axia system is as simple as plugging in an Audio Node** wherever you need inputs. And should you need to move to new digs, you can just unplug your Axia system and take it with you. Try doing *that* with a big iron router.

**A node for every need** • Someday, all broadcast gear will speak Livewire (so says our Magic 8-Ball). Until then, there are Axia Audio Nodes that turn analog and AES sources into routable 48 kHz / 24 bit audio streams.

**It's not rude to point** • Little kids tell mommy what they want by pointing -- a pretty intuitive way of doing things. PathfinderPC software gives talent the same convenience. You can **build custom "button panels"** to execute complex operations with just one click. You can map these panels to controller modules on Element consoles or to turret-mounted controls, place mini-applications on studio computer screens, even run them on touchscreen monitors.

**AES yes** • You like your audio to stay digital as much as possible, right? We get that. That's why we have AES/EBU Audio Nodes that let you plug AES3 sources right into the network. Studio-grade sample-rate converters are inside: anything from **32 kHz to 96 kHz** will work. Oh, and there's 8 AES ins + 8 AES outs in each node. Digital distribution amp, anyone?



**Orc slayer** • Hooking up an Axia Audio Node may be the simplest thing you've ever done. All our I/O is presented on RJ-45 and adheres to the StudioHub+ standard, so connecting audio devices is as simple as plugging in an Ethernet patch cable. All of which gives you more time to play World of Warcraft with those guys from IT.

**Level headed** • These green bouncing dots built into every Axia Audio Node are confidence meters. One glance and you know whether an audio source is really active — or just playing possum.

**Push to play** • Axia Router Selector Nodes are pretty cool. Think of them as **really advanced selector and monitor panels**; put one anyplace you need access to audio streams from the IP-Audio Network. Like newsrooms, where a reporter might need access to a satellite feed or a Zephyr connection. Or dubbing stations, where audio is captured and stored for later use. Or in the station's TOC, so you can monitor any of the hundreds — or thousands — of audio streams on your network at a moment's notice. Use the LCD screen to scroll through a list of available streams, or use the eight Fast Access keys on the front panel to store and recall the streams you use most. And Router Selector nodes have something standard X-Y panels don't: an input for fast connection of an analog or AES device. Sweet.





« Thinking about Axia but waiting 'til we're "more established?" You might not know that there are over 400 Axia studios on-air around the world -- and counting.



« An Axia system can expand or shrink as much as you want it to — the Ethernet backbone lets it scale easily, on-demand. Portable too: just take it with you if you move.



« Axia systems install in as little as half the time of hardwired routers — and without expensive, bulky multi-pair cable. Whatever will you do with all the time you save?



« Is IP reliable enough for 24/7 audio transport? Millions of VOIP business phone users with systems based on Cisco routers certainly think so. Coincidence?

**Nothin' but Net** • Did you know you can plug a PC directly into an IP-Audio network and use it to send and receive audio? Can't do that with a mainframe router. Well, you *could* add more input cards to the mainframe, and then buy high end audio cards for your PCs, and then run more wiring all over the place... but with Axia, you just install the **IP-Audio Driver** on any Windows® PC to send and receive pure digital audio right through the PC's Ethernet port — no sound card required or additional router inputs needed. You get better, cleaner PC audio that's sharable right to the network. The single-stream version is great for audio workstations; the multi-stream version lets you send and record **16 stereo channels simultaneously** — perfect for digital automation systems.

**CYA** • Sooner or later, someone's going to ask for a hard copy of a specific broadcast. Whether it's a client looking for proof of play, a Group PD that wants airchecks, or a listener claiming your morning show did something naughty, you're going to need a way to prove what was said. Axia makes it easy to keep archives of your programming with iProFiler networked audio logging software. Just install iProFiler on a Windows PC with a NIC and connect it to your Axia network; tell it what audio streams you want to record and it goes to work, sucking audio out of your network like pimientos from

Martini olives. iProFiler can record **up to 16 channels of stereo audio simultaneously**, storing them as time-stamped MP3 files you can save to a network drive or FTP server for listening or re-broadcast. And since logic always follows audio in an Axia network, you can tell iProFiler to record only when the jock's mic is open (or vice-versa). And of course, you can listen to saved audio from any PC connected to the Axia network.

**Put that in your pipe** • How many discrete wires can a CAT-6 cable replace? Well, a T-3 data link is pretty speedy with 44.7 Mbps of throughput. But Axia networks use Gigabit Ethernet links, with 1000 Mbps, between studios. That's more than 22 times the capacity of a T-3; enough throughput for 250 stereo channels per link — the equivalent of a **500-pair bundle on one skinny piece of CAT-6**. You can even use media converters and optical fiber for higher signal density if you want. Think that might save a little coin in a multi-studio build-out?

**Heavyweight champion** • This is an Axia StudioEngine. It works with our Element Modular Consoles (the fastest-growing console brand in the world by the way) to direct multiple simultaneous inputs and outputs, mix audio, apply EQ, process voice dynamics, and generate multiple mix-minuses and monitor feeds on the fly. To make sure it delivers the reliability and ultra-low latency broadcast audio demands, we powered the StudioEngine with a fast, robust version of Linux — so fast that **total input to output latency is just a few hundred microseconds**. How can one little box do so much? There's a blazingly-fast Intel processor inside, with enough CPU muscle to lift a small building. Strong *and* fast: Ali would approve.

**Hakuna matata** • Axia networks are self-monitoring and self-healing. Spanning Tree Protocol in the Cisco Ethernet switches we use combines nicely with PathfinderPC's automated program stream monitoring to help ensure that your studio network is **on the air 24/7**. And all Axia gear (like this StudioEngine, that mixes control room audio streams) runs real-time Linux for operation that's as bulletproof as Superman's boxers. Which means "no worries, mate."

**You got to have friends** • Sure, we think IP Audio is cool. But it's even cooler that so many *other* folks think so too. Delivery system providers like ENCO, Prophet, BSI, BE, iMediaTouch, DAVID Systems and more all have products that **work directly** with Axia networks. So do hardware makers like AudioScience, International Datacasting, Radio Systems, Telos and Omnia. Check out the whole list at [AxiaAudio.com/partners/](http://AxiaAudio.com/partners/).

**Jammin' on the mic** • Radio studios and microphones go together like Homer Simpson and donuts. Unfortunately, so do preamps, mic compressors, EQ boxes, de-essers — let's face it: most studios house more flying saucers than Area 51. Axia helps clean up the clutter by including mic preamps with our Microphone Nodes; not bargain-basement units either, but **studio grade preamps** with headroom enough to handle Chaka Kahn. Phantom power, too. And if you choose to use Axia Element consoles in your studios, you'll find world-class mic processing built right in: vocal dynamics (compression and de-essing) from the audio processing gurus at Omnia, plus three-band parametric EQ with SmartQ, available on every mic input. Rap on, Grandmaster.

**Very logical, Captain** • Routing logic along with audio used to be almost as hard as performing the Vulcan Mind Meld. But Axia makes it simple, because machine logic can easily be converted to data and paired with Livewire audio streams. So **logic follows audio throughout the facility** on Axia's switched Ethernet backbone. Eight assignable GPI/GPO logic ports, each with five opto-isolated inputs and five opto-isolated outputs, are built into every Element power supply, so you can control on-air lights, monitor mutes, CD players, DAT decks, profanity delays, etc. If you've got more than eight audio devices (and who doesn't), just add a standalone GPIO node like this one wherever you've got gear.



[AxiaAudio.com](http://AxiaAudio.com)



# Studio Sessions



PRODUCT EVALUATION

## TG-X 48 Dynamic Shuns the Noise

by Ty Ford

In our best of dreams, the studio is deathly quiet and we have the perfect acoustics. The smallest pin dropping makes enough noise to be picked up by a world-class mic. From the sound, we can tell if the pin was brass or steel and how many times it bounced before it came to rest.

Then you wake from the dream.

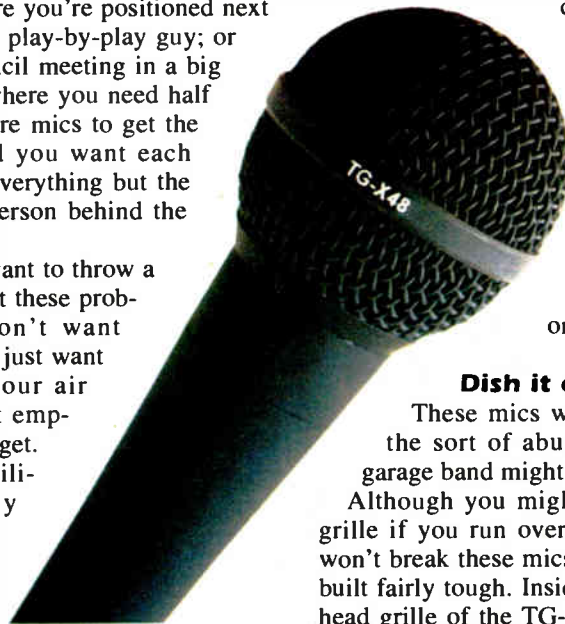
The reality is that your studio is a pretty noisy place — computer drives and fans, HVAC, an aging 360 Systems Short/cut and maybe even a few old cart machines. Oh, and at least two or three fairly large sheets of glass to bounce the noise around; sort of like a mini-racquetball court.

Getting good vocal sounds in that sort of environment takes a directional mic that's not overly sensitive — one that you work closely. Maybe one that also

can be used for the occasional remote broadcast where you're positioned next to a screaming play-by-play guy; or at a town council meeting in a big slappy room where you need half a dozen or more mics to get the coverage, and you want each one to reject everything but the voice of the person behind the mic.

You don't want to throw a lot of money at these problems. You don't want "perfect." You just want to improve your air sound without emptying your budget.

One possibility, especially where cost is a factor, is the beyerdynamic



TG-X 48 supercardioid dynamic mic. At a minimum advertised price of \$99 and a street price of less, you can probably buy a box of them and not lose any sleep if one disappears.

### Dish it out

These mics were made to take the sort of abuse an entry-level garage band might inflict.

Although you might crush the head grille if you run over it, you probably won't break these mics because they are built fairly tough. Inside the metal mesh head grille of the TG-X 48, a foam lining reduces popping. The TG-X 48 may

### Product Capsule:

beyerdynamic TG-X 48 Dynamic Microphone

#### Thumbs Up

- ✓ Bargain Price
- ✓ Durable

#### Thumbs Down

- ✓ Peaky; requires EQ
- ✓ Pop filter would be nice

PRICE: \$99

CONTACT: Visit [beyerdynamic.com](http://beyerdynamic.com)

reduce the bass when someone does eat the mic. These three adjustments made a big and positive difference.

Most radio stations use similar mic processing these days, so you'll probably find similar settings to tailor the sound of the TG-X 48. The black satin

### EXPECT MORE FROM YOUR AM TRANSMITTER



Made in USA

#### Armstrong Transmitter X-1000B

1KW HD Radio ready AM Transmitter for under \$10K

Built with dual hot-swappable 600 Watt RF modules capable of 150% modulation, X-1000B can bring that major market sound to your radio station. Engineered with the latest technological innovations, X-1000B offers high reliability, built-in redundancy and it is HD Radio ready.

Best of all, our customers tell us that the money they save running the X-1000B pays for itself with savings in electricity and

maintenance costs over an older transmitter ... and as a bonus they get exceptional reliability and that major market sound for free.

But, don't take our word for it. Talk to our customers already on-the-air with the X-1000B. Call or email for a users list and decide for yourself why owning this transmitter is a no-brainer.



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HD Radio is a registered trade mark of iBiquity Digital Corporation.

The black satin finish of the mic is unobtrusive. If you want to dress the mics up a bit, the grilles come in grey, blue, green, red and white.

require addition wind gear. I think some sort of pop filter would be a good idea just to keep people from eating the mic and making it sound too woofy.

The TG-X 48 has a rising frequency response, up six decibels from 1 kHz to 10 kHz, with pronounced peak of +10 dB at 15 kHz. That's pretty steep. This means the mics will cut through even the duller of PA systems, which is probably what they were designed for. Without EQ, that spike might make them a bit edgy for FM, but will definitely poke through on any AM broadcast.

I compared the TG-X 48 to my original Sennheiser MD 421 mics at the "M" setting. At "lips on" proximity range, the beyerdynamic had more bottom, the Sennheiser had a flatter more balanced response. I also noticed that the TG-X 48 was not as sensitive to EMI buzz as the 421.

Backing off to a more reasonable two inches, the bottom drops away noticeably from the TG-X 48. In an effort to correct for the pronounced HF EQ peak and the proximity effect, I ran some basic EQ with the four-band equalizer in my Millennia Media STT-1 preamp.

I found that adding a few dB at 120 Hz and at 900 Hz, with moderately wide Q, filled in the frequencies below that +10 dB peak, warming the sound and bringing it forward. I also rolled off some of the very low frequencies to

finish of the mic is unobtrusive. If you want to dress the mics up a bit, the head grilles come in grey, blue, green, red and white.

The beyerdynamic TG-X 48 may not be in your broadcast gear catalog. You may end up finding it in a local music store. Don't go in Saturday morning because that's when the guitar players

Although you might crush the head grille if you run over it, you probably won't break these mics because they are built fairly tough.

show up to try the new electric guitars. Think cacophony.

P.S.— I wish beyerdynamic still made the original m260 ribbon mic. It was a bargain with a great sound for radio. The m260.80 just isn't the same.

Ty Ford has been writing for Radio World since 1986. He may be reached at [www.tyford.com](http://www.tyford.com).



# MOST WANTED

*The world's best on-air microphone - period.*



*"The PR40 makes me sound fabulous. I absolutely love this microphone. We replaced our old microphones, which by the way were considered to be the industry standard, and the difference is like night and day."*

– DUSTY STREET  
FREED RADIO STUDIO  
ROCK AND ROLL HALL OF FAME  
SIRUS SATELLITE RADIO



*"I am not the most technical guy in the business, but after 32-years in the broadcast business, I know microphones. I plugged in the PR 40 straight into the board without any processing and it absolutely blew me away. Without a doubt the PR40 is the best broadcast microphone ever developed."*

– MIKE MCKAY  
BRAVO MIC COMMUNICATIONS  
KVLC 101-GOLD FM  
KXPZ ROCKET 99.5FM



*"This mic is unbelievable. I have worked with some of the most expensive microphones in the broadcast industry and none, I mean NONE compare to the PR 40. I have received reports from stations all over the world about the amazing audio quality of this mic."*

– GREG HEMMINGS  
WSLS-TV NEWSCHANNEL 10



*"The Heil PR 40 is incredible. There is absolutely nothing better on the market and I've had the opportunity to use all the standards over the years. The difference is really remarkable."*

– PD MICHAEL "SHARK" SHARKEY  
WSUN FM 97X  
COX RADIO TAMPA BAY



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618.257.3000



FIRST PERSON

# When Murphy Tags Along for the Satcast

*A Live Broadcast from the Outskirts of Maine  
Reiterates Importance of Preparing for Unknown*

by Aaron Read

Recently I was tapped to engineer a live interview by American Public Media's "Weekend America" in the snowy reaches of Camden, Maine. Nothing special? Well, it was made a little more interesting by the location: a ski slope next to a frozen lake with no AC power, no telco landlines and no wireless Internet. Plus, it had to be done live.

American Public Media wanted to cover the U.S. National Tobogganing Championships and sent freelance writer Keith O'Brien to report on the competition. So how'd we do it? ISDN over satellite.

Now as you might imagine, there are about 1,000 things that can go wrong with such a scheme ... and go wrong they did. But with foresight, planning, backups, testing, more backups, more testing and yet more backups, we kept it a comedy instead of a tragedy.

A few days before the event, my mailman delivered a Thrane & Thrane M4 TT-3080A portable satellite telephone with folding dish ([www.globalcoms.com/products\\_satellite\\_thrane.asp](http://www.globalcoms.com/products_satellite_thrane.asp)), and a Telos Zephyr Xstream ISDN, with built-in mic mixer, in another ([www.telos-systems.com](http://www.telos-systems.com)). The Thrane satellite phone folds into a portable and lightweight package that is carried easily in a backpack.

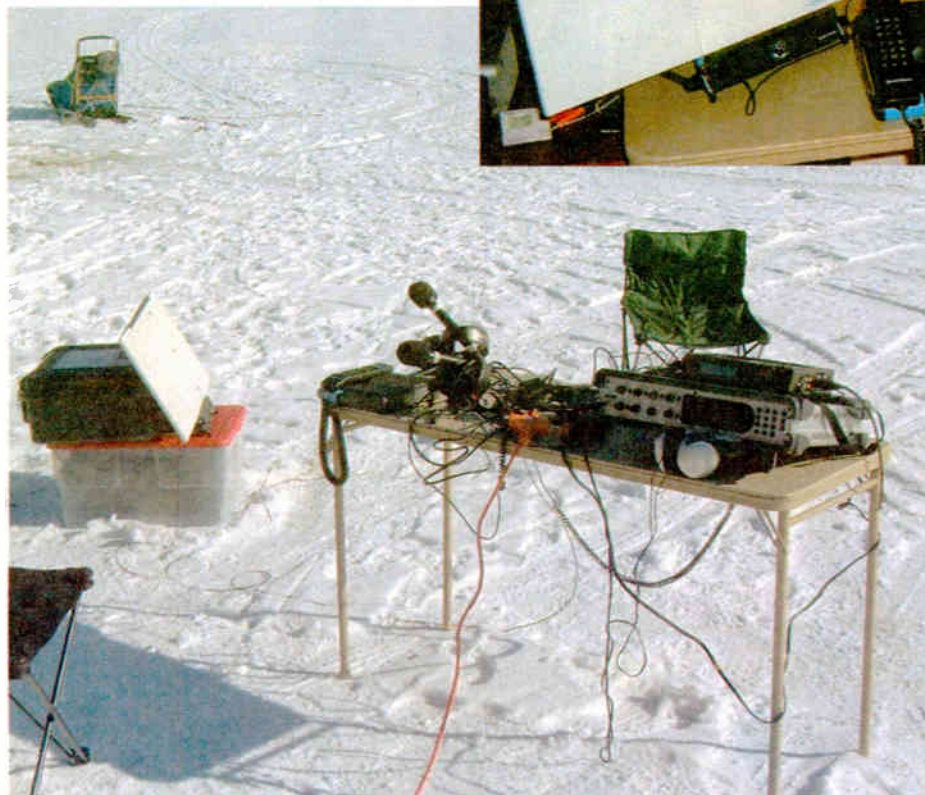
## Test runs

Our first test was from my apartment in Boston. I had a narrow — very narrow — view of the sky from my back porch, just enough for one little bar of signal from the Inmarsat AORW floating over the western Atlantic Ocean region. That's enough to get the ISDN to dial, and lock on one end; but not both.

After much fiddling with the satellite

dish I discovered you must aim the dish precisely, but you'll get four or five bars of signal as a reward, and a happy ISDN. The AAC-LD (low delay) codec sounded remarkably good over our 64 kbps channel.

So the telco problem was solved. Now we needed to deal with a lack of power. This proved to be tricky. A standard little



The gear at the lake: On the left is the satellite dish on a Tupperware-like bin, a storage case holding it in place. At upper left is a dogsled for the dogs. Upper right is a folding chair to keep people from walking in front of the dish. On the table (from left) is the satellite phone; two Electro-Voice RE50 microphones with Sony 7506 headphones atop; an orange power cord; a Telos Zephyr Xstream MXP ISDN codec with four-channel mic mixer; Sony headphones; and a Marantz PMD670 atop the Zephyr Xstream MXP.

"brick" UPS such as the APC ES250 ought to provide enough power for our needs, and a stress test confirmed about 25 minutes of power. I decided a second,



Most of the same gear, organized more neatly and photographed at the author's house. From left: the Thrane & Thrane folding satellite dish; Thrane & Thrane satellite phone; Telos Systems Zephyr Xstream MXP ISDN; and (on top of the ISDN) an Electro-Voice RE50 microphone and Sony 7506 headphones.

snowstorm blew through that evening, turning a four-hour drive into six hours.

Late that evening, I arrived at the toboggan chute, found an ideal spot and set up for another test run. There was a freezing rain/snow mix steadily falling, and not all this gear is weatherproof. Fortunately, I'd brought a five-foot-wide patio umbrella with me and clamped it to the trunk lid.

After getting another successful test done, I retired to my hotel room. I repacked all the gear with an eye towards carrying it by hand if I couldn't get my preferred spot. All batteries were topped off and I nodded off for the evening, hoping the weather would clear.

Fortune smiled upon us, as the day arrived with beautiful clear skies, a fresh layer of ice on the chute and plunging temperatures. Good thing I'd packed extra sweaters and long underwear. Unfortunately, one of my UPSs suddenly wasn't holding a charge. Thankfully, we had a spare UPS. And as it turns out, despite valid concerns about an inverter's "square wave" causing audible noise on the ISDN, there wasn't any noise during our last-chance morning test and we ran on the inverter alone.

Soon after, a dogsled team with ten noisy, barking huskies set up shop not 20 feet from us. A little chat with the owners and they said it would be no problem to take the dogs on a run across the lake when we were live. The by-then-faint barking actually worked great from an ambient sound perspective.

The morning's test on the satellite phone had drained the satellite phone's battery alarmingly fast. (Perhaps the battery was too cold?) Even worse, we suddenly learned that running the satphone's charger off the inverter caused too much electrical "noise." The ISDN wouldn't lock any more. Fortunately, we had a spare battery in the warm car; a quick swap and we re-established the ISDN link. But even the warm battery was quickly running out of juice. Suddenly this 15-minute connection looked mighty tenuous.

Both Keith and I have cell phones

See SATCAST, page 30 ►

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## PRODUCT GUIDE

## Innkeeper Connects Signals To Telephone Line

JK Audio says its Innkeeper 1x gets audio in and out of telephone lines, and that caller audio does not exhibit the transmit and receive crosstalk common to analog hybrids.



It connects audio signals to a standard analog telephone line, and uses a 16-bit DSP to monitor the phone line and audio signals continuously. The dual-convergence algorithm achieves trans-hybrid loss typically exceeding 50 dB.

The Innkeeper 1x's front panel features a headphone jack and volume control. Users can monitor the send signal, the caller's voice or a mix of the two. This output also is sent to the rear screw terminals so a monitor speaker can be added. The company says remote features can be found on rear screw terminals for ease of installation. Audio connections include mic/line switchable XLR input, XLR caller output and an additional, user-defined XLR output.

For more information, contact JK Audio in Illinois at (800) 552-8346 or visit [www.jkaudio.com](http://www.jkaudio.com).

## JBL Adds Two Models to VP Loudspeakers

JBL Professional expanded its Venue Performance (VP) Series powered loudspeakers with models VP7210/95DP and VP7212MDP.

The VP7210/95DP is a powered, 10 inch, two-way integrated loudspeaker system, suitable for spot-fill applications, featuring 1,750 watts of peak output power and digital signal processing.



JBL VP7212MDP  
and  
VP7210/95DP

The VP7212MDP is a powered, 12 inch, two-way integrated loudspeaker system. It features 1,750 watts of peak output power and onboard digital signal processing.

Additionally, the new VP Series models feature powder-coated, die-cast aluminum handles.

As with each VP Series model, the VP7210/95DP and VP7212MDP were designed in cooperation with Crown International.

For more information, contact JBL Professional in California at (818) 894-8850 or visit [www.jblpro.com](http://www.jblpro.com).

## M2.2R Adds Monitoring, Alarm Tools to M.2

DaySequerra updated its M2.0 HD Radio modulation monitor with the M2.2R, which includes six programmable dry, floating alarm relays; RBDS and RF multi-path displays; and FM analog component monitoring including SCA and pilot injection levels and AM noise.

Highlights include a multiplex output for external SCA decoders, Ethernet interface for streaming Program-Associated Data or remote control, and Remote Dashboard software. The latter lets broadcasters remotely tune the unit, alarm key signal parameters and log their data.

The M2.2R also features full-time digital audio output, even when turned to an analog station.

Additionally, the company rolled its Performance Loss Module option into the M2.2R. The technology uses heuristic algorithms that the company says are not fooled by pink noise or tones, and generate alarms when real program silence is



M2.2R

detected in HD Radio or analog broadcasts.

DaySequerra also debuted two HD Radio tuners. The M4.2R offers many of the features of the M2.2R; and the M3 contains three separate AM, FM and HD Radio tuners in a 2 RU enclosure. Each of the M3 tuners' vacuum fluorescent display shows station frequency, HD-1 through HD-8 PAD, analog RBDS data, signal strength and multipath.

For more information, contact DaySequerra in New Jersey at (856) 719-9900 or visit [www.daysequerra.com](http://www.daysequerra.com).

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# Satcast

► Continued from page 28 with Verizon service — no wireless interference to our audio gear. We quickly dialed Keith's cell phone into the "Weekend America" studios and patched it in to its mix board so we had a hot-standby ready to go. I set up Keith and his interviewee, tobogganer Andy Hazen, with Electro-Voice RE50B mics with hefty windscreens, and Sony 7506 headphones.

As 12:30 rolled around, we were feeling a little nervous, but nonetheless hopeful. Host Bill Radke introduced Keith and we were off. The background noise of dogs, snowmobiles and PA announcements set the scene perfectly. Keith shared his toboggan run story, Andy shared his secret toboggan wax formula of "moose drool" — and I nervously watched the satphone's battery indicator steadily drop and the satphone start to beep softly.

Fervent wishful thinking on my part ensured the satphone battery held in there just long enough to finish the interview. I later learned that data calls on the sat-

phone drain the batteries fast, but they still should have lasted around 20 minutes or so. Our batteries must've been old; they were dying after barely 10.

### Be prepared

The point here is that pretty much everything that could go wrong, did. Even comically so. For instance, my polarized sunglasses — ideal for snow glare — made reading the LCD displays very difficult. Fortunately we tested extensively and had time to prepare backups.

As it happened, the one thing we didn't test to real-world conditions was the one thing we were nearly bitten by: the battery life of the satphone. Admittedly, we thought we were covered with a spare battery and a charger, but the one thing for which we had two layers of backup needed three. The moral is, always do a complete test, just as if it were the real thing.

As a side note, I'm not sure I'd recommend ISDN over satellite for doing remote interviews. It has several points of failure and is quite expensive. But at the same time, when you're away from the comforts of home it's nice to know you can have ISDN-quality sound if you need it. And admittedly, I got to have a fun trip to Maine and watch guys hurtle down a chute



The faint barking of a dogsled team in the distance 'actually worked great from an ambient sound perspective,' said Read.

on an old couch. Ain't public radio grand? Listen to the piece at [www.weekendamerica.org](http://www.weekendamerica.org) in the Feb. 3, 2007 archive. Aaron Read is technical director for

NPR's "The Infinite Mind," and a freelance radio engineer. This tale and others are told in more detail at [www.friedbagels.com/blog](http://www.friedbagels.com/blog).

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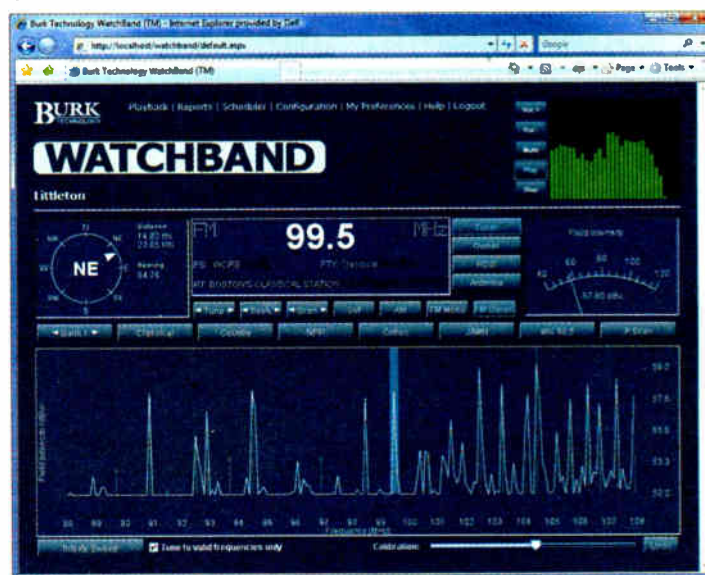
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### PRODUCT GUIDE

## Burk Debuts WatchBand Remote Receiver

Burk Technology's WatchBand Remote Receiver allows managers, engineers and programming departments to remotely monitor and log audio metrics, playlist data and off-air audio for stations in the market. The Web-based interface allows users to tune to any AM or FM station, listen live and view real-time field intensity data.

WatchBand decodes RDS/RBDS for each FM station, allowing station-to-station comparisons of RDS implementation. The display also shows FCC license data, the receiver's distance and direction from each station and the expected signal strength at that location.



With automatic logging of RadioText, WatchBand constructs playlist records for FM stations, revealing content on stations within the market. The company says this allows programming staff to compare individual dayparts on competing stations, as well as generate aggregate reports over longer durations.

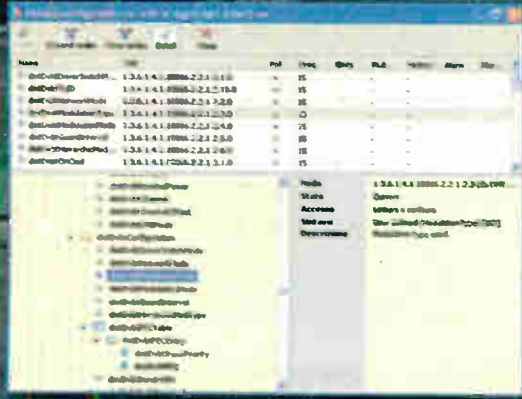
Audio logs can be configured for detailed program logging or for skimming multiple stations. With remote access to off-air audio logs, engineering departments can cross-reference audio alarms while managers and programming staff gain a valuable listening tool. Consolidated studio facilities can use WatchBand to monitor stations outside the studio's reception area.

It does on-demand tuning sweeps for the entire AM or FM band to show actual and expected field intensity in strip chart format. Users can click within the chart to tune to any station and reveal licensee and antenna data, including HAAT and ERP. The chart features a calibration slider, which allows adjustments for antenna gain and local terrain.

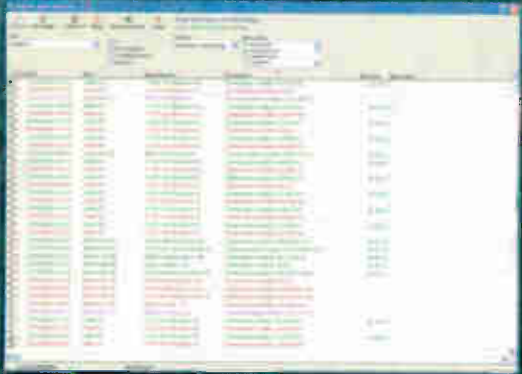
For more information, contact Burk Technology in Massachusetts at (800) 255-8090 or visit [www.burk.com](http://www.burk.com).



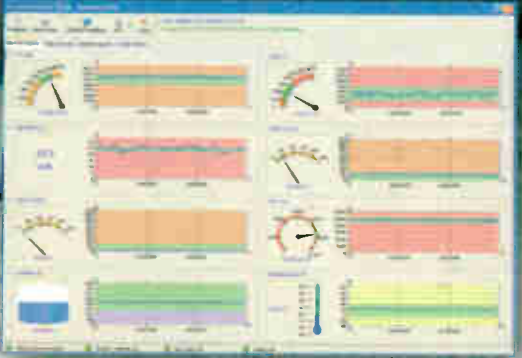
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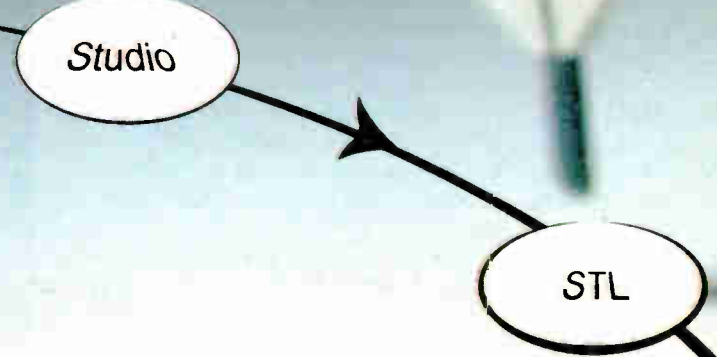
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# Buyer's Guide

Tech Updates



Inside

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Transmitters

May 9, 2007

USER REPORT

## Nassau Outfits Maine Aux Site With Harris

by Anthony Gervasi  
SVP, Engineering and Technology  
Nassau Broadcasting  
WFNK(FM)

Nassau Broadcasting Partners, based in Princeton, N.J., uses Harris transmitters at the majority of its stations from Maine to Maryland. Throughout my 12 years at Nassau I've been free to rebuild almost every Nassau-owned station, focusing on specific technology upgrades that provided clear benefits for the market and to the station for reliability, continuity and programming.

Our latest project was an auxiliary site at WFNK(FM) in Portland, Maine, which is scheduled to be on the air shortly before you read this. We recently built the fully redundant auxiliary site at the Hearst-Argyle-owned WMTW(TV) television transmission facility to back up the WFNK main transmission site on Black Cat Mountain in West Poland, Maine.

This site can be difficult to reach, and if hit with heavy snow and ice, has the potential to go down — even with an onsite generator. This is never a good prospect for a market-dominant station like WFNK.

### At the site

The WFNK auxiliary site houses a Harris HT-25 FM tube transmitter as its main transmitter and a ZX2000 low-power solid-state transmitter. Both broadcast in analog-only but are ready for HD Radio broadcasting.

The HT-25 FM is a reliable model from the HT series of FM transmitters that have provided longevity and reliability as main and backup transmitters at many Nassau stations. The HT-25 FM fulfills the 18.5 TPO requirement as a main transmitter for WFNK.

The ZX2000, a 2 kW model from the new Harris ZX low-power range, is outfitted with the Harris FlexStar HDx exciter. This was worth the additional small expense to set us up for HD Radio broadcasting. The upgrade entails adding the Engine card and using the Harris-provided USB thumb drive on the exciter to upload the HD settings.

We also like the fact that this is a DSP-based exciter that allows us to bring the IT components back to the studio — an important benefit in harsh weather regions.

When we do upgrade the auxiliary site, the ZX2000



Loading the rack: "This was all done single-handed, which is why there are no other people in the picture," said DOE Bill Ryall. "Box to rack alone was no problem. The ZX is easy to handle."

will run in the hybrid combined FM/HD mode. The ZX and an HD Radio-upgraded HT-25 would operate in the split-level combining mode. This connects the two transmitters into a switchless RF device that combines the signals as they pass through to the antenna. The FlexStar exciter will provide a new benefit here with its two separate outputs: One output will feed the ZX2000 for digital transmission, and the booster output will feed our analog-only devices.

Many of my significant transmitter upgrades since coming to Nassau were with the Harris ZCD series of IBOC transmitter for HD Radio broadcasting. As is our philosophy, we preferred to back up each ZCD transmitter with a low-power FM transmitter. This was usually a choice between the Harris Quest range and various Crown low-power transmitters.

The Quest model was bulky as a backup, could be difficult to install and most important did not share any similarity to the Z series. This often was a problem, as we prefer to interchange modules and other spare parts between main and backup transmitters when required.

### Made to order

The introduction of the ZX series was a welcome development. Our director of engineering in the Portland market, Bill Ryall, offered advice to Harris on the ZX range that Harris engineers warmly welcomed and put to use in the development phase. The easy-to-mount, easy-to-install ZX2000 shares the spirit of the Z series.

The PA modules and power supply are accessible through front-door access; by removing three screws, everything required for maintenance is arranged clearly. A module replacement is a simple swap, and the transmitter features enough overhead to nearly reach its 2 kW output limit if a module fails.

The ZX2000 also features the Harris WEB Remote module for remote control and monitoring, which is added through the transmitter's RJ-45 jack. This allows us to check temperatures, control points and voltage and current levels from a distance. Burk remote control equipment also is used to check transmitter current and voltage, especially on the HT-25 tube transmitter. We expect to make at least one onsite trip a month for maintenance purposes.

WMTW, from which we rent the auxiliary space, is a well-maintained, all-Harris HDTV/analog TV transmission plant with plenty of power and filtering to maintain a cool and clean environment. This, along with the fact that the facility once maintained its own radio operation, made site preparations almost non-existent. We purchased a Shively 6810 two-bay antenna and hung it on the tower with a center of radiation at 1,535 feet.

We expect that the HT-25 and ZX2000 will provide the excellent audio quality we are accustomed to with help from FlexStar and Digit exciters. These transmitters have always worked well, and with basic transmitter maintenance and occasional cap replacement on the exciters, their reliable power output allows us to penetrate our markets for full audio coverage at high quality.

For more information, including pricing, contact Harris in Ohio at (941) 639-1889 or visit [www.broadcast.harris.com](http://www.broadcast.harris.com).

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## USER REPORT

# BE Settles Into UMass Campanile

*Nonprofit Educational Station Selects FMi 1405 for Its HD Radio Upgrade*

by Frank Baptista, CBRE, CRO  
Chief Engineer  
WUMD(FM)

**NORTH DARTMOUTH, Mass.** Over its 35-year history, the radio station now known as WUMD(FM) at the University of Massachusetts in Dartmouth has gone through several transformations. It had its meager beginnings as a 10 watt student-run station in a basement dorm closet, later to become a 1,200 watt station.

It took nearly 14 years to finally realize its latest metamorphosis, a 9,600 watt HD station that serves communities in two states, both Massachusetts and Rhode Island. This nonprofit educational station provides a variety of non-commercial music, news, ideas and other forms of artistic expression that are underrepresented in mainstream media.

This has been an exciting time for everyone involved, and I am so grateful to have been a part of it. Strangely enough, we're fortunate it took so long for our latest upgrade to happen. If we'd had the resources to do this several years earlier, we would have probably missed out on our opportunity to take advantage of the evolutionary change in radio with HD broadcasting.

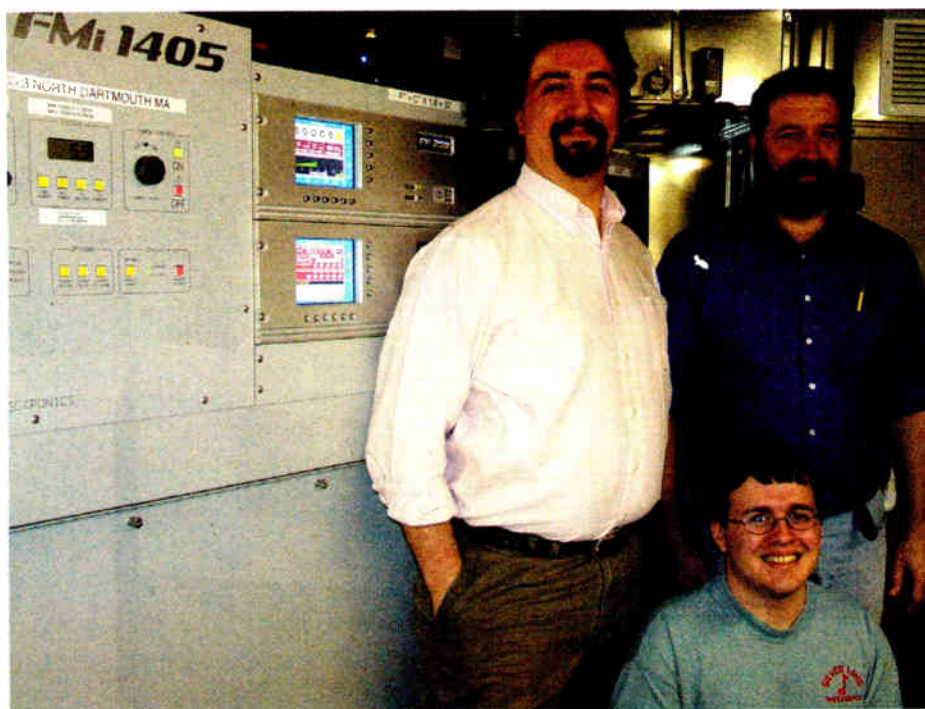
## Path to HD

Besides holding the license for our previous signal at 91.1 MHz, UMass Dartmouth also held a construction permit for our new signal at 89.3 MHz. Our existing ERP was at its limit, 1,200 watts, with no chance of ever increasing. However, the new signal would permit us to go to 9,600 watts ERP vertical. In order to facilitate the move and provide the financial resources, the university sold our former signal to California-based Educational Media Foundation.

When we started the process of identifying transmitters, there were several considerations that guided us. As a minimum, we knew we wanted a transmitter that was HD-capable/upgradeable, so we at least had a future path to HD in the event we couldn't afford it right away. Of course, reliability and service availability also were big considerations.

With a three-bay antenna coming, we were going to need an FM transmitter that could deliver a minimum of 5,800 watts FM-only. However, we also knew there was a possibility that, perhaps someday, we could have an opportunity

to increase our output power, so we wanted to be sure we had some reserve to spare. In addition, we wanted to maximize our uptime, so we were considering options for either dual transmitters or a transmitter with redundant modules that



Frank Baptista with Assistant Broadcast Engineers James House and (front) Daniel Chase.

could keep us running in the event of a single point of failure.

We put together a competitive bid spec based on what would meet our criteria. We also wanted the transmitter/antenna project to be turnkey.

Of the options on the table, the solution with the best value was the Broadcast Electronics FMi 1405, solid-state analog/HD transmitter, which we selected after reviewing the bids.

It's a 14 kW FM+IBOC transmitter (5.6 kW IBOC-only), and can operate in several modes: as an FM-only, an FM+IBOC or IBOC-only. Not only was the price of its FM+HD transmitter competitive with that of other HD-capable transmitters, it came with the next-generation HD hardware to support multicasting, namely, BE's XPi 10 exporter/HD Radio signal generator. BE's reputation for outstanding 24-hour support made our decision easier.

## Backup

I have to admit that, after reviewing the configuration of the transmitter for

single points of failure, I found a couple of "links" in the chain that had the potential to bring the station down. One was the single exciter, and the other was the internal controller. After talking to John Bisset, BE northeast regional sales manager, he was able to allay these concerns to my satisfaction.

First, BE added a second exciter to our delivered configuration, which would

We had various project meetings with electrical and HVAC contractors, architects, campus facility engineers, transmitter installer and college administrators. The plan was to do as much of the electrical and HVAC as possible prior to the delivery and installation and then do the transmitter and antenna installations at the same time. Jeff Rosenberg of Modulation Magic was the engineer responsible for the transmitter/antenna turnkey project, and the authorized installer for BE.

One of the bigger challenges of the project was the location of the transmitter room: the basement of the Campanile (bell tower) on campus. Access to this room was through a narrow outdoor stairway, which made the crane operator's job interesting to say the least. Besides the transmitter, we also had a three-phase voltage stabilizer come through that same passageway.

On delivery day, it meant a lot to see John Bisset of BE visit our site to review the entire installation.

The transmitter's performance has proven itself over and over again in the nine or so months we've had it in place.

One of the major pluses of the FMi 1405 is that it is a modular transmitter. There are 32 modular solid-state RF amplifiers, so there are no single points of failure in the amplifier chain. Instead of a single power supply, eight power supply modules feed groups of modules, providing the operating DC voltage.

The company's FXi 60 exciter has excellent clarity. The XPi 10 has a variety of analog and digital inputs and outputs to support any kind of FM/HD configurations.

During the time we've been in operation with our BE transmitter system, we had a single power supply module fail. As anticipated, the transmitter didn't miss a beat.

For more information, including pricing, contact Broadcast Electronics in Illinois at (217) 224-9600 or visit [www.bdcast.com](http://www.bdcast.com).

## TECH UPDATE

### Continental Expands 816HD Series

Continental Electronics says its 816HD line of transmitters provides an RF system without requiring separate antennas, lossy IBOC combiner, circulators, separate IBOC transmitter, tower modifications, tower crews, coax modification or dummy loads. The company says it has expanded the 816HD line to higher power levels.

The original 816HD transmitter has been renamed the 816HD-20, with nominal TPOs of 10 kW to 22 kW. To meet the needs of customers needing higher power, Continental recently introduced the 816HD-25, capable of TPOs from 20 kW to 25+ kW; and the 816HD-28L, a liquid-cooled system capable of TPOs from 25 kW to 28+ kW. For even more power, users can combine two 816HD systems for TPOs up to 56 kW.

Continental offers an HD upgrade kit for 816R "C" series transmitters for users with TPOs from 10 to 22 kW, or combined TPOs to 44 kW, who don't want to replace an existing transmitter.

Continental's 816HDR (HD Ready) series of analog transmitters are suitable for broadcasters who are unsure when they will upgrade to HD, but need to replace an aging analog transmitter and want to be ready when the time comes to convert. The transmitter system can be field-upgraded.

For more information, including pricing, contact Continental Electronics in Dallas at (214) 275-2319 or visit [www.contelec.com](http://www.contelec.com).



## Product Showcase



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USER REPORT

# Calvary Nabs Crown FM 10K Beta

*Christian Network Selects Crown's FM 10000, Still in Beta Phase, and Is Pleased With Results*

**by Jim Motshagen**  
**Operations Manager/  
 Administrator**  
**Calvary Radio Network**

**VALPARAISO, Ind.** Anybody who has built a radio station or two would appreciate having a radio station in a box. This is not a new concept, but Calvary Radio is getting closer and closer to making it being a reality.

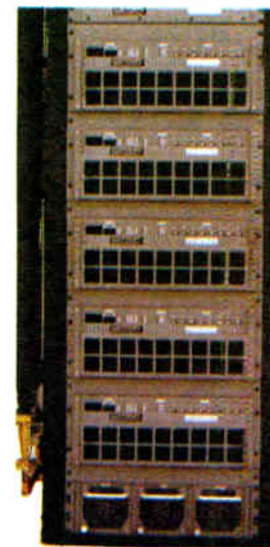
We needed 8.2 kW TPO in a transmitter for WCJL(FM) located in Morgantown, Ind. It was a remote site; we needed the reliability of solid-state technology and the dependability we've experienced with Crown Broadcast/IREC over the years.

IREC/Crown products. We also have been pleased with the integration of the Omnia stereo cards in the exciters, and how the overall sound quality has improved.

There was little we had to do on-site before we turned the transmitter on. We basically just connected the antenna and audio, and then switched it on. The transmitter is pre-assembled in one rack and ready to go, which saves man-hours at the tower site.

Crown/IREC cares about its product, doing everything it can to assure quality and reliability. There are many choices when selecting transmitter manufacturers. The solid-state design, reliability and support made it easy for us to go with Crown Broadcast. We were so pleased with WCJL's FM 10000, we purchased another one for KKCJ at Cannon Air Force Base in New Mexico. We had the transmitter on-air within an hour of loading it off the truck.

For more information, including pricing, contact Crown Broadcast/IREC in Indiana at (866) 262-8972 or visit [www.crownbroadcast.com](http://www.crownbroadcast.com).



Crown FM 10K

**Crown wanted to enter the 10 kW field and was willing to build a 10 kW transmitter for us. We were pleased that WCJL was going to have the first FM 10000.**



## Just Kidding.

RemoteMix 4 actually has everything BUT the kitchen sink.

Crown wanted to enter the 10 kW field and was willing to build a 10 kW transmitter for us. We were pleased that WCJL was going to have the first FM 10000, and it would have the "beta" designation. I have been in the "beta" world a time or two, and usually it has not been good. But we had confidence in Crown Broadcast and went for it. It works great.

The FM 10000 offers up to 11,000 watts of solid-state power in on 35 RU cabinet. It is available with Crown's FM300 driver with optional three-band audio processor by Omnia.

Crown says the FM 10000 is based on its FM 2000 amplifier, five of which are used in the 10K configuration. Three hot-pluggable 5.6 kW power supplies power the FM 10000, which provides plenty of headroom in the event one of the power supplies goes offline. The FM 10000 is frequency-agile from the front and fully remote controllable. Because it is wide-band, there's no tuning needed across the FM band. It can stay on the air with the loss of one or more amplifiers or power supplies, at a reduced power.

Features include proportional fold back of the unit in times of excessive VSWR, temperature or over current conditions.

The FM 250 exciter and the five 2 kW solid-state transmitters matched together have been proven to be solid. We also like the plug-and-play reliability of Crown FM transmitters. Currently, 85 percent of our stations are operating

With so many ways to get audio from one place to another, it's clear that we really need simple tools that intelligently combine compatible functions. JK Audio, always the leader in smart design, now takes a giant leap forward...

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Plus... IT SOUNDS GREAT! A soft limiter prevents overdriving the phone line interfaces, while the mixer



The back panel of the RemoteMix 4 shows how flexible it really is. Its tiny footprint (9.5 x 8 x 3") lets it easily fit into your audio toolbox.

XLR output is pre-limiter (full range), meaning you have a feed for every need. Bass boost adds a bit of low end before sending the signal down the phone line to provide that "how'd you get it to sound THAT good over POTS lines" nudge. There are convenient 3.5 mm send and receive jacks for recording the show or mixing in your MP3 player.

We think we've done our homework with RemoteMix 4. And we're going to have it out in plenty of time for the fall sports season.

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## USER REPORT

# X-1000B Tx Works 'Magic' in Tennessee

by **Scott Bailey**  
**Owner/General Manager/  
 Chief Operator**  
**WMRO(AM) Magic 1560**

**GALLATIN, Tenn.** Back in 1997, I was forced to replace an old Collins 20V-3 I had bought used when I put WMRO(AM) 1560 on the air a few years earlier.

I purchased a new transmitter in April 1997 to replace the old Collins, as the cost of 4-400 tubes for the Collins was getting more expensive. I was happy with it, but over time I found it blowing MOFETS in the PDM amplifier. In the spring of 2004,

each. I would call the manufacturer of each transmitter and ask why it thought its transmitter was so great.

One day I was speaking to Jim "Turbo" Turvaville, corporate expansion specialist/engineer of the WAY-FM Media Group. He pointed me toward Armstrong Transmitter.

## Seen and heard

I had seen the Armstrong's X-1000B transmitter in an ad in the trade magazines, but I had not done research on it. I knew WAY-FM was using Armstrong's FM boxes with great success,



and coax from the tower to it and it's ready to go. Remote control connections are available through a serial port in the back of the transmitter. A modulation monitor connection is available in the rear of the transmitter.

There is an RF injection jack in the back of the box to accept an IBOC exciter or AM stereo exciter. Direct meter readings are taken with one multimeter on the front of the box. Armstrong has made this transmitter so easy for set up that non-technical general managers and owners can install it.

The X-1000B has been on the air at WMRO for almost three years and has not been off due to a malfunction of parts yet. I occasionally turn it off for 20 minutes or so every three to four months to clean the modules and inside the box. That's only a 10-minute job. I use a can of compressed air, like what you buy at Wal-Mart to clean a computer keyboard, and that seems to wipe the dust off the parts without my fingers touching them.

**Another feature I found important was the capability of lower power for pre-sunrise and nighttime power.**

the PDM generator of the box started to give us major trouble.

At that point, I said to myself, "I've had it with this box." It was costing too much money in parts and repairs to maintain. I started browsing the Internet looking for a reliable, economic, smaller transmitter. I looked at several of the AM transmitters and the specifications of

but I was under the impression that Armstrong was just a manufacturer of FM transmitters and I was unsure of its understanding and needs of the AM broadcaster. Jim had me look at the X-1000B AM transmitter.

I called Ernie Belanger of Armstrong and he sent me the specs on the X-1000B. As I looked them over I really started to

take notice. One of the main features I liked is that it uses switching power supplies.

Unlike most transmitters still using conventional power supplies, I found that the switching power supplies are just as reliable or more reliable than the conventional power supply found in the BE, Harris and other small AM transmitters, rated at 1000 watts and below. I ordered the X-1000B from Armstrong in late June 2004.

After it was installed, up and running, over time we found electric bill savings as well. Bear in mind, my studios, offices and transmitter are under one roof. My electric bill using the Collins 20V-3 ran about \$475 a month on average. When the previous transmitter was installed, it came down to roughly \$240 a month. Now with the Armstrong X-1000B, my AC bill is now down to under \$150 a month. My central heat and air system in the building pulls way more AC juice than the Armstrong X-1000B.

Another feature I found important was the capability of lower power for pre-sunrise and nighttime power. WMRO(AM) operates a pre-sunrise power of 500 watts and a night power of just 5 watts. The X-1000B can operate at any of these powers without audio degeneration. There are three convenient power level positions that can be user-set with the X-1000B to accommodate AM stations with pre-sunrise, post-sunset or low nighttime power levels. At WMRO, we have the transmitter wired to our on-air automation PC using Jim Barcus' Digital Juke Box software to lower and raise power at sunrise and sunset, according to our FCC license.

Its size is so small that it barely takes up any space in the rack. It's only 12 inches high, 20 inches in depth and 19 inches wide. It's hard to believe they crammed a 1 kW AM transmitter in a small box like this.

Installation is easy. Once mounted in the rack, just connect the audio up using an XLR male connector, connect the 220 AC

**The X-1000B uses two small fans in the back of the unit that draw cool air into the box to cool the modules.**

The X-1000B uses two small fans in the back of the unit that draw cool air into the box. The fans are very small, like what's used inside of a computer. They bring in the fresh air to cool the modules and the air exits the front of the transmitter.

The audio of the X-1000B is loud. Of course, we use an Omnia-3AM audio processing box to get the maximum loudness we can get. Armstrong claims major-market sound when using the X-1000B, and that's what you will get. It even gained up to 10 miles of coverage. We have been told that we sound much louder than some of the 5 kW stations around here.

For more information, including pricing, contact Armstrong Transmitter in New York at (315) 673-1269 or visit [www.armstrongtx.com](http://www.armstrongtx.com).

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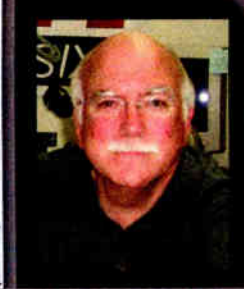
Certifications/Honors: Lifetime General Radiotelephone License; past speaker/panelist at NAB, TAB and Digital Hollywood

Hero/Mentor: Robert Shrader, author, "Electronic Communications." Without that book I would never have passed my Second or First Phone.

Favorite Station Growing Up: WIL, St. Louis — Dick Clayton, Gary Owens, Ron Lundy. Best group of Top 40 jocks, ever.

Most Memorable Broadcast: Engineering a live audience, two-way, four-station lash-up for a Bill Clinton Town Hall meeting from KDFW(TV)

Favorite Saying: The only thing in life that's not for sale is your character.



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TECH UPDATES

## Bext Offers Compact 10 kW FM Transmitter

Bext says the TFX 10000 is the first in a new line of hot-pluggable solid-state FM transmitters, which includes the TFX 10000, TFX 20000 and TFX 30000.

Main features include modular architecture, hot-pluggable PA modules, dual (redundant) exciter with auto-changeover and stainless steel enclosures.



The TFX 10000 is a compact 10 kW FM transmitter in a 19-inch standard rack cabinet of 55 inches tall (30 rack spaces high). The company says the unit is energy efficient, with approximately 70 percent overall efficiency for the entire transmitter, keeping heat generation to a minimum. The multiple PA modules allow the transmitter to remain on the air at reduced power in the event of loss of one of the PA modules.

RS-485 and USB connections for PC readings and control are standard, as are the more traditional analog-type remote control connections for power readings and control. Proportional Auto Foldback is standard for excessive VSWR, and the transmitter is protected against circuit overloads.

The Bext TFX 10000 is available for three-phase as well as single-phase operation. An optional built-in RDS card is available.

Both the PA and the exciter sections come with digital displays showing the operating parameters and a menu allows user interface and control. The transmitter comes with a stereo generator that can be either activated or bypassed by the user.

The exciter section is frequency programmable and the PA is broadband, making a frequency reassignment an easy task. A harmonic/low pass filter is built-in and the transmitter complies with FCC requirements.

For more information, including pricing, contact Bext in San Diego at (888) BEXT INC (239-8462) or visit [www.bext.com](http://www.bext.com).

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E-mail Emmily Wilson at [ewilson@imaspub.com](mailto:ewilson@imaspub.com).

## BW Has Three Encoders for RDS

The RDS1 encoder from BW Broadcast is a rack-mount unit that provides a solution for radio stations that wish to use the Radio Data System. The user interface allows basic RDS parameters to be controlled with four buttons.



The encoder is able to transmit basic RDS information such as the program service name (PS), program identification (PI) and program type (PTY). Decoder information and the music/speech flag also are supported. Options and settings are controlled from the front-panel LCD display. The unit does not require a computer to setup or operate.

The encoder provides several ways of connection to a broadcast transmitter, which the company says ensures compatibility with most transmitters. There is a virtual earth mixer to mix the RDS with your audio, and "standalone mode" RDS output for

connection to the RDS input of a compatible transmitter. The company also offers the RDS2 encoder, which supports scrolling text and timed text lists; and RDS3, a dynamic RDS encoder with TCP/IP connectivity.

With RDS2, users can program up to 8,000 characters of PS information into the encoder to provide several text transmission possibilities. RDS3 creates an RDS subcarrier and permits the insertion of static RDS parameters +EON, CT, PTYN, SLC, PIN, LINK, Paging, IH, TDC, TMC, ODA and EWS. It can be connected to automation software for automatic display of titles, singers on the car receiver (if allowed by your regulation authority).

For more information, call Broadcast Warehouse at (888) 866-1671 or visit [www.broadcastwarehouse.com](http://www.broadcastwarehouse.com).



RDS1

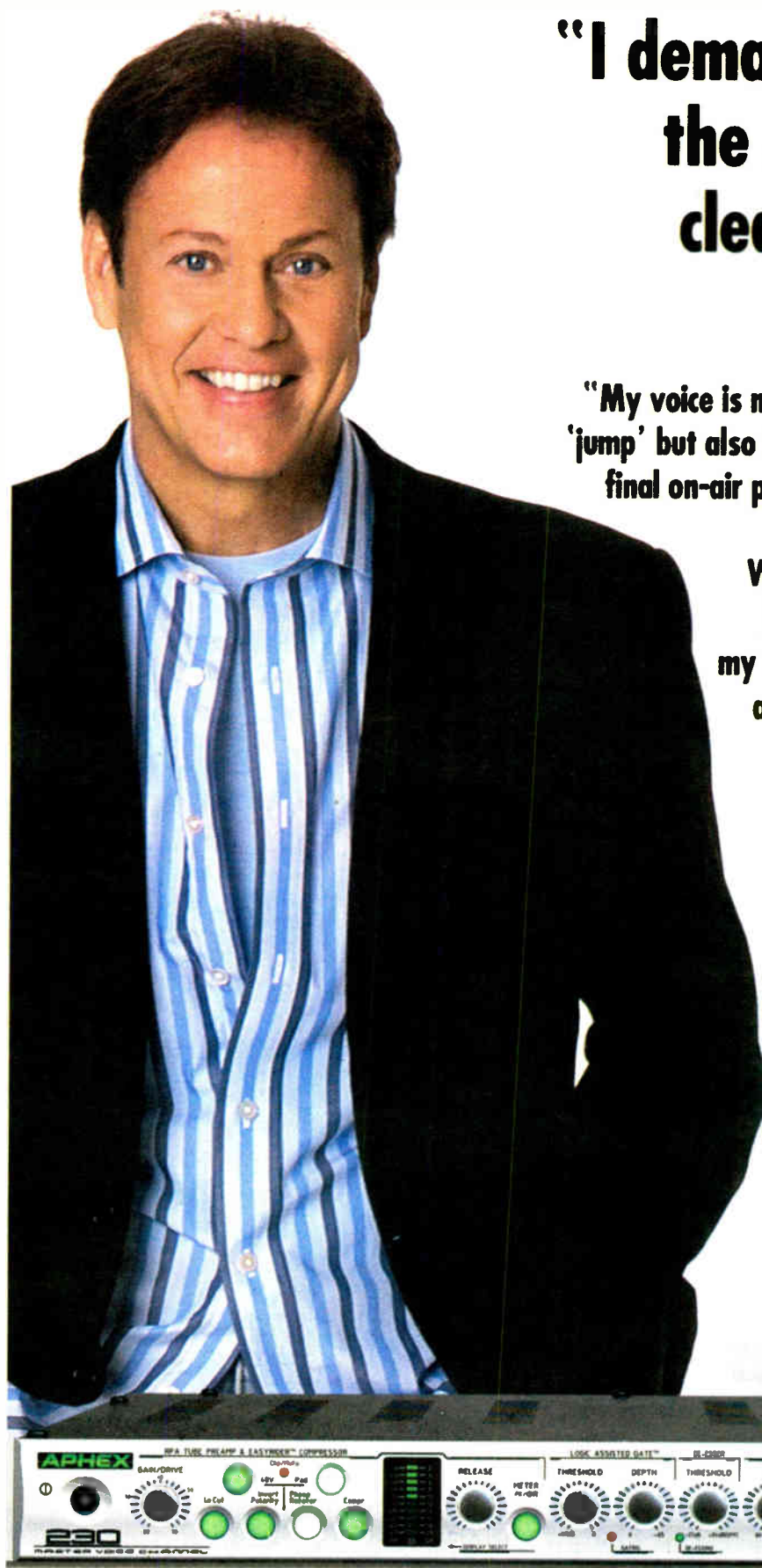
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TECH UPDATES

## FMeXtra Offers X1 Multi-Channel SCA System

The FMeXtra X1 encoder from Digital Radio Express combines a 1 RU rackmount PC server with digital audio hardware from Lynx Studio Technologies and DRE's FMeXtra hardware and software to provide a multicasting digital radio broadcasting system.

To get on the air, users connect digital audio sources to the X1 via the AES/EBU digital audio interface and connect the analog SCA output to the existing SCA input of the FM exciter.

The X1 combines input data sources and generates the FM subcarrier signal. The occupied bandwidth, peak injection and data throughput characteristics of the generated SCA signal are determined by a user-created descriptor file. Data sources may include uncompressed AES/EBU digital audio, pre-encoded digital audio streams and generic packet data. The X1 accepts sources and schedules bits depending on the SCA spectrum bandwidth occupancy.

The company says the X1 makes efficient use of the available SCA spectrum. The generated FMeXtra SCA signal can be configured to use combinations of the lower and upper subcarrier spectrums, and also the stereo spectrum, when the main channel is operated in mono audio.

For more information, including pricing, contact Digital Radio Express in California at (408) 956-8707 or visit [www.dreinc.com](http://www.dreinc.com).



## CTE VL3 Features Power Amp, External Rack Power

CTE International offers a 2,500 W compact FM power amplifier, the VL 3. It features a standalone power amplifier and an external rack power supply stage. The RF power amplifier of the VL 3 is composed of two 1,300 watt modules, each of which has four Model SD 2942 final RF transistors.

The two modules are connected to a 3 dB coupler completed with an unbalanced dummy load of 700 watts. The output of the RF module is connected to a band-pass filter that cuts the harmonic emissions to a level lower than 90 dBc. The output filter is connected to a directional coupler monitoring the direct and reflected output power, and also is used to control the ALC and VSWR protections. The output connector is 7/8-inch EIA Flange.

The power supply section is composed of three independent modules with 1,800 watt capacity (working at 75 percent of the total capacity during regular condition). The power supply module is a switching type double conversion with active PFC and power factor better than 0.98.

In case of failure of one power supply module, the internal control logic sends the information through a data bus to the other module in order to increase the current demand. CTE says this solution allows an RF power reduction of less than 1 dB, whereas in the case of failure of two power supply modules, the RF power reduction will be less than 6 dB.

The VL 3 power amplifier is equipped with RS-232 for the modem and PC connection, DB-15 for parallel interface connection, RS-485 to connect several equipment to one master source and RJ-45 Ethernet connection for TCP/IP and SNMP protocol. The VL 3 requires 40 W input power; the company suggests driving it with its TX 250 Plus FM exciter with output power limitation at 50 W.

To obtain a compact 5 kW power amplifier, combine two pieces of VL 3 power amplifier in a standard 19-inch rack, the company says.

For more information, contact CTE's U.S. dealer Midland Radio Corp. in Missouri at (816) 241-8500 or visit [www.cte.it](http://www.cte.it).



## RT+ Injector Adds Text Based on RDS Codes

Broadcast Electronics says the latest in its line of products for managing and transmitting data is a unit that inserts Radio Text Plus (RT+) information into the RDS data stream. The RDS RT+ Injector generates traffic updates, weather readouts and other services for readout on RDS radios.

The RT+ Injector is available as an option for BE's RD1 20 generator. The company says it was introduced this year to enable broadcasters to add RDS text services based on the new category codes established by the RDS Forum in June 2006.

BE's RD1 20 generates RDS Radio Text, or the 64-character message display available on RDS radios typically used for Program-Associated Data such as song title and artist information. Adding the RT+ Injector unit enables broadcasters to generate the "plus" Radio Text codes for adding new service fields of data to the transmission.

The RT+ Injector is in production and available for around \$200 as an option for the RD1 20 RDS generator.

For more information, contact Broadcast Electronics in Illinois at (217) 224-9600 or visit [www.bdcast.com](http://www.bdcast.com).



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USER REPORT

# WYNZ Taps Nautel for HD Radio Upgrade

*Stations Like V15d's Energy Efficiency, RF Safety; XR-6 for Optional Second 6 kW Power Module*

by **Andrew Armstrong**  
Director of Engineering  
Portland Radio Group/WYNZ

**PORTLAND, Maine** The Portland Radio Group includes seven stations in the Portland, Maine market: WMGX(FM), WGAN(AM), WYNZ(FM), WZAN(AM), WPOR(FM), WBAE(AM) and WVAE(AM). The group is owned by Saga Communications of Detroit, which operates 90 radio stations in 26 markets.

The Portland Radio Group is on a path to upgrade our facilities to HD Radio over the next four years and the WYNZ project was another step to get us to that point. Our months of research and equipment needs led to the choice of the Nautel V15d for WYNZ.

There were a few challenges to address in choosing a migration path to HD Radio, which included the transmitter. A key factor in our research for WYNZ was to choose a method that was not only reliable, but energy-efficient.

With most transmitter technologies we investigated, whether it was common amplification or high-level injection, there was a concern of power consumption and dissipated heat. Depending on the operating range of the transmitters the overall site Pin/Pout ratio can be downright frightening considering the small amount of digital signal being passed.

Also, WYNZ is a directional station recently collocated with WGAN, a directional AM also serving the Portland metropolitan area, and we didn't want to disturb the existing directional installation further. This ruled out dual antennas, interleaving or dual-input antenna options or anything having to do with hanging additional equipment on the towers.

## Clean signal wanted

Our transmitter sites are in downtown Portland surrounded by a high level of residential housing, which also is a concern when investigating transmitters because RF is a huge factor with us being so close to the homes. This was one of the big deciding factors in

going to Nautel for a transmitter. The signal needed to be clean and able to adapt to varying antenna icing conditions without additional spectral regrowth. Nautel's active pre-correction included in the V15d transmitter is just what we needed.

We also were interested in Nautel's patented Secure HD Protocol for delivering HD data from the Exporter to the tower site over our existing Moseley Starlink STL system. Secure HD repackages the data stream from the Iqivity software and exports it in a way that is more robust over low-bandwidth asynchronous links.

Also, the physical size of the transmitter was a factor. We desired something that was compact enough to fit in our existing plant without extensive modifications to the RF, electrical or cooling infrastructure.

We're one of the first customers for the V15d transmitter. In our initial discussions with Nautel Sales Engineer Wendell Lonergan, we were looking at the V10 or V20 transmitters, and out of nowhere he said "We are considering building a V15 model. Are you interested?" It turned out the V15 was a good match for us.

At the time we placed the order, the lead time was quite long. We weren't expecting to receive it until fall 2007, as it was a new product. Instead, we received confirmation informing us the transmitter would be built right away and they would attempt to meet our original construction completion date of April 2, 2007. The equipment arrived on-site less than seven weeks after the initial order was placed.

The Nautel V15d includes the company's M50 digital exciter with integrated Exgine and active pre-correction,



Andy Armstrong and the Nautel V15d

SCI controller, Exporter, digital audio interface (EASU) and UPS, which means everything we needed for our HD upgrade was there in the product. WYNZ is operating the V15d in common mode amplification, which carries analog and digital signals simultaneously from one transmitter.

Our installation was easy. Nautel allowed me access months prior to our purchase into the Nautel User's Group (NUG), letting me gain information from the inside on how its customer service area works. I could review postings, technical service bulletins, equipment manuals, etc., which gave me a comfort level on how Nautel resolves problems and product issues. There was never any hesitation from the company on giving me access to the NUG.

## No fiddling

The Portland Radio Group ended up also purchasing a transmitter for WGAN at the same time. We

See NAUTEL, page 41 ►

## SH SHOWCASE

Products & Services

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# Nautel

► Continued from page 40

knew HD was inevitable and decided to take care of both stations at once. After our experience in choosing the V15d, we thought we might as well make the entire site a Nautel plant and bought its XR-6 for WGAN with a plan to install both transmitters at the same time.

The big deciding factor on the XR-6 was the option to add a second 6 kW power module for automatic backup in addition to its dual exciter switching. If either a PA or exciter fails, the other is automatically selected, which allows full-power operation even if there's a PA failure. The PA modules also are hot-swappable if necessary. This added a level of redundancy.

When we received our V15d transmitter, everyone was pleased with how well the equipment was packaged. Nautel's crating of the system showed its care in packaging and shipping its products. The transmitter was delivered to us unscarred.

Nautel's documentation was great too. It was personalized for both stations at this installation, and aside from making our own mistakes, the documentation was flawless. The V15 installation seemed complicated at the beginning but once we read through the documentation and followed the steps, it fast became simple.

Nautel sales, engineering and support communicate well. If we had any questions, all we had to do was drop them a simple e-mail and they would respond within 24 hours.

We had been buying another manufacturer's transmitters for years so working with Nautel was a new experience for us. Three other stations within the Portland Radio Group already are broadcasting HD Radio and we have varying levels of success with them. One still remains a work in progress due to a number of issues. But with this site, however, within a day of getting the final installation work done, we had immediate success. There was no fiddling or tweaking, we just plugged it in, verifying spectral compliance and everything was a go.

My advice to other stations: Do the research, and the best option for your migration to HD Radio will appear.

For more information, including pricing, contact Nautel in Nova Scotia at (902) 823-3900 or visit [www.nautel.com](http://www.nautel.com).

TECH UPDATES

## viaRadio VC04 Has Microprocessor at Center

The VC04 RDS encoder from viaRadio, built by 2wcom, includes an RDS/RBDS feature set and optional TCP/IP interface. Each encoder comes with ARCOS Basic configuration software, which runs on Windows 95/98/2000/NT/XP.

Applications of the VC04 include scrolling PS such as real-time title and artist display or advanced RDS applications such as paging, Traffic Message Channel and Emergency Warning Systems.

The box is a standard 19-inch 1 RU. At the center is a microcomputer for controlling the hardware functions, managing the RDS data and driving the interfaces. Four RS-232-C interfaces are available.

The software is stored in flash memory so that firmware updates can be made easily. Functions such as non-volatile data storage, watchdog, real-time clock, remote control inputs and signaling relays are standard in the VC04.

The RDS and VRF signals are generated by digital synthesis using a digital signal processor. The generated digital RDS/VRF signals pass a D/A converter followed by a bandpass filter. The analog RDS amplifier can be adjusted to match with different input impedances and fine level adjustment is quasi-continuous in the selected gain range.

The signals are applied and forwarded via decoupled unbalanced (or balanced) inputs and outputs on the front and/or the rear depending on the settings. The company also offers the VC02 encoder, which includes an LCD display and jog wheel on the front panel so users can set up onsite without a laptop or PC.

For more information, including pricing, contact viaRadio in Florida at (321) 242-0001 or visit [www.viaradio.com](http://www.viaradio.com).



## ECO Series Uses One Tube, No Neutralization

Energy-Onix says its ECO series of single-tube, grounded grid, medium power FM transmitters is suitable for broadcasters who need between 3 kW and 12 kW of transmitter power to meet their ERP requirements.

The ECO series uses one vacuum tube — a zero bias, high-mu triode tube. The transmitter design allows final stage metering for grid current, plate current, plate voltage, forward and reflected power. The output tuning and loading controls are the same adjustments Energy-Onix uses in its transmitters up to 50 kW.

The company says no neutralization is required. The power amplifier uses a true grounded grid configuration in which the control grid of the tube is connected directly to DC ground. Energy-Onix says this arrangement guarantees stability and freedom from oscillation under all conditions of tuning and loading. The PA input and loading controls are located on the front panel under the output tuning and loading controls.

Circuits in the ECO series are protected by circuit breakers located on the ECO Control Center. There are independent breakers for the blower, filament, IPA and PA power supplies as well as the main transmitter circuit breaker.

Incoming AC voltages are read on the AC voltage meter located on the Control Center panel. These voltages can be read even before the transmitter's main circuit breaker is actuated. This meter also monitors the PA filament voltage.

Additional highlights include VSWR foldback and protection, and surge protection.

For more information, contact Energy-Onix in New York at (518) 758-1690 or visit [www.energy-onix.com](http://www.energy-onix.com).



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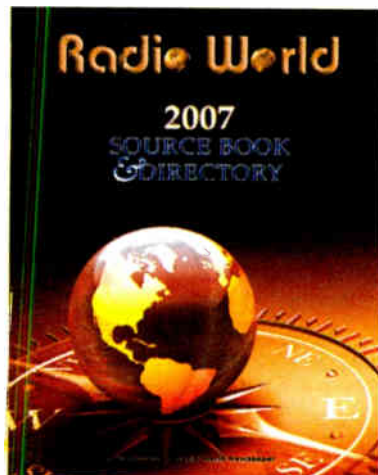
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# ◆ READER'S FORUM ◆

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*Bob Pierce  
Director of Sales  
Bell Tower Corp.  
Chelsea, Okla.*

## Ham Radio And ARRL

Congratulations on the story regarding the American Radio Relay League by James Careless ("ARRL is Robust as It Nears 100," March 28).

As a licensed amateur since 1945, I am happy to see you devote space to a topic such as this. The league has been a positive force for amateur radio for almost a century and continues to fight for all hams, whether they are members or not.

One aspect of this is the current battle with the FCC over its lax rules governing broadband over power lines. Anyone in the communications field, whether amateurs or not, should be aware of the potential damage that can be inflicted to the radio spectrum by the current BPL rules. The league has been attempting to bring this to public attention for several years. It's time others involved in the

## Correction

A review of the Directed Electronics HD Table Top receiver in the April 11 issue reported the user could not program a multicast channel preset nor tune to a multicast channel while in preset tuning mode. Those statements are incorrect.

radio industry do the same.

Also in the March 28 issue, I note a letter by a Burt Fisher who stated his amateur call as K10IK. Mr. Fisher characterized amateur radio as a "vast wasteland." While some of what Mr. Fisher says may be true, his characterization is hardly new.

Various people have been slamming the content of ham conversation since voice operation first became popular back in the 1930s. When it comes to improper language and the like, such comments are certainly valid. But taking amateur radio to task for what hams talk about, as Mr. Fisher does, is not only silly, but is a disservice to the hobby.

What does Mr. Fisher expect hams to discuss? U.S. politics or the situation in the Middle East? Such conversation would be totally inappropriate on the amateur bands and *should* invoke criticism. One of the reasons amateurs, and their equipment, are available when communication emergencies strike is because hams are allowed to converse about meaningless dribble and make contact with other hams in the United States and across the world merely for the purpose of collecting states or countries.

Mr. Fisher likens contacts he overheard in a recent sweepstakes contest as akin to "so many notches in a belt." It's quite obvious that Mr. Fisher doesn't care for contests. Many hams share his opinion, while others love them. Such differences of opinion are one of the aspects that make amateur radio interesting and continually viable.

If Mr. Fisher would delve into what else is going on in amateur radio instead of merely spinning his dial and dwelling on what he hears on the bands, he would know that hams continue to make technical advances that benefit other radio services as well as amateur radio.

I cite innovations such as the computer programs written by Dr. Joe Taylor, K1JT, which enable medium-power VHF amateur stations to exchange information with other similarly equipped stations by bouncing their signals off the moon and the fleeting ionized trails left by meteors entering the Earth's atmosphere.

The software-defined radio equipment developed by Gerald Youngblood, K5SDR, is another example of a recent advance. This same software-defined radio concept has been adopted by AMSAT (The Radio Amateur Satellite Corp.) here in North America as well as a German AMSAT group for use in spacecraft being built on both sides of the Atlantic.

These two satellites, and others to follow, will enable hams with modest equipment and small antennas to converse over distances of thousands of miles for many hours per day and will be valuable resources in times of emergency.

There's a lot more to amateur radio than what Mr. Fisher condemns as "a vast wasteland."


Incidentally, my interest in amateur radio and that of my associate, Robert J. Carpenter, W3OTC, led us to form High Fidelity Broadcasters Inc. and establish the first stereo FM station in the Washington, D.C. area, WHFS.

*William A. Tynan, W3XO  
Kerrville, Texas*

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## ◆ READER'S FORUM ◆

### Leave Us Alone

Let this be an open letter to all AM broadcasters to pay attention, and to those involved with trying to enact new rules of technical standards for AM, to please get a new life and leave us alone.

I just returned from installing a new 10 kilowatt solid-state Energy-Onix AM transmitter, the second of which I've installed in the last three years. It's analog and it sounds beautiful. It doesn't need to be IBOC and doesn't need somebody to dream up a new standard to narrow its bandwidth so it can sound like a \$29.95 CB radio transmitter.

IBOC might be the answer for the big

which so many truckers and rural Americans depend upon, is just plain stupidity. I've listened to the results. I, through my attorney, have forwarded recorded results, not only to Radio World but a copy to each one of the commissioners. I hope they listened.

The long and short of it, at least from this AM broadcaster's perspective, is leave us alone. Go find somebody else's life to screw up.

If you wish to visit with me, and explain how you think you're going to improve my lot in life, I am available at [kprmkdck@unitelc.com](mailto:kprmkdck@unitelc.com) or at (218) 732-3306. Until then, thank you for your attention; and please all you technical diddlers, just go away.

*Ed De La Hunt  
President, General Mgr.  
De La Hunt Broadcasting Group  
Park Rapids, Minn.*

**To those involved  
with trying to enact  
new rules of  
technical standards  
for AM, please get  
a new life.**

— Ed De La Hunt

boys who have nothing but money and a burning desire to spend it any way they can.

Your article on the NRSC standard and the NRSC people asking for involvement ("Public Okay With Lower AM Bandwidth?," March 28) blows my mind because they won't listen to anyone anyway.

It's reminiscent of the battle days of C-Quam. Nobody listened to us, the owners and operators of AM stations; they just plowed ahead looking for a new avenue to increase equipment sales. What a total flop it ended up.

I applaud the first NRSC standard that sought to eliminate sideband interference to adjacent channels. It made perfect technical sense, but enough is enough.

You poor technique types, if you really have that much time on your hands, why don't you join me this summer and help me paint all my buildings? It should keep you busy and out of the AM broadcasters hair for a while.

There are some improvements that can be made, but rushing into HD IBOC radio and destroying AM nighttime skyway,

### Satellite Merger

Paul, I was surprised that your recent editorial "Merger? Two Words: Get Real" (March 28) failed to mention our commitment to more choices and better prices for consumers following a Sirius-XM merger.

Consumers and the global entertainment industry may be even more surprised to read that you feel the audio entertainment industry has not fundamentally changed since 1997.

At Sirius, we look forward to working with the FCC in the coming weeks and months, and believe that the agency will recognize that this merger serves the public interest, both in terms of enhanced programming and better prices. Subscribers who pay \$12.95 today will not pay more for that package following the merger. Anyone wanting to take advantage of the best of both program lineups, like NASCAR and Major League Baseball to use your example, will be able to do so for less than this would cost today.

Furthermore, the cost savings will enable us to offer tiered programming packages at lower prices and increase programming diversity.

Today, consumers have access to a wide spectrum of audio entertainment choices, including free AM/FM radio, HD Radio, Internet radio, mobile phones, CDs, MP3 players and iPods. A recent Arbitron report found that satellite radio listeners represent only 3.4 percent of the overall radio audience — a number that pales in comparison to the 282 million weekly

### FASTROAD: Life in the Fast Lane

The NAB recently announced formation of a technology advocacy program called FASTROAD, which, if nothing else, could be a finalist in a competition for acronym design: Flexible Advanced Services for Television and Radio On All Devices.

Its stated mission is "to seek and facilitate development and commercialization of new technologies that can be exploited by broadcasters using radio and television broadcast spectrum." NAB apparently has earmarked millions from its war chest to the project, which will select and invest in creation of new media services for implementation by local broadcasters over several years.

This clearly is the work of a reinvigorated NAB as it and some well-chosen partners — NPR Labs and the Association for Maximum Service Television — attempt to help broadcasters remain relevant in the digital age and break free of their rust-belt legacies. We applaud the effort, in particular the emphasis on localized services, which remain the unique strength of terrestrial broadcasters.

It does give us pause, however, to consider that such services are not being naturally developed as a matter of course in the commercial broadcast marketplace's evolution and instead require proactive stimulation from a trade association.

While this seeding approach may be common in the non-profit or government space — where missions and budgets do not typically allow speculative investments — in today's commercial media environment such innovation routinely is proposed by forward-thinking "incumbents" using their own development funds, or by startups powered with venture capital.

The very fact that broadcasters' own advocacy group concludes that it must take this action is a tacit acknowledgement of the industry's unfamiliarity and possible vulnerability in this area.

We hope FASTROAD will kick-start old-school broadcasters into learning how to best apply their new digital delivery mechanisms. We also hope the process doesn't go the way of many such bodies and end up as a lot of nice words on paper, or the funding of interesting research projects, and nothing more. FASTROAD is a good idea, but to reach its stated goal, broadcasters will have to take this spark and add their own fuel if they have any hopes of riding the digital highway for the long haul.

— RW

radio listeners. Satellite radio is only one option available to consumers in a highly competitive market.

Sirius expects to continue posting solid revenues and subscriber growth on a standalone basis. Our proposed merger with XM is not a merger of necessity; it is a merger that will position the two companies to better compete in the ever-expanding audio entertainment marketplace, while improving our ability to deliver the best content at the best prices to consumers. That's something everyone can appreciate.

*David Frear  
Executive Vice President/Chief  
Financial Officer  
Sirius Satellite Radio  
New York*

Paul, you make some excellent points and I completely agree.

Mel Karmazin is promising not to raise prices, and that in fact prices could drop. This is a red herring! As your editorial mentions, they agreed not to merge when they were originally granted their licenses to operate. They also agreed *not* to offer any local programming, and that they would comply with FCC regulations

regarding repeaters and such.

In my opinion the satellite companies cannot be trusted. As history now demonstrates, these companies are changing their tune regarding a merger. They agreed not to provide services that couldn't be utilized nationwide, however they provide local traffic service (albeit on a national basis). They have been derelict in their placement of repeaters, both the number of receivers and where they're authorized to be placed. There's also a problem with their receivers being too powerful (retransmitting their signal to FM in someone's car) and *no* receivers exist that allow consumers to receive both services — another condition of their license agreement.

So who's to say that shortly after the merger is approved, which is an admitted long shot at this point, Mel won't be lobbying for more regulatory relief in order to raise prices, or again significantly alter the terms to which they agree to do business?

I hope the government has the foresight to recognize this as well. Down with the merger — competition is the way to go.

*Tom Calococci  
Operations Manager  
WPOW(FM)  
Miami*

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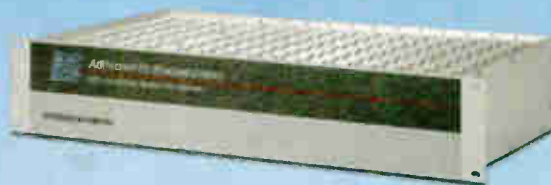


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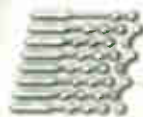
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