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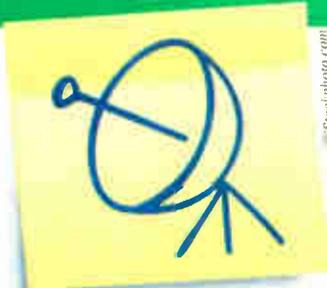
Rollout Report

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GEP for The Bird

Good engineering practices to get the most out of your satellite system.



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Radio World

\$2.50

The Newspaper for Radio Managers and Engineers

November 19, 2008

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NewBay Media
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IBOC+Satellite? Subscribers Not Impressed

Commenters Oppose Rules to Mandate It in Their Radios

When the Federal Communications Commission okayed the merger of Sirius and XM this August, commissioners pledged to initiate a Notice of Inquiry on the issue of requiring satellite radios to also receive IBOC signals "or any other technologies capable of providing audio entertainment services," according to the decision.

Radio World peeked into MM Docket 08-172. Initial public comments were due Nov. 10 and replies are due on Dec. 9.

As of mid-October, there had been about 30 comments filed, mostly from satellite radio subscribers who opposed a mandate, as well as an amateur radio operator who opposed it and one broadcaster who supported the idea.

Here is a sampling of early remarks on the concept and on a bill introduced by Rep. Edward Markey, D-Mass., that would mandate including HD Radio capability in any receivers that can tune analog AM/FM and satellite radio signals. Occasional minor typographical

See MANDATE, page 5 ▶

NEWS ANALYSIS

Mark Mueller takes field intensity readings.

The New World of AM DA MoM

SBE Is Asked to Develop Training Programs; MoM Not Without Its Critics

by Randy J. Stine

WASHINGTON New rules adopted by the Federal Communications Commission will soon allow most AM broadcasters in the United States to verify the performance of their AM directional antenna by modern computerized methods.

With the new rules, the FCC modified the means of verifying AM directional antenna performance to include antenna pattern-prediction modeling known as Method-of-Moments (MoM) computer modeling. The new rules had not gone into effect as of late October; they were still pending approval by the Office of Management and Budget and publication in the Federal Register.

There are approximately 1,900 directional AM stations currently licensed in the United States, according to the commission.

The rule changes should save broadcasters money and time, industry watchers said. Previously, broadcasters were required to conduct magnetic field-strength measurements for AM DA verification. MoM computer modeling is considered by most as a simpler and less time-consuming task.

It's possible that as many as half of

See AM DA, page 8 ▶

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NEWS WATCH

DRM Alaska Test License Modified

SILVER SPRING, Md. The experimental authorization for the Digital Radio Mondiale test in Alaska has been modified to avoid interference with amateur radio operators.

The action came after the American Radio Relay League protested the test plans of Digital Aurora Radio Technologies, the company that has an experimental authorization to test Digital

Radio Mondiale broadcasts at high latitudes.

The ARRL said some of the frequencies on which DART planned to test would interfere with amateur broadcasts, and the ARRL asked the Federal Communications Commission to modify or cancel the experimental license. The FCC amended the license in October.

In 2009, DART plans to test statewide transmission of DRM at high latitudes in the 5, 7 and 9 MHz shortwave bands; it hopes the tests, if successful, will lead to a terrestrial, high-frequency digital radio service for the state of Alaska.

The ARRL took issue with testing on the 7.1 to 7.3 MHz portion of the band,

according to its October petition: "There is a 100 percent certainty of severe, continuous, harmful interference from operation of the DART facilities as authorized by the commission to ongoing amateur radio operation at 7.1 to 7.3 MHz."

According to the grant for the CP and license, issued Oct. 7, operations are subject to prior frequency coordination with the SBE. On Oct. 24, the FCC issued an amended license that redefined one of the station's frequency ranges to eliminate conflict with the Amateur Radio Service. The amended license narrows the range to 7.3 to 7.6 MHz.

Company President Whit Hicks said that DART would not operate in 7.1 to

7.3 MHz, to avoid any interference with amateur operators.

File Comments On IBOC Power Hike

WASHINGTON The Federal Communications Commission is taking public comments on the proposed FM IBOC power increase.

A coalition of mostly commercial broadcasters and four IBOC transmission manufacturers seeks commission approval of a voluntary FM IBOC power increase of up to 10 dB — from the current level of 1 percent of a station's authorized analog power (-20 dB) to a maximum of 10 percent of a station's authorized analog power (-10 dB).

The intent is to boost digital power levels for better building penetration and mobile and (soon) portable reception. iBiquity Digital filed studies in support of the request.

National Public Radio also submitted its recently completed, Corporation for Public Broadcasting-supported research into digital radio coverage and interference.

In its studies investigating potential effects of increasing the digital power by up to 10 dB, NPR concluded that such an increase could result in interference to reception of first- and second-adjacent channel FMs, and that further testing is necessary.

The FCC seeks comment on the original request for the power increase as well as the iBiquity and NPR studies. Comments to MM Docket 99-325 are due Nov. 28 and replies on Jan. 4, 2009.

WINNING THE RATINGS WAR VORSIS: THE TECHNICAL STUFF

The loudness wars are over. The winner? Nobody. Why? Because when everyone became as loud as possible, using the same limited tools, the personality of every station got lost. We call it "the sameness syndrome."

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Intuitive Interface and Operation

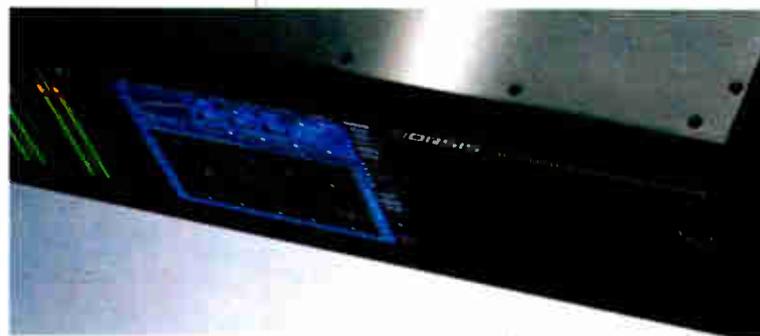
No processor can meet its full potential if it's not something that's easy to use or if the full

Think about having the full engineering control you've always dreamed of — being able to find the whispers as well as the screams in your station's sound, crafting an aural signature that's so good, so transparent, you will have people calling to find out how you do it.

Vorsis Dynamics Control

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Five-band AGC (four-band in the VP-8) ensures a consistent spectral balance. Vorsis' exclusive SST™ Sweet Spot Technology manages the behavior of the AGC in real-time so that



what the incoming level or era of the music.

Powerful Bass, Incredibly Clean Voice

Vorsis' Bass Management System extracts and reveals the nuances in the program that are simply not heard in any

and use L+R to L-R signal ganging to prevent the image from wandering uncontrolled. It's already field-proven to manage wide discrepancies between the recording techniques of various eras (oldies to the over-mastered music of today) and even reduce multipath interference.

Surgical Limiting and Clipping

To some the idea of 31 bands is scary. Not to us. It's simply amazing what can be done with it. Limiting and clipping's primary purpose is peak control to increase loudness; the less audible in its action, the better. 31 bands allow surgical limiting — its dynamic operation is nearly inaudible to the ear so the resulting sound is louder AND cleaner. It also provides unprecedented opportunity to further fine-tune the sound. FM and HD/DAB have entirely different transmission characteristics, so Vorsis processors have completely separate limiting and final peak control sections for analog and digital broadcast.

Welcome to the 21st Century

Vorsis is the first processor designed for the needs of a modern radio station and its listeners. Visit the web to learn more and read our application notes and white papers. Call us to set up a demo today.

It'll make a HUGE difference in your station's sound AND your bottom line.

other radio processor. It puts deep pristine bass on the air without the distortions of common bass clipper technologies. VoiceMaster is a special Vorsis clipper management tool that has its own automatic processing chain dedicated to detecting and specially processing live speech signals, giving you the loudest and cleanest on-air voices ever.

Superior Stereo Enhancement

In rethinking Vorsis, it became clear that stereo enhancement HAS to be integral to the processing. It is, after all, a manipulation of the amplitude of the L/R difference signal that creates the perception of a wider sound field. With Vorsis, you'll get smear-free enhancement that can be as wide as you desire. But that's only the beginning — you can also control the stereo image width on a frequency-conscious basis

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AP-2000 without HD/DAB section
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• 5-band dynamics controller
• 10-band limiter/clipper
- FM-10HD**
Digital Audio Processor for FM analog and HD/DAB
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• 8-band limiter/clipper
- HD-P3**
Production HD, STL Processor
• 3-band AGC
- M-1**
Digital Mic Processor



palette of controls are not accessible. The Vorsis GUI is designed for intuitive operation, from the front panel or remotely on your PC. No control is more than two clicks of the mouse away. The screens offer a logical layout with a virtual control surface above and monitoring graphs and meters below. You can see and hear the results instantly. Nothing is easier.

it always operates in its "sweet spot." The multi-band compressor, operating in concert with the AGC, provides unprecedented dynamics control. All operate in sum and difference — the highest signal controls the amount of processing. This is a completely new way to manage multiband dynamics to maximize the consistency of your station's on-air presentation — no matter



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Buterbaugh Legendary in Upper Midwest

Broadcast Engineer Remembered for His Influence on the Sounds of Classic AMs

by Randy J. Stine

DETROIT Ed Buterbaugh would have made most anyone's list of the "most respected" engineers. That probably never really mattered to Buterbaugh.

Friends say that whether he was building new radio studios or engineering a University of Michigan football game, Buterbaugh was comfortable with his place within the profession.

Buterbaugh, a longtime fixture in Detroit radio and respected broadcast engineer, passed away from bladder cancer in September. He was 65.

He had engineered three of the top AM radio stations in North America. He worked for a stint at WABC(AM) in New York, followed by CKLW(AM) in Windsor, Ontario, a station that dominated Detroit's radio ratings for many years in the 1970s. He finished his career at Citadel's WJR(AM) in Detroit and retired in late 2004.

Many engineers consider Buterbaugh a driving force in AM audio quality. He was relentless in his pursuit of AM fidelity and was a respected talent not only within the discipline of broadcast engineering but by broadcasters in general, friends and colleagues say.

"For example, for the national anthem at University of Michigan games, ABC-TV and ESPN were satisfied using a single Shure M58 microphone. Not Ed. We used a stereo SASS mic on digital delays so the music was synchronized with the talent's microphones in the booth. All angles were always considered," Arnaut said.

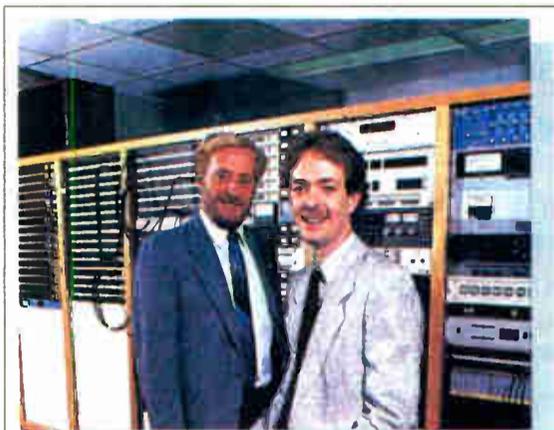
Then there was the time Buterbaugh coordinated a live remote with Cadillac for WJR. The remote consisted of morning talent Paul W. Smith riding through town broadcasting from the back seat of a new car with an engineering van in tow containing the necessary wireless receiver and IFB, Arnaut said.

"The topper was Ed getting on the phone with the Bose radio company to complain about the sub-standard AM tuner section of the Bose Acoustic Wave desktop receiver.

"He spent a half-hour on the phone with Dr. (Amar) Bose himself recommending solutions that could be implemented in the Wave Radio," Arnaut said.

he began work for WDAD(AM) as a 14-year-old, engineering remote broadcasts and running audio for Sunday morning church services, said Pam Buterbaugh, Ed's wife of more than 42 years.

"I recall him telling me after we first met when he was in high school that he would work for WABC and CKLW someday. We could listen to both stations where we grew up and he always said they sounded the best," she said.



Chief Engineers Ed Buterbaugh (WJR) and Hal Buttermore (WHYT); the key individuals responsible for orchestrating the impressive installation and change-over.

Buterbaugh appeared in a brochure for Pacific Recorders about a rebuild at WJR around 1987.

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"He was serious about making his stations sound better. And not just better, but the best," said Alan Buterbaugh, Ed's son and senior vice president for business development for Wireless Ronin Technologies.

"He enjoyed nothing more than packing a cooler of beer and heading to his house on the beach on Lake Erie and listening to all the stations on the dial to see how his compared."

All about the sound

Buterbaugh's commitment to details knew no limit, said Michael Fezzey, president/general manager of WJR.

"Ed did everything with excellence in mind. He was a fun-loving, hard-driving broadcast engineer who battled for the resources to improve the sound of his stations."

Chris Arnaut, IT manager for WDIV(TV), Detroit, was hired by Buterbaugh in 1996 as a bench tech and remote engineer.

"Ed had a passion for audio supremacy over everyone else. Not for his own ego, but rather for his own deeply rooted love of audio."

Arnaut said his Buterbaugh's penchant for perfection led to audio standards that often brought stares from contemporaries.

It was that doggedness that fellow broadcast engineers admired, said Tony Butler, assistant CE at WJR.

"He never settled for second best. His detail in pursuit of quality was very evident," Butler said. "One of the most obvious daily reminders of Ed's legacy is the quality sound of WJR."

Buterbaugh was a strong believer in public safety and warning and was involved with EAS affairs, said Larry Estlack, director of technology for the Michigan Association of Broadcasters.

Don Backus, vice president of sales and marketing for ENCO Systems, said, "Keeping WJR on the air at all times was the most important thing to Ed. When ENCO installed digital automaton systems for (WJR) in 2000, one of the first things he told me was 'WJR cannot go off the air,' and he meant it," Backus said.

That commitment was tested during the blackout of 2003 when widespread power outages struck parts of the eastern third of the United States, Backus recalled.

"I remember how WJR stayed on the air through it all while some other Detroit stations struggled to do so," Backus said.

Buterbaugh's radio experience dated to his teens.

He was raised in the community of Indiana in the state of Pennsylvania, where

Buterbaugh attended Grantham College of Engineering near Washington for radio engineering and later went to work for WEAM(AM) in Arlington, Va. He joined WABC(AM) in New York in the late 1960s to work as a station engineer with DJ Cousin Brucie in the evenings.

"(Ed) was thrilled to be in a major market," his wife said.

It was back to WEAM in the early 1970s for a short time before he joined CKLW(AM) in Windsor, Ontario, in 1972.

'Big booming sound'

Buterbaugh is credited by colleagues with constructing the on-air sound of the station, known as "the Big 8 CKLW," with its cast of boss jocks and high-energy newscasts.

"He was the mastermind behind the big booming sound of the station during its reign over Detroit radio in the mid-1970s," said Art Voulo, Jr., radio historian and journalist. "The station sound was bigger and better than anything else on AM."

CKLW was a broadcast juggernaut across parts of the upper Midwest, those familiar with Detroit radio history said.

"Those were great times and Ed loved every minute of it. He was very busy. But (CKLW staff) did a lot of partying and

See BUTERBAUGH, page 5 ▶

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When Times Are Tough, Get Reading

Gift Ideas for Your Book Lover This Holiday Shopping Season (Part 1)

You know I love books. Sing your praises to the BlackBerry, Kindle or laptop; no modern gadget yet supplants the warm pleasure of sitting by a fire with a glass of Montecillo Rioja Crianza at hand and a fresh book in my lap.

Books are fine gifts in times of economic distress. In this column and next, I offer gift suggestions for the radio lover, engineer or manager on your list. Or you might leave these ideas where your own elf can find them.

Some of the books are new, others may have slipped your notice earlier. Prices are retail; in most cases you can find titles for less online.

"Broadcasting on the Short Waves, 1945 to Today" and "Listening on the Short Waves, 1945 to Today" by Jerome S. Berg — If you enjoy Radio World's articles about shortwave radio history, take note of these titles.

The first book, a sequel to one published in 1999 about the "pioneer" days of radio, consists mostly of a year-by-year recounting of what American listeners have heard on international and domestic shortwave bands since World War II.

Berg, an attorney, is a long-time shortwave buff and a member of the executive council of the North American Shortwave Association. His text is a straightforward accounting of shortwave comings and goings.

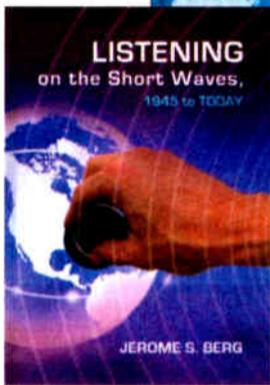
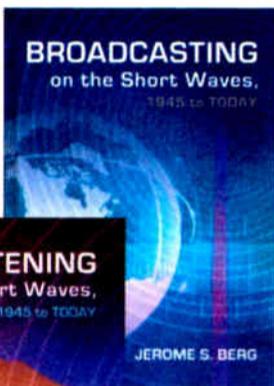
With so much history, unfortunately he can only provide a few lines of detail about each operation, and offers little discussion of the people involved. But in addition to the excellent historical chronology, he provides an introductory overview about

shortwave, a discussion of its changing face today and numerous photos of QSL cards. (Berg is chair of the Committee to Preserve Radio Verifications.)

The sister volume, "Listening on the Short Waves," focuses on the listening community and completes his trilogy. Berg discusses shortwave clubs, listener programs, receivers, QSLing and the impact of computers on the hobby.

These books are not cheap, at \$65 apiece; but if you know a zealous fan of shortwave and its history, the pair would be a treasured gift. If I had to choose just one, I'd go with "Listening."

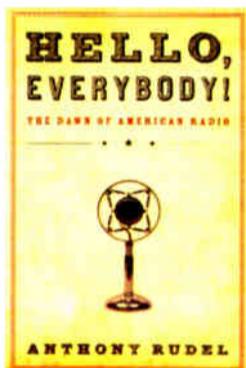
Published by McFarland & Company Inc., 2008. Hardback. Each title \$65.



"Hello, Everybody! The Dawn of American Radio" by Anthony Rudel — The author considers radio "the real American mosaic, crafted from that magical, invisible ether." It's refreshing to hear from a writer who not only appreciates radio as it was but finds value in what it does today.

His subject here, however, is the panoply of personalities who defined the medium in early days. It's an enjoyable and literate overview of radio's puberty; his emphasis is content, which is unsurprising given that Rudel's background is in programming.

If you are up on your radio legends, you'll find much that is familiar: John Brinkley, Rudy Vallée, Graham McNamee, Father Coughlin, Aimee Semple McPherson. But Rudel is a good writer and careful researcher who likes unusual characters and does a nice job introducing them. His book is a welcome addition to the



genre and a suitable gift, particularly for someone who isn't already deeply versed in radio lore.

Published by Houghton Mifflin Harcourt, 2008. Hardback, \$26.

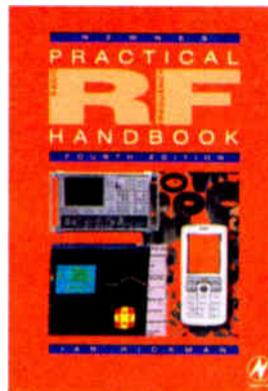
"Practical Radio-Frequency Handbook, Fourth Edition" by Ian Hickman — This is intended for anyone with an interest in electronics as applied to radio frequency communications.

Chapters deal with passive components; passive circuits; RF transmission lines; RF transformers; couplers, hybrids and directional couplers; active components for RF use; RF small-signal circuitry; modulation and demodulation; oscillators; RF power amplifiers; transmitters and receivers; advanced architectures; propagation; antennas; attenuators and equalizers; and measurements.

Hickman provides appendices on useful relationships, RF cables, frequency allocations and other topics. This edition includes developments in OFDM, UWB, WiFi, WiMax and modern test equipment.

A meticulous technical book, it is intended as a guide for engineers, technicians and hobbyists who want to know about the technology behind modern consumer electronics and wireless communication devices. Useful and thorough.

Published by Newnes, 2007. Paperback, \$43.95.



From the Editor



Paul J. McLane

Believers in WMMS are not given to understatement. Gorman describes his book as "the story of how one manic, drug-induced, sex-crazed, take-no-prisoners, renegade-warrior radio station helped revive an American city that had been written off as dead." That's a big claim, but in my experience, others involved with WMMS agree with him about its impact on both Cleveland and rock radio.

As usual Gorman is provocative, launching his story by quoting an early '70s argument over the future of FM radio with engineer Tom Bracanovich,

and wrapping up with a description of the toxic environment that had developed at WMMS by the end of his run: "Blame games were so common, I came up with the 'Malrite salute' — fold your arms

and point your fingers in opposite directions."

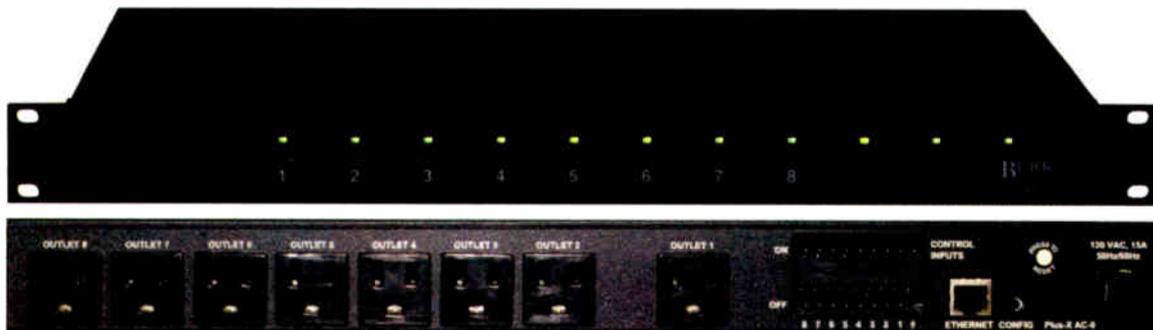
Get this for a fan of pre-consolidation FM radio formats or of Cleveland radio history.

Published by Gray & Company, 2007. Hardback, \$24.95.

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Mandate

► Continued from page 1
errors and punctuation have been modified here for ease of reading.

We will publish additional comments as more are filed.

Let the Market Decide

No mandate! Let the market and manufacturers decide if they want to include iBiquity's proprietary, low-resolution junk format in the same box.

HD Radio's pathetic adoption rate should be a huge red flag here. It was an answer to a question no one asked, highlighting the frittering-away of the public's interest performed by the FCC when it adopted it as the sole "standard." ...

The public places great value in the consumer radio spectrum, which has always been best-served by analog radio. Clear Channel places great value in the consumer radio spectrum too. Who do you serve?

David Deckert
Woodstock, Ga.

Turnabout is Fair

If it is fair to require Sirius XM to include HD Radio in their radios, why would it not also be fair to require the opposite? That all HD Radios have a receiver for satellite radio?

It is ironic that it would be required to include a component (HD Radio receiver) in a unit (satellite radio) that people are purchasing in order to avoid terrestrial broadcasts and the commercials/homogenization that goes with it.

Brian Hardenstein
Walnut Creek, Calif.

And the Kitchen Sink

No, no, NO to requiring satellite-radio receivers ... to also carry HD Radio receivers! I am an XM subscriber. HD Radio is fancy-schmancy terrestrial radio, still with commercials. Satellite radio is, on most channels, commercial-free. So why should I be forced to pay extra for an HD receiver?

Republicans supposedly believe in "the free market," right? So let HD Radio continue to be an add-on option for a satellite-radio receiver. Either that, or go even further: Every satellite-radio receiver must also include an HD Radio receiver,

er, a Swiss Army knife and a cigarette lighter. (I'm being sarcastic.)

Thomas Richardson
Missouri City, Texas

It's a Good Idea

I believe it would be ultimately beneficial to all consumers were the FCC to require that all SDARS receivers (e.g., XM and Sirius) be capable of AM/FM DAB ("HD Radio") reception as well.

In their arguments for a waiver of FCC SDARS ownership rules to allow them to merge, XM and Sirius argued that as a service, SDARS competes more with other media technologies than they do with each other. This premise is fundamentally flawed unless every SDARS consumer, by definition, is able to use the same device to access other media technologies. ...

Requiring SDARS receivers to have HD Radio reception capability would also provide a convenient means of "jump-starting" the nascent DAB migration for AM and FM. A chief problem with the migration has been the inability for consumers to purchase receivers; what few are available are often very difficult to purchase in a store, and not much easier to purchase on-line.

While it arguably is not the FCC's job to stimulate a private business ... it is the FCC's job to act in the interest of the public. The FCC has already decided that it is benefit to the consumer to migrate AM and FM reception to a Digital Audio Broadcasting solution, and the iBiquity HD Radio solution has been formally accepted by the FCC, and the National Radio Systems Committee, as the official DAB standard for the United States. Ergo, the FCC has a mandate by default to promote HD Radio for the betterment of consumers.

I do not believe the addition of HD Radio reception will prove prohibitively expensive nor difficult to implement due to size. The chips themselves are just IC chips; not terribly big. The existing displays and concerns on virtually all SDARS receivers can act as software controls for AM/FM reception just as easily. And when done in bulk, the individual costs per unit inevitably drop substantially.

Moreover, since all SDARS receivers will have to be re-tooled to accept transmissions from both XM's and Sirius's satellite networks, this is an excellent

would be enjoyable.

"Processing at the studio included an Aphex Compeller, with CRL pre-processing, Dolby SR encoders and an Optimod stereo generator. The composite output from there was fed through the Dolby decoders, a phase chaser and another compeller and finally an Omnia that fed the transmitter," Arnout said.

Buterbaugh built new studios for WJR in the Fisher Building in downtown Detroit in the late 1980s and oversaw periodic upgrades for WJR and its FM sister stations.

"He was amazingly talented and truly WJR is his broadcast legacy," said Fezzy.

Buterbaugh won several awards from the Michigan Association of Broadcasters along with other industry honors and presented many papers on AM radio at radio engineering conferences.

Buterbaugh is survived by his wife, three children and nine grandchildren.

See related story, page 6.

opportunity to "get in on the ground floor" as it were, and drastically reduce later implementation costs.

One oft-cited concern is that HD Radio tends to require external antennas to function properly. However, this is no different from SDARS, which also effectively requires an external antenna to receive the satellite signal. If necessary, it would be an acceptable compromise to have the SDARS receivers sacrifice internal antennas of any kind in exchange for external antenna jacks (twin-lead for AM, coaxial F type connector for FM — the most common for external antennas).

Aaron Read
Canandaigua, N.Y.

The above author also is an occasional contributor to RW; opinions are his own.

Unnecessary Appendage

I am an amateur radio operator with license KB1OKL as well as a concerned citizen and this bill H.R. 7157 Rep. Markey is sponsoring is ridiculous.

He cites part of the reason to include HD radio in sat-rad receivers as public safety. First of all, I have not seen a car built since 1972 that hasn't come with an AM-FM receiver already built in and this included my brand-new 2009 Pontiac which includes XM satellite as well as AM and FM analog.

Analog radio works much better than HD Radio. HD shortens the receive range to a mere 10-15 miles and interferes with adjacent channels, especially on the AM

band at night where it is now a mess of white noise masking AM stations all up and down the band.

HD needs to be shut off for public safety, not added as an unnecessary, unused appendage to an already established albeit struggling industry known as satellite.

Robert D. Young Jr.
Millbury, Mass.

Where Does FCC Authority End?

I respectfully submit that it is well beyond the bounds and abilities of the FCC to design and develop electronic equipment for the 21st century. Imposing a mandatory design requirement that all radios must be capable of receiving multiple, fully non-compatible signals is unacceptable.

Where does your supposed authority end? Why didn't the commission direct Blu-Ray DVD makers to include HD technology? Perhaps you should have imposed Beta technology on VHS manufacturers, too. The FCC would have tried, except for the fact that those markets couldn't be coerced by your outdated and self-serving licensing practices.

The market will decide which services are desired and supported, and which are no longer needed or in need of change to become desired again. ... I hope that this commission will show a glimmer of honor, and stop the pandering to special interest groups representing a dinosaur industry.

Bruce Meinhold
Chester, Md.

Comment on this or any article to radioworld@nbmedia.com.

Buterbaugh

► Continued from page 3

had fun, too, during that time," said Pam Buterbaugh.

Ed Buterbaugh was chief engineer and vice president at CKLW before leaving in 1986 for Detroit's WJR. He spent 20 years at WJR perfecting the sound of the "Great Voice of the Great Lakes," colleagues said.

"Ed insisted the fidelity [be] maximized to its fullest potential. He processed AM like it was FM," said WDIV's Arnaut. This as true even on remotes. When other AM stations were using POTS codecs, Arnaut said, "WJR was using a three-line Gentner frequency extender, which was also fed through a Dolby SR noise reduction unit in the field."

Arnaut described the extensive audio chain Buterbaugh designed at WJR as "maximized to ensure no fidelity was sacrificed" so the listening experience

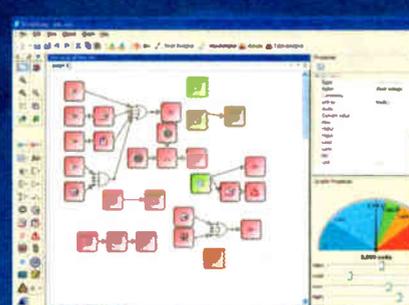
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Buterbaugh: His Colleagues Look Back

Orban's Greg Ogonowski was inspired by Ed Buterbaugh (see page 3) and collected these comments about him:

Ed was one of my biggest technical inspirations for developing audio processing systems.

Ed made CKLW, Windsor, Ontario one of the finest sounding radio stations in North America. After leaving Detroit fresh out of school, I soon realized how many 'broken' radio stations there were in the world.

It was CKLW and Ed Buterbaugh who helped shape and mold the sound of the Gregg Laboratories Audio Processing Systems. Knowing his excellence in audio, Ed paid me the ultimate compli-

ments when he chose our processor for CKLW(AM) in stereo, and then again for CKLW(FM) "The Fox."

Ed and his wife Pam always made me feel like family, never allowing me to stay at a hotel. When visiting, I always stayed with the entire family, including the dogs, at Camp Buterbaugh, overlooking majestic Lake Erie with that awesome view.

And yes, there were those infamous dingy trips on Lake Erie to not only sample the radio signals, but also enjoy several adult beverages in the process. ...

The staff always welcomed me. It seemed like "the station that I worked at, that I never really worked at." Ed and I certainly had one thing in common to make all this happen: "We never took no

for an answer." He is a mentor who will be truly missed.

— Greg Ogonowski
VP, Product Development, Orban

By the early 1970s, having extensive rebuild experience with XELO(AM) — which back then was in Juarez, Mexico — and KOMA(FM), Oklahoma City, Okla., I soon realized that most of the big recognized engineering names of the day were not up for sharing what they knew with the younger up-and-coming crop of broadcast engineers. It was obvious that at the end of the day, for the most part, you were on your own to "sink or swim."

It was during this time in my life I had the chance to meet Ed Buterbaugh and hear CKLW for the first time. From that

time on I have been blessed to have a personal friendship and professional relationship that has spanned over 36 years.

Never once during this relationship did Ed ever tire of my relentless questions about how he had envisioned and executed his numerous engineering feats at CKLW and elsewhere. I think that having grown up as an only child, with both his parents being teachers, made him a natural for being a born mentor.

All of us who took due note from Ed recall that he looked forward to spirited debate on whatever questions were presented, but you knew that you were expected to make clear to him that you had indeed full grasp of what he had just explained to you. I also was always welcomed at Camp Buterbaugh over the years and felt it a great privilege to be received as family in his inner sanctum.

To this day, there very seldom is an engineering project I undertake, that I first do not ask myself as to how Ed would approach the same given task. It would not have surprised me that Ed would have eventually found time to teach engineering classes if he had not been taken from us so quickly after starting his retirement.

There has never been a finer AM medium-wave signal to cut through the ether over North America than CKLW during the years Ed has his hand firmly on the throttle. History will be written that we were blessed to witness one of the handful of engineers who truly knew how to "make the box speak."

— Bruce Earle
Senior Technical Advisor

I first met Ed in Washington in 1970. Ed was at WEAM(AM) and I was at WRC(AM)/NBC, both of us young and ready to innovate and fix all the problems inherent in AM radio. We had many technical discussions, and many beers were consumed during these conversations.

Later in 1977, I was employed at a Washington broadcast consulting firm, Carl T. Jones Corp. Ed was now at the Big 8, CKLW and was going to rebuild the antenna system.

With much calculating in the firm we built the phasor and antenna tuning units and tuned it up. The wide-bandwidth antenna system coupled with Ed's savvy audio processing brought about a new era in rock and roll radio, so fitting for the third-highest billing station in North America.

A small radio transmitter even enabled CKLW to broadcast inside the Detroit-Windsor tunnel. You just never lost it!

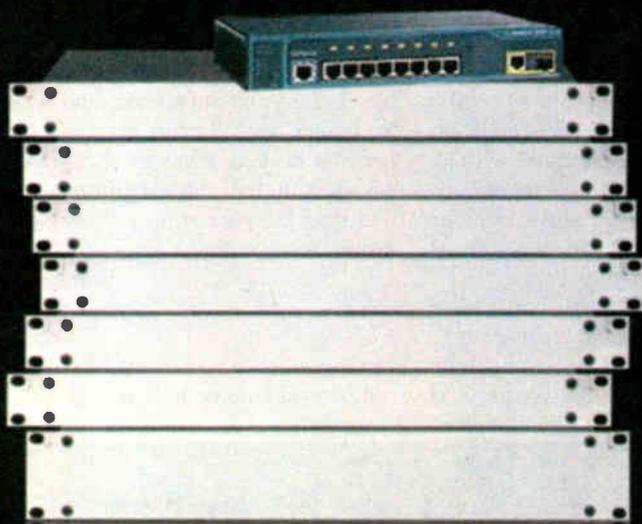
In 1984 Ed went on to go across the Detroit River to Capital Cities WJR, "The Great Voice of the Great Lakes." Our firm again was employed to build tuning units for the main and auxiliary antennas. Again the audio was like no other; as close to FM as could be had.

His expertise extended to the personal mixing of the University of Michigan football broadcasts. Using seven microphones around the stadium, parabolic mics, and much attention paid to the U-M band, the football game became a wonderful experience to enjoy....

It always was great to be challenged by Ed. Good enough was never acceptable, but rather as perfect as possible. Ed's life's work was the epitome of that philosophy.

— Harv Rees,
Broadcast Technical Consultant

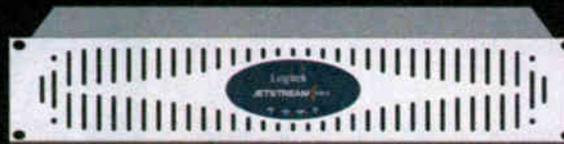
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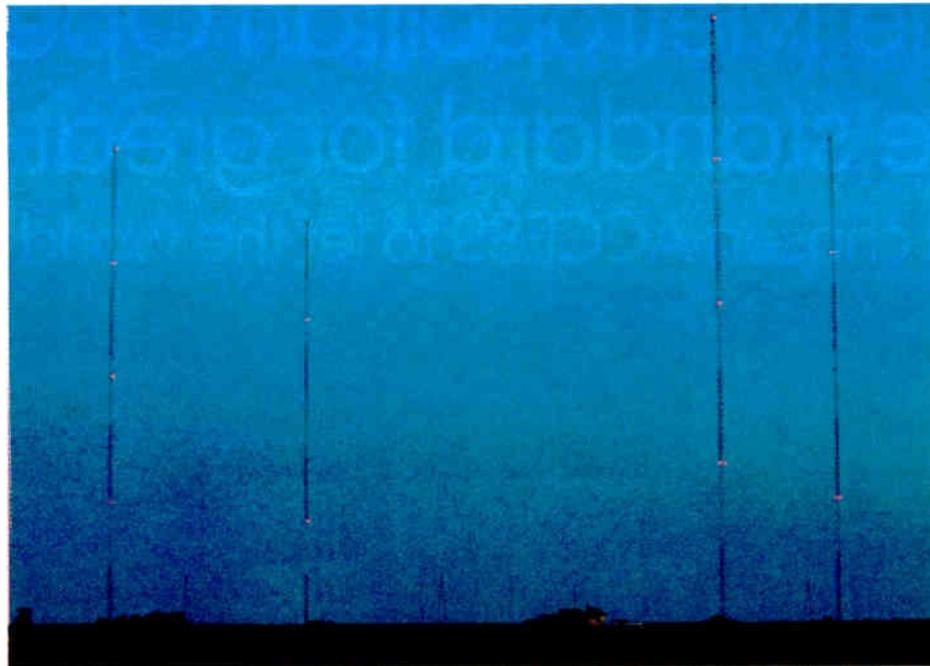
► Continued from page 1

the AM directional arrays in the United States are out of compliance in one way or another, and in many cases the cost of bringing them back into compliance has effectively prevented owners from doing so, several industry experts said.

The FCC is permitting the use of the new computerized verification method for AM stations using series-fed radiators. However, towers that are shunt fed or top loaded are ineligible. The commission is requiring verification of the antenna monitoring system every two years.

Nearly every large AM broadcast group in the country supported the rule-making request, including CBS Radio, Clear Channel Radio, Citadel Broadcast Company, Cumulus Media Inc., Entercom Communications Corp. and Cox Radio. The groups, along with broadcast consulting engineers and equipment manufacturers, formed a coalition to support MoM adoption.

For the new antenna certification rules to affect a broadcaster, the individual must file an FCC 302 application for a new or modified application. If the application is filed specifying MoM, the new rules will apply and magnetic field measurements will no longer be required when doing a full or partial proof, said Ray Benedict, chair of the AM Directional



The antenna array of KCBS(AM), San Francisco; the station is licensed to CBS Radio East Inc.

Antenna Performance Verification Coalition and director of spectrum engineering for CBS.

"The coalition is satisfied. We have asked SBE to develop educational programs to help explain the new rules to station engineers and to assist them in gaining the knowledge necessary to comply with the new rules."

Benedict said he expects some radio stations and broadcast groups to have the

internal expertise to do computer-modeling work in house.

"It will save money and it is a simpler, less time consuming procedure," Benedict said.

Even with MoM certification as an option, the FCC retains the right to ask AM broadcasters for a complete magnetic field measurement if changes are made or parts are replaced in an antenna system, Benedict added.

Barry Thomas, president of SBE and vice president of engineering for Lincoln Financial Media, said, "Licensing under MoM rules will eliminate monitor point readings and will greatly simplify and reduce the cost of all subsequent changes to the array. I believe it would be prudent for all stations eligible for MoM licensing to do so because of the benefits over time.

"As long as there is significant care in the accuracy of the sampling mechanisms, computer modeling is at a level of sophistication such that models can be used more accurately to predict performance of an antenna system than limited field measurements."

Less expensive

Training broadcast engineers and broadcast engineer consultants on computer modeling, which uses Numerical Electromagnetic Code-4 or MININEC, will be a crucial step in the adoption process, said Jack Sellmeyer, president of Sellmeyer Engineering.

"The process requires qualified engineers trained in the use of Method of Moments calculations. The effort required is not trivial and requires certain skills to obtain accurate results which will stand up to scrutiny," Sellmeyer said.

The FCC said in its MoM decision that a minority of commenters dissented to the proposal in comments for MM Docket No. 93-177, "An Inquiry Into the Commission's Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification."

Greater Media was the most notable broadcaster to dissent.

In its public comments, Greater Media and Charles A. Hecht & Associates, a broadcast engineering consulting firm, wrote, "while the techniques specified in the coalition's proposal produce a directional antenna pattern that is 'reasonably close' to the authorized pattern, the coalition's procedures are not adequate in themselves for antenna performance verification. Greater Media advocates adop-

tion of a hybrid method consisting of modeling and a set of field-strength measurements similar to that required for a partial proof."

Immediate savings?

Despite reports that MoM will result in significant cost savings for AM broadcasters, at least some remain unconvinced that immediate savings will be evident.

"We've heard of some compelling estimates because of the hours and hours saved because the time-consuming field measurements are not required," one industry observer admitted. "Time will tell for sure. The real savings will likely be over time as the total cost of proof of compliance will be much reduced with a properly licensed MoM array."

Mark Mueller, president of Mueller Broadcast Design, a broadcast engineering consulting firm, said while modeling can help avoid lengthy field tuning and measurements, the field-intensity measurements themselves are not that difficult and should not cost as much as some charge to take them.

"This new method to verify performance introduces additional costs upfront, as well as ongoing certification costs. The big savings seem to be a mirage," Mueller said.

The big savings seem to be a mirage.

— Mark Mueller

Mueller, who has worked with directional arrays since 1983, specifically questions the new costs likely to be associated with the re-certification of the antenna monitoring system every two years.

"The station will have to go off the air to re-certify the sample system. This will also most likely require consultant fees and won't be cheap — probably in the several thousand dollars range," Mueller said.

"At the end of the day, all that is really saved is the cost of the field intensity measurements, which for most smaller arrays only take a few days under the current rules. MoM antenna modeling is not foolproof.

"A qualified, trained engineer will still have to visit the site with the proper test gear, verify overall construction, verify the antenna sample system, measure the self-impedance of the towers and generate the mutual impedance input data necessary for accurate modeling. Consulting engineer visits are usually expensive and this won't be an exception."

Yet at least one consulting engineer disputed that view on cost savings.

"Saving days and sometimes weeks of field measurements is a significant savings for a broadcaster. Not only that, but the validity of internal array measurement techniques for a proof is undoubtedly better than relying on magnetic field measurements in a perturbed environment," said Ben Dawson, managing partner of Hatfield & Dawson Consulting Engineers.

Dawson said the requirement for sample system measurements every two years is trivial.

"It's a few hours of work at the most. A reasonable percentage of the techs and contract service providers and virtually all consulting engineers know how to use an impedance bridge and an oscillator/detector," Dawson said.

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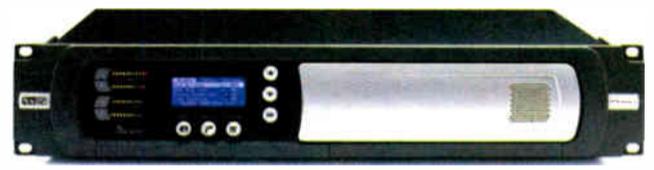
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World Radio History

Workbench

Radio World, November 19, 2008

Past columns are archived at radioworld.com

What's Wrong With This Picture?

by John Bisset

Do you enjoy hidden word puzzles? They're supposed to be great for exercising your brain. Well, here's a spin on that concept, which we call the hidden problem picture.

Let's say you showed up at the FM site in Fig. 1 as the new CE. Make a list of problems you can identify from the picture, and compare them to the list at the end of this column.

★ ★ ★



Fig. 1: How many problems can you spot in this photo?

Reliability of today's transmission equipment can cause a mentality of "out of sight, out of mind." With so many spinning plates, you may only have time to worry about the ones that are about to crash.

But if all you can schedule is one hour a month at each site, do it!

What should you check?

Salisbury University Chief Engineer Bruce Blanchard grabs a spiral notebook for each site and starts writing. The notebook will eliminate the need to write on equipment panels and can provide you a history of inspec-

tions. Bruce adds that veteran engineers will remember FCC-required maintenance logs, which documented a variety of inspections at the station.

Start with your STL and record the operating parameters. If you're fortunate enough to have the factory test data, compare that information to what you read, to form a baseline for normal operation. Signal strength and DC voltages may come in handy in the future; write them down. When a piece of equipment fails, you'll be grateful to have a starting point to compare readings for quicker diagnosis and repair.

Make it a general rule to measure anything with a power supply. Power supply capacitors are under constant stress and their complete failure can ruin your day. Catastrophic failure is pretty easy to spot; but aging capacitors also can leak, allowing ripple on the DC power supply rails. This slow failure can be more insidious in its effect on equipment.

Has equipment been in service for more than seven years? It's probably time to replace the power supply electrolytic capacitors. This proactive replacement may help you spot other problems.

A can of compressed air comes in handy to clean the dust off heat sinks while you're inside. Clean sinks allow cooler operation. Outside, keep fans and filters clean, as seen in Fig. 2.

See TROUBLESHOOT, page 12 ▶



Fig. 2: Keep fans and filters clean, like this exciter.

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Menu-driven from the front panel, the 525 tunes in 1kHz steps and has five station memories that can be preset to your own station and to market companions. The high-resolution, peak-holding LCD readout shows positive and negative modulation simultaneously, and also switches to display the incoming RF level and asynchronous noise to

Just how good (or bad!) does your AM signal really sound?

qualify modulation readings.

Two sets of peak flashers indicate both absolute and user-programmed modulation limits, and programmable front-panel alarms (with tallies) give overmodulation, carrier-loss and program audio-loss warnings. The 525 is supplied with a weatherproof loop antenna at no extra cost.

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Troubleshoot

► Continued from page 10

Check operation of audio processing, remote control equipment and monitors. While you're performing this operational check, note the type of fuse. An adequate stock of spare fuses is a lifesaver when your local electronics parts store or RadioShack is closed.

Keep your "record of readings" notebook at each site and take the five or 10 minutes to record the operating parameters for each piece of equipment, including the transmitter. You'll find this a great investment to help minimize future problems.

Thanks to Bruce Blanchard of WSCL(FM)/WSDL(FM) in Salisbury, Md. He can be reached at bdblanchard@salisbury.edu.

★ ★ ★

OK let's see how observant you are with Fig. 1.

The Queen Anne's Lace is pretty but not welcome at a transmitter site. It appears the former engineer did the right thing by placing gravel around the building, but he or she let the weeds get out of hand. The gravel will deter rodents and snakes but when weeds grow, the growth offers cover to these varmints. Clear it out!

The growth has gotten out of hand inside the tower fence. The coax running up the tower identifies this as an FM tower so there are no buried radials; remove growth to include the roots and

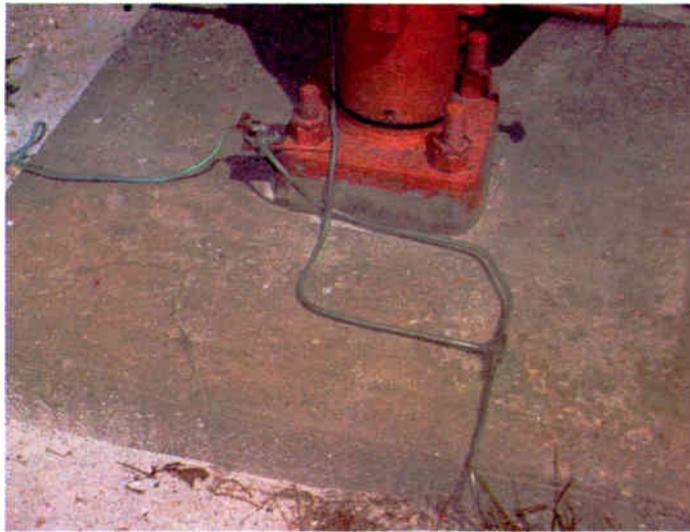


Fig. 3: Fasten tower grounds securely.



Fig 5: Tower identification can be placed at the entrance to the property.

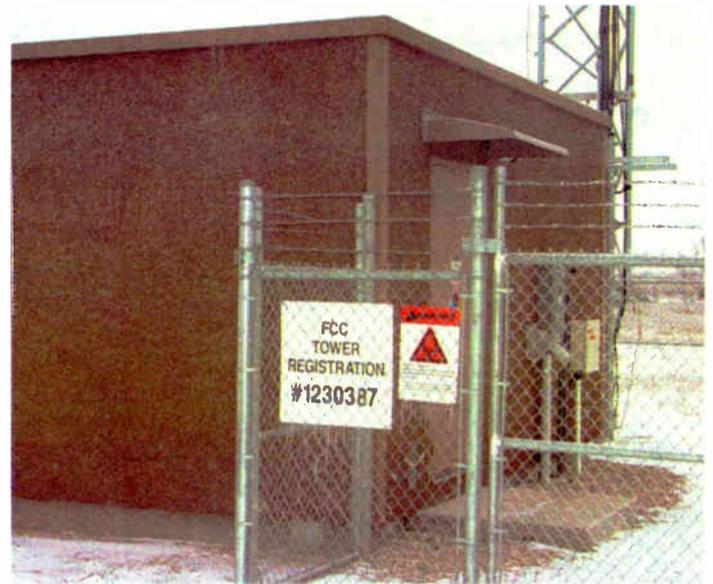


Fig. 4: A properly identified tower. Note both the ID number and Rad-haz sign.

cover the space with landscape fabric or plastic to deter growth.

Now that the area inside the tower is clear, check the tower grounding. Is it secure? Look for green corrosion, rust or loose connections. Grounds should be securely silver soldered or cadwelded, as seen in Fig. 3. Measure

the edge of the fence to the tower. When you get back to the studio, check that the fencing meets ANSI specs.

There's no tower identification number posted on the fence, nor is there an emergency contact sign. These are useful to identify the owner in case of an emergency, and in the case of the FAA Tower Registration Number, its omission may put you in violation. Tower identification signs can be placed at the tower, as shown in Fig. 4, or at entry to the site, as in Fig. 5.

One source for tower signs is Antenna ID Products of Glenmoore, Pa., www.antennaid.com. In addition to a variety of signs, they also provide guy wire markers and balls.

The barbed wire at our site is intact (a good thing), but the wooden box is a ready-made "ladder" for vandals. Not only does it provide access to inside the tower fence, it's a great home for undesirable animals and insects. The box could also be moved to the side of the building, offering access to the roof or ventilation opening. Eliminate the temptation and get rid of the box!

The tower paint looks OK but you'll want to check it up close for blistering, peeling or fading.

The tower field needs to be mowed, at least in the direction of each guy anchor. It's hard to inspect the guy anchors trudging through waist-high weeds, to say nothing of the ticks you'll attract. Keep the guy anchor points clear of brush and vegetation. Inspect them for loose or missing hardware and rust.

If a local resident has a Bush Hog, see what they charge to mow the field. If you use a farmer or neighbour to clear the field, make sure you are present to guard against running into anchor points. Concert tickets and station T-shirts are excellent means of bartering for these

services.

(Plus, it's a good idea to get to know the neighbours around the transmitter site. Drop off some T-shirts with your business card and encourage them to call you if they spot anything unusual. Be sure to let the GM know how much money you saved the station by arranging for these services. It doesn't hurt to promote that your department can save money and not just spend it.)

Did you spot the unsupported coax? The 3-inch line has a nice drip loop, so water won't flood the transmitter building, but it's lacking any real support. An ice bridge would be a nice addition.

Your former chief gets a high mark for using a jacketed cable entry port for the main FM and a bowl insulator for the STL, but it looks like that luxury was forgotten with the tower lighting conduit. Remember, any holes or spaces in the walls of the building invite unwanted guests. Seal them up while there is still some decent weather.

It's not a bad idea to copy down the electrical pole ID numbers and keep them in your phone, along with the electrical service number. Seeing the pole-pig transformers on the pole in the distance reminds me that transmitter sites at the end of an AC feeder often are forgotten when storms roll through. The pole numbers can expedite restoration of service when a fuse blows on the pole.

Although there's no way of telling, the door should have a deadbolt or lock and hasp to secure it. I've been seeing more and more sites where engineers have installed a second deadbolt at the top or bottom of the door, making it difficult to kick in. Adding a deadbolt isn't rocket science, and the folks at Lowes or Home Depot will be glad to show you how to install one.

As a last resort, consider adding a door switch that will trigger a remote control alarm. It's not fancy, but will help alert you to an intrusion.

OK, that about exhausts my list. Did you add others? E-mail your suggestions at the address below.

John Bisset has worked as a chief engineer and contract engineer for 40 years. He recently joined Nautel as regional sales manager for Europe and Southern Africa. In 2007 he received the SBE's Educator of the Year Award. Reach him at johnbisset@verizon.net. Faxed submissions can be sent to (603) 472-4944.

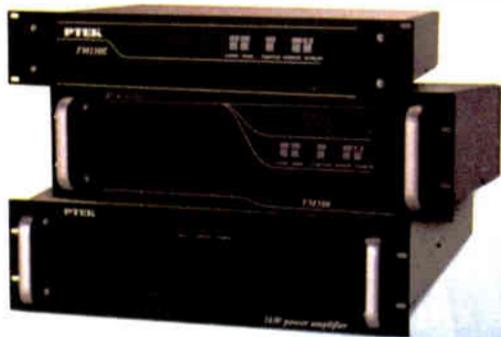
Submissions for this column are encouraged and qualify for SBE recertification credit.

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Can a radio console be over-engineered?

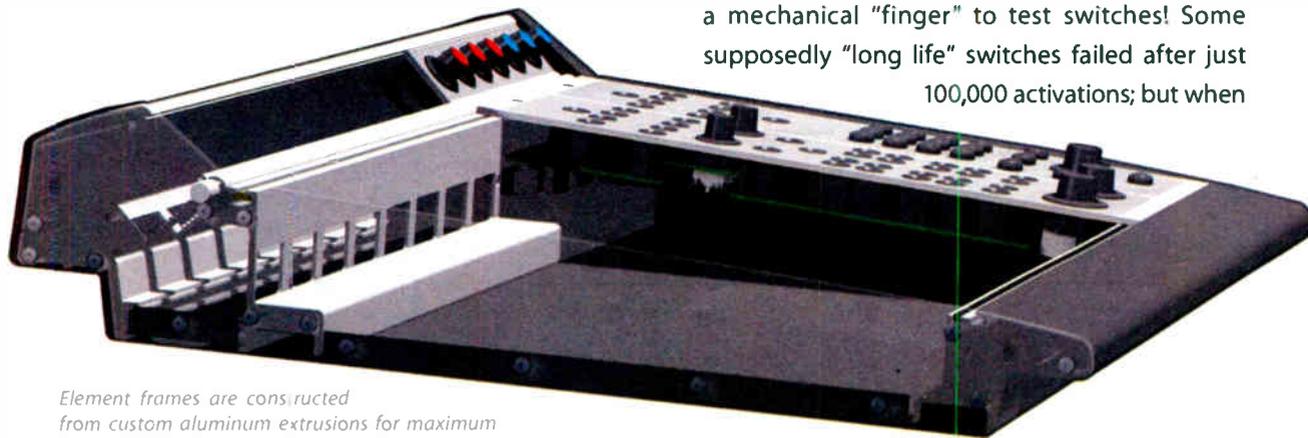
(Only if you think "good enough" really is good enough.)

The radio console, redefined.

Building a great console is more than punching holes in sheet metal and stuffing a few switches in them. Building a great console takes time, brain-power and determination. That's why Axia has hired brilliant engineers who are certified "OCD": **Obsessive Console Designers**, driven to create the most useful, powerful, hardest-working consoles in the world.

Beneath the surface

There's more to a great board than just features. **Consoles have to be rugged**, to perform flawlessly 24/7, 365 days-a-year, for years at a time. So we literally scoured the globe for the absolute best parts — hardware that will take the torture that jocks dish out on a daily basis.



Element frames are constructed from custom aluminum extrusions for maximum rigidity. Module face plates & console side panels are machined from thick plate aluminum. Ever-the hand rest is a beefy extrusion. All this heavy metal means even the most ham-handed jock can't dent it..

First, Element is fabricated from thick, **machined aluminum extrusions** for rigidity and RF immunity. The result: a board that will stand up to nearly anything.

 With so many devices in the studio these days, the last thing anyone needs is gear with a noisy cooling fan. That's why Element's **power-supply is fanless**, for perfectly silent operation inside the studio.

Element modules are **hot-swappable**, of course, and quickly removable. They connect to the frame via CAT-5, so pulling one is as simple as removing two screws and unplugging an RJ — no motherboard or edge connectors here.

Faders take massive abuse. The ones used in other consoles have a big slot on top that sucks in dirt, crumbs and liquid like the



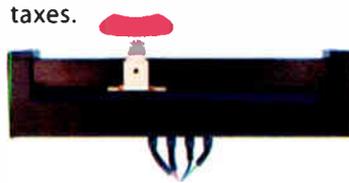
There's a reason these board-ops are smiling. Axia consoles are in more than 1000 studios worldwide.

government sucks in taxes.

By contrast, our silky-smooth conductive-plastic faders actuate from the side, so that

grunge can't get in. And our rotary controls are high-end optical encoders, rated for more than **five million rotations**. No wipers to clean or wear out — they'll last so long, they'll outlive your mother-in-law (and that's saying something).

Element's **avionics-grade switches** are cut from the same cloth. Our design team was so obsessed with finding the perfect long-life components that they actually built a mechanical "finger" to test switches! Some supposedly "long life" switches failed after just 100,000 activations; but when



sticking the Lexan to the top of the module like some folks do, our overlays are **inlaid on the milled aluminum module faces** to keep the edges from cracking and peeling — expensive to make, but worth it. For extra protection, there are **custom bezels** around faders, switches and buttons to guard those edges, too. Which means that Element modules will **look great for years**.

By the way, those on/off keys, fader knobs and bezels are our own design, custom-molded to give **positive tactile feedback**. The switch is flush with the top of the bezel, so it's easy to find by touch. But if something gets dropped on it, the bezel keeps the switch from being accidentally activated.



More than just products

Even the best products are nothing without **great support**. So Axia employs an amazing network of people to provide the best support possible: Application Engineers with **years of experience** in mapping out radio studios... the most knowledgeable, **friendly** sales people in the biz... Support Engineers who were formerly broadcast engineers. Plus a genius design team, software authors who dream code... one of the **largest R&D teams** in broadcast.

our guys found the switches used in Element, they shut off the machine after **2 million operations** and declared a winner. (The losers got an all-expense-paid trip to the landfill.)

Element's individual components are **easy to service**. Faders come out after removing just two screws. Switches and rotary volume controls are likewise simple to access. And all lamps are LEDs, so you'll likely **never need to replace them**.

Engineers have said for years that console finishes don't stand up to day-to-day use. Silk-screened graphics wear off; plastic overlays last longer, but they crack and chip — especially around switches and fader slots, where fingers can easily get cut on the sharp, splintered edges. We decided that we could do better.

Element uses high-impact Lexan overlays with color and printing on the back, where it **can't rub off**. And instead of just



And now Axia has become radio's **first console company to offer 24/7 support**, 365 days a year. Chances are you'll never need that assistance, but if you do, we'll be ready for you. Our 'round-the-clock help line is +1-216-622-0247.

Proudly Over-Engineered

Are Axia consoles over-engineered? **You bet.** If you're looking for a cheap, disposable console, there are plenty out there — but this ain't it. Not everyone appreciates this kind of attention to detail, but if you're one who seeks out and appreciates excellence wherever you may find it... Axia consoles are built **just for you**.



www.AxiaAudio.com

KFI Back at Full Power With New Tower

by Marvin Collins

The author is retired chief engineer of KFI.

I well remember Sunday morning Dec. 19, 2004. As I was about to head out the door of my residence to go on my usual Sunday morning bicycle ride, the telephone rang. I decided to answer rather than let it go to the machine.

It was a call from KFI(AM) telling me of the disaster that had occurred a few minutes before. A small airplane had hit near the top of the 755 foot KFI tower. The impact sheared off the top 10 feet of the tower. The force of the impact also caused the tower to collapse. As the tower folded and came pretty much straight down, it destroyed the antenna tuning house close to the tower base. Two people in the plane died.

Even though I had been retired for four years and did not have to deal with this disaster, I certainly felt bad about it and had a keen interest in the reconstruction.

Soon it became apparent that this was not going to involve a simple replacement of the tower. Pilots from nearby Fullerton Airport objected to the tower being rebuilt, arguing it was a hazard to air navigation. KFI is licensed to Los Angeles but the transmitter is located in the nearby City of La Mirada, which is next to Fullerton. The permit process to rebuild the tower was drawn out, with a lot of city council meeting hearings.

It was not until early in 2008 that a permit was obtained; it required a compromise on the height of the replacement tower at 685 feet. Thus the replacement KFI tower has a 50 foot diameter top hat to make up for the reduced height.

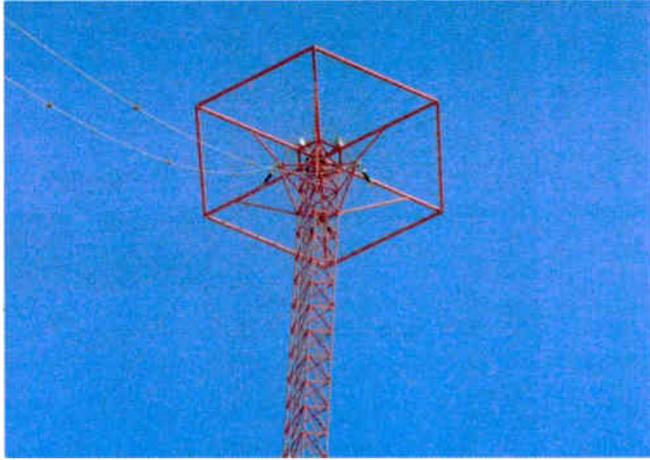
Construction of the replacement tower started in March of this year. When the tower reached the 300 foot level during construction a turnbuckle on an elevated guy point failed, causing the 300 feet of metal to fall to the ground. Luckily nobody was seriously hurt. Of course this delayed construction of the tower further.

By late August the replacement pieces were on site. A redesigned elevated guy point was installed and tower construction commenced. Thirteen days later the new tower with top hat was completed.

The uniform cross-section steel structure, built by Magnum Tower, has a seven-



A view of the KFI tower, standing 684 feet AGL, with its top hat. The Clear Channel station airs at 640 kHz.



Close-up of the top hat on the replacement tower. It is 50 feet in diameter.



New antenna tuning unit and base insulator of the replacement KFI tower.



The KFI tower and destroyed antenna tuning house as they looked after the tower collapsed, having been struck by a small aircraft in 2004.



Morning host Bill Handel, closing the ceremonial knife switch, puts KFI on full 50 kW power into the replacement tower.



The redesigned elevated guy anchor. This replaces one at which a turnbuckle failed, causing the replacement tower to fall during construction this year. The redesigned elevated anchor has two turnbuckles in parallel.



The KFI transmitter building in La Mirada. The replacement tower can be seen on the left; on the right is visible the 200 foot aux tower, which had been in use at 25 kW since the main was knocked down in 2004.



The base of the tower. The insulator to the right side of the base insulator is for a data path for tower lighting data. The tower now has daytime strobe lighting and red light lighting at night.

foot face. The new tower has daytime strobe lighting and red nighttime lighting. Ground system repairs and antenna tuning unit installation required a few more days of work.

On Sept. 25 at 5:10 p.m., morning show host Bill Handel closed the ceremonial knife switch that put KFI back on full power into its new tower. Sixty-four contest winners and their guests were invited to the party near the base of the new tower, where catered food and refreshments were available. A good time was had by all.

Tom Cox, senior vice president of engineering for Clear Channel Radio, told RW the project was managed locally by John Paoli and Terry Grieger of the Los Angeles engineering staff. Greg Ashlock, the market president, was actively involved in obtaining zoning.

Ron Rackley of duTrell, Lundin and Rackley did the design for the antenna and ATU. Wayne Davidson of Tower Structures did the structural design of the tower and top hat. Seacomm Erectors put the tower up. The antenna tuning unit was built by Kintronic Labs.

On the regulatory front, work was done by airspace counsel Ed Faberman at Wiley Rein and Gary Allen at Aviation Systems as well as land use counsel Jim Eskilson at Reed Smith.

Cox said the station's coverage has improved tremendously now that KFI no longer is operating on a very short, heavily top-loaded auxiliary tower at 25 kW.

This story received a sad postscript when John Paoli of the Clear Channel engineering staff passed away unexpectedly in October, a few weeks after completion of the project on which he'd spent so much time.

Photos courtesy Marvin Collins

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AND EVERYTHING IN BETWEEN



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3G or Not 3G? That Is the Question

*Whether 'Tis Nobler to Suffer the Slings
And Arrows of Outrageous Competition ...*

It's now no longer a question of if, but rather when, the wireless Internet will have measurable impact on radio listening. The proliferation of broadband wireless devices (both handhelds and automotive) and 3G/4G services (using EV-DO, HSDPA and WiMAX technologies) is well underway, and popular units like the iPhone already offer branded applications that make it easy to listen to certain Internet radio streams. Some Internet radio services also present iPhone-optimized pages to which iPhone users are automatically directed when seeking those URLs from that platform.

The effect of this trend on *broadcast* radio can be either positive or negative, depending on which streams users choose to listen to.

If they are broadcasters' streams, those stations thereby extend their brand and influence to a new platform. This is particularly important because many of those handheld devices do not include broadcast radio receivers, so the path for broadcasters' content to flow to the users of these devices is via wireless broadband, not AM or FM transmission. If listeners choose non-broadcast Internet radio streams on these devices, however, this is yet another nail in broadcast radio's coffin.

Thus it is critical for broadcasters to acknowledge this movement and to compete in this fast-moving marketplace. This implies that broadcast engineers should now become familiar with the process and platforms involved, if they are not already.

Some large broadcasters may want to address these new platforms (such as the iPhone) on their own, while it may make sense for other broadcasters to work with a third party — such as Radiolicious, iheartradio or others — for such efforts.

Alas, poor Radio...

It seems a bit silly to broadcasters to have to go through the Internet to get to these devices when they exist within stations' local broadcast coverage zones, but such is the control that wireless network operators obtain through their subsidy of these devices.

There is still a battle afoot over whether at least FM receivers will be included (via mandate or voluntarily) in wireless devices, but odds appear to be against this happening to any large measure. It is therefore to broadcasters' advantage to play along rather than fight; discretion is the better part of valor.

Consider that getting to these handsets costs the broadcasters no more than it does to get to any other unicast Internet terminal, so if the 3G path is the only way in, why not take it?

Another advantage to broadcasters is the continuing improvement of the quality and penetration of Internet audio delivery. The cost of these rapid and massive infrastructure improvements are borne by the network operators, and are essentially free to broadcasters or other streaming providers.

Think of it as a third-party transmitter company that carries your content to a secondary set of users at minimal cost, and which continues to expand the coverage and quality of its delivery service for

you at no extra charge. (If anything, bandwidth costs to large users like streaming audio services are decreasing in many cases.)

Of course, most of the cost for this delivery service is actually paid by the end users, who are willing to do so to get Internet access in general. The fact that Internet radio becomes available in the process seems like a bonus feature to these customers, and thus it appears "free" — which fits nicely into the broadcast service tradition.

Broadcasters are not the direct beneficiary of any of this service revenue collected by wireless networks, but they can benefit indirectly via advertising, as they always have. Bandwidth costs to broadcasters can be considered as paid in lieu

**Audiences for
your streams?**

**'Tis a consummation
devoutly to be wish'd.**

of transmitter amortization and maintenance. On a per-listener basis, these fees may be at relative parity to the ongoing cost of supporting over-the-air delivery (depending on the relative sizes of on-air vs. online audiences).

Meanwhile, the 3G network providers obtain a great value-add to the appeal of their service from Internet radio offerings, giving them further incentive to not include AM/FM receivers on their devices.

Note also that the general trend of telecom providers toward "triple play," in which the same service provider offers multichannel TV, telephone and Internet access, or even "quad play," in which wireless voice/data service is bundled as well, notably leaves out radio — at least the broadcast variety (i.e., some TV services include their own music channels, which are either the remains of the old "cable radio" services, or provided as alternate delivery services by Sirius XM).

All's well that ends well?

So if radio broadcasters in the U.S. are to take their place among the digital service trinity of Voice, Video and Data, it will necessarily be by their own doing,

via the Data component.

This implies that they will also have to *promote* their presence there, since they will be bundled among a nearly infinite number of other services, and in a "pull" environment, which is quite a different service model than what broadcasters are used to.

That could be the greatest challenge of all, but a synergistic balance of cross-promotion and counter-programming between on-air and online services could provide an extremely powerful combination in the new media world, and is something only broadcasters can offer.

Also bear in mind that while wireless Internet service may seem a far cry from broadcast radio in terms of availability and coverage today, this too is changing rapidly.

Consider that today there are already resourceful listeners who choose to listen to local AM stations via the (wired)

The Big Picture



Photo: Garry Hayes, BBC

by Skip Pizzi

Notably, T-Mobile bills for the call from where it *started*, so although WiFi calls are free, if the call was started on the cellular network, the time spent in WiFi mode still counts against the caller's cellular minutes. On the other hand, the opposite is also true; a call started in a WiFi hotspot remains free even after it switches onto the cellular



Stockphoto/Betsy Dupuis

Internet, preferring the quality and building penetration of the streaming service over the RF delivery — no surprise, if the Internet is available and free at the listener's location.

Beyond such early shifts, the eventual goal of wireless service providers is seamless 3G/4G coverage in most markets, with some devices perhaps even switching transparently between transmission technologies. This could truly make radio delivery via Internet streams a viable equivalent (or in some cases, superior, as in the AM example above), even within broadcasters' local markets.

As an interesting and relevant aside, consider that T-Mobile already offers a phone that switches between the cellular network and VoIP-over-WiFi *during a call*.

(For example, a user can start a voice call in the car via the cellular network, and upon reaching home, office or anywhere else where a WiFi hotspot open to the device exists, continue the call via WiFi without even knowing the switch had occurred — unless the user happened to look at the handset's screen, where an icon displays the current connection mode.

network, at least under the current billing scheme.)

Some anecdotal reports have also circulated recently regarding Internet radio listening via 3G in a moving vehicle, which found remarkable continuity over long distances. (Other informal tests have found the opposite, however, so this capability is not yet broadly assured.)

Finally, remember that Internet radio listening is measurable, more so than over-the-air service, in fact, since it can be accomplished either via streaming service reports from host servers, or via audience research (diary or PPM). Any out-of-market listening via the Web is a bonus, but it will be difficult to monetize.

Thus broadcasters' focus should be on building audience for their streaming services in their local markets, and adding this component to their traditional sales processes.

So it's once more unto the breach for radio broadcasters. Exploring this area sooner rather than later is the prudent course, since it may soon become an important venue by which your countrymen lend you their ears.

Skip Pizzi is contributing editor of *Radio World*. ●

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FIRST PERSON

Exploring HD Radio Availability in Philadelphia

Shopping for HD Radio Receivers in the City of Brotherly Love

by J.R. Russ

As a fellow broadcast consultant and researcher, I often ran into Thom Moon in the Diary Audit rooms of Arbitron years ago. When I saw his report in these pages on the availability of HD Radios in the Cincinnati area earlier this year, I thought it would be good to check out availability in the Philadelphia market.

I am no stranger to HD Radio signals and their shortcomings, having a Dual XHD6425 USB HD Radio in-dash receiver in my car, a Sony XDR-S3HD tabletop at home and Radiosphy HD100 in my Washington office.

I chose "the usual suspects" as far as retailers, the first being a Best Buy in Conshohocken, a suburb to the northwest of the city. It is line-of-sight to the Roxborough antenna farm approximately 10 miles away and under 2 miles from the 50 kW signal of KYW(AM), 1060 kHz, which is broadcasting in HD Radio.

As I looked around at the table radios at the Best Buy,

an employee named Justin asked if he could help. When I said, "I would like to see the HD Radios," I got a blank stare for a moment, then he brought Zach over, who said: "Hmmm, we don't have any of those."

He went to the next aisle and said, "We had a Sony Boom Box, uh ... but, that's gone too. I guess we don't have any."



Photos by J.R. Russ



"How about car radios?" I asked. "Oh, yeah, maybe over there. Ask for Sean. He knows all the radios there."

A stroll to the corner of the store found Sean; a repeat of the question sent him to a JVC KT-HDP1 Transportable HD Radio kit resembling a satellite radio receiver with an RF modulator to transmit to the existing car radio. These were in sealed packages and were not able to demo the sound.

I said I would prefer a new in-dash radio and would like to hear one.

Their display center featured two HD Radios, an Insignia NS-C5112 and a JVC KD-HDR30. The Insignia, less expensive at \$79, could not pick up a signal of any sort. The JVC, at nearly \$100 more, worked.

The JVC was able to get good analog signals of WBEB(FM) and WYSP(FM) among others; however, all signals were analog. When I asked if they were HD Radio Sean replied "I think so." Then I discovered how to manually tune the radio and found the '80s format of WBEB HD2. I said "See? There are different channels." He said in slight amazement, "Oh."

I checked WYSP and received no HD Radio indicator and was unable to tune the simulcast of KYW(AM) that airs on WYSP(FM)'s HD2 and could tune in no other FM digital stations.

I then switched to AM, hoping to amaze him when he heard the all-news KYW jingle in crystal-clear stereo.

Sorry. No AM reception, even at such close proximity to the 50 kW transmitters. And the auto radio department is in the northeast corner of the store, so only a cinder block wall stood between the station and true HD Radio reception.

After about five minutes of trying to pick up more stations, I decided to allow him to wait on other customers looking at satellite radio, which was playing nicely on separate Sirius and XM displays.

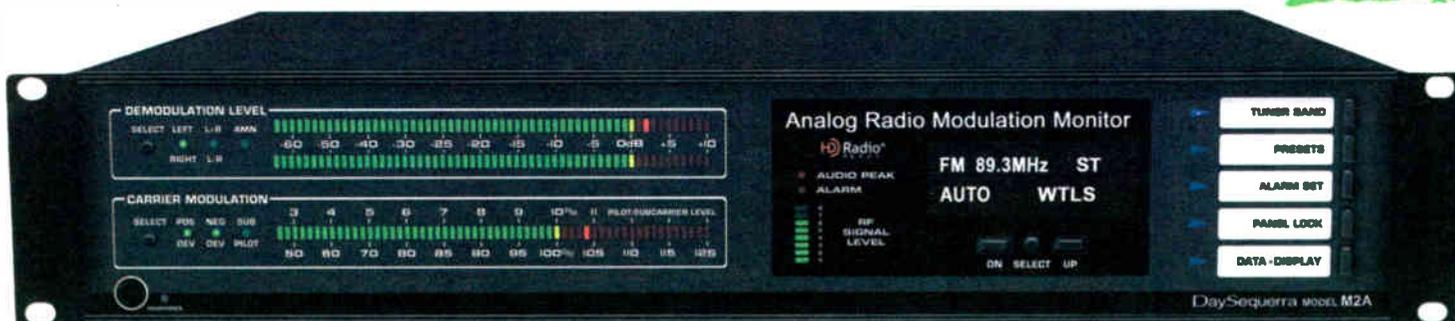
Tweeter

I went to Tweeter, an audiophile store primarily serving the northeast. Tweeter is far more professional and expensive, and therefore less busy.

I was greeted by Peter, who pulled a large remote control with an LCD screen from under the central desk. He proceeded to demonstrate the Sonos ZP90 Zone Player with optional remote. This device merges the Internet and a home stereo. He was able to surf the Net and played the IBOC streams of FMs WXPB and WHYI, saying he is "into jazz and classical music."

See PHILLY, page 20

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BE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total	9
Visitors	1	0	1	0	0	0	0	0	0	0	0	0	0	0	Total	2

Sponsored by Broadcast Electronics

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, BIA Financial Network and other sources. Data reflect best information as of mid October. This page is sponsored by Broadcast Electronics. HD Radio is a trademark of iBiquity Digital Corp.

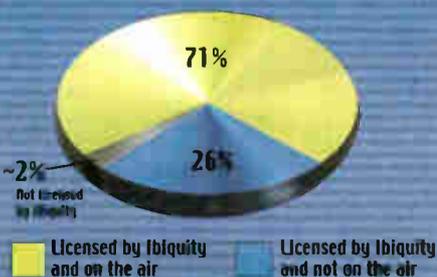
HD RADIO AT THE TOP 25 GROUPS

Owner	HD-R On Air	% on Air	Multicasting	No HD Radio
Clear Channel	783	69%	340	358
CBS Radio	182	87%	77	29
Entercom	123	76%	60	38
Cox Radio Inc	65	66%	19	33
Univision	54	66%	15	28
Citadel Comm	51	26%	0	145
Citadel/ABC	34	94%	14	2
Radio One Inc	46	100%	1	0
Cumulus Bcstg Inc	28	9%	2	283
Bonneville Intl	42	93%	18	3
Emmis Communications	33	85%	16	6
Cumulus Media Prtnrs	34	74%	10	12
Greater Media	30	100%	12	0
Salem Comm Corp	1	1%	0	89
Spanish Bcstg System	6	33%	0	12
Beasley Bcst Group	41	80%	15	10
Saga Comm Inc	35	38%	3	58
Lincoln Financial Md	8	53%	1	7
Entravision Comm Co	26	52%	4	24
Regent Comm	31	53%	6	27
Aloha Station Trust	37	55%	18	30
Journal Bcst Group	17	49%	0	18
Liberian Bcstg Inc	5	21%	0	19
Inner City Bcstg	0	0	0	17
ABC/Disney	39	89%	1	5

Source: Data is from BIA Financial Network's data service MEDIA Access Pro™ and also includes iBiquity information. Visit www.bia.com

HD Radio at Minnesota Public Radio

Total stations: 42



The HD Radio Bottom Line

	Total Licensed	On the Air	FMs Multicasting
	2,220	1,797	945
Last Month:	2,216	1,788	928
Last Year:	2,001	1,510	743

Philly

► Continued from page 18

While I was thinking "I've got to have one of these!" my mouth somehow managed to say, "That's nice but I don't want to spend \$600 to \$1,000. Do you have just a radio that picks up HD Radio over the air?"

He took me to a wall of shelves; near the bottom of one was a Sony XDR-S3HD. It lit up but received no no main HD stations nor multicasts.

I asked if it had an antenna and he said "Yes." This is the same radio I own and it only had a wire plugged into the Audio Out jack. There is an antenna connector for coax or the supplied 36-inch antenna wire but nothing had been connected and Peter didn't seem in a hurry to do so.

He took me into another listening room and began to demonstrate the Sonos again. Now that's a salesman!

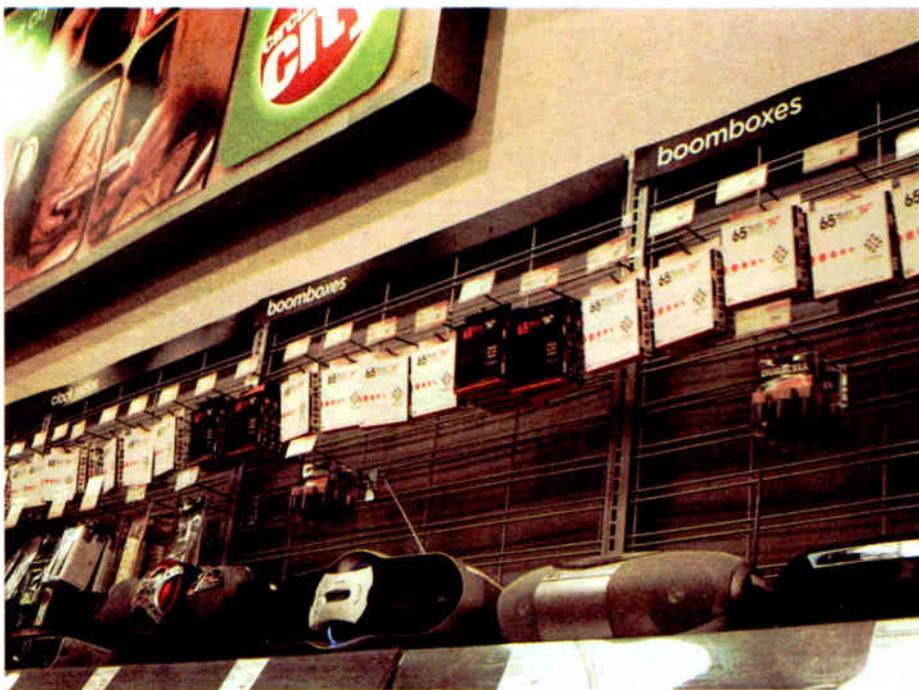
I asked about auto radios and he skirted over it, saying "We have a couple but they aren't connected." I said, "Let me see that one." The \$399 Alpine IDA-X001 he showed me lit up but wouldn't play. I said I'd think about it.

Circuit City

I went to another location in "the land of big stores," a Circuit City about a block away. That store was busy and it was near closing time so no help was available.

There were no table or boom box models. On display in the automotive section were a JVC KD-HDR30 at \$159 and JVC KD-G340, which is HD-READY, priced at \$104. Both lit up, but neither could receive any signals, which was just as well because someone had an XM radio blasting the hard rock of a channel named "Squizz."

On the way out someone with a walkie-talkie and no name tag (a manager?) asked if I'd found everything. When I said "No" and explained, he said, "You can probably find them at circuitcity.com." I thanked him and thought, "That really doesn't help



me listen to it, does it?"

On another day I decided to go where my Philly experience began.

I was hired to do nights at WWSH, known as "FM-106" in the 555 Building on City Line Ave., though that was six formats and seven sets of call letters ago; 555 is in Bala Cynwyd, and across the street is Philadelphia.

The Adam's Mark hotel, a block south, has given way to a shopping complex featuring a Target, which is only a few miles from the antenna farm and "spitting distance" from the WHAT(AM), 1340 kHz, tower. Too bad there were no HD Radios available at Target.

I traveled down the street to Bala Plaza and RadioShack. In a corner of the busy store was their Accurian brand, Model 12-1686. I first heard one of these units in the offices of WHAT(AM) in 2006 when it had changed to AAA "Skin Radio." It sounded great and I was excited to hear the radio again. Unfortunately, it had no power supply.

As I looked the unit over, associate Christine came over to assist me. When I asked if I could hear the radio she said, "Just a minute."

It was more like five but she came from the back with the box containing all the associated material, including the power supply. She un-wrapped everything and the radio could receive several analog FM stations — but, again, none of the digital signals.

I mentioned that there was an antenna connection so she un-wrapped it and connected the antenna. The tuner would then pick up several HD Radio channels including the '70s format of WOGL HD2, an urban AC on WDAS HD2 and another urban on WUSL HD2.

But still, no AM. So, Christine connected the AM loop. It could then receive nearby AM stations WHAT (1340 kHz) and WDAS (1480 kHz) — but not in IBOC.

She stood there patiently while I tried to receive any AM HD Radio signal but to no avail. The city's other 50 kW AM signal WPHT (1210 kHz) transmits from New Jersey, some 20 miles away and could not be received at all.

WPEN (950 kHz) has a transmitter facility nearby but it has moved in the daytime to Norristown which is past Conshohocken, where I was previously. After much fiddling, I sheepishly said I'd

think about it and left. On the way out I observed a customer buying a \$150 Sirius radio package. When I got back in my car I found that WHAT was not broadcasting a digital signal.

Meanwhile, RadioShack people work on commission and that bothered me since Christine was so patient and willing to satisfy a customer. Having worked retail sales several times in my life, I felt bad that I had put her so many hoops. So bad, I actually called the store to tell her I was writing an article and that I wasn't a jerk. (RadioShack management: Promote this woman!)

So how is HD Radio doing in Philly? Badly.

How can broadcasters expect the public to get excited about HD Radio when it can't be uniformly heard everywhere?

How can retailers sell the product if they don't stock it? Or if the products they do have on hand can't be demonstrated and employees are clueless?

How can manufacturers justify building the product if it doesn't sell for these reasons? No wonder some automakers balked at putting HD Radio in cars when it came up tied to the satellite merger.

That's one thing satellite radio has done well: point-of-purchase marketing. Even if the sales people are not well versed, the displays can do the job. They work, they explain what channels are offered, they are easy to use; product is available.

RadioShack

Until recently, all terrestrial radio had to say is that there are "channels between the channels." That means nothing to the average listener. I don't think I've ever heard HD2 or HD3 programming promoted on any station's analog channel. I have only heard KYW(AM) promoting that they can be heard on WYSP HD2.

Plus, the difference between analog and digital FM is often negligible. The real difference is on AM but, since most AMs are talk nowadays, you rarely get a chance to enjoy it except during IDs, bumper music and commercials.

A recent trip across Pennsylvania to Erie found only a handful of HD Radio stations, mostly in the larger cities. I believe digital has a long way to go to sell listeners and radios and fear HD Radio is "another AM stereo," a technology that also sounded great. Those radios were installed in many GM and Chrysler cars in the '80s just as most AMs moved away from music to talk, negating the need for stereo. Plus, stations would tout, "Now broadcasting in AM stereo" so Joe Public got in his '77 Galaxie 500 and heard the same crummy-sounding AM station. Click. Back to FM.

Terrestrial broadcasters and the NAB held up the satellite merger, blaming the medium for many of their woes. I think the answer is to look in a mirror.

J.R. Russ is a long-time broadcaster, consultant and president of J.R. Russ Programming & Research. Reach him at www.movieticketradio.com.

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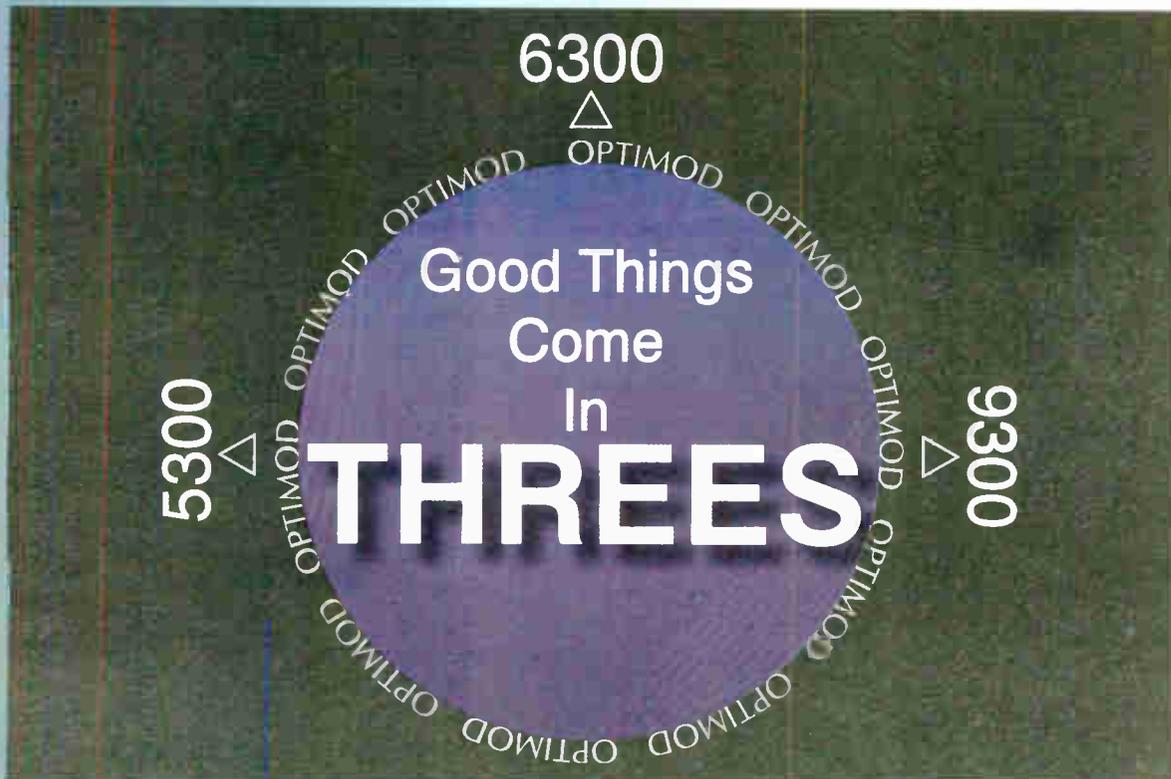
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DIGITAL NEWS

Neural: MP3, iPod-Sourced Music Rates High

The consumer electronics industry is losing control over content and that's a challenge for those who build audio systems. There's no way for someone designing a playback system to know the quality of the content, according to Neural Audio CEO Geir Skaaden.

With the close relationship between people and their digital media, "people are ripping their own CDs and not necessarily paying attention to the levels," he said.

Compressed audio sounds fine on ear-

buds and headphones, as CE sales will attest, but it sounds worse if you take that same MP3 or iPod audio and play it back on a premium home or car stereo system.

That's because the stereo masker is "unmasked" and the sound "image" is expanded, according to Skaaden, who said the company has a way of compensating for that in a post-processing mode that makes adjustments in the playback system. The Neural-THX Surround Digital Music Mode is designed for any compressed audio. It also works with an HD Radio system.

To illustrate that point, at AES in San Francisco in October, Neural discussed survey results of about 60 participants from the September CEDIA show, an event focusing on staff at CE stores, custom installers and equipment resellers.

Neural was surprised to find that 50

percent of its survey participants — those who spend more than \$2,000 on their stereo system — preferred iTunes and iPods, which employ compressed audio, as sources of music for their customers over CDs or DVDs.

Neural expected to find the opposite. Eight percent of survey participants said radio, which can also be compressed audio, was the most important source of music.

True IBOC Car Penetration in 2010-11?

While broadcasters believe the market of HD Radio receivers is growing at a

painstaking pace, the penetration for any product in the consumer market takes a while.

Neural Audio CEO Geir Skaaden believes it will be 2010 or 2011 before we see real HD Radio receiver penetration. "It's not there yet but it's coming," he said, crediting iBiquity and the HD Digital Radio Alliance for getting the top-tier brands in automotive consumer electronics to make HD Radio fundamental to their next product cycles.

And in the next two to three years, early adopter broadcasters will also be upgrading their IBOC equipment, he predicts, much like some early-adopter large broadcast TV companies are already upgrading their digital gear.

Neural is seeing broadcasters take advantage of services that offer value-added audio entertainment, such as car telematics and audio and images in the home, from the simple level of album art to, at a more advanced level, streaming ads.

"The targeted streaming ads you see on the Internet today, those ad rates are a higher rate-per-thousand than for TV. There's no reason you can't tag that for audio entertainment," Skaaden said.

Warren to Lead Alliance; HD2 Ad Changes Too

Now that the HD Digital Radio Alliance is established and has strengthened relationships with automakers, receiver manufacturers and retailers, it's moving into more of a marketing phase — precipitating a change at the top.

As of Jan. 1, 2009, Peter Ferrara will step away from the president/chief executive role and Diane Warren, now executive vice president, takes the top job. She had been promoted to EVP from a senior marketing/communication position in January.

Ferrara felt it was "time for a change" and that Warren's talents are more suited to the new role of the alliance. He is staying on as an advisor and says he has other opportunities he's vetting with investment and technology companies. Observers believe Ferrara is ready for something new.

Alliance member broadcasters remain committed to funding the group, Ferrara said, and there will still be ad campaigns promoting HD Radio. In fact, a holiday campaign began Nov. 5.

Warren said her goals are to keep broadcasters focused, to have engaging ad campaigns and to "continue to have that conversation with consumers" as well as be a resource for HD Radio.

When the alliance launched in December 2005, there were 300 stations on-air with IBOC and 40 multicast channels. Now there are some 1,800 stations on-air and 945 multicast signals.

The alliance has also lifted its voluntary restrictions on multicast ads and programming.

The HD Radio Alliance comprises Clear Channel Radio, Beasley Broadcast, Citadel Broadcasting, Greater Media, Entercom, Bonneville International, CBS Radio, Emmis Communications and Cumulus.

— Leslie Stimson

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TECH TIPS

GEP for That Bird Without a Wire

Internet Notwithstanding, Satellite Remains A Great Tool, So Get the Most Out of It

by Charles Fitch

Many years ago, more than I'd want to admit, I taught economics as part of an "engineering economy" section.

Economics, unlike physics or mathematics, is about as inexact as a "science" can be. For that reason you can have and defend any theories you want. With this license and for the purposes of stimulating the exploration of more generally recognized principles, I developed The Laws of Fitch.

This was a lot of fun (at least for me), although in retrospect I feel sorry for all those indented students.

Of those laws, my favorite is No. 1: "The future gets here when someone is willing to pay for it." There can be few better examples of this than satellite technology.

Visionary

The late futurist and writer Arthur C. Clarke generally is viewed as having been first to propose the concept of geostationary orbiting satellites for communications use.

His first article, a 1945 piece for *Wireless World*, described the use of manned satellites in 24-hour orbits high above the world's land masses to distribute television programs.

Clarke was specific in detailing a workable system; yet it took nearly another 30 years before someone was ready to pay for communications satellites for broadcasting.

Real-time, terrestrial, distribution/transmission of network TV and radio has always been costly and prone to point-of-failure disruption through miles of cable and multiple microwave hops. In some cases, creation of such a system was impossible, such as TV service to Hawaii and Alaska using undersea copper cable; this was one of the first uses of satellites worth the money in the '70s. Shortly thereafter radio networks such as ABC, RKO and Satellite Music hitched a ride on these TV birds.

Someone willing to pay for it had been found.

Components

A working satellite system has 3-1/2 operative components.

The first is the satellite itself, which for our uses is basically a radio repeater in space. The "bird" is positioned to fly at 6,877 mph in an orbit around the equator at a distance of a bit more than 22,000 miles above the earth's surface. That speed matches the rotation of the earth turning below so that the relative position of the satellite over a spot on the equator never changes. The speed is just under the escape velocity that would throw the bird out into space.

The second component is the uplink, essentially a glorified microwave transmitter installation with high-powered amplifiers and usually as big an antenna as the budget can afford or the techs can handle to narrow the beam width into a tight focus.

Think of the factors that influence 950 MHz STL paths that struggle to make dis-

tances such as 30 miles; then ratchet up your thinking of the alignment and loss budget to reach a moving target 22,000 miles away at three or more octaves higher in frequency. Quite a challenge.

The third component is the downlink or receiver site. You know these; because satellite delivery is a ubiquitous radio programming tool, there may be five or more working dishes associated with your station — possibly 10 out in the yard, if you haven't bothered to take the old dishes down.

The remaining "half" component is the control station. This command center tracks and positions the owner's satellite to keep this immense investment up there and "in the box."

Satellites are not static devices. We don't throw them up there with a rocket slingshot and expect them to stay put.

As the earth turns on its vertical axis and the winds of space (not to mention

**The appearance of
satellite technology
for program delivery
was a great leap,
retiring frequency-
limited and noise-
challenged wire and
radio circuits.**

gravity) assault these high-tech space vehicles, onboard propulsion devices (miniature thruster rockets in older birds, ion pumps in the newer models) shuttle them around following instructions from the ground to position them so that they are always where your receive dish is pointed.

The "payload" (the industry euphemism for the configuration of the bird) is selected to maximize revenue generation (remember, someone has to pay for all this; only when that's done is it time for profit).

As mentioned, these space platforms are repeaters. In the KISS philosophy, transponders are used where the incoming signal is merely shifted in frequency, amplified and sent back out.

The control station also has management over transponder power out, whether the signal is crossbanded (perhaps taking a C band signal in and putting a Ka band signal out) and selection of outgoing antenna.

The process of getting a moneymaking satellite running is a morass of decisions and actions including governmental approval. International agreements will guide selection of orbital slots, frequency bands, polarity format and receive footprint (what part of the earth you want to serve).

How you divide up the spectrum into channels, the count of transponders, the nominal powers used and the selection of transmit antennas are decisions that, though subject to convention, are within the purview of the operator.

Power used by the transponders plays directly into the size of the solar array

needed and the onboard battery storage size required for when the bird is not receiving sunlight. Because these items have a direct effect on the satellite's usable life cycle, these choices are critical.

We mentioned outgoing antennas; the latest birds have multiple choices including spot beam antennas. With these, lower power can be used if service is only needed in a small area on earth, also allowing a frequency to be reused with-



out interference, perhaps on both the East and West Coasts for example.

Earthside

We'll leave the birds to the financial heavy hitters for the moment. What about our end of the system on the ground here at the station?

Outside, in the yard, up on the roof, sometimes even out at the transmitter or mounted on the tower is the microwave antenna — the dish — used to receive those satellite transmissions.

Our STLs at 950 MHz essentially obey optical principles, and these microwave signals from space do too. Solid objects such as buildings will mask the signal completely; so can leaves that grow into the path in the springtime. Bare trees waving in the wind, rain, heavy fog, and snow or ice on the dish will attenuate the signals. Even heavy dirt on the dish can be a factor.

Also, because we're dealing with microwave frequencies where loss in coax is measured in inches rather than feet, the sooner we can get down to frequencies we can deal with, the better.

For that reason, most often the antenna

will have a combination device at the signal focus, the Low Noise Block converter. A polarity sensitive "feed horn" antenna couples signals into the LNB in which these microwave signals are shifted down to something usable, such as 1 gigahertz or 400 MHz.

At these frequencies, the signals of interest can travel far greater coax distances to a convenient location where the receiver demodulates those signals into a format we can use.

On really long cable runs or when there are dissimilar grounds at each end of the circuit or in the presence of much

electromagnetic interference, these down-converted signals are modulated into light and sent on fiber optic cable instead.

Best practices

As happens with most technology, cost and complication have come down while reliability and features have come up. Today's earth station systems are far less expensive and finicky than those of even a decade ago.

Pragmatically speaking, however, users should be aware of good engineering practices that will always be with us.

- GEP suggests that the best performance and reliability come from the best installations. Do it right the first time and you'll never have to come back to it.
- Support and attach the dish to its mount as well as you can. Alignment tolerances are less than +/- 1 degree in most cases. Even the smallest allowable movement can take you off the air.
- To avoid loss of alignment from pole rotation always install "spurs" on mounting poles sunk in concrete. For

See SATELLITE, page 28 ►

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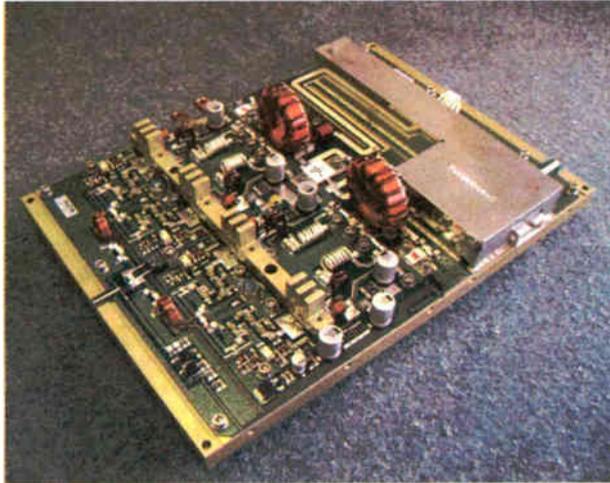
MARKET PLACE

Richardson Offers 1 kW FM Amp Module

Richardson Electronics is offering the FM1K-108, a compact 1 kW FM amplifier module made by Res-Ingenium.

The Class B amplifier is designed for FM and HD Radio FM broadcast applications. The company said it provides robust protection circuitry for security against overdriving, SWR over-voltage and thermal runaway.

The amplifier offers 1 kW of linear CW output power (from 87.5 to 108 MHz), a 74 percent collector efficiency and superior harmonic suppression (-55 dBc), Richardson said.



It uses four MRF6V2300NBR1 LDMOS transistors from Freescale Semiconductor. Enhanced gain (22 dB) allows the system designer to use lower input power (7 watts), eliminating one or more gain stages and saving cost.

This module is intended for transmitter, translator and exciter designs. Data sheets and samples are available from Richardson Electronics sales representatives. The module can be used with the Wakefield 510-9M heat sink from Richardson Electronics.

Info: www.rfwireless.rell.com/amplifiers.asp.

Satellite

► Continued from page 26

poles used with small dishes (24 inches or less), these can be as simple as drilling two holes near the bottom of the pipe and sending pieces of continuous thread (allthread) through those holes in quadrature. On larger poles it's best to weld angle iron onto the pole.

- In areas of severe frost heaves, make certain that any satellite mounting foundations are proper for the region and that they get under the "frost line." In high latitudes, frost heaves can move even huge dishes way out of alignment.
- Find a location that has a completely clear view of the satellite of interest in all seasons and, if at all possible, can "see" the balance of the equatorial satellite horizon. Cost pressures beat all of us into the ground; programmers will change carriers to follow the lowest cost, and you may need to find that new bird quickly.
- Treat your sat RF connections even better than you would your STL. Use the lowest-loss, highest-quality connectors and cables available, avoid splices no matter how pretty, minimize the jumper count, ground and ground as often as possible especially the dish assembly, the LNB, the coax, the receiver frame, etc.
- Make certain that the DC that powers the LNB is really pure DC and that it is the right voltage at the LNB.
- Keep notes of signal levels and bit error rates over time and channels so that you have some benchmark data at troubleshooting time.
- On digital systems a peak alignment using just the receiver is best obtained by minimizing the eb/no value. The receiver takes some time to update the display of the error rate so adjust *very slowly* while monitoring the demodulated audio to make certain that you are peaking up the desired signal.
- Carefully seal up the feed horn assembly to avoid creating a year-round bug hotel. Bug bodies are great RF attenuators especially when a zillion of them are jammed in your feedhorn.
- After peaking fixed dishes, you should mark their alignment with durable indicators so if the dish is moved by high winds or an aberrant auto bumper, you can quickly restore them to the approximately correct orientation to relocate the signal.

The appearance of satellite technology for program delivery was a great leap, retiring frequency-limited and noise-challenged wire and radio circuits throughout the nation.

As a young consulting engineer I visited one of the first stations on the RKO satellite network. The station's production room had the net pot open, and just before the news I heard the network announcer practicing his opening copy. My comment to the station staff was that this fellow had a great voice. I asked, "How long has he been working here?"

I thought the fellow was in the next room, not 50,000 miles away in New York. Doncha just love satellites?

Charles S. Fitch, W2IPI, is a registered professional consultant engineer, member of the AFCCE, senior member of the SBE, lifetime CPBE with AMD, licensed electrical contractor, former station owner and former director of engineering of WTIC(TV) in Hartford, Conn., and WSH(TV) in Marlborough, Mass.

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SUPPLY SIDE

A Chat With Bay Country

Supply Side is a series of occasional articles about broadcast industry suppliers.

Bay Country Broadcast Equipment Inc. buys and sells used radio broadcast equipment and recently noted its 10th anniversary.

A visit to its Web site on a typical day showed gear from manufacturers such as Comrex, Belar, Aphex Systems, Harris, Audio-Technica, Autogram, Sine Systems, Anchor Audio, Tieline, Scala, Marti, Musicam USA and Titus Labs.

RW asked founder Steve Scarborough for some background.

RW: How did the company get started, and why?

Scarborough: It was started with the notion that radio broadcasters needed a place to go to be able to purchase quality used equipment with a 100 percent satisfaction guarantee. I have been taking care of sales and support personally for over 10 years.

RW: What's your own background, prior to this?

Scarborough: I started out with David Green Broadcast Consultants in 1984 as warehouse manager, and eventually received the opportunity to move into new equipment sales.

RW: How has the nature of your business changed in the time since you launched it?

Scarborough: The nature of the business has not changed. Our customers are still looking for a good deal on used equipment. The only thing that does change is the equipment. I have to keep up with the new technology since it will be in demand on the used side.

RW: How has HD Radio affected your business? How has the current national economy affected it?

Scarborough: HD Radio has increased the supply of equipment available for sale from the stations that upgraded.

We are doing our part to help out in this sluggish economy. Everyone is looking for a way to save money and we can accommodate them with a piece of equipment to meet their needs at a substantial savings.

RW: Where did you learn to service the gear you buy and sell?

Scarborough: The knowledge has been gained mostly from hands-on experience. If we have an issue that can't be resolved here we have an array of repair facilities to use. Sending a piece of equipment back to a manufacturer for repair or



upgrades is also utilized.

RW: What's the most gratifying sale or project you've been involved in?

Scarborough: There is no single one that stands out. I am very thankful for all of the terrific customers who have purchased equipment from me.

RW: What are terms for someone who

wants to buy?

Scarborough: I sell our equipment on a cash basis; that can be accomplished with either a check in advance, credit card or on some occasions COD.

RW: And for the seller?

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used PayPal on some transactions.

RW: What else might a Radio World reader want to know?

Scarborough: Our Web site is the best place to see the most up to date list of quality used equipment available. It is updated every weekday.

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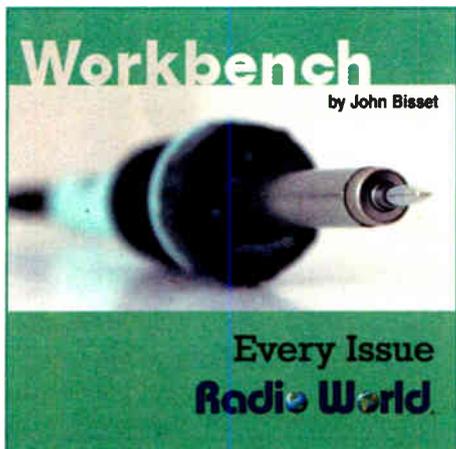
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RADIO IT MANAGEMENT

Radiolicious Brings Radio to iPhones

by James Careless

In the war between radio and Internet-based technologies, Radiolicious is trying to build a business model by striking back on broadcasters' behalf. Radiolicious is a free downloadable player for iPhone users. Once on their wireless handsets, Radiolicious allows them to stream audio and Web content from any AM/FM station that is signed up to the service, at no cost to the iPhone user.

"Radiolicious is the third leg of the modern broadcasting stool, the other two being over-the-air transmission and the Web," said Rick Brancadora, an early affiliate. He is the CEO, licensee and GM of LifeRadio WIBG(AM), a Christian talk station that has signed up to Radiolicious.

"With more than 20 million iPhones out there, Radiolicious is a great way for us to grow our audience."

The technology

Radiolicious is a software application developed by MySimBook.com, a developer/marketer of awareness-based advertising products. The company is owned by Global Security Systems, also known in the radio industry for its FM Alert technology.

"Radiolicious is a truly native iPhone radio player," said Doug Daigle, co-founder of MySimBook. "It provides all of the Web streams, including WMA, from subscribing broadcasters directly to iPhone users."

Radiolicious works on all commercial

wireless networks, including EDGE, WiFi and 3G. Besides delivering audio, it provides iPhone users with graphics and the ability to request songs, send comments and enter contests from their handsets.

Operationally, Radiolicious is simple;

LifeRadio is based in Ocean City, N.J. It is licensed as a daytime AM, operating at 1,900 watts; it signs off every sunset to make way for clear channel KDKA. But WIBG runs on the Internet 24/7, and with its appearance on Radiolicious, the sta-



The mobile phone has profoundly changed how people interact with media when they're on foot or in their cars.

— Doug Daigle

after subscribing to the service — usually by purchasing a subscription based on market size or bartering commercial airtime to MySimBook — the station logs onto MySimBook's business Web site and links their audio streams. They can also provide the other content described earlier and arrange for interactive traffic between their station's e-mails and Radiolicious users.

At the consumer end, "The user simply downloads a Radiolicious from the app store," said Daigle. "It is free to download, and there are no additional charges."

Stations are categorized by genre and location, making it easy for Radiolicious users to find the stations they want and add them to their Favorites list for fast access. Radiolicious subscribers can also access Internet-only audio streams, share music with friends and buy songs directly from iTunes while using the player.

"The mobile phone has profoundly changed how people interact with media when they're on foot or in their cars," he says. "Radiolicious makes it easy for broadcasters to reconnect to this audience, many of whom have forsaken conventional AM/FM radio for newer technologies."

tion says it has found a second way to keep reaching its audience at night without broadcasting.

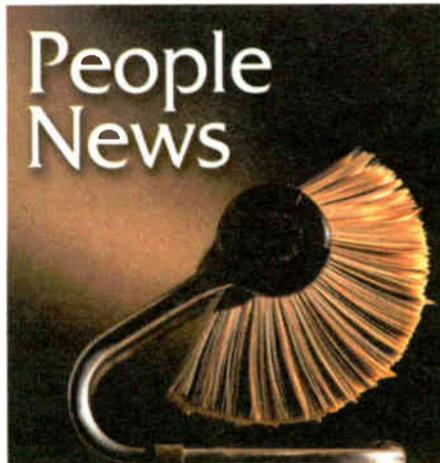
"We are finding more and more peo-

ple are tuning into our Web-based audio stream," said Brancadora. "With iPhone now included via Radiolicious, we've got the necessary second half of this one-two punch."

Being on Radiolicious isn't just a way around being a daytimer. "On the Web and Radiolicious, we have as big a footprint as ABC and CBS," Brancadora said. "But it's really Radiolicious that makes the difference, because we are now available on a portable medium unfettered by radio's physical limits."

To further promote LifeRadio online, Brancadora hopes to take advantage of blogging sites offered by Radiolicious, plus the system's two-way messaging capability.

"We are already a two-way station, because we're talk radio," he said. "Instant messaging is also proving to be big, which is where Radiolicious comes in. With this platform, people will be able to hear us all over America, and interact with us as well."



Marcel van der Meijs, Barix

be based in the Netherlands. He's held positions with Lantronix International and HID Corp.

Nautel opened a customer support center in Quincy, Ill., and made several staff announcements. Jim Krueger had worked on high-power systems at Harris and before that was with the U.S. Coast Guard, where he was involved with installation of Loran-C high power transmitters. Also hired is Nelson Bohorquez, who had worked at Broadcast Electronics in customer service.

Nautel also said John Bisset and Ellis Terry joined in sales positions and Steve Schmitt in a sales engineering role. Bisset was with Broadcast Electronics; he also has worked for Harris and run his own engineering firm. He was SBE's Educator of the Year last year and writes RW's *Workbench* column; he becomes Nautel's regional sales manager for Europe and Southern Africa.

Terry will be Nautel's Western U.S. regional sales manager. He has worked at BE and Harris and is a former chief engineer. Schmitt comes aboard as sales engineer. He held a similar position at BE and has worked in customer service at both BE and Harris; he'll be based in Quincy.



Jim Krueger and Nelson Bohorquez with Nautel Customer Service Manager Kevin Rodgers, center.

Entercom Communications named Rick Rapalee as director of engineering for its six stations in Sacramento, Calif. They are KCTC(AM), KDND(FM), KRXQ(FM), KSEG(FM), KSSJ(FM) and KWOD(FM).



Rick Rapalee, Entercom

He's been with the company for 12 years as an engineer and chief engineer; prior to that, while in the U.S. Air Force, he specialized in satellite communications.

WCPE General Manager Deborah S. Proctor was honored by the Institute of Electrical and Electronic Engineers. Its Eastern North Carolina Section presented a Technical Achievement Award "in recognition of her enterprise, innovation and entrepreneurial drive in the conception, development and successful evolution of WCPE, The Classical Station."

Engineer Ed Dulaney becomes director of engineering for Rocky Mountain Radio Network. He had been with Crawford Broadcasting for 12 years.

He'll assist Rocky Mountain in the acquisition of five radio stations in Colorado, with an eye to expansion. Dulaney is also a contract engineer with a focus on AM and HD Radio.



Ed Dulaney, Rocky Mountain Radio Network

Barix AG named Marcel van der Meijs as VP of sales and marketing; he'll

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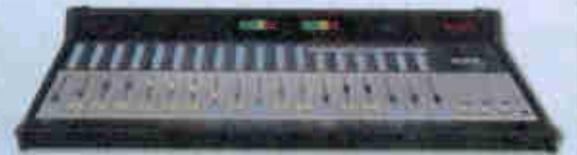


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Millenium Digital gives you fantastic "bang for the buck!" Available in 6-, 12- and 18-fader sizes, Millenium Digital gives you analog and AES/EBU inputs (with built-in sample rate conversion) on every channel, 3 mixing buses with analog or digital outputs, and up to 10 fully-programmable mix-minus outputs. Choose the new Millenium Digital Network model for easy connection to Axia IP-Audio networks!



HARRIS NETWAVE

The newest console from Harris is at home in any facility! With four mixing buses, two mix-minus channels, easy-to-use talkback and telco interfaces and universal input modules for analog and digital sources, NetWave is perfect for stations in smaller markets that still want the power of a Harris console. Comes in 8-, 16- and 24-input sizes with optional networking capability and a "heads up" meter display!



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Radio World

HD & Signal Monitoring, Remote Control & Test

November 19, 2008

USER REPORT

Belar FMHD-1 Clears the Skies

Monitor Helps Washington State University Clarify HD Radio Signals at Several Stations

by Jer Hill
Broadcast Chief Engineer
KNWY(FM), KFAE(FM)
and KWWS(FM)
Washington State University

RICHLAND, Wash. Washington State University operates several radio stations in affiliation with Northwest Public Radio. I am the chief broadcast engineer for those stations. Recently I had the opportunity to put the Belar FMHD-1 modulation monitor through its paces at several of our HD Radio stations.

The first test for me with any new product is the ID-10-T ... can you hook it up, turn it on and get useful work out of the device without reading the manual?

The answer for the FMHD-1 was a conditional yes. Navigating the menus with the function wheel worked very well, but to enter data — that took a little playing around. Nothing strenuous. In fact, once I figured that out, it impressed me that so much is available with the simple turn

and click function knob. A very good and compact design job by Belar.

Easy start

The manual was also compact in verbosity but clearly described each screen



Front and Back Views of the Belar FMHD-1 Monitor

and answered most of my questions. It did not take more than a few minutes and I was accessing all functions.

A major positive is that the display stays on. There is no resetting of the device needed when you switch functions or screens. The information is updated

whether you are viewing the screens or not. It does not go to sleep, thus requiring a reboot. All functions are available via the screen and you don't need to hook up a laptop to it to get into the finer details of adjusting your system but the laptop does enhance the usability of the FMHD-1.

Useful features include measuring proper absolute audio polarity between

FM and HD1 and power measurements on the spectrum analyzer page that are useful for indicating FM to HD carrier ratio of 20 dB. It has a number of very good audio meters including HD, analog (de-emphasized) and composite pre-emphasized FM. Oh, and it decodes PAD.

The FMHD-1 will work with a com-

puter or a LAN/WAN computer network. All display menus, metering and display pages are available in the computer application form and it is possible to monitor the market by using the computer for signal tuning and the display screen for monitoring. Using a computer does, however, disable the function wheel.

The best feature is the audio blend delay detection screen. That page shows a reading in samples or milliseconds and a report of whether the analog is leading or lagging and by how much.

I used the o-scope/oscillator method to align the analog and digital at KNWY (FM) a year ago when we built that station. The FMHD-1 reported that we were 378 samples out of alignment. I could not hear this error in the blend in my HD Radio receiver but it was nice to know that I could precisely set the delay and not worry about the drifting packet timing. With the monitor, it is easy to detect this parameter being out of adjustment. Also, having the error reported in samples was a very simple data entry in the Exporter delay menu. Problem was fixed with a couple of button clicks.

At KFAE(FM) I did a quick by ear time-alignment and went on to other things. According to the FMHD-1, we were over 4,000 samples out with reversed phase. It was simple to bring it into alignment and once in alignment it was obviously correct. The jury is still out on the delay as to whether it is set-and-forget or do you have to tweak every once and a while. This is a handy box for reassuring that.

Also on the delay screen is a measurement of the audio power in the FM analog and the HD1 signal with a dB ratio of the difference. This is something that I set with my ear to good result ... but we were out by about 1 dB ... or the limit of human perception to level change. So, I welcomed the information to get it spot on. Now listening to the KFAE analog to HD1 station blend, we hear the wide-open highs of the HD1 signal rather than the high-frequency limiting distortion on the pre-emphasized analog side.

Belar uses a unique dual indicator on the metering for delay error. One scale is the current value indicator, defining whatever is happening at that instant. The second is an average reading indicator, allowing an engineer to follow longer-term performance trends. Using these two you can get a sense of the overall alignment and any potential drift in your system.

Meters matter

Speaking of metering, in the HD Radio world, there is no such thing as an absolute standard, so some of the meters have scalability that allows users to find a reasonable match for the performance of the system in order to have a meaningful display that relates the relative quality of the audio.

I suppose that using the composite FM signal loudness as your reference, all other

See BELAR, page 35 ▶

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**Congratulations Tampa Bay Rays
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Above: Rays broadcasters **Andy Freed** (left) and **Dave Wills** (right) interview Rays' star third base prospect **Evan Langoria** on the "The Hot Stove Radio Show."

Top: **Larry McCabe**, Tampa Bay Rays Senior Director of Broadcasting and **Rich Herrera**, broadcaster and Director of Radio Operations are shown on the field during spring training.

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Fans of the Tampa Bay Rays baseball team are intimately familiar with Dave Wills and Andy Freed, play-by-play announcers and hosts of "The Hot Stove Radio Show." Offering the inside track on all things Rays, the show kicked off its 2008 season with the "Countdown to Opening Day" series. While at a remote from a well-known sports bar, ACCESS showed its true worth. Two minutes before the broadcast, the ISDN line that was supposed to be used for the broadcast failed to connect. Luckily, they had the ACCESS running on Wi-Fi provided by the restaurant. The broadcast got on the air and was flawless for the entire one hour show.

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World Radio History

TECH UPDATES

Burk Adds to Plus Family

Burk Technology aims to make remote control and monitoring easier and more cost-effective with the Plus-X 300 eight-channel I/O interface and PlusConnect direct interfaces for select transmitter models.

These products join the Plus-X AC-8 remote outlet controller and PlusConnect interfaces for Harris Z and 3DX transmitters in a series of IP-based designed to capitalize on the ARC Plus platform.



The Plus-X 300 connects via Ethernet to a new or existing ARC Plus remote-control system to add eight metering or status inputs and eight relay outputs for control. In addition to traditional transmitter site applications, the Plus-X 300 is well-suited for use in studios, control rooms, IT space and elsewhere because engineers no longer need to accommodate wiring paths back to the remote control rack.

Instead, Plus-X units distribute I/O throughout the building while the ARC Plus manages alarms, notifications, automatic events and corrective actions. For existing ARC Plus installations, the Plus-X 300 can be used in conjunction the input and command relay units already in place.

The new PlusConnect models allow direct integration of the ARC Plus with the Broadcast Electronics 4MX, Nautel V-series and Rohde & Schwarz 8000-series transmitters. The PlusConnect series of products eliminates external parallel wiring to the transmitter; Burk says this dramatically reduces installation time and effort. The PlusConnect exposes more remote control parameters than otherwise available, allowing the ARC Plus to offer detailed troubleshooting via Web, telephone, software or front panel.

For more information, contact Burk Technology at (800) 255-8090 or visit www.burk.com.

New 5.1 Software Helps Broadcasters

New 5.1 surround sound software from DK-Technologies, for its MSD Series of high-end audio meters (MSD600M++, PT0600M, PT0660M and PT0660M-LS), has useful features to help broadcast and post production professionals improve audio quality for surround sound, stereo and mono.

Among these features is the new StarFish display that allows users to see what they are hearing when listening in surround sound.

When the same audio signal is applied to two loudspeakers, it can under certain conditions sound twice as loud as it does when one loudspeaker is switched off.

This phenomenon cannot be read via a normal PPM meter, but StarFish shows an image of the acoustic audio levels, thus allowing the user to visualise the true level. This information is given alongside the images provided by DK's JellyFish display, which shows audio levels supplied to the center, left/right and left/right rear speakers.

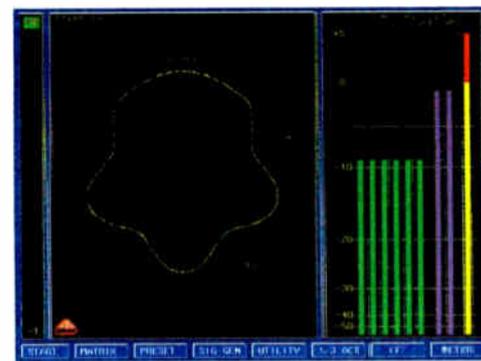
The new software also includes ITU-recommended loudness measuring methods that provide new additions to the LEQ (m) and Flat Filtering methods available in earlier versions. Also new is the ability to show SMPTE timecode on the main display to define the start and stop of the loudness measurement. This feature supports the direct spooling of the audio to the desired position in the recording. By utilizing the dual ballistics of the PPM, the audio engineer simultaneously can monitor the correct level on a conventional audio scale and ensure that the level does not exceed the margins decided by the digital signal.

DK-Technologies' software allows an integral matrix in the audio meter to determine the mix down of the surround sound signal to a stereo and a mono signal. This feature allows the audio engineer to monitor and optimise the mixdown while working on the surround sound signal.

For automatic logging of the audio signal, DK-Technologies has introduced DK-LevelRead, a PC program that reads the levels from the audio meter and stores the measurements on the PC, together with the accompanying timecode. The measured values are used to determine and display the maximum levels. Alarms originated by too high levels or missing signal are detected and marked on the readings for easy identification.

All new audio meters from DK-Technologies are delivered with the new software, while existing users can upgrade earlier audio meters with the new features.

For more information, contact DK-Technologies America at (800) 421-0888 or visit www.dk-technologies.com.



M2.2R Improves Remote and Alarms

The DaySequerra Model M2.2R Modulation Monitor, based on the popular M2.0X, gives broadcasters additional tools to monitor and create alarm triggers for their HD Radio broadcast transmissions.

In addition to the original M2.0X model's basic capabilities, the M2.2R includes six programmable dry, floating alarm relays, RBDS display, full FM analog component monitoring including SCA and pilot injection levels and AM noise, a multiplex output for external SCA decoders, Ethernet interface for streaming PAD data or remote control, and DaySequerra's Remote Dashboard software program, which lets broadcasters remotely tune the unit, provide alarms for key signal parameters and log their data. The new M2.2R also features full time digital audio output, even when tuned to an analog station.

The DaySequerra proprietary PLM (Performance Loss Module) Option has also been included in the M2.2R. This technology employs heuristic algorithms which cannot be misled by pink noise or tones, and will generate alarms when real program silence is detected in HD Radio or analog broadcasts. Unlike external silence-sense units, the M2.2R can also trigger an alarm on loss of RF carrier, audio, OFDM lock, RBDS stream, PAD stream, multicast available and delay bit.

In addition to its onboard programmable relay alarms, the M2.2R can be remotely controlled and monitored through the included Remote Dashboard software. Users can measure, log and alarm RF carrier strength, confirm the program status of the analog signal and HD-1 through HD-8, monitor and provide alarm for loss of audio and analog delay bit, even auto-scan through multiple station presets. The complete HD Radio PAD and SIS data package, including station descriptions and program song title, artist, album, genre and comments, can also be simultaneously displayed, each in its own window. Alarm capability is provided for all Remote Dashboard functions including analog and digital audio silence sensing. Active alarm notification is via relay contact closures as well as E-mail.

For more information, contact DaySequerra at (856) 719-9900 or visit www.daysequerra.com.



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Belar

► Continued from page 32
meters can be made to give you a deflection that would help you track performance of that parameter.

The problem to overcome is that the HD importer and exporter sound cards also have scalable inputs. It is possible that a fully useable audio dynamic range is not being delivered in the digital domain. Such a situation would lead to, for instance, compensating for it in the exciter scaling or the audio processor.

The manual has an extensive section on using the spectrum analyzer to display the RF Mask. This is a powerful feature of the FMHD-1. Using the measurements column and the correct mask screen read-

out with averaging, you will get a comprehensive picture of your FM and HD modulation. In the case of KFAE(FM), we are high-level combined with two transmitters and we were able to verify correct operation of the system through

the FMHD-1 spectrum analyzer. It should be noted that the spectrum mask display must be set up in a special way for proper monitoring.

Another quibble I have is that while a peak line can be made to stick for a few

moments on the audio displays, the product lacks a good analog composite peak flasher/counter that can be relied upon for set-up of the analog modulation.

This is a really great product and I've only scratched the surface of the available functions in this unit. I understand that this is a new offering from Belar. I would suggest that they come up with a peak counter for analog signals and provide meters that have the option of selectable indefinite peak hold. But it is already ready for prime time and it is better than any other product offering that I've used. In fact I can say that this box gives me confidence that we are able to measure and calibrate our operation within the legal limits according to FCC rules and regulations. Wish we owned one.

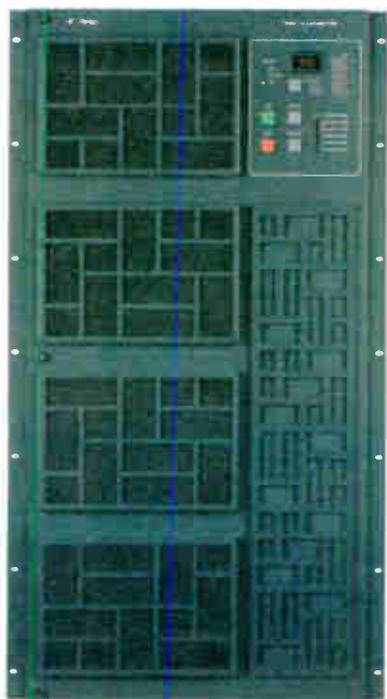
For more information, contact Belar at (610) 687-5550 or visit www.belar.com.



Belar HDFM-1 Time-Align Screen

Remote Control For Harris ZX Transmitters And More

The Harris Web Remote system is a new compact monitor and control system for use with any Harris transmitter and other supporting equipment. This compact package allows broadcasters to monitor and control an array of equipment at a remote location via an embedded Web server and a standard browser application.



The Web Remote provides reliability and a small form factor thanks to a design that uses no moving parts. The Web Remote comes in two versions: a slide-in card designed for the Harris ZX line of low-power FM and HD Radio transmitters, and a 1RU rackmount system to support universal connectivity. Equipment connected to Web Remote will interface with the Internet or LAN to provide monitor and control capabilities in any location via IP.

Connections to the system are made via standard DB-25 connectors for monitoring inputs and control outputs. The card version is powered from the ZX transmitter and the rackmount version by an external 5 VDC power supply. The system includes standard connections to either a LAN or the Internet via a RJ-45 connector.

For more information, contact Harris (513) 459-3400 or visit www.harris.com.

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3. Our features are easy to sell — for rookies and veterans alike, whether by telephone or in-person, to one or two large sponsors or many smaller ones.
4. Our features are easy to produce — generally you just tag 'em and run 'em!
5. Our campaigns are modestly priced — most stations turn a huge profit every time (which is why they keep coming back for more!)
6. Our series make great "signature campaigns" for NTR advertisers — non-retail types love to have a reason to be on the air...and we provide it!
7. Beyond Customer Service — whenever a station has questions about selling a series, we're happy to visit with the sales staff to help 'em out. No extra charge. We want you to succeed with each campaign you use!
8. Fully-produced by seasoned professionals — adding one or more new voices to your station!
9. We make it easy for your customer to say "Yes!" — when you play a produced feature with the client's tag, he hears just how good the finished product is going to sound on the air - and you make another sale!



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For information on affordable advertising call David Carson at 615-776-1359 or email dcarson@nbmedia.com.

TECH UPDATES

New Nautel Transmitters Accessible from Anywhere

Nautel FM and AM transmitters introduced over the past year have the ability to be controlled from anywhere thanks to the company's Advanced User Interface.

The Nautel AUI, which is standard in NV and NX series transmitters, allows operators to control the system either locally or remotely. All local display functionality can be accessed remotely.

Nautel touts its approach to transmitter control as unique. Rather than put all of the high-level control functionality into an exciter, Nautel treats the exciter as a module and instead uses its control interface to manage the whole transmitter including its exciters. This approach, Nautel says, brings greater control and avoids burdening the user with the cost and confusion of separate controls for the transmitter and each of its exciters.

Using a 17-inch touchscreen display and embedded instrumentation, along with metering and status indication plus a TCP/IP interface, the AUI is a dashboard to drive new features in Nautel's transmitters. Screens are easy to set up and read.

The AUI makes use of information-gathering features built into the transmitters. It is automated with a top-down interface; the user selects the desired mode to run and it pops up. Metering can be configured down to the level of every amplifier, which aids in troubleshooting. The AUI keeps a history of operating levels so that the user can effectively go back in time to when a fault occurred and determine the cause.

A key feature is the built-in spectrum analyzer. While other manufacturers have added spectrum analyzer functionality to their exciters, Nautel says, it uses the spectrum analyzer to cover the entire transmitter. This is a valuable addition to the unit's system monitoring and control. The AUI also offers a constellation view of the HD Radio signal, giving visual indication of any problems.

In addition to local access, the Nautel AUI can be controlled remotely via any Internet-based device including smart phones. The user simply opens a Web browser, enters the transmitter's IP address and is connected. All of the AUI's display functionality is available on the browser.

For more information, contact Nautel at (902) 823-3900 or visit www.nautel.com.



NTI Extends Minirator MR-Pro Capabilities

The MR-Pro audio signal generator from Neutrik Test Instruments (NTI) is delivered with more storage capacity, now 512 MB. This allows storage of 16 times more tests signals than the previous version. That should translate into up to 80 minutes of audio. Units already in the field can be upgraded by the factory.

Another upgrade is firmware revision 2.10. Improvements include offering compatibility with the Apple MAC OS versions 10.4 onwards running on G4/G5 as well as on the new X86 architectures.

Also, in response to customer feedback the impedance measurement of the MR-Pro now handles power calculations for 35 V, 140 V and 200 V voltage distribution systems, in addition to previously supported 70 V and 100 V systems. This test of the calculated apparent power simplifies the load verification in distributed loudspeaker systems.

Along with firmware V2.10, a WAV file set with sinusoidal subsonic frequencies between 1 Hz and 10 Hz is available for download. Each file generates a pure, low distortion sinusoidal waveform at a fixed frequency. With this set of WAV files the MR-PRO serves as a signal stimulus for vibration sources.

The MR-Pro analog audio generator provides a complete set of analog audio test signals, in addition to measuring load impedance, phantom voltage, balance and testing cables, all in a palm-sized, battery powered instrument

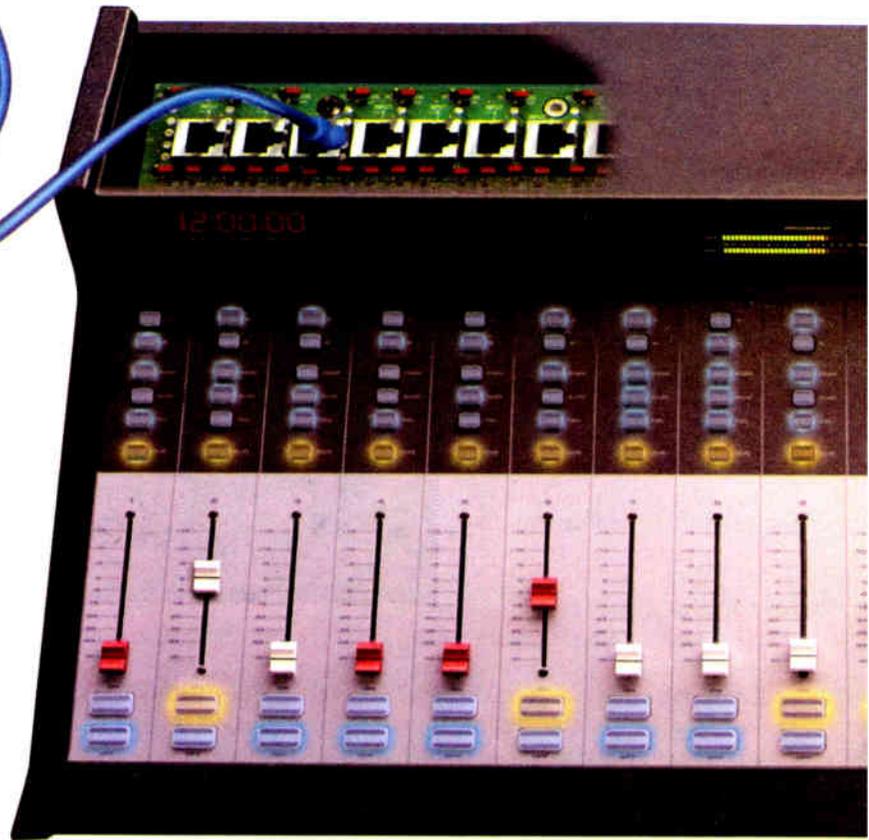
For more information, contact NTI Americas at (503) 684-7050 or visit www.minstruments.com.



StudioHub+ Inside



Plug and play your next installation with Radio Systems Millennium Broadcast Consoles now with StudioHub+ inside — the Broadcast Wiring Standard!



ANALOG Two inputs per channel with fully agile - mic thru line sensitivity on every input • Soft touch, LED lit ultra-wear rubber keypads • Two stereo program buses with TEL mix minus bus output • Up to four additional mix-minus outputs available • Full metering and monitor section • Up/down clock/timer with master sync capability • Complete GPI channel remote control provided for all A & B inputs • Available in 6 / 12 / 18 / 24 channel frame sizes



DIGITAL AES/EBU or analog on any input channel • Mic thru line sensitivity on every analog input • Soft touch, LED lit ultra-wear rubber keypads • Two stereo program buses with TEL mix minus bus output • Ten fully programmable mix-minus outputs — standard • All outputs provided in analog and digital simultaneously • LED VU or PPM metering and full monitor section • Up/down clock/timer with master sync capability • Complete GPI channel remote control provided for all A & B inputs • Available in 6 / 12 / 18 / 24 channel frame sizes



NETWORK Six IP audio Livewire channels with LCD selectors • Local input channels with two inputs per channel / analog or digital / mic thru line • Soft touch, LED lit ultra-wear rubber keypads • Two stereo program buses with TEL mix minus bus output • Ten fully programmable mix-minus outputs — standard • All outputs provided in analog and digital simultaneously • Full metering and monitoring • Up/down clock/timer with master sync capability • Complete GPI channel remote control provided for all A & B inputs • Available in 6 / 12 / 18 / 24 channel frame sizes

ANALOG is good. There are over 4000 analog Millennium consoles in service today and we continue



to manufacture and ship analog consoles every day. That's because these boards are inexpensive, sound great (with specifications that rival and exceed many digital designs) and have enough features for many small and medium market applications. For more demanding applications, our analog consoles optionally can be equipped with additional mix-minus outputs, distributed output busses and redundant supplies making them even more capable and still a great value.



Going **DIGITAL** is a process. Radio Systems eliminates some of the stress with our NO CHARGE Digital upgrade program. For the life of your console we will swap any analog plug-in card for a digital one (or vice-versa) allowing you to gradually transition your studio to digital. You can even start out all analog and convert one channel at a time as digital arrives in your facility. But from day one your Millennium Digital console will out-put pristine digital audio to feed your air-chain processor and produce up to ten fully configurable mix-minus feeds.

At Radio Systems, our **NETWORK** is IP Audio by Livewire®. We've adopted this proven multi-channel standard from Axia® and installed it in our digital consoles. But we left local inputs as well to create the perfect hybrid of stand-alone and network capabilities. This way Millennium Network consoles easily mix local studio sources and connect to all Livewire enabled devices using standard Ethernet switches.



StudioHub+® is the glue of our entire console line. Use our award-winning CAT-5 wiring system to simply and quickly plug any source into any console channel. Or, easily configure custom talent panels and even interstudio tie line connections. And its value doesn't end after the installation is over. RJ-45 connectors allow new sources to be added at any time and makes trouble shooting easy.



*Livewire is a registered trademark of TLS Corp.
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TECH UPDATES

Prism dScope Upgrades Software

Prism Sound has introduced new software for its dScope Series III audio analyzer. Registered dScope users can download the software free of charge.

Version 1.2 represents an upgrade in functionality and incorporates new features including additional tools for acoustic measurements, PC audio and 192kHz sampling on digital audio interfaces.

Prism dScope Series III is suited to testing signal paths in the broadcast and production environment; it includes AES17 scripts for implementing the AES recommended practice for characterizing digital audio equipment. It can also perform a rapid multitone-based "quick check" giving frequency response, distortion, noise and crosstalk analysis in as little as two seconds. In addition, the company says, dScope is suitable for situations where testing for proving reliability or finding intermittent faults is required.

Using dScope, measurements such as THD+N can be monitored with precision in real time for evidence of any glitches and the results logged to file. A similar approach can also be taken with the dScope's "confidence test," where a known bit-sequence is transmitted and then checked by the analyzer for errors. This is so accurate that a single bit error in a 24-hour test period will be detected.

Other version 1.2 features include 192kHz sample rate support on AES3 and S/PDIF digital audio interfaces; analog I/O can now sample at 48 kHz as well as 96 kHz and 192 kHz to increase LF resolution of the FFT analysis; very fast measurements (including frequency response) using swept-sine (Farina) method or bin-centred noise with impulse response and FFT; time domain averaging to reduce the effects of random noise on measurements; script debugger allows breakpoints, single stepping, examination/setting of variables; support for measurement microphone sensitivity and frequency response calibration; support for acoustic measurements of transducers and rooms and quasi-anechoic measurement using an adjustable time-window to eliminate acoustic reflections

Prism Sound has also incorporated smaller enhancements and improvements. Among these are the ability to import and export sample buffers and WAV files; enhancements to the user interface; the ability to run a script on every sweep step; new Trace Transformations; clipping warning indicators on monitor outputs; a new dB SPL unit; the ability to run multiple scripts simultaneously and a new non-intrusive warning system to give users warning of potential set-up problems.

For more information, contact Prism Sound at (973) 983-9577 or visit www.prismsound.com.



Davicom MicroMAC Is a Low-Cost Control Option

The new Davicom MicroMAC is designed to handle the remote-control and monitoring needs of users needing full capability but having only a small budget.

The MicroMAC's I/O set includes eight metering inputs, eight status inputs and eight built-in 60 W relays. Communications with the low-cost unit is achieved over dial-up or with the included (secure) IP network interface.



The MicroMAC operates with the same graphical user interface as other Davicom MAC products. The MicroMAC is as intelligent, with condition-driven and event-driven programming capabilities. It boasts a choice of communication means, including voice/DTMF, PC, FAX, e-mail, pager, text messaging and Web browser. It also allows access via a BlackBerry or smart phone through the wireless Web interface.

Local connection is achieved through the front-panel USB device port while the back-panel USB host port is used to connect external modems and memory devices and can be used for EAS logging record-keeping

Like other Davicom MAC products, the MicroMACs are designed not to "alarm users to death." Their deglitching delays and hysteresis ensure that only real alarms are sent to on-call personnel, the company says. The units are also designed to be robust to ESD and EMI, they are EMC tested at voltages up to 12 kV and fields up to 10 V/m.

For more information, contact Davicom at (877) 282-3380 or visit www.davicom.com.

Fanfare TRO Replaces Demod, Remod at Translator

According to Fanfare its FP-TRO receiver/translator for HD Radio and analog eliminates the necessity for demodulation and remodulation at a translator.

Instead, the "TRO" converts the modulated carrier internally from one frequency in the FM broadcast band to any other frequency within the band.

TRO is capable of translating cleanly, to the next adjacent, without any visible (scope) or aural interference, according to the company. To complete the installation, a linearized PA system is required.

As such, a TRO-equipped translator does not demodulate the signal and therefore does not impinge on any intellectual property for which licensing may be required, the company says.

Fanfare also offers high-gain directional FM antennas for concentration on stations in a specific direction, and minimizing reception from stations in other directions; vertical



omnidirectional antennas for reception of FM stations in all directions; a mobile version of the FM-2G-type antenna; and antenna accessories to optimize installation such as lead-in cable, connectors, rotators and switches.

For more information, contact Fanfare at (866) 26-TUNER (268-8637) or visit www.fanfarefm.com.

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TECH UPDATES

CircuitWerkes Sicon-8: Expandable Control

The CircuitWerkes Sicon-8 is an eight-channel, dialup- and Internet-capable remote control that can be expanded up to 32 channels.

Voice responses are user-recordable and can be uploaded digitally or as WAV/MP3 files or recorded in analog mode. The internal Web server's two-second update time means that you see responses in near-real time, even when using 32 channels. The server has been designed to perform on major browsers including IE, Firefox, Opra, Safari and Chrome. It works on platforms including Windows, MAC OSX and Linux.

The Sicon-8 uses an internal voltage reference to maintain calibration over broad temperature ranges and with widely varying input samples. A battery-backed real-time clock and 128-event scheduler handle multi-step timed events such as power and pattern changes.

The Sicon-8 includes the Sicontroller software that gives the user enhanced control and programming capabilities. Multisite capability lets users control several sites from one computer.

The free software includes a firmware updater, allowing users to add features to their Sicon-8 hardware in the field. Advanced logging, e-mailing alarms and virtual metering are included in the software. A scripting tool automates complex tasks from within the software and can be used for managing items like power changes or backup transmitter operations where status and meter values must be read and used as part of a decision process.

By adding an accessory, the Sicontroller software can be used to access and program the Sicon-8 over the Internet. This provides a second method of Internet control in addition to the internal Web server.

The system's I/O, including eight channels of relays, are featured on the main chassis. Circuits that interface with the outside world are built on replaceable daughter boards, including the telephone interface, relays and Web server. Metering, status and control connections are on de-pluggable screw terminals. The hardware is expandable to 32 channels by adding up to three additional SX-8 expander chassis.

For more information, contact CircuitWerkes at (352) 335-6555 or visit www.broadcastboxes.com.



ATI Now Shipping DM500

ATI is shipping its new, "Cool Stuff" Award-winning Portable Digital Audio Monitor.

The DM500 is both a digital audio monitor and digital-to-analog converter in a portable carry case. It accepts AES/EBU and S/PDIF digital audio formats from 27 through 96 kHz sample rate via XLR, BNC and RCA connectors. A 24-bit D/A converter feeds a stereo headphone monitor amplifier, balanced analog line outputs and a stereo LED meter.



The DM500's display tells the user about a digital audio signal including input level, sample rate, validity and errors. The stereo VU meter can be switched to indicate headroom below 0 dBFS (the digital maximum output of the D/A) or the analog output level with 0 dB midscale equal to +4 dBm output. Analog display ballistics are PPM for optimum indication of audio peaks.

The DM500 is suitable for digital signal troubleshooting on the go, but is also at home on the bench or in a rack. Audio loop-through connectors let you insert the DM500 into a digital signal path, with input termination also provided. A battery clip for field work is included, or use an available external 24 VDC power supply.

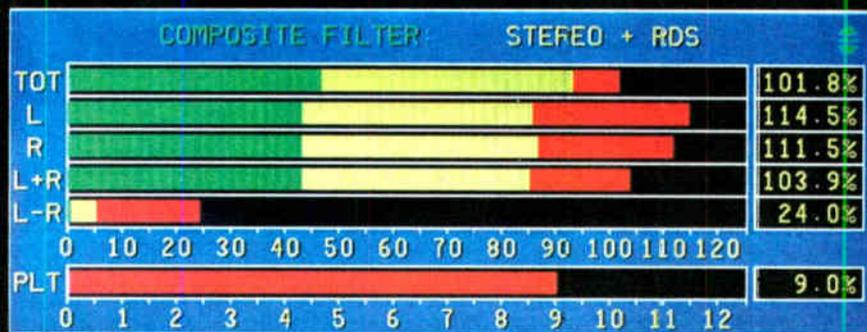
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TECH UPDATES

RFC-1/B: 8 Channels of Telemetry, Raise/Lower Control

Sine Systems' model RFC-1/B remote facilities controller is a transmitter remote control system that can be accessed through a standard telephone or wireless/cellular phone. Telemetry readings are reported with a male human voice.



The basic system consists of an RFC-1/B and an RP-8 relay panel that provides eight channels of telemetry and raise/lower control. Eight relay panels can be connected for a maximum of 64 channels. The RFC-1/B can be programmed to perform automatic power/pattern changes and log readings. It also can be programmed to alert station personnel during an alarm condition. For telephone line and telemetry signal surge protection, the company suggests the SP-8 surge protector.

For more information, contact Sine Systems in Nashville at (615) 228-3500 or visit www.sinesystems.com.

Relio From Audemat Delivers With ScriptEasy V2

The Audemat Relio is a 1U enclosure facility management unit that provides 64 digital inputs, 64 digital outputs and 24 analog inputs, four serial ports (RS-232, RS-422 and RS-485), two Ethernet ports, four USB ports and one phone-line connector.



It is now delivered with new ScriptEasy V2 graphical software that includes the new MasterView viewer. MasterView is a graphic user interface that allows fast and flexible creation of multiple "views" where users can see information from and control remote equipment over a network connection. Simply drag and drop I/O data and logic functions to generate monitoring and control scripts.

Also part of the package is a voice DTMF interface with an included library of some 700 words and the capability to upload user created voice files.

The Relio is "IP-based." It supports HTTP, SNMP, FTP protocols. It includes a SMTP server for alarm sending via e-mails. Also new is the capability of monitoring and controlling equipment using SNMP GET/SET commands as well as PING commands.

For more information visit www.relio.us.

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- LED indicators for each alarm and status output
- Opto-isolated outputs to protect external site monitoring equipment
- Easy setup — one button calibration
- Easy to install — installs inside the transmitter building, even if the lighting control equipment is located at the tower
- Insures total lighting compliance — alarms for single bulb failure (marker and beacon), beacon flash rate or on/off ratio outside of FAA specifications and photocell failure
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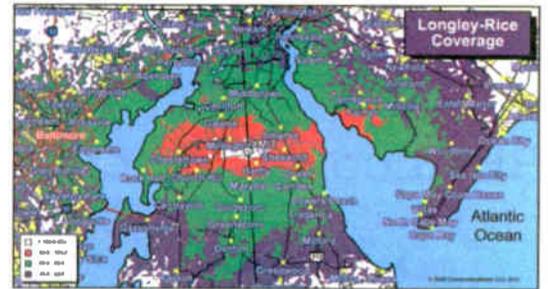
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◆ READER'S FORUM ◆

(By the Way, Don't Do This)

Just picked myself up off the floor after reading Steve Lampen's article ("Caveat Emptor Is Always Good Advice," Sept. 24).

It reminds me of a service manual for the Sony BTU-200A Umatic video recorder. The manual gave at least a page and a half of instructions about how to connect the scope and the digital volt meter, and which direction to approach the adjustment from (CCW vs. CW) — then, as the *last* item, at the bottom of the page, it tells us: "Do NOT make this adjustment as much as possible."

Not near as funny, but further proof that "six weeks of English might not be enough."

Randal W. Howard
Chief Engineer
KJLL(AM)
Tucson, Ariz.

Tech Support's Vicious Cycle

I tend to agree with the engineer Paul McLane mentions in "Products That Work, Out of the Box" (Sept. 24).

The trend of inadequate support and documentation has been surfacing for several years and has been most notable in automation systems. In my opinion, as PCs continue to be used in or as the platform for equipment we use, the trend will continue.

I think this mimics the model established by Microsoft, which rarely documents adequately; I believe MS along with the entire IT industry is likely responsible.

The push to get large volumes of inexpensive product to market — product often not really ready for the real world — as well as the attitude that "documentation is available online" are keys to the lack of adequate documentation and support. In addition, "support fees" and "extended warranties" are big revenue generators.

Unfortunately, the average first-line support technician knows little about the product, often frustrating the average engineer, who actually knows more. The engineer is further frustrated by time wasted "going through channels" trying to reach someone who can really help.

Compounding the issue is what I will refer to as a "throw it away" mentality.

I recently purchased a headphone amplifier. The cost was \$25. Frankly, if it doesn't work out of the box, it really isn't worth my time to do anything but order another. Regardless of when it fails, I will simply throw it away and purchase a new one.

I find it ironic that PCs — which are generally assigned a usable life of three to five years — are being used in transmitters that typically boast a 15-year usable life.

Further, in times past we would purchase audio delivery systems (cart machines, etc.) and expect them to serve 7 to 10 years, longer in some cases; but again we are now relying on PCs with half the life expectancy for audio delivery.

The short life span of software means that a new "better" product is expected in the very short term, which leads to the need for improved hardware, which leads to rapid obsolescence of hardware.

Therefore it is necessary that hardware be inexpensive, which means it is generally manufactured in the most inexpensive way possible with a short life expectancy.

The short life expectancy of software and equipment leads to inadequate training for support techs because they must learn the new product and have little

I find it ironic that

PCs — which are generally assigned a usable life of three to five years — are being used in transmitters that typically boast a 15-year usable life.

— Roger Taylor

experience with the old, while the "new" product will be the "old" in a matter of months, again leaving the tech with little experience with any product they are expected to support.

Further, documentation takes time, which is generally unavailable because a new product is out before adequate documentation can be completed for the old. The push to get volumes of product "out the door" to make way for the latest product generally means the product is rarely set up and tested adequately.

There are manufacturers that are still "old school" and provide outstanding support and excellent product, but they seem to be a rare breed these days.

Roger Taylor
Director of Engineering/IT
GAP Broadcasting
Lubbock, Texas

Cessna Won't Teach You to Fly

I'd like to comment on the issues raised by the user who found lacking documentation on his exciter and transmitter purchases ("Products That Work, Out of the Box").

I can think of several reasons for this.

First, some designers excel at their craft but are not good writers or have the ability to relate their thoughts to others on paper. I once had a flight instructor who was a good pilot but not a good instructor. His inability to relate techniques and issue constructive criticism caused me to no longer engage his services.

See DESIGNERS, page 45 ▶



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GUEST COMMENTARY

Radio Thrives in Digital Age

Both Legacy FM Radio and Emerging Services Demand an Increasingly Broad Palette of RF Solutions

by Mick Bennett

Three key factors underpin the long history and bright future of radio broadcasting: a robust business model, relatively simple technology and overall cost-effectiveness.

Over the past century, broadcast radio has evolved into the most ubiquitous medium of the broadcast world.

Heard in almost every household, street corner and village around the world, broadcast radio continues to be a vital and fast-growing sector.

Core objective

Even pitted against a growing field of highly competitive alternative media, the “bullet-proof” broadcast radio business model has analysts predicting that legacy analog radio has a long future.

Nevertheless, it is widely understood that emerging digital radio variants will sustain and shape the future of radio over the next decade.

Around the world, the commercial radio broadcasting market is renowned for its fiercely competitive nature and the core objective of broadcasters to establish and retain market share.

FM radio — the most refined analog offering — tends to be regionally localized, leaving openings for more radio broadcasters to join the market.

As a result, the industry is experiencing dual pressures — one from new broadcasters wanting to join the market, the other from incumbent broadcasters looking to expand their services and thus hold on to market share.

Both require spectrum and broadcast infrastructure in an increasingly congested climate.

Spectral squeeze

This “spectrum squeeze” in the FM radio world has inspired a wide range of innovative RF broadcast solutions.

Traditionally, FM is broadcast in part of the VHF band II as 200 kHz channels with 800 kHz spacing.

Spectral squeeze is now behind a rising trend to shrink this channel spacing to 600 kHz and address any



Mick Bennett

resultant receiver interference risks with sharper filtering options.

Where two-pole filters may have once sufficed, more sophisticated three- and four-pole filters are fast becoming the FM norm.

Similarly, the rollout of new FM services demands more space on increasingly congested broadcast towers. This demands a broader range of FM broadcast antennas, fea-

turing innovative radiation patterns, bandwidths, mounting options and physical compactness.

This diversity of need is the defining aspect of 21st century FM radio broadcast systems, which vary widely from site to site and from broadcaster to broadcaster.

Technical challenges

The transition to digital radio is now well established in many parts of the world, most notably in the United Kingdom, the United States, Denmark, Norway and Switzerland.

The reasons for the push to digital radio are similar to those behind the digital television transition — spectral and commercial efficiency; enhanced services to complement traditional audio, such as text, images and listener interactivity; and improved quality.

In many respects, the choice of digital radio platforms comes down to national and regional availability of spectrum, specifically that in the VHF band III, L or S bands.

In the case of the more popular DAB/DAB+ platform, the major challenges include spectrum availability; addressing deployment models — conventional “broadcast” models vs. the “cell-style” topologies typi-

cally required in L band deployments — and the availability of receivers.

Arguably one of the most pressing technical challenges with DAB/DAB+ is addressing issues of RF filtering, power handling and voltage peaks.

The power of a DAB/DAB+ service can be as high as 10 kW — of the same scale as a DTV service — yet it is squeezed into a narrow 1.5 MHz channel. This exacerbates the digital service peak-voltage challenge, and also presents filtering and power-handling challenges.

Filter response

To meet these challenges, companies such as Radio Frequency Systems (RFS) are exploring solutions such as double cross-coupled filters, filters with not one but two cross-couplings. These achieve much sharper filter

Heard in almost every household, street corner and village around the world, broadcast radio continues to be a vital and fast-growing sector.

response in a fraction of the footprint of a conventional filter, along with a reduction in in-band insertion loss.

Also promising are technologies such as advanced water-cooled filters, in development at RFS. The first of their kind in the world, these filters specifically address the uniquely high power-to-channel bandwidth ratio of digital radio.

Digital radio antenna systems are also evolving and include a range of L band panels and VHF band III antenna solutions that help legacy FM and emerging digital services coexist on a single broadcast system.

In the future, challenges will stem from the evolving global “transmission mask” specifications for digital radio, most specifically, their interpretation and translation into practical network effective radiated power (ERP) levels and filtering solutions.

Though different generations, legacy FM radio and emerging digital radio services have much in common. Both will support the powerful and growing radio business model for some time to come.

For their survival and growth, both demand an increasingly broad palette of RF solutions, a rich mix of antennas, filters, combiners, feeders, patch panels and so on.

Flexibility and scalability, along with a complete end-to-end understanding of the radio broadcast system as a whole, are and will continue to be essential.

Mick Bennett is global product manager, Broadcast and Defense Systems for Radio Frequency Systems (RFS).

Designers

► Continued from page 44

Manufacturers prefer not to hire tech writers as it adds cost to the products.

Second, designers are under pressure to get out the next product.

With the pace of evolving technology there is fierce competition in the marketplace. It takes longer to construct and test a prototype, then mass manufacture it, than it does to design it. Designers are not afforded the opportunity to prepare detailed documentation. That was yesterday's product, let's work on the future, not the past mentality.

Third, consider the audience. What is the experience, competence and ability to the end user? Experienced engineers are becoming scarce. It is cheaper to have users call tech support than it is to use up the more valuable time of designers to write a manual that few will understand anyway mentality.

To the last point: Some years ago I was contacted by an engineer who

wished to purchase one of my software programs, one that designs antenna matching networks. I asked him some questions which anyone experienced in the design and adjustments of Tee networks would answer in a second. He could not.

fied to use the tool (software).

One of the key elements in all my programs is *user-friendly*. A well designed product should be intuitive to the qualified end user.

Let's look at some consumer devices. Some VCRs are nearly impossible to pro-

Designers are not afforded the opportunity to prepare detailed documentation. That was yesterday's product.

— Tom Osenkowsky

I elected not to sell him the program because I foresaw myself with endless “support” calls and having to do the design myself. He refused my offer to design the network if he provided me measured data. He was basically unquali-

gram without having to read manuals and decipher what was going on inside the designer's head.

Many designers are not users. Therein is a major problem. They design but do not have to maintain their creations.

I saw a documentary on the design process for the Boeing 777 jetliner. Boeing asked crewmembers for input. One captain was astonished at this. “You are asking me?” was his response.

I recall Harris saying that field service had a lot of input on the design of a new series of FM transmitters because engineering was tired of hearing their complaints of inaccessible components, adjustments, etc. A wise move.

Back in my younger days when I thought life was all about cold beer and crazy women, I worked in manufacturing. It was an excellent education in the process of design, prototyping, testing and manufacturing a product. I believe I speak with some expertise on this subject.

Cessna will sell you an airplane and ensure it operates within specifications. They will not, however, give you flying lessons.

*Tom Osenkowsky
Brookfield, Ct.*

The author is a radio engineering consultant and contributor to RW. Opinions are his own.

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A Vote for Change

Election Day 2008 Has Multiple Implications for U.S. Broadcasting

Nov. 4 was a momentous day in U.S. history and marked a true inflection point in the country's political trajectory.

Another vote taken that day could presage similar implications for the broadcast industry.

Some will have noticed that FCC commissioners also met and voted to approve the unlicensed use of "white spaces," the unused DTV channels in any given market, post-analog TV shutdown, for WiFi-like networking of consumer devices.

Putting aside the technical merits of this decision — and questions on validity of claims that this will cause harmful interference to DTV stations and wireless microphones that share this spectrum — the vote suggests an important shift in the halls of D.C. politics. It was another resounding defeat for the once-vaunted juggernaut lobbying power of the NAB.

The vote put the association's recent record at 0–2 in its highest-profile policy battles of 2008, the previous loss coming in the satellite radio merger case. It meant that NAB spent a lot of its members' dollars and political capital in two losing battles this year — not even achieving compromise, but going down essentially to defeat on both.

Looking ahead at the incoming administration and Congress, we wonder how successful NAB will be in pursuing its positions on other pending matters, like LPFM and media ownership. A new, Democrat-controlled FCC conceiv-

ably could rule against NAB's position on the remaining open issues in the IBOC proceeding, regarding a potential bandwidth cap and/or tax on datacasting.

Worst of all, if the NAB also loses on what will likely be its next highest-profile issue, music performance royalties for broadcast radio — or the performance tax, in NAB's term — it could be three strikes. It's hard to say how the new Washington environment will play out on this critical issue or when; but the stakes for an NAB victory in this case are certainly made even higher by its recent record. (And even though President-Elect Barack Obama has said he does not support renewal of a Fairness Doctrine, at least some Democrats would like to see one return, a topic on which NAB would surely attempt to lead opposition.)

Some might be tempted to see these recent developments as more than just the ups and downs of Washington business as usual, but rather the beginning of the end of an era in Washington power circles. We suspect that's a simplistic reading and that NAB, like so many influence-seeking entities, will adapt with the times and the climate. But we will be watching closely as the Obama administration and other newcomers take their seats and consider our industry's — and its advocates' — fate.

— RW

◆ READER'S FORUM ◆

This Is Insanity

Watching the spectacle of the industry I have loved, lived and breathed for over 41 years, relentlessly and disastrously pressing the failed technology known generically as IBOC, reminds me of nothing so much as the common housefly impotently crashing against a pane of glass in his attempt to escape into the sunshine.

Maybe if we try the same thing for the 13,000th time, we'll get what we want!

Memo to the HD Radio contingent: Stubbornness is not a valid substitute for true innovation.

A year after The Great HD-AM Nighttime Rollout, the adjacent-channel interference being visited on helpless distant stations from those operating with HD-AM at night has been nothing short of disastrous.

Legacy 50 kW major-market signals are annihilating their neighbors, frequently co-owned facilities, so that even local coverage AM coverage in distant markets at night is severely compromised.

And now the fix proposed for HD-FM's coverage problems is to repeat the AM debacle on FM via a digital power increase?

Let's all recall the time-worn advice that "the definition of insanity is repeatedly making the same mistake but expecting a different outcome."

Many experienced engineers feel that 10 dB will do nothing but transplant AM's adjacent-channel problems up into the VHF spectrum while providing little real-world improvement in digital penetration. And don't fantasize that increasing digital HD-FM power by some lesser factor is a practical notion. It portends a regulatory morass with enough lucrative litigation potential to gladden the heart of any trial attorney.

It's tragic how we continue to argue and tinker with a technology left behind

by the listening public and the majority of broadcasters long ago, while wireless Internet radio and other competing platforms thrive and grow.

Terrestrial radio's fortunes continue their slow decline; radio companies have slid into penny-stock territory as audiences and revenues shrink.

This is not the time to pit broadcaster against broadcaster over HD Radio interference issues. We need to present a united front, clean our programming house and offer real, not illusory value to our listeners and advertisers instead of endlessly wrangling over a technology nobody in the real world cares about.

To the radio industry, HD Radio is Dumbo's feather. If we just let go of it, we'll find that we can fly.

Robert C. Savage
 President/CEO
 WYSL(AM)
 Avon, N.Y.

tried to teach me something about what he was doing.

Jeff, Jack Didier, Jeff Goode and also Dan Mettler and Mogan David — these gentlemen were the reason I took up the cause and pursued electronics, and eventually got the chance to work the circuits. I got more shots working "with pictures" for a Fort Wayne TV station, and installing for Harris Broadcast on a few jobs. Right now I'm out of the biz, but always looking.

Guys like Jeff, Dan, Mogan, Jack and Jeff Goode are what's right about broadcasting, and it's time they get their due, especially from me. By honoring Jeff, you have done that for me.

Congratulations, Jeff, from a former "radio rat" from CC.

John Corbin
 Fort Wayne, Ind.

Jeff Littlejohn

When Jeff was working for Broadcast Circuit Systems he engineered for my high school station, WJHS (FM), in Columbia City, Ind.

I was getting used to just running the gear and had not thought of trying to fix it. Jeff used to come in and really give me all sorts of grief over the music I would play and the things I said. (I probably deserved it too.)

But the few times he got into a piece of equipment or "down in the blocks," he

HOW ARBITRON DESCRIBES YOUR DIGITAL STATIONS. Page 6

Quincy Bound? Nautel plans a sales and support office in a city with an RF history. Page 3

Studio Time Machine A former engineer evolves to cart machine. Page 10

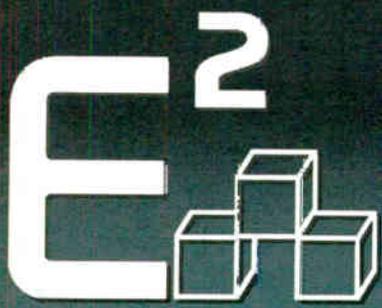
FEMA Says 'Yes To CAP' But Manufacturers' Broadcaster's Safety Funding Are 'M' by Randy J. Stone

WASHINGTON The most alarming proposal... Jeff Littlejohn of Clear Channel is the prototype engineering executive for an industry where business now goes beyond 'tail towers and big fields.' He is the recipient of Radio World's 2008 Excellence in Engineering Award. Page 8

INSIDE ENGINEERING The heart of any effective planning is a robust system in a central ground system. Page 12

STUDIO SESSIONS WAWZ in Josephsh N-1 faces its new facility. Page 30

GM JOURNAL Life Haven and... Page 30



Ethernet Audio Done Right



MEET THE SQUARE

The Wheatstone E² (E SQUARE) gives you the convenience of Ethernet audio without all the IP hassle. It just *knows*. The built-in Setup Wizard lets you configure an entire system with just your browser and a laptop. Unplug it when you're done and there's no PC between you and system reliability.

SQUAREs are totally scalable: use one as a standalone 8x8 studio or transmitter site router, with browser access from anywhere. Plug two together and have a standalone digital snake. Add a fanfree mix engine and build yourself a studio using analog and digital I/O SQUAREs.

All the power is *in* the SQUARE. Distributed intelligence replicates all configuration data to every unit. Profanity delay and silence detection are done *in* the SQUARE. Even virtual mixing (w/automation protocol) —it's *in* there; all with real front panel meters, 32 character status indicators and SNMP capability.

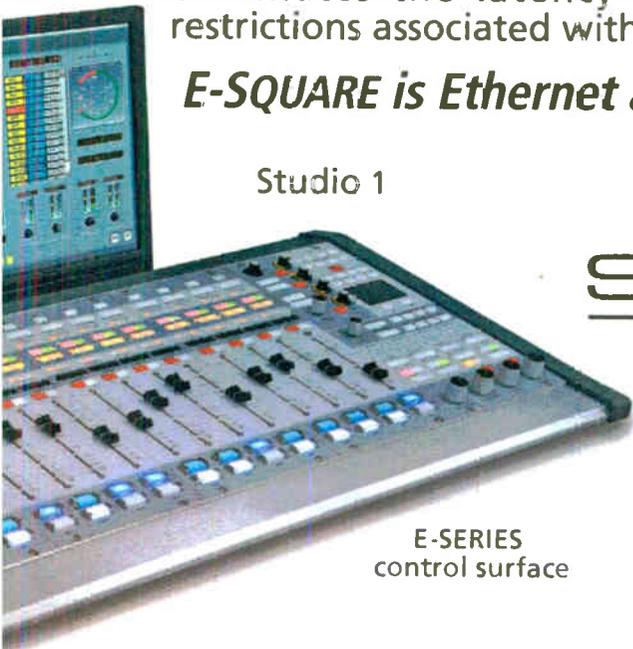


88E DIGITAL ENGINE: Just plug an E-SERIES control surface or GLASS E computer interface into this engine and get all the mixes, mic and signal processing you need. Fanfree, so it can stay in the studio where it belongs.

Because the E² system doesn't rely on a third party GUI, tech support is straightforward (and 24/7). Likewise, system operation doesn't require external PCs for continued full functionality. Best of all, 1 Gigabit protocol eliminates the latency and channel capacity restrictions associated with older technology.

E-SQUARE is Ethernet audio done RIGHT!

Studio 1



E-SERIES control surface



88D I/O: 8 digital inputs and outputs. You can headphone monitor and meter any of the SQUARE's inputs or outputs in real time. The 32 character display gives you all the information you need about your audio and system configuration. And because you can operate in either 8-channel stereo or 16-channel mono mode, 16 channels of metering are provided.



88A I/O: 8 analog inputs and outputs. You can bring a new SQUARE up in seconds and of course use the front panel encoder for your X-Y control. Front panel status LEDs give you continuous link, status, and bit rate information as well as confirmation of any GPIO activation.

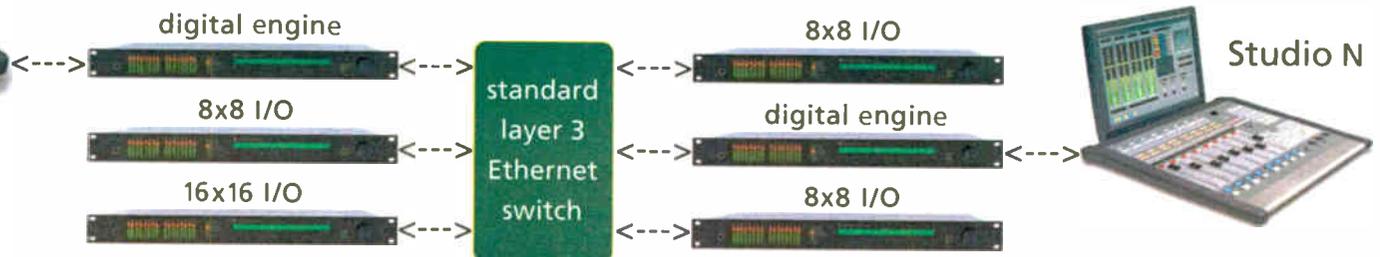


88AD I/O: 4 analog plus 4 digital inputs and outputs—perfect for small studios or standalone routing.



88 I/O CONNECTIONS: E² has both DB-25s for punchblock interface and RJ-45s for point-to-point interface. All SQUAREs have 12 individually configurable opto-isolated logic ports that can be either inputs or outputs.

STUDIOS DONE EASY!





While the two usual suspects slugged it out in the loudness war, we quietly developed the ultimate weapon for the REAL challenge:

WINNING THE RATINGS WAR

Basic loudness is simply not the draw it was in the last century. Today, with so many options for audio delivery, getting and keeping listeners means you need to SOUND GREAT across all media. That's why we developed VORSIS – to deliver clean compelling audio that cuts through the muck without fatiguing those all-important ears.

With Vorsis, we rethought the whole process – developing new tools to let your station deliver the best possible sound to each and every one of those 20th century radios, not to mention the great new standard and hi-def radios being produced in THIS century.

With Vorsis, you're never stuck with your processor's signature sound. You have a full toolset to create your own magnificent sonic signature – one your listeners can key into just by scanning the dial. For the first time, you have the capabilities of bringing true fidelity to FM, AM, and HD/DAB radio.

Intrigued? Call us or visit us on the web to learn more or set up a demo. You'll be happy you did. Vorsis – more listeners listening more.



W H E A T S T O N E
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