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March 2008
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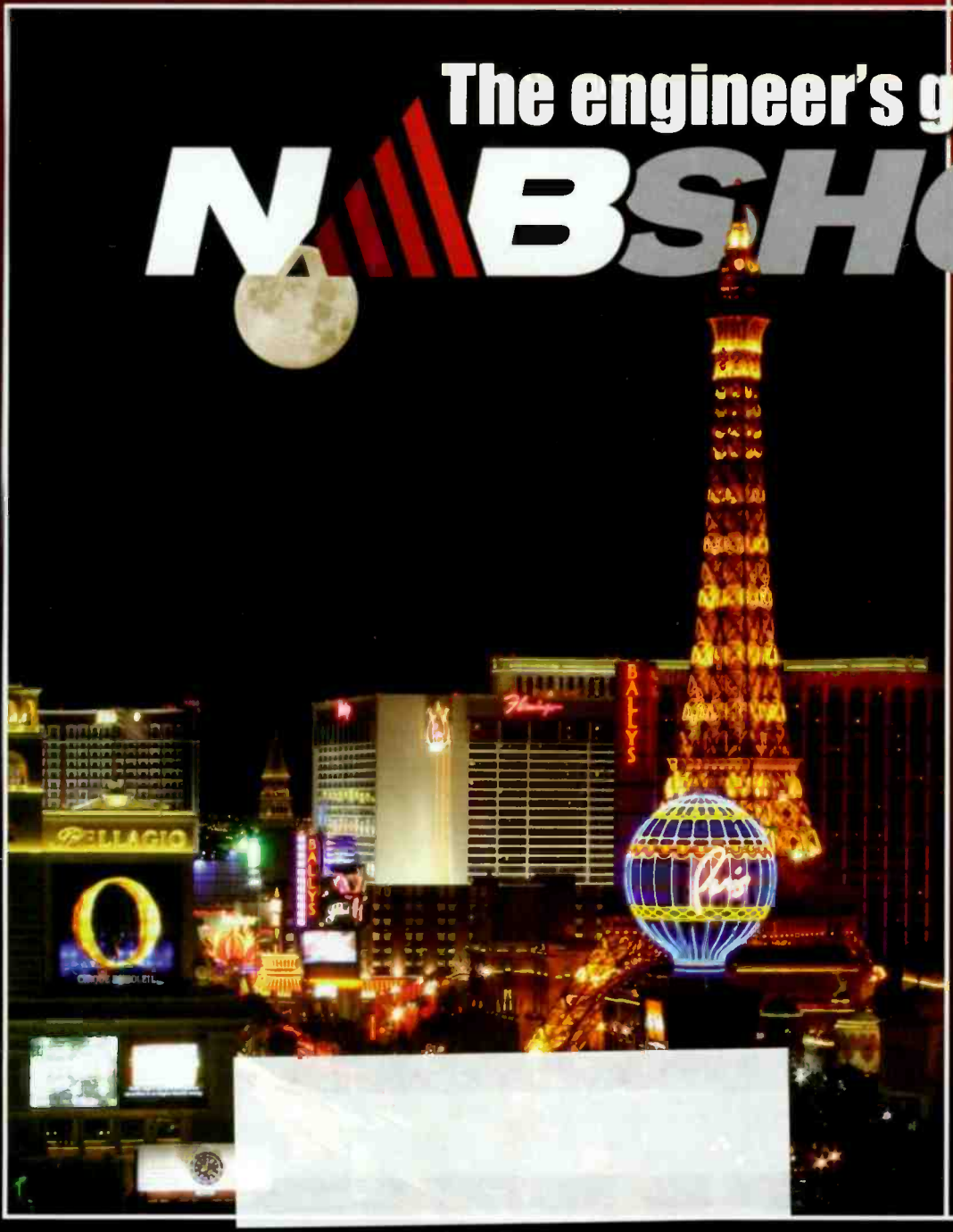
The engineer's guide to the NABSHOW

Everything from products to sessions



TECHNOLOGY

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FIELD REPORTS

Day Sequerra M2.2R
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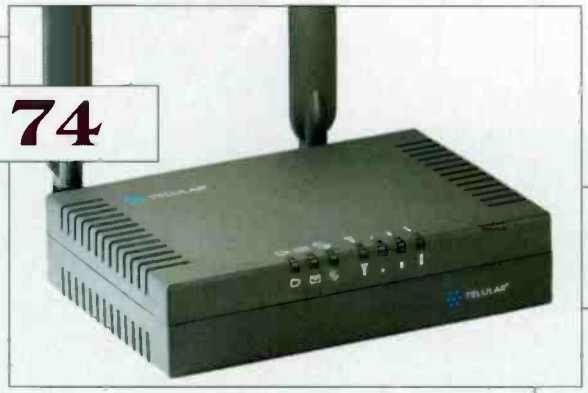

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ON THE COVER

The 2008 NAB Show in Las Vegas is quickly approaching. Starting on page 14, we'll fill you in on all you need to know to make the trip go smoothly. Cover design by Michael J. Knust.

Features

Columns

Departments

Wireless Broadband Internet Remotes

"The first time out with the Tieline was a brilliantly simple experience for everyone involved. For lack of a better phrase, the codec just worked."

- **Christian Vang**
  Chief Engineer
  Clear Channel St. Louis

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- **Grady Jeffreys,**
  Technical Manager,
  Mackay Communications

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- **Mike Rabey**
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Currents Online

Selected headlines from the past month.

FCC Ordered to Study Bird-Tower Collisions

The U.S. Court of Appeals for the District of Columbia Circuit sided with conservation groups and has ordered the FCC to study the environmental effect of towers built in the Gulf Coast region.

MRC Rejects PPM in Philly and NYC

The notice was revealed in Arbitron's annual filing with the SEC. Arbitron attributes the decision to old field tests, but is gathering new data to secure the endorsement.

Enco Systems Celebrates 25th Anniversary

The celebration will be held at the NAB Show. Enco was founded by Eugene Novacek and Judy Kane Novacek in 1983.

OMT Releases Imediatouch v3

The update includes 20 new features and user interface enhancements for touchscreen and drag 'n drop functionality.

Pregnar Named DOE at Entercom Wilkes-Barre/Scranton

Dan Pregnar takes over the duties previously held by Lamar Smith before he was promoted to director of engineering/chief engineer at the company's Austin, TX, cluster.

Nautel to Deploy Three 300kW Transmitters in Turkey

In addition to the NX series transmitters, Nautel will also provide services including site survey, installation, ventilation, transmission line, commissioning and site testing.

125th AES Convention Open Call for Broadcast Session Suggestions

The Audio Engineering Society is getting an early start on the plans for the 125th AES convention to be held in San Francisco from Oct. 2-5. Send brief proposals for broadcast-related subjects to 125th_broadcastevents@aes.org.

DRM+ Trials Continue in Germany

The University of Applied Sciences Kaiserslautern broadcast on 87.6MHz in DRM+ from its own experimental radio station on March 1.

Find the mic and win!

Tell us where you think the mic icon is placed on this issue's cover and you could win a Heil mic courtesy of Transaudio Group.

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Site Features

What's on Your Mind?

TALKBACK

Radio magazine has launched a blog, and we want to hear from you. Talkback is your chance to comment on articles, news items and general radio industry events.

FASTtrack for Your Handheld

Take the *Radio* magazine FASTtrack with you. We have adapted our exclusive FASTtrack and exhibitor booth listings into an easy-to-use application that will run on any handheld device. Access it online or download the files. Follow the link at RadioMagOnline.com.

Advertiser Links

Access Web links to the advertisers in the March issue.

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Convention time

All attention turns to the NAB Show this time of year. It is the biggest industry event of the year after all. Even if you don't go or have never gone, it still has some relevance, since this is where the latest product developments and technology introductions specific to broadcasting are unveiled.

We have even updated our convention preview approach to provide you with as much information as possible before you get to the convention. This year we call it the Engineer's Guide to the NAB Show, which is exactly what it is: your guide to what the convention offers to the radio engineer and technology manager.

I realize that not everyone in radio attends the convention. A trip for even a few days to Las Vegas isn't the cheapest destination, although you can find some travel bargains if you investigate. I've said many times before that even an occasional convention trip is a worthwhile effort for anyone's career. It's easy to be overwhelmed and unproductive, which is why you need to set a plan before you get there. Have a list of manufacturers to visit and sessions to attend. Try not to fill your schedule completely, because you will find plenty of unexpected things to take some extra time.

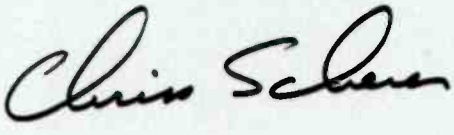
Still, if you can't make it to the NAB Show, look into local and regional conferences. Many of them are held with the support of state broadcast associations and the SBE, and offer a similar quality experience. You may need to convince a manager that it's worth your while to attend, so plan carefully.

One twist to this year's convention is that I already know I won't see some of the people I know who I usually see attending. Clear Channel and Entercom have cut back on the number people that are being sent. Like I said earlier, it's not always cheap to get to Las Vegas, and I understand that the financial situation has to be considered.

What concerns me is what could happen next year. It may be decided that there's no reason to send people to the convention again, especially when so much money was saved the previous year. I'm not saying that Clear Channel and Entercom will do this, but I have seen other companies and stations do this in the past. Once the expense is cut it's hard to get it back.

Sure, sometimes a session is more sales pitch than educational. Sometimes exhibitors are showing a box loaded with weights and a dummy display while touting a new product. But there's nothing that can replace the chance to network with other people in your field, and a regional or national convention can do that like no other opportunity.

I hope to see you at the convention. If not, I'll see you at an upcoming regional event.



At the Convention

I will moderate the session Communicating with Management on Monday, April 14 from 10:30 to noon at the convention. The session will be held in room S228. The second half of the session will be a roundtable discussion with several radio managers about improving a manager's commitment to the role that engineering and technology – and the engineer – play in the success of the station. Many engineers complain that management doesn't understand them. This is your opportunity to overcome that obstacle.

What's your opinion? Send it to radio@RadioMagOnline.com

Shark, shown interviewing BERT MCCRACKEN, lead singer for THE USED, says: "When Comrex told me that their internal code name for ACCESS was "THE NEXT BIG THING" I got it right away. This IS BIG – I was live, on the air, in places I could NEVER have gone with regular old technology. THANKS COMREX!"

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COMREX

Forgotten modulation methods

By John Battison, P.E., technical editor, RF

Electrified telegraphy was the first practical use of electricity for long-distance communication. This was a tremendous improvement over flashing lights and waving signal flags. The well-known Morse code was an essential part of the system. The requirement for accurate knowledge and use of the Morse Alphabet quickly brought a requirement for voice communication. Various inventors around the world, including the ubiquitous Bell and Edison, devised methods of electronic voice communication using wires. This, of course, led to a requirement for a wireless voice communication system.

Wireless communication was first accomplished by using spark wireless code transmitters with their typical ragged spark tone characteristic. Unfortunately, it was not possible to use anyone's microphone to efficiently and understandably modulate the spark transmissions. And so, as wireless communication improved, methods of generating continuous waves were developed. This also led to improved long-distance wireless telegraphic communication still using the Morse code and later to teletype operation.

The use of wireless signals produced the CW and ICW signals. Older hams will no doubt remember these symbols. They stood for continuous wave and interrupted continuous waves and required use of the Morse code. In order to make a continuous wave convey voice information it was necessary to modulate or change the nature of a continuous wave.

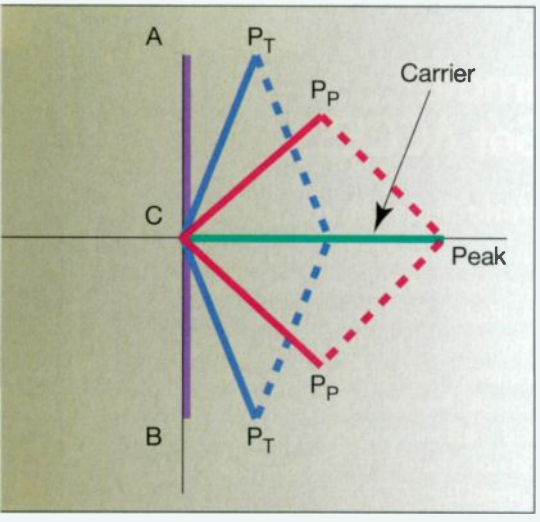

Figure 1. A vector diagram comparing the carrier and peak levels in out phasing modulation.

Vacuum tubes had not yet been developed and Arc transmitters (and later the Alexanderson alternator) were the main sources of continuous waves. Modulation of such waves was produced by inserting a carbon microphone in the antenna lead. This was somewhat effective, but as might be expected, microphones tended to overheat as antenna currents increased, carbon granules arced and audio quality suffered in general.

Then came the introduction of the vacuum tube and such microphone problems vanished, but a new problem developed. This problem, which was tackled by many engineers, was how to impress the signal voltages developed by the microphone onto the continuous wave (carrier) with the greatest efficiency. As various circuits were devised and patented, and as the widespread manufacture and sale of radio transmitting equipment increased, many efforts were made to develop new and different modulating circuits, and thus avoid the payment of license fees. *Radio* magazine has carried articles on many of the various modulation systems and in this issue we shall talk about the out phasing method of modulation.

Out phasing modulation

Early in the 1930s French engineer Henri Chireix devised an ingenious method of modulation that he named most appropriately out phasing. It was based on the result of combining two out-of-phase voltages. This produces a fluctuating signal voltage that varies in amplitude as the audio signals change. This voltage, after amplification, drives a power amplifier stage with properly amplitude-modulated RF. It's interesting to note the similarity between this and the Doherty System. Each method uses phase relationship to accompl sh its purpose. The famous RCA Ampliphase transmitter used the out phasing modulation system.

As in most of the useful developments in radio engineering, a good knowledge of mathematics leads to the generation of new ideas. In the case of out phasing modulation the use of vectors simplifies understanding of the system and its development. When two signals of equal amplitude with a phase difference are combined, the magnitude of the resulting vector is determined by the phase difference. Wher the difference in phase is 180 degrees and the resulting vector is zero they have effectively canceled each other. As the phase difference varies between zero and 180 degrees, the magnitude (within limits) is determined by the difference between the phases. However, 90 degrees is the minimum phase separation allowable before quality suffers and undesirable effects occur.

This limits the positive peak attainable because at small angles the vector sum does not change as quickly as it does with larger angular differences. In other words, the positive peak would be flattened with undesirable consequences.

In practice it is usual to establish a phase difference of about 45 degrees between the two signals. Figure 1 shows this relationship.

Basic phase modulation of an RF signal can be produced in the circuit shown in Figure 2 is used as a variable resistance connected in series with the plate circuit. As this resistance varies, the plate

load impedance will swing from negative to positive (the phase thus changing without a change in amplitude). A practical transmitter might consist of an oscillator with two output channels 180 degrees apart on the operating frequency. One signal is advanced by 22.5 degrees and the other one retarded by the same amount. Phase modulation then takes place on each channel. Because phase modulation takes place at a low level, and several stages in the series are needed to deliver the required signal to drive the IPA, which is grid modulated. The PA follows basically the circuit shown in Figure 3.

The output of each tube reaches the load resistor through very necessary individual 90 degrees networks. When two currents, equal in magnitude and phase, are fed into a common load, the load impedance seen by each tube will be doubled. It follows that when the signals are exactly out of phase, i.e. 180 degrees apart, the load impedance will fall to zero. This would be a very bad operating condition for a tube receiving grid drive. The 90 degrees networks have the valuable property of inverting the impedance seen, thus ensuring that each tube's impedance remains reasonably high as required. For example, if the plate load impedance for a tube should fall to a low value, the 90 degrees network will invert it and maintain a desirable plate load impedance until the conditions change.

Because the 90 degrees network circuits do not normally have the high Q of a normal PA plate circuit, it was necessary to include a harmonic filter (not shown) in the transmitter output to meet FCC requirements.

E-mail Battison at batcom@ohio.net.

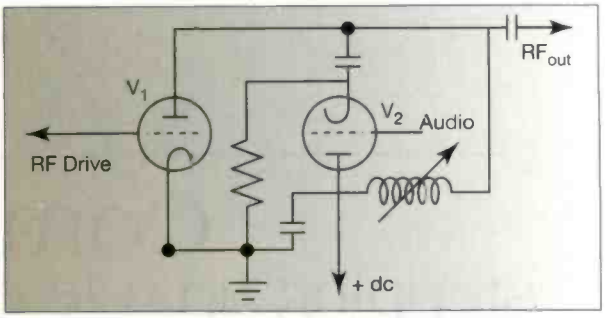

Figure 2. With phase modulation, V_2 audio causes the impedance of the plate load to swing between positive and negative. The RF output therefore varies with phase.

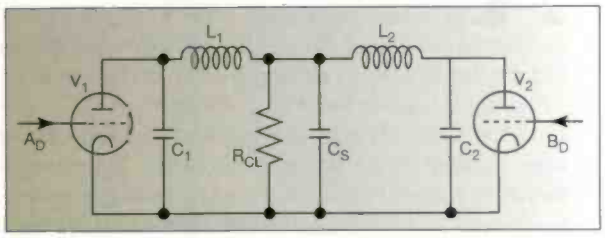

Figure 3. The phase-modulated drive from the outputs of V_1 and V_2 are combined in the common load (R_{CL}).

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Commission
stepping up rule enforcement

By Harry Martin

A Texas AM station was fined $8,800 for failing to maintain a main studio and power down at sunset. An FCC inspector, after checking on four successive days, could not find the station's main studio. While conducting this search the agent took signal measurements and determined that the station was not powering down at night as its license required.

After speaking with the station manager, the FCC agent was directed to a local hair salon. There he was told that the salon, also operated by the manager, doubled as the station's main studio. The manager explained that the beauticians knew to call him if anyone turned up asking questions about the station. The manager showed the agent broadcast equipment in a closet in the back room. However, the agent found the equipment was not plugged in to any power source.

Dateline

April 1 is the deadline for submission of biennial ownership reports by radio stations in Delaware, Indiana, Kentucky, Pennsylvania and Tennessee.

On April 1 radio stations with more than 10 full-time employees located in Indiana, Kentucky and Tennessee must electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

Also on or before April 1 radio stations in the following states must place their annual EEO Reports in their public files: Delaware, Indiana, Kentucky, Tennessee, Texas and Pennsylvania.

A meeting with the contract engineer revealed that the station was broadcasting from an unattended computer at the transmitter. Moreover, the engineer confirmed that the station had not been powering down at sunset. The FCC fined the station $5,600 for using a beauty salon as its main studio with no full-time station employees and an additional $3,200 for not powering down.

A Utah FM station faces a $4,000 fine after one of its on-air personalities made a prank call to a state poison control center to ask about symptoms from swallowing pepper spray. He recorded the call and played it back for his listeners, one of whom complained to the FCC. In this case the person contacted at the poison control center was not told, as the rules require, that the conversation was being recorded for broadcast.

The station admitted that the incident occurred but claimed that the D.J. was behaving in violation of company policy, that management was unaware of the prank and that it only happened once. The station also noted that at least the D.J. called a non-emergency number. The FCC reiterated its zero tolerance policy for recorded or broadcast telephone conversations and fined the station $4,000.

In 2005 the FCC's attention was called to www.hobbytron.com, an Internet supplier of illegal FM pirate radio equipment. The website now has a new owner. The FCC recently visited the website again and found it is marketing illegal FM transmitters. In fact, the website continues to offer the equipment at clearance sale prices. The FCC has warned the new owner that selling transmitters without an FCC certificate is a punishable federal offense. This ongoing saga is likely to continue until arrests are made.

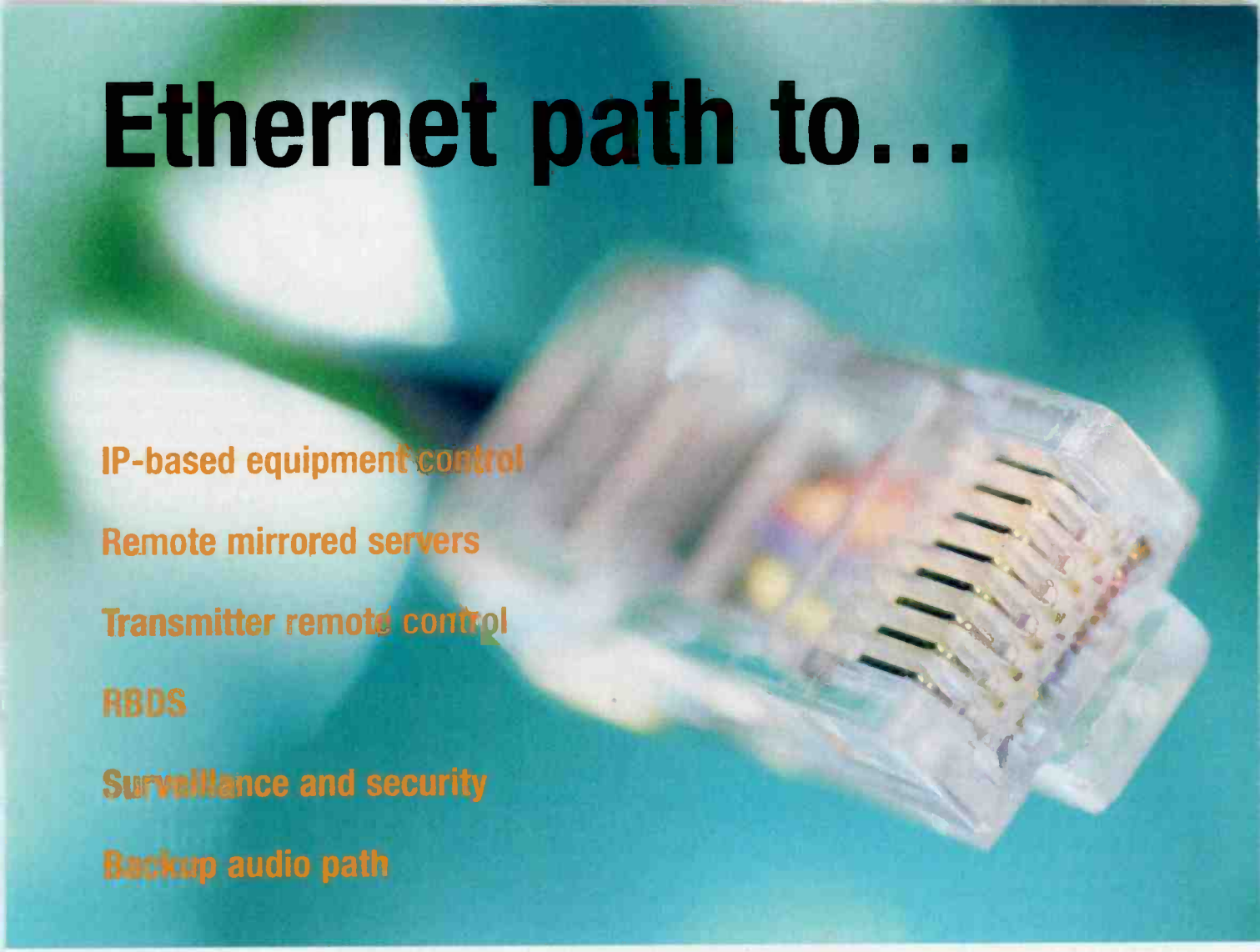
Changes in fee filing location

The FCC is changing its "lockbox" bank location for all fees submitted by check. Effective upon publication of the order in the Federal Register, all application fees, regulatory fees and any accompanying paper applications, forms or other filings, which used to go to the Commission's lockbox bank in Pittsburgh, will have to be delivered instead to US Bank at 1005 Convention Plaza in St. Louis. As in the past, each filing must reflect the FCC as the addressee, with a particular P.O. Box specified, with the box number varying depending on the nature of the filing being submitted.

The FCC has provided a 45-day transition period which will begin the day of Federal Register publication. During this period, any fee-based filings and fee payments submitted to the Pittsburgh location will be automatically forwarded to the St. Louis lockbox bank, and the date-stamp reflecting the date of receipt by the Pittsburgh lockbox bank will be deemed the official filing date.

Martin is a past president of the Federal Communications Bar Association and a member of Fletcher, Heald & Hildreth, Arlington, VA. E-mail martin@fhhlaw.com.

Ethernet path to...



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The engineer's guide to the NAB SHOW

Your essential convention information source

Time is our newest scarce resource. We can't afford to waste any of it. Your time at the annual convention is even more valuable, because even though the event spans nearly a week, it's over before you know it. This is why you need the Engineer's Guide to the 2008 NAB Show.

The National Association of Broadcasters has renamed the convention the NAB Show, following the NAB's interest in expanding the convention to new areas of entertainment technology.

The *Radio* magazine Engineer's Guide includes several parts, and they extend beyond the pages of this issue. The largest part of the convention are the exhibits, and once again, there's plenty to see. While most of the radio-specific exhibits are in the North Hall, there are many exhibitors with radio-relevant technology in the Central and South Halls. As a preview to what will be shown, the Radio magazine NAB Extra! highlights many of the new offerings.

If you're looking for specific technology, turn to the *Radio* magazine NAB FASTtrack. This exclusive section organizes the exhibits into product categories, and then sorts those exhibitors by their booth number. This makes it easy for you to move from booth to booth and reduce the time wasted by running from one end of the convention to the other.

To help you find your way, the *Radio* magazine North Hall map provides a clear view of the hall. Our map also includes an alphabetical listing of exhibitors. The map can be easily removed from this issue, so you can keep the magazine safe in your briefcase while keeping the map handy.

A convention is not built on exhibits alone, however, and our Insight to Sessions provides a convenient timetable to help you plan your day.

I mentioned that our Engineer's Guide extends beyond this printed edition. You can find the other components online at RadioMagOnline.com. For the weeks leading up to the convention, the *Radio* magazine NAB Insider e-mail newsletter delivers up-to-the-minute information about convention events, exhibitor news and product info. You can subscribe by using the link at RadioMagOnline.com.

As we have done since 2001, the *Radio* magazine FASTtrack is also available for your handheld device. We include our exclusive FASTtrack and alphabetical listing of the exhibits. This year's version has been created to display through a Web browser, so it can be viewed on nearly any handheld device. The files can be viewed live online or downloaded and saved.

And while you're at the convention, be sure to check RadioMagOnline.com every day to view the *Radio* magazine Daily Photo Blog. All the sights of the 2008 NAB Show will be captured there.

See you at the show.

Chriss Scherer

— Chriss Scherer, editor

Exhibit Hall Hours

Monday – Wednesday
9 a.m. – 6 p.m.

Friday
9 a.m. – 4 p.m.

rubicon

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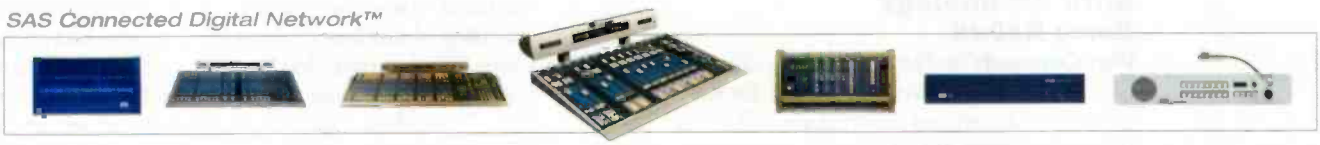

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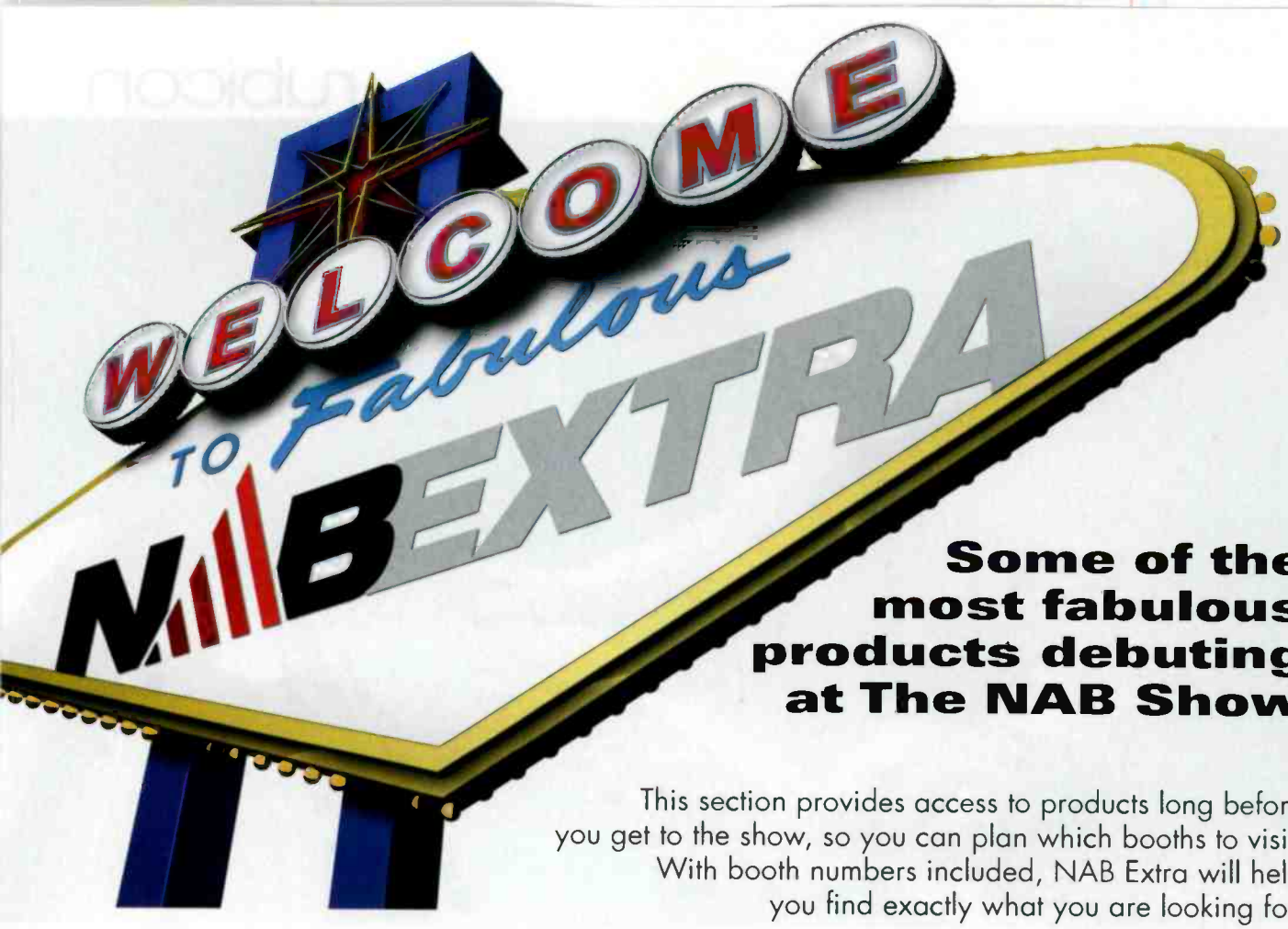

Some of the most fabulous products debuting at The NAB Show

This section provides access to products long before you get to the show, so you can plan which booths to visit. With booth numbers included, NAB Extra will help you find exactly what you are looking for.

Audio gateway codec

Mayah Communications
Booth C10619D

Centauri II 4001: Centauri II Audio Gateway codecs cover all typical audio codec applications. The CII 4000/4001 include the 3000/3001 features and focus on the additional functionality to stream audio to many destinations and simultaneous encoding for up to four stereo audio channels, each in another audio format and transport in multicast or multiple unicast.

+49 811 55 16 0
www.mayah.com
info@mayah.com

Remote control for Harris Z transmitters

Burk Technology
Booth N6920

Plus Connect: The Plus Connect provides a link between the Harris Z series of transmitters and the Burk ARC Plus remote monitoring and control system. The Plus Connect brings more than 400 transmitter parameters on-board the ARC Plus system without parallel wiring, allowing broadcasters to manage the transmitter, ancillary equipment and IT infrastructure on a single platform.

800-255-8090; www.burk.com; sales@burk.com

Rack-mount audio monitors

Sonifex
Booth N4919

RM-2S4, RM-2S10, RM-4C8: Each reference monitor is a 1U rack-mount unit offering loudspeaker monitoring and high-resolution metering of up to four or 10 stereo audio sources. Sources may be in any mixture of analogue and AES/EBU digital formats, with sample rates up to 192kHz accepted and a 5-band parametric EQ can be used to tailor the unit for the room it is mounted in. Sources are selected via a front panel rotary encoder, with clear LED indication of the current selection. On the rear panel, open-collector alarm outputs provide hardware indication of sustained under-level, over-level and phase errors. The three-way loudspeaker system is fed via a DSP-based active crossover and a trio of highly efficient Class-D amplifiers. Optional additions to each model are HD video input expansion cards, allowing multiple AES groups embedded within an HD-SDI or SD-SDI signal to be de-embedded and monitored.

207-773-2424; www.sonifex.co.uk
info@independentaudio.com

Surround mic system

Soundfield Research

Booth N7037

DSF-1: The DSF-1 Music Surround mic system incorporates Soundfield's technology that enables the high-resolution capture of ambient or image critical music events that must ultimately fit a variety of delivery formats. The DSF-1 can deliver mono, stereo, 5.1, 6.1, 7.1 and B format, the archival medium for future formats, all without ever leaving the digital domain.

+44 1924 201 089; www.soundfield.com
sales@soundfield.com

Dynamic mic

Heil Sound

Booth N7039

PR 35: The PR 35 has been designed for commercial broadcast, recording and live sound reinforcement applications that require a smooth, flat response over a wide frequency range. It was designed around the PR 30 element and incorporates a sorbothane shock mount. The PR 35 uses a special magnet structure and a large aluminum 1 1/2" low mass voice coil assembly. The PR 35 is equipped with a three position roll off switch. The cardioid pattern offers the greatest rejection of unwanted audio at 180 degrees off axis, which is directly behind the microphone; there is virtually no off-axis coloration.

618-257-3000; www.heilsound.com
info@heilsound.com

Patchbay design tool

Wirecad

Booth N3635

Patch Verx: Patch Verx creates accurately scaled and easily printable designation strips and layouts for jackfields and patchbays. Patch Verx uses predefined or custom-generated template files to which a user adds data and any display formatting desired. Patch Verx includes a built-in CAD viewer to show the jackfield as it would export. Users can also create custom definition files using the new Jackfield Wizard. By default Patch Verx prints jackfields scaled 1:1 so the designation strips can be sheared and applied directly to the jackfield.

661-253-4370; www.wirecad.com; sales@wirecad.com

Console
Audioarts Engineering
Booth N7612

W-12: The W-12 Console targets small- to mid-market radio stations and offers high-end features such as: three stereo main buses, 12 A/B dual source stereo line inputs (analog or digital), two microphone preamps, uncompressed 24-bit operation (44.1 or 48kHz), switched VU meters, built-in cue speaker with level control and headphone jack with built-in amp.

252-638-7000; www.wheatstone.com
sales@wheatstone.com

Condenser microphones
Sennheiser Electronic
Booth N8207

MKH 8000: The MKH 8000 series of microphones combines the company's exclusive RF condenser technology with a compact, modular form factor and a range of application-specific accessories for broadcast, recording and performance use. The MKH 8000 series is available in three models, offering omni-directional, cardioid or super-cardioid pick-up patterns. All of them feature an extremely wide frequency response.

860-434-9190; www.sennheiserusa.com
lit@sennheiserusa.com

FM antenna
Dielectric
Booth C 1918

DCBR: This antenna consists of a crossed-dipole radiator fed in phase quadrature and mounted within a circular cavity. The cavity used in this circularly polarized FM antenna is a welded, stainless steel or galvanized grid. The cavity grid is supported from a center mounting plate, which also serves as a mounting for the dipole assembly and for attachment of the unit to the supporting structure. The use of grid cavities and aerodynamic design significantly reduces weight and windload requirements of the supporting structure. Multistation operation can be achieved only with the wide bandwidth characteristics the DCBR antenna offers. The antenna is stainless steel with three or four configurations available, power ratings up to 10 class C stations, single or dual EIA inputs up to 9", ABS feed point randome, low downward radiation, near omni-directional free space pattern performance, RH circular polarization, low weight and wind load.

800-341-9678; www.dielectric.com
dcsales@dielectric.com

Field recording mic
Avlex
Booth N5232

Superlux E522, E523: The Superlux E522/B features a closely matched pair of capsules in an X/Y configuration, an integrated switchable low-cut filter, external on/off switch, the ability to operate on either battery or phantom power and dual unbalanced outputs. The Superlux E522/B excels as a stereo field recording microphone. Featuring two closely matched fixed-charge, back plate, permanently polarized condenser capsules with an X/Y stereo polar pattern, the new E522/B captures live performances with broad spatial effect.

877-447-9216; www.avlex.com
sales@avlex.com

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email: sales@musicamusa.com
web: www.musicamusa.com

See us at NAB 2008 Booth #N5825

NABEXTRA

FM broadcast antenna
Propagation Systems
Booth C 2324

Power Tiller: This omni-directional, circularly polarized FM broadcast antenna with rugged copper and corrosion-resistant brass construction is available in high power (PSIFHR) for input power up to 60kW and medium power (PSIFMR) for input power up to 15kW. The elements are stacked in arrays of up to 12 bays for increased gain and are end-fed from a support boom. For arrays requiring beam tilt and/or null fill a center feed system is required. The entire antenna system including the feed is pressurized. Each antenna is supplied with standard galvanized mounting brackets for round leg mounting on uniform cross section towers. Custom mounting brackets are also available. For those antennas exposed to adverse weather conditions, fiberglass radomes are available.

814-472-5540
www.psibroadcast.com
sales@psibroadcast.com

Audio processor
Vorsis
Booth N7612

FM-5: One of the newest members of the Vorsis processing family, the FM-5's features include a proprietary five-band multiband dynamics controller along with a precision 10-band final limiter with distortion-masked clipper. The FM-5 also ships with a high-pass filter that may operate in stereo or M/S modes; automatic audio source fail over on analog and digital audio inputs; separate audio input gains for analog and digital inputs; four-band parametric equalizer; five-band linear phase crossover with adjustable crossover points; FM output simultaneously available as AES3 and analog; and reference-grade multiplex encoder with selectable composite clipper, multiplex filter and twin composite outputs.

252-638-7000; www.vorsis.com; sales@vorsis.com

Element accessory
Axia Audio
Booth N7620

Element Touchscreen Timer Panel: Board operators and hosts using Element consoles have access to a full-featured time-keeping suite using console-mounted controls. Now, the Element Touchscreen Timer Panel gives studio guests, producers and show hosts access to these functions with a touch-sensitive interface. The Touchscreen features configurable, digital and analog time-of-day clocks, an elapsed-time counter with freeze and pause functions, expansion ports than can host up to five more Element studio accessories, a built-in Web server and the option to be desk or turret-mounted.

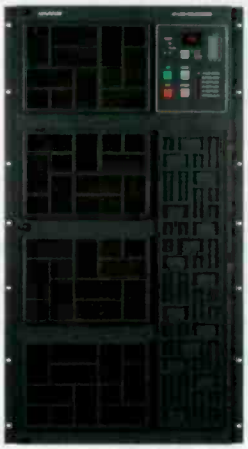
216-241-7225; www.axiaaudio.com; inquiry@axiaaudio.com

LED obstruction lights
Dialight
Booth N3222

L-810: The RTO Series of LED obstruction lights utilize a patent-pending optical design and can be operated in steady or flashing mode. They are available as either single or dual FAA-compliant fixtures for new installations or as retrofit lamp assemblies with adapters for replacing existing incandescent lights. The new lights comply with FAA AC NO: 150/5345-43F; Canadian Aviation Regulation CAR 621.9 (Transport Canada); ICAO (Annex 25, November 2004 Fourth Edition); Low-intensity Type A (10 cd); and Low-intensity Type B (32 cd). The shock- and vibration-resistant RTO Series features advanced high-flux LED technology that lasts years longer than incandescent lights and uses 95 percent less energy.

800-835-2870; www.dialight.com; info@dialight.com

Low-power transmitter
Harris
Booth N2502



ZX5000: The ZX5000 transmitter is the latest entry in Harris' range of ZX transmitters, now comprising five models ranging from 500W to 5kW of power. The Harris ZX5000 offers a compact size for a 5kW transmitter for both analog FM and HD Radio broadcasting and comes in a single-rack size with an exciter and signal processing gear. As with other ZX transmitters, the ZX5000 supports tri-mode operation with on-the-fly switching between analog FM operation, HD Radio digital-only operation, or FM/HD Radio common amplification broadcasting.

800-622-0022; www.broadcast.harris.com
broadcast@harris.com

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Booth N 5429

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e-mail: aeqsales@aeq.es website: www.aeq.eu

NABEXTRA

High-resolution audio recorder/mixer

Zaxcom

Booth N4533

Fusion: This system replaces the multiple mixers and portable recorders normally required to support mixing and recording of audio via RF link or hardwired cable. Fusion can mix 16 inputs to eight output buses for recording up to eight tracks. Fusion eliminates the use of a hard drive, which additionally removes concerns of hard drive damage from extreme temperatures or motion. The system records to two Compact Flash cards simultaneously, ensuring 100 percent solid-state recording that provides redundancy and flexibility. With the Fusion's DSP-based audio tools, users can adjust over 300 mixer cross points and 200 controllable parameters. Four balanced AES inputs with sample rate conversion allow eight channels of audio to come from four different devices with varying sample rates or unlocked sample rate clocks.

973-835-5000; www.zaxcom.com; info@zaxcom.com

Audio splitters

Switchcraft

Booth C 7508

RMAS8 and RMAS8 PRO: These are 24-output dual transformer isolated audio splitters. Both units feature eight Switchcraft XLR front-panel inputs with a line level pad and two ground-lift toggle switches. On the back, four DB25 connectors wired to the Tascam DTRS standard pinout can be used to accommodate all of the units I/Os. The RMAS8 Pro features Jensen magnetically shielded dual isolated audio transformeres and has a third set of I/O connections utilizing Phoenix terminal blocks.

773-792-2700; www.switchcraft.com
sales@switchcraft.com

Rack-mountable shelves

APW Enclosures

Booth SU 5613

E-Rack: Available in a variety of heights and depths, the Stantron E-Rack simplifies mounting of ground bars and lacing of cable. The E-Rack is 22" wide for high-density cabling. Its doors open 180 degrees, cable chase access panels remove without tools and provide kinkless cable runs.

714-634-7300; www.apw.com
sales.us@apw.com

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BluePack allows field reporters and remote talent to conduct live man-on-the-street interviews through a cell phone equipped with Bluetooth. Mix the mic input (balanced XLR) and the 3.5 mm aux send for a 3.4 kHz station feed back though your phone (via Bluetooth) and/or grab a full-bandwidth mix from the stereo output to the recorder of your choice. Its professional microphone preamp and powerful headphone amp deliver the highest quality audio.

RemoteAmp Blue allows IFB monitoring through a cell phone equipped with Bluetooth Wireless Technology. This is a listen-only device designed for voice IFB or full-bandwidth stereo music listening. The line input jacks and separate volume controls allow wired operation in parallel with the Bluetooth connection.

RemoteAmp Two provides a wired, listen-only connection for mono IFB or full bandwidth stereo music listening. Separate volume controls for the XLR and 3.5 mm line input jacks allow a simple mix of mono and stereo sources.

Each has a powerful ½ watt stereo headphone amplifier that will cut through any crowd noise. **BluePack** and **RemoteAmp Blue** also pair to Bluetooth-equipped sound cards and music players in full-bandwidth stereo A2DP mode.

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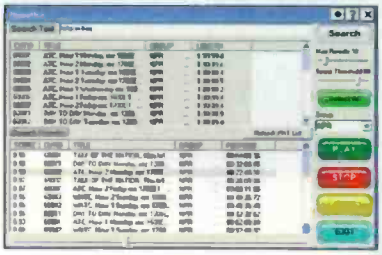
Phonetic-based search system
Enco Systems
Booth N6512

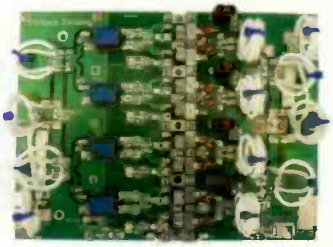
Phonetica2: Phonetica2 is a phonetic-based search system for digital audio and is available as an integrated module in Enco's Digital Audio Delivery system. The module allows users to search through a library of audio files containing spoken material and find specific words or phrases simply by typing them.



800-362-6797; www.enco.com
sales@enco.com

Low-cost amplifier modules
Power Module Technology
Booth N9109

RF Amplifier Series: These modules range from 88-92MHz and 88-108MHz, and are available in power levels ranging from 50 to 500W. All modules are housed on compact circuit boards measuring no larger than 5.67" x 7.625". The lower-power modules are even smaller.



775-883-1122
www.pmtrf.com
sales@pmtrf.com

broadcast codec
Telos Systems
Booth N7620

Zephyr Iport MPEG Gateway: Using the Livewire protocaol for networked audio over Ethernet, this codec connects directly to an Axia IP-audio network. A single CAT-6 cable carries eight channels of stereo I/O and remote control. The Iport connects eight channels of stereo audio between two Livewire-equipped sites over an IP link. The Iport can also be used for any application where MPEG encoding and/or decoding are needed for transmission over IP channels. Applications include studio-to-transmitter links, satellite uplinks, Internet streaming, broadcasting to mobile phones and audio distribution systems.

216-241-7225; www.telos-systems.com; telos-info@telos-systems.com

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Eventide Broadcast Delays are designed to keep profanity off your air, and angry listeners, embarrassed advertisers, and the FCC off your back. We invented the obscenity delay and have a solution for stations large and small that provides up to 80 seconds of the highest quality revenue and license-protecting delay.

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The BD600 offers two different methods of delay buildup and reduction: Eventide's catch-up and catch-down system, and an exclusive fast-entry-and-exit feature which allows starting a broadcast with the delay already built up to a safe amount and ending it with a rapid reduction of delay.

For HD, the BD600 offers MicroPrecision Delay™ mode which allows up to 10 seconds of delay to be adjusted in real time in 100 nanosecond increments. This is useful for synchronizing analog and digital signals while on-air, without audible artifacts, to maintain a seamless user experience.

Whatever your size, whatever your format, you can't expect to protect the integrity of your air and the foundation of your business without an Eventide Broadcast Delay in your rack.

NAB 2008 Booth #N6914

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NAB EXTRA

Compression add-on

Barix Technology

Booth N8036

AAC Plus for Extreamer-110: Barix Exstreamer IP audio decoders now feature AAC Plus v2, which builds on the success of MPEG-4 AAC Plus to improve compression rates over the initial release as well as MP3. Radio broadcasters distributing content over the Internet to Exstreamer-110 decoders can use ACC Plus v2 compression to significantly reduce bandwidth or improve audio quality.

866-815-0866; www.barix.com; info@barix.com

Parallel protector

LEA International/ Transtector

Booth N4519

LS Plus: This compact, modular, multi-stage, parallel protector utilizes a symmetrical array of balanced MOVs for maximum surge handling performance. The LS Plus is equipped with a user-friendly digital readout touchpad for surge counter, audible alarm and dry contacts.

800-654-8087

www.leaintl.com; lea@leainternational.com

8-channel sub snake

Hosa Technology

Booth SL 2108

SH-8X0: Featuring a compact, eight-channel junction box for inputs and terminated with eight robust Hosa XLR connectors in 25- and 50-foot lengths, this sub snake reduces cable clutter. This unit offers eight XLR sends. Featuring metal construction, the junction box provides side-mounted XLR input connections that are designed to reduce stress on the XLR connectors. With Hosa's Pro Connectors on the box and fanout, this sub snake's XLR terminations can be changed using Hosa's XLR adaptors to convert each channel.

714-736-9270; www.hosatech.com; lee@hosatech.com

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Air and production workstation

Broadcast Software International

Booth N9111

Series 110: The BSI Series 110 System offers considerable cost savings against buying the component parts separately. It's also fully configured, including network configuration, to run right out-of-the-box. Comprising of one air and one production workstation, additional workstations can be easily added to expand your network. The Series 110 is an ideal system for small and medium markets, or for satellite operation (using the supplied 24-way BSI Trigger Kit).

888-BSI-USA1; www.bsiusa.com; info@bsiusa.com

Stereo headphone amplifier

JK Audio

Booth N7929

Remote Amp Two: Remote Amp Two provides a listen-only connection for mono IFB or full bandwidth stereo music listening. Separate volume controls for the XLR and 3.5mm line input jacks allow a simple mix of mono and stereo sources. The 0.5W, 1/4" stereo headphone jack will cut through any crowd noise. Connect an IFB earpiece to the 3.5mm earpiece jack for mono operation.

800-552-8346; www.jkaudio.com; info@jkaudio.com

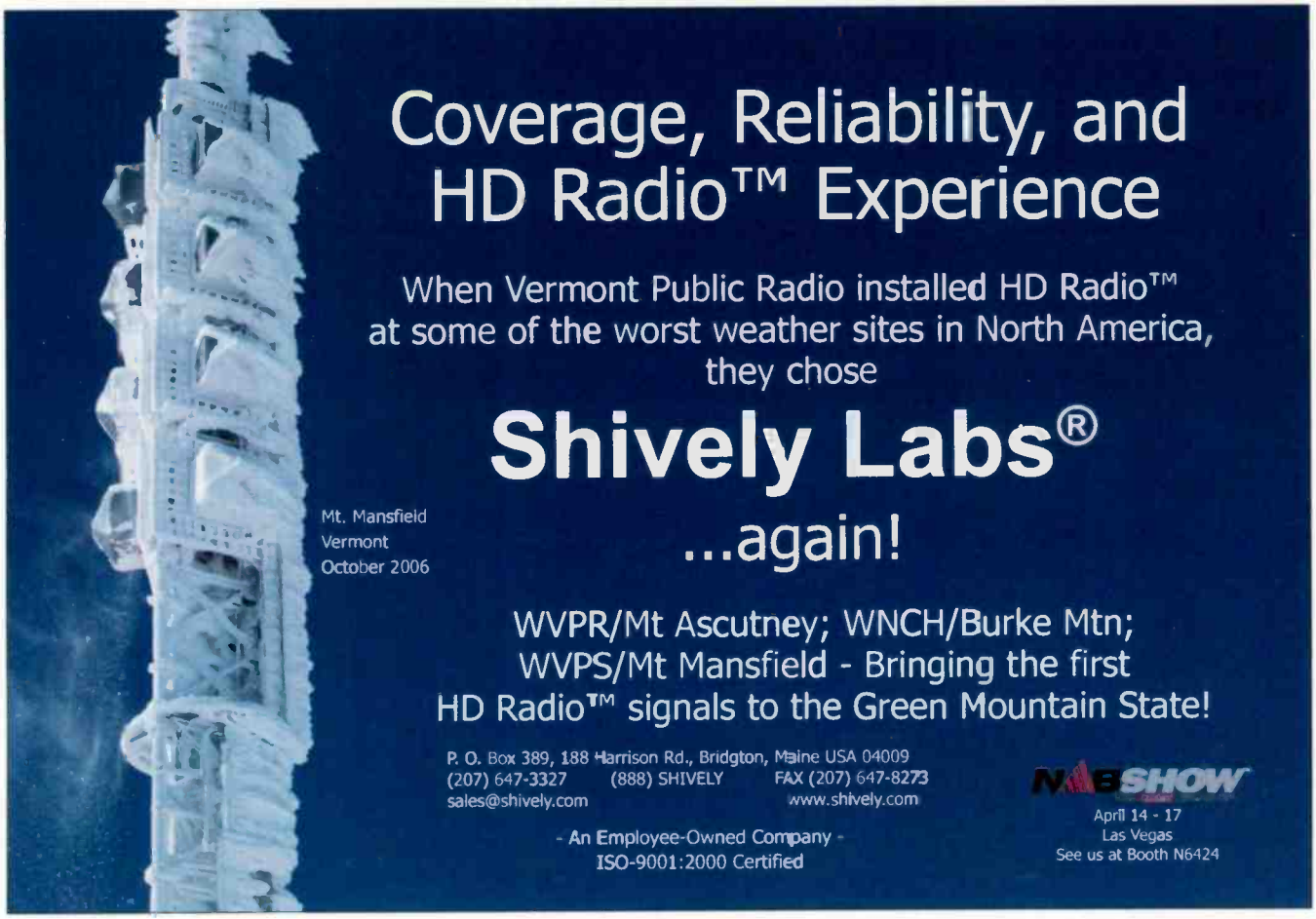
Single-phase UPS

Staco Energy Products

Booth N4218

Unistar P: This single-phase online uninterruptible power supply features protection over a wide input voltage range. This true double-conversion UPS is available in 6, 8 and 10kVac models, to protect from outages and irregularities in incoming line voltages from 160 to 280Vac at 45-65Hz. Up to four Unistar P modules can be installed in parallel for redundancy or additional capacity. A constant, clean, steady sine wave protects downstream equipment even without going to battery mode. Each Unistar P features high-overload handling, without transfer to the bypass, and protection against short circuit and over-temperature conditions.

937-253-1191; www.stacoenergy.com; sales@stacoenergy.com



NABEXTRA

Digital KVM
Avocent
Booth SL13016

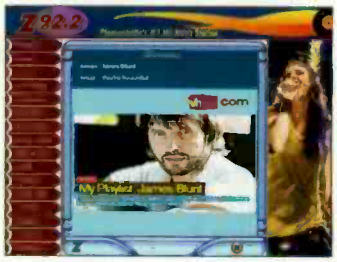
Emerge DM2000: The Emerge DM2000 Desktop Manager is an Ethernet-based digital KVM switch. The switch delivers unlimited distance over Ethernet for greater flexibility. The manager, together with the Emerge ECMS2000 extender, provides digital workstation switching, allowing virtualized access to broadcast systems. The switch provides digital KVM, audio, USB switching and extension with advanced support for extension of USB mass storage devices and wide screen resolutions.

800-275-3500; www.avocent.com
connectivity.sales@avocent.com

Interactive broadcast software
RCS
Booth N5917

Radio Show: This software is designed to keep a station in front of the listener regardless of the digital platform being used. Radio Show displays information such as song titles and artist names of the music playing on the air. The information is shown in real-time, synchronized to the terrestrial station's audio. Visuals, such as CD covers, artist graphics, station photos and sponsor logos, can be synchronized to an audio stream.

914-428-4600
www.rcsworks.com
info@rcsworks.com



Surround control
RTW Radio-Technische Werkstatten
Booth N3223

31900/31960: RTW has completely overhauled its Surround Control family, an eight-channel system that controls, monitors and analyzes surround sound utilizing RTW's Surround Sound Analyzer. The analyzer is the house-shaped display featuring an easy-to-read, visual manifestation of overall sound, including loudness and sound pressure level, phase correlation and level differences among channels. The Surround Control 31900 is designed for studios and fits in a 1RU case, while the Surround Control 31960 is sized as a half 19" 3RU module.

+49 221 709130; www.rtw.de

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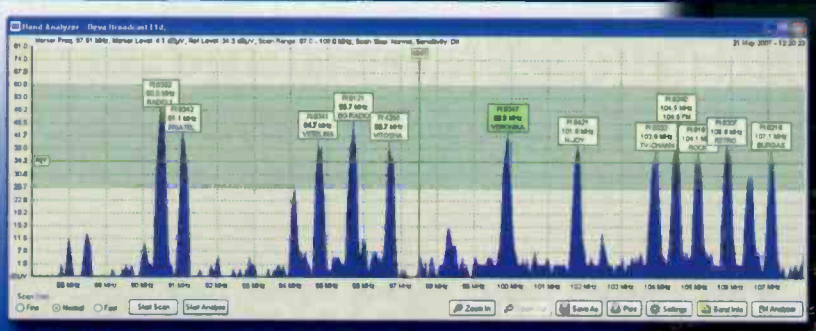
sales@devabroadcast.com



R·D·S RADIO DATA SYSTEM

USB FM-Scanning Receiver
Modulation and RDS Analyzer

Band Scanner Pro

The Band Scanner is a tool to evaluate FM broadcast band congestion and to log station identification parameters. The system is powered by the USB port of any Windows PC. Supplied free of charge Windows software sweeps the receiver across the FM band, logging every carrier and generating a spectrum display of carrier level vs. frequency. It then analyzes each carrier and creates a station list. Stations with an RDS presence are further refined to show all the radio data groups being transmitted. Its interface is like a portable radio: It may be tuned manually through the receiver screen or by double-clicking a point on the spectrum plot or an entry on the station list. Spectrum plots may be saved as jpg or bmp files. The RDS data error level is graphed in a separate window on the receiver screen. The program can be monitored with headphcnes plugged into a standard 1/8" jack.

Handheld condenser mic

Samson Technologies

Booth N5823

CL5: The CL5 features a 12.7mm gold sputtered capsule with a 3-micron tensioned diagram working in concert with advanced head amp electronics to faithfully reproduce any sound source. The CL5 is a studio condenser in a handheld package. It handles a high SPL of up to 141dB. The CL5 is a pressure gradient, true condenser with cardioid pick-up pattern and extended linear frequency response that operates on 48V phantom power and comes with a dual stage windscreen and comes in a durable carry case. The CL5 is available in both a nickel and black finish.

631-784-2200; www.samsontech.com
info@samsontech.com

Connectors

Neutrik

Booth N9029

BXX-CR, HTXP: The BXX-CR accessory kit consists of a black XX boot without the standard XXR coding ring and a clear ring XXCR instead. This saves assemblers time and money, as they do not have to replace the standard ring before assembling the clear ring. Neutrik's HTXP hand tool for its XX and PX series is the newest addition to the wide range of assembly tools now offered by the company. The HTXP can either tighten the XX boot or the bushing for the new PX plug series.

732-901-9488; www.neutrik.com
info@neutrikusa.com

2G pocket recorder

Yamaha

Booth SL 5710

Pocketrak: The Pocketrak 2G is a light and compact pocket recorder featuring 2GB of built-in memory, long battery life and easy USB file transfer. It includes a copy of Steinberg Cubase AI DAW software. It features two tracks of CD-quality recording in PCM, MP3 and WMA formats. The Pocketrak 2G includes a rechargeable battery capable 19 hours of MP3 recording. Plugging its sliding USB connector into a powered USB bus simultaneously recharges the battery and transfers files to a PC or Mac. The Pocketrak 2G includes an on-board speaker in addition to a headphone jack.

714-522-9000; www.yamaha.com/proaudio; infostation@yamaha.com

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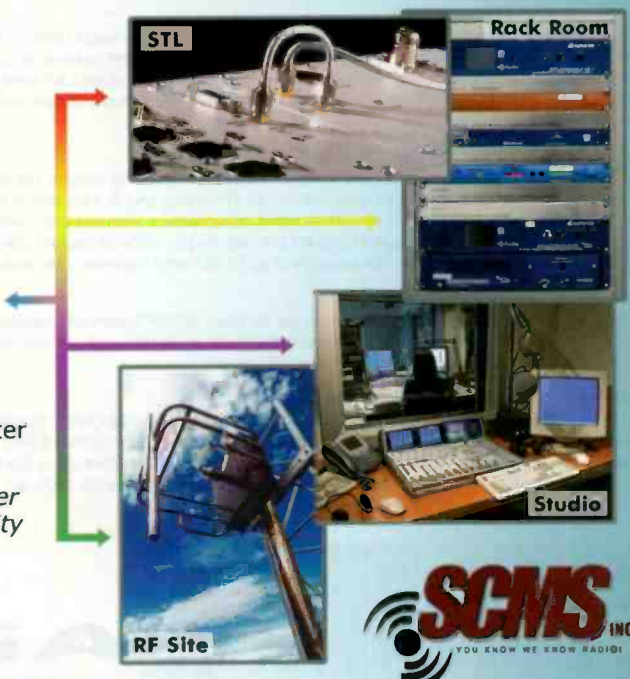

Moseley Starlink is available from the most reputable supplier in radio broadcast- SCMS

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NABEXTRA

Portable recorder
Tascam
Booths SL 9623 and SL10328

DR-1: The DR-1 portable digital recorder is a compact unit that captures hours of music using built-in mics to its 1GB SD card. A pair of high-quality stereo condenser microphones is mounted on a variable angle mechanism, which allows the recorder to record from almost anywhere. It features 48 or 44.1kHz/24-bit recording resolution. The DR-1 includes auto gain control and analog limiting for easy setup and a low-frequency cutoff to eliminate handling or wind noise.

323-726-0303; www.tascam.com; tascamlit@tascam.com

from the company that brought you apt-X coding technology...

the professional broadcaster's choice for

IP & T1 STLs

WorldNet Oslo

Widely deployed in broadcast networks throughout the US and worldwide, the WorldNet Oslo offers everything you could want from a professional STL including a flexible, upgradeable platform, high quality audio and 24/7/365 reliability.

Flexible, Upgradeable Platform
With a modular approach and a large selection of audio, data and transport options, the WorldNet Oslo can be tailored to the exact requirements of your current network and easily upgraded on-site as these requirements change. Inherent flexibility enables LAN extension, ring networks with drop and insert over T1 and unicast, multicast and multiple unicast configurations over IP.

Uncompromised Audio Quality
The WorldNet Oslo offers both linear PCM and Enhanced apt-X coding options. Enhanced apt-X will deliver the same audio quality as linear with under 2ms delay and at a fraction of the data rate. Other options include MPEG L2, J.57 and J.41 companding. With four channels of audio per plug-in module, up to seven audio modules per unit, and a choice of over 20 different audio modules, each WorldNet Oslo has the capacity of up to 28 mono channels / 14 stereo pairs.

Rock Solid Reliability
On the WorldNet Oslo, solid dependability comes courtesy of DSP-based architecture, hot-swappable modules, passive backplane, redundant PSUs, automatic back-up switching and a user-configurable suite of audio, link, sync and PSU alarms.

Throw your terminal screwdriver in the trash can!
No Dip Switch settings here - configuration and control of the WorldNet Oslo is straight-forward and simple thanks to APT's powerful and intuitive Codec Management System (CMS). Offering extensive real-time management of multiple codec units, the CMS enables alarm monitoring, logging and performance monitoring as well as configurable user and audio profiles.

APT

www.aptx.com

For more information, call APT on 800 955 APTX or 781 810 2260

Internet streaming
Stream Guys
Booth C 1848

Aggregated Streaming Services: Stream Guys offers a variety of streaming media solutions and tools enabling quality delivery and monetization of digital media, across all sectors of Internet broadcasting. The Stream Guys Aggregated Service Platform includes various hardware and software to support a mix and match of audio and video streaming formats, with advanced services for server clustering, load balancing and performance monitoring.

707-667-9479; www.streamguys.com
info@streamguys.com

Find the mic winner
January issue

Congratulations to
Steve Doyle
of KRSC, Claremore, OK. His name was drawn from the correct entries for the January issue. He won a Heil PR-20 mic from Transaudio Group.

The mic icon was cut out of the operator's mic boom.

TRANSAUDIO BROADCASTING

www.transaudiogroup.com

No purchase necessary. For complete rules, go to RadioMagOnline.com.

Program loudness meter

DK Technologies

Booth N1533

MSD100C Loudness: This loudness meter is a stand-alone unit that incorporates ITU Recommendations BS.1770 and BS.1771, which specify the algorithms that should be used to measure audio program loudness. It is able to display the loudness of the individual audio channels, as well as the sum of the left and right signals, and can be used as a health check during production or prior to transmission. The actual unit provides accurate loudness matching of audio from a number of different sources and offers a selection of working modes, including fast mode for real-time viewing of loudness, integrated mode for measuring the loudness of a recorded section or the complete recording and gated mode for viewing loudness of audio material with long pauses.

+45 4485 0255; www.dk-technologies.com; info@dk-technologies.com

New workflow tools

Klotz Digital

Booth N5925

Vadis upgrades: A variety of new Vadis workflow tools will be unveiled at the convention. Vadis Shared Control Management module manages the use of sharing resources through a LAN infrastructure, such as central play out systems, freely assignable announcer booths, remotely controlled mic preamps, pools of telephone hybrids and codecs, central devices and devices in other studios or areas. It provides access to all device specific parameters, functions and attributes to allow a quick operation. Vadis Remote Source Assignment module allows the studio console selection of remote router sources in the same manner as local sources. It provides the communication between a mixing console and a central router. Router sources are assigned to the console on a need to use basis.

678-966-9900; www.klotzdigital.com; sales@klotzdigital.com

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"Within a short amount of time Omnirax was able to come up with a beautiful concept for our new studios."

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"I was impressed with the exceptional care given packaging for shipment. A few very large and potentially fragile components made it cross-country completely unscathed"

"I wholeheartedly recommend Omnirax to everyone."

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Booth numbers made easy

The *Radio* magazine FASTtrack helps you plan your fastest route through the exhibits. Companies are arranged into product categories, and then sorted by booth number.

Understanding the booth numbering plan seems to be a challenge sometimes, but it's actually pretty simple when you know that all the halls are arranged into columns and rows. The first two or three digits are the columns, the last two digits are the rows. Once you figure out the starting corner, finding a booth should be easy. The other challenge is actually knowing where you are at any given time.

And be sure to take the FASTtrack with you. Download the FASTtrack for Handheld at RadioMagOnline.com.

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NEW! from Inovonics! ...for NAB 2008

Model 525

AM Reference Receiver & Mod-Monitor

A wideband frequency-agile receiver for accurate off-air AM modulation measurements, even with 'hybrid digital' (IBOC) transmissions. Menu-driven operation features total-mod, RSSI and noise readouts, and a user-selectable variable audio cutoff simulates the response of consumer radios. Supplied with weatherproof loop antenna.

Model 261 Rev. 2

Digital Stereo Utility Audio Processor

DSP-based AGC, compression, peak control and independent pre-emphasis protection limiting. Unobtrusive operation, ideal for link/uplink protection, general leveling, LPFM. Easy menu-driven setup with restricted artistic control so it can't be made to sound bad. Features front-panel and remote alarms for out-of-tolerance program inputs.

Model 720

Dynamic RDS/RBDS Encoder

The new 720 surpasses all previous designs in ease of installation and operation. Serial and USB interface has built-in diagnostics for quick automatic connection to station automation. Supplied with self-guiding software, a front-panel LCD shows all setup and operating parameters without the need of a computer on site! Incoming data from automation can be seen on-the-fly and scrolling messages are displayed exactly as they appear to listeners. The automation command set is compatible with earlier models and a new 'no-headers' mode supports unformatted streaming text feeds.

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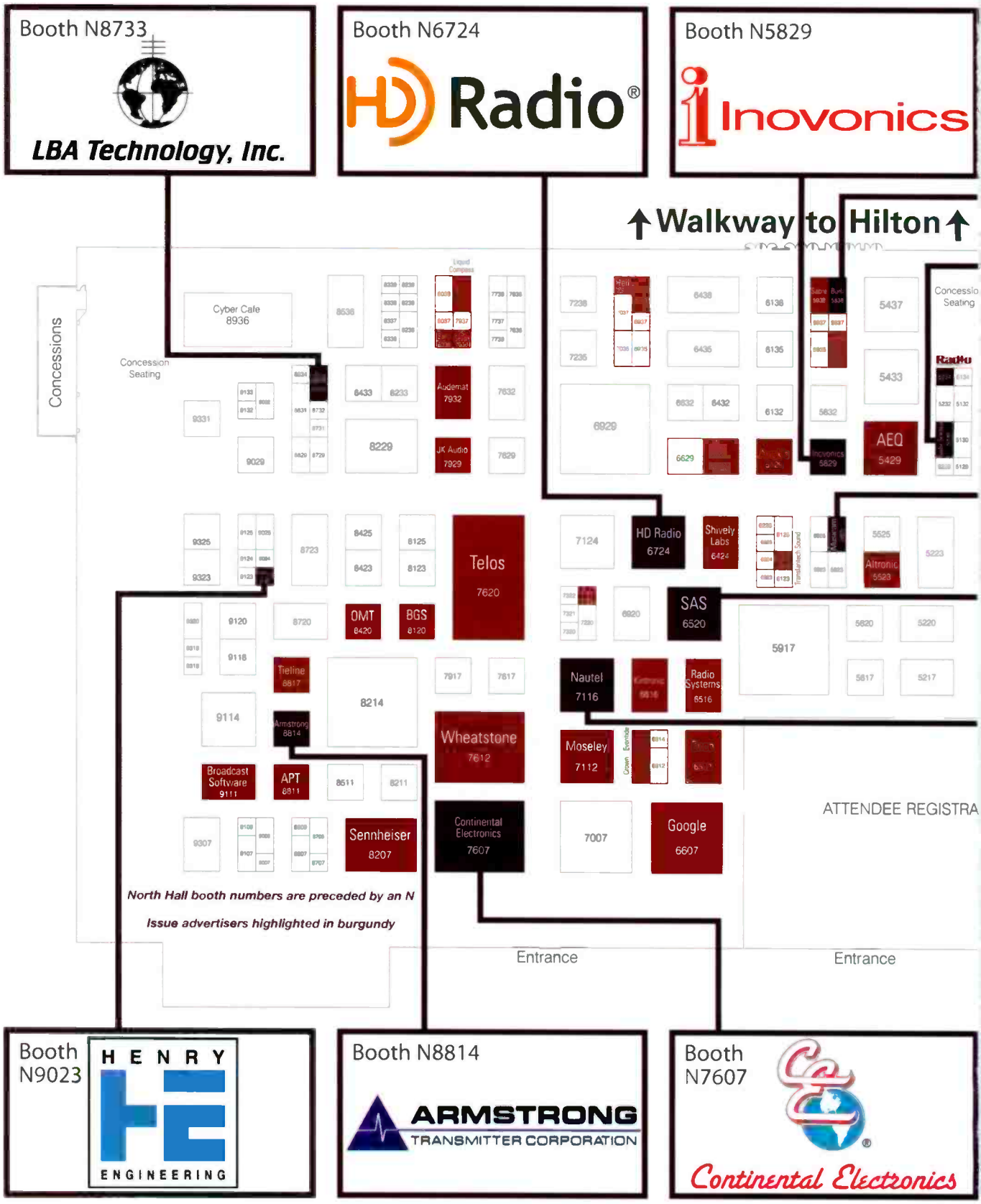

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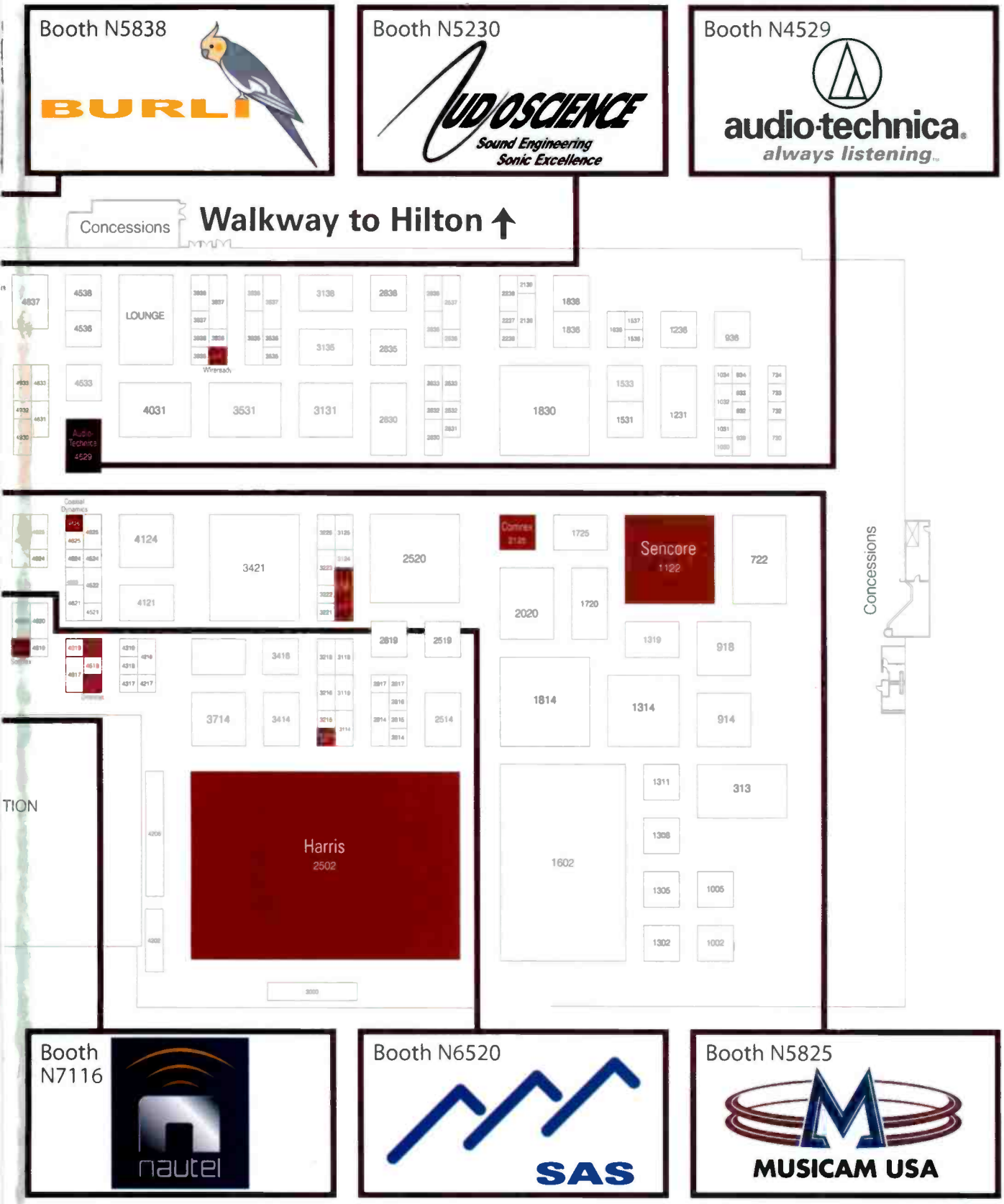

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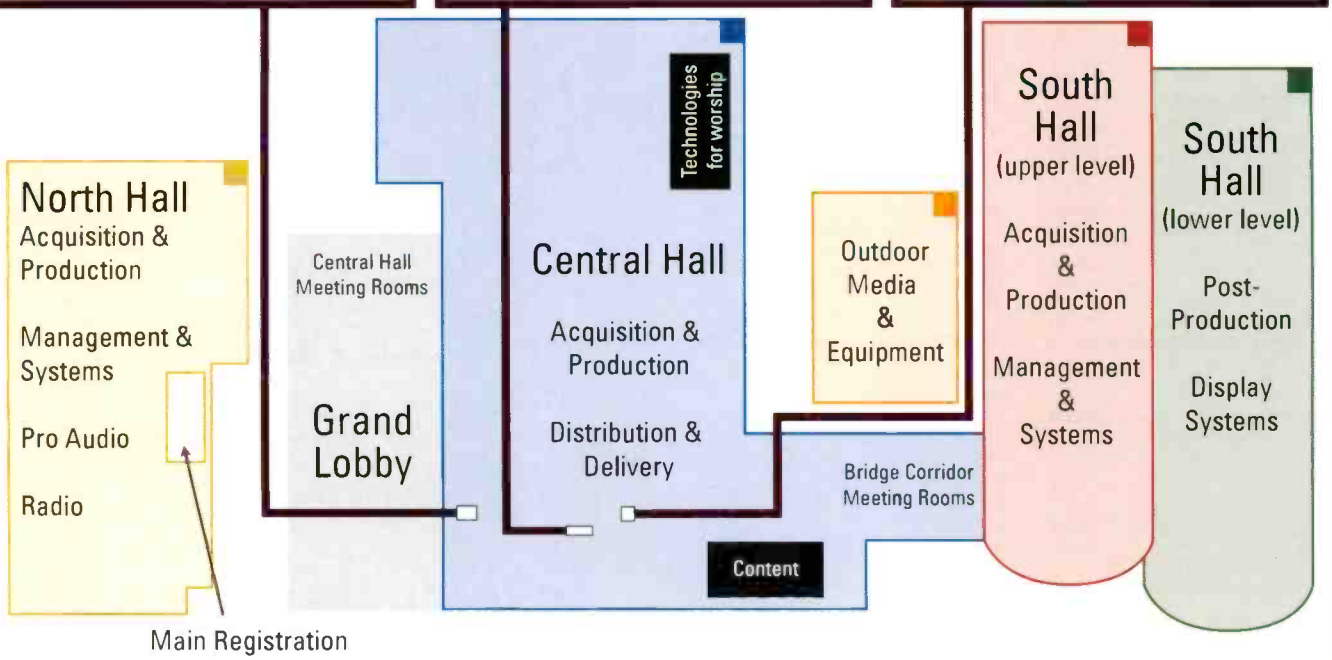

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Shure N2830
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DH Satellite ..... C 6337
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Scientific Atlanta ..... SU 6120
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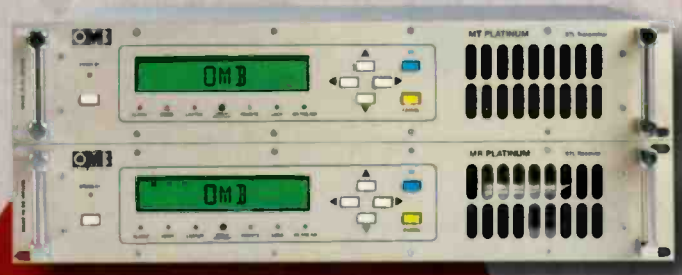

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RDL (Radio Design Labs)	***N6429***
ERI-Electronics Research	N6929
Logitek	N7124
Belar	N7629
Audemat	***N7932***
Symetrix	N8120
Broadcast Tools	N8120
Dorrough Electronics	N8211
Calrec Audio	N8723
Neutrik	N9029
Fraunhofer Institut	SL 7424
Ward-Beck Systems	SU 7420
Sencore Electronics	***SU12108***

Transmission: Feedline, Towers, Tubes, Components, Services

Tower Innovations	C 1118
Reliable Broadcast	C 1121
SWR	C 1133
Richland Towers	C 1314
Tower Consultants	C 1619
Coast to Coast Twr Svcs	C 1624
Stainless	C 1628
KPFF Consulting Eng	C 1728
Dielectric	C 1918
Myat	C 2215
Precision Communications	C 2318
RFS Broadcast	C 2321
Propagation Systems	***C 2324***
Jampro Antennas	***C 2607***
CPI Eimac	C 2611
Micro Communications	C 2624
Radian/Rohn	***C 2632***
Burle Industries	C 3013
H.C. Jeffries Tower Co	C 3507
Thales	C 5946
Andrew	C 7537
Flash Technology	N3114
Unimar	N3221
Dialight	N3222
Magnum Towers	N4525
Paragon Towers	N4619
Coaxial Dynamics	***N4626***
EMR Corporation	N4819
TWR Lighting	N4825
Phillystran	N5132
Altronic Research Inc.	***N5523***
Bird Electronic	N6138
Shively Labs	***N6424***
Kintronic Labs	***N6816***
ERI-Electronics Research	N6929
CPI Eimac	N7220
Econco	N7220
American Tower	N7238
Towerswitch	N8120
Phasetek	N8729
LBA Technology	***N8733***
Dasto	N8809

Transmitters, Antennas, Digital Radio Equipment

Delta RF Technology	C 1111
SWR	C 1133
Dielectric	C 1918
RFS Broadcast	C 2321
Propagation Systems	***C 2324***
Valcom	C 2539
Jampro Antennas	***C 2607***
Larcan	C 2618
OMB America	***C 3024***
Electrosys	C 3331
Kathrein, Scala Division	C 5508
Thales	C 5946
Harris	***N2502***
RVR	N5220
Lectrosonics	N5223
Bext	N5620
RCS	N5917
QEI	N6223
Shively Labs	***N6424***
Eddystone Broadcast	N6632
SBS	N6632
Kintronic Labs	***N6816***
Crown Broadcast	***N6912***
ERI-Electronics Research	N6929
Broadcast Electronics	N7007
Nautel	***N7116***
Continental Electronics	***N7607***
TFT	N7617
CTE International	N8125
DB Elettronica	N8233
Energy-Onix	N8708
LBA Technology	***N8733***
Dasto	N8809
Armstrong Transmitter	***N8814***
PTEK	N9032
Power Module Technology	N9109
Transradio Sender Systeme	N9123
C Crane Company	N9124
Siel Electronic Systems	N9323
Seratel Technology	N9331

Tuners and Monitors

Dielectric	C 1918
RFS Broadcast	C 2321
Telex Communications	C 5928
Wohler	N1314
Harris	***N2502***
Flash Technology	N3114
RTW Radio	N3223
Denon Electronics	N4833
Audio Science	***N5230***
AEQ	***N5429***
Inovonics	***N5829***
RCS	N5917
QEI	N6223
Potomac Instruments	N6226
Burk Technology	N6920
Nautel	***N7116***
Belar	N7629
Audemat	***N7932***
Circuitwerkes	***N8120***
Broadcast Tools	N8120
Pristine Systems	N8831

Wire, Cable and Connectors

RFS Broadcast	C 2321
Nemal Electronics	C 2542
Jampro Antennas	***C 2607***
BTX	C 3548
Audio Accessories	C 3551
Optical Cable	C 4343
Gepco International	C 6918
Switchcraft	C 7508
Clark Wire and Cable	C 7519
Andrew	C 7537
Whirlwind	C 7733
Hannay Reels	C 7822
Amphenol	C 7823
Wireworks	C 7924
Belden	C 8828
Yellow Jacket	C10612
Techflex	C11017
Rip-Tie	C11126
Altronic Research Inc.	***N5523***
Bird Electronic	N6138
Holophone	N6435
Holophone	N6438
Heil Sound	***N7039***
American Recorder Tech.	N8120
Neutrik	N9029
Hosa Technology	SL 2108
Tascam	SL 9623
Tascam	SL10328
Multidyne	SU 3411
Canare	SU 4805
Mohawk	SU 5026

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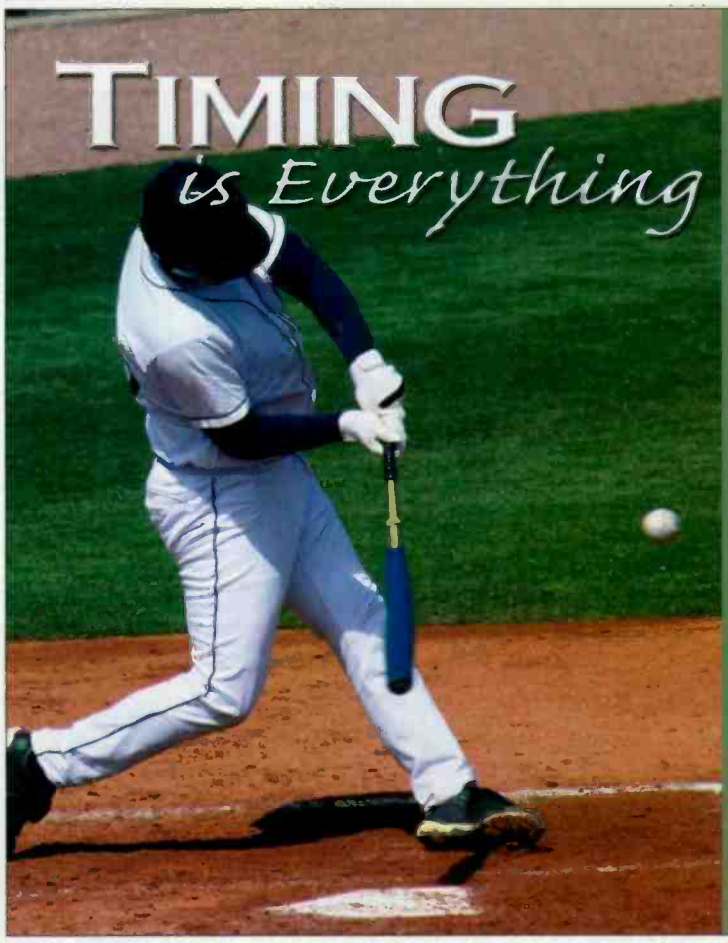

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Room	8:00	8:30	9:00	9:30	10:00	10:30	11:00	11:30	Noon	12:30	1:00	1:30	2:00
Saturday April 12													
S219/S220	SBE Ennes Workshop												
Sunday April 13													
S219/S220	BEC Breakfast												
S224			BEC Opening Session										
S226/S227				Digital Opportunities for Radio							Digital Radio Advancements		
TBD	Focus on Leadership												
Monday April 14													
Exhibits			Exhibit Halls Open										
S228						Communicating with Management					Alternative STL Technologies		
N231/N233						All Hands on Deck: Unattended Station Operation							
N235/N237													
N239/N241						New Technologies: New Revenues	How Traditional Media Can Survive...						
TBD			State of the Industry Address										
Tuesday April 15													
Exhibits			Exhibit Halls Open										
S228			New Technologies for Radio Listening								Audio Over IP		
TBD	FCC Breakfast									Radio Luncheon			
TBD	BEC Breakfast												
N231/N233			Coping with Copyright: From Performance Tax to Internet Streaming										
N239/N241							What the World's Best Radio Managers Do Best						
Hilton Ballroom A													
Wednesday April 16													
Exhibits			Exhibit Halls Open										
S228			Monitoring and Measurements in the Broadcast Plant - Radio										Radio RF
Hilton Barron									Technology Luncheon				
Hilton Ballroom B													
Thursday April 16													
Exhibits			Exhibit Halls Open										

What's a convention without sessions? The Broadcast Engineering Conference (BEC) is loaded with topics covering new and digital technology. The engineering sessions begin on Saturday with the annual SBE Ennes Workshop. The technical radio sessions end on Wednesday.

There's plenty of discussion about digital radio this year, and it's moved beyond the transmission system (which is also covered) to the support systems, including STLs, monitoring and audio contribution. There's even a session that will try to bridge the perceived gap between engineering and management on Monday morning. We have extracted the sessions relevant to radio and provided them in the grid below.

We also reviewed the sessions offered in other conferences and added those that appeal to technology managers to the grid. There are several in the regulatory and management tracks we found interesting. While their focus may not directly cover the technology of radio broadcasting, they cover subjects important to the business of radio, and many have a technology foundation involved.

Finally, we have also included the exhibit hall hours for your reference. All the session information is provided by the NAB. Room numbers are subject to change, so be sure to check the session schedule when you arrive at the convention.

The radio portions of the BEC schedule are included in the exclusive *Radio* magazine FASTtrack for Handheld, so you can take it with you, too.

2:30	3:00	3:30	4:00	4:30	5:00	5:30	6:00	6:30	7:00
						BEC Reception			
	Digital Radio Summit								
Political Advertising: Taming the Beast of 2008									
			GM Pizza & Beer Exchange - Back to Basics						
	Future Broadcast Technologies			Next-generation Public Alerting					
					SBE Membership Meeting				
Everything You Want to Know About FCC Regulation But Have Been Afraid to Ask									
			The FCC Face-Off						
nd Transmission Systems									
							Amateur Radio Operators' Reception		

New Delivery

Redefining radio in a Web world

By Chris Wygal

We live in a time when we must take a good look at the definition of radio. Why? Consider the story of a college sports fan who wanted to hear the radio broadcast of a recent football game, but wasn't near a radio. He used his cell phone to get online, navigate to the station that carried the football game broadcast, clicked on Listen Live, and heard the game. He wasn't listening to FM or AM signal propagation. He was listening to a digital audio stream, but wasn't it the same material that was heard over the air? What if the station's transmitter suddenly went out of service and all the listeners migrated to the Web to hear the broadcast? The station would still be accomplishing its objective: sell the material to the listeners.

A notable number of radio stations have been live-streaming their daily broadcasts for almost a decade. According to Radio & Records 2007 Who's Listening survey, 18.69 percent of listeners across all formats logged on to a radio station website within the last month (of having taken the survey). Considering the growth and increased use of the Internet, we can expect more listeners in the near future to look for alternative media on the Web. This new era of media delivery capabilities begs a question: What happens when someone can readily access the Internet in his or her car? Will FM or AM radios even be necessary anymore? Can radio as we know it keep up? Plus, what will new media like the Ipod and podcasting mean for radio? Wow, are we asking too many questions already? OK, then let's move on and answer a few of them.

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New Delivery

Radio streaming 101

Making live audio available via the Internet will by nature launch radio broadcasting into a new realm of delivery. I suspect that one day in the future, FM and AM transmitters may be retired because of the growing relationship between radio and the Web. If your station is considering the Internet as an added delivery system, there are just a few basics to remember.

An Internet stream must be encoded. It's the basic step that creates the correct protocol for transferring audio over the Internet. A trusty PC with a high-speed Internet connection and a sound card will accomplish the task. Using Windows Media Encoder 9 (free, easily configurable software available for download) is a simple solution for encoding audio. Once WME 9 is installed, feed the program audio to the input of the soundcard. The output of an Optimod is a good choice because of the leveling and compression. However, encoding processed audio can be a problem. Take the program material into consideration and feed the encoder wisely. Hard limited or aggressively processed audio can perform strangely in the digital world. As far as the stream parameters, a 44.1kHz stream at 37kb/s is a safe start. A bit rate below 56kb/s accommodates folks who still use dial-up Internet service.

I suspect that one day in the future, FM and AM transmitters may be retired because of the growing relationship between radio and the Web.

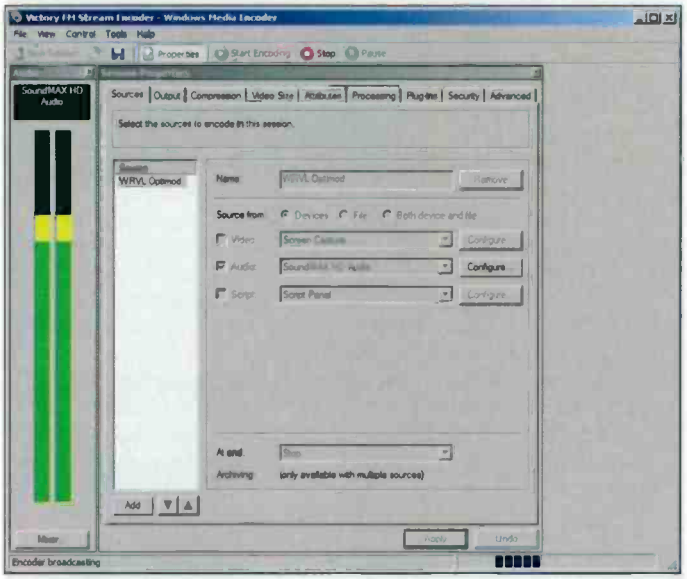
In addition to encoding the audio, the live streaming file is named and detailed by the encoder. Station information or a moniker like, "Classic Rock 97.7" would appear on the listener's media player. In more advanced streaming and Web design scenarios, integrating the audio stream with XML file output coding from the automation system will allow the listener's media player, or the station's website to display the current title and artist, or other album information. Consulting with a professional Web design firm will produce the best results if the station is interested in more tricky Web integration.

A quality Internet stream will attract a sizeable audience. A single encoder in most cases cannot handle multiple users or clients. Contracting with an Internet content delivery service such as Vital Stream or Akamai's Nine Systems allows radio stations to create one stream, and let a third party handle the distribution. Watch out for firewall and Internet securities within the local network or ISP. The content delivery servers need to see the originating encoder's IP address at all

times. Remember that content delivery services base their costs on bandwidth usage. Thousands of listeners will accrue more costs than hundreds. Also a mono 37kb/s stream is most likely cheaper than a stereo 128kb/s stream. Budgetary limitations and the audience should be considered.

Pointing the audience to the stream is vital! On most websites, a Listen Live link of some sort is highly visible. The link automatically directs the listener's media player to the streaming file that originates from the streaming server. The station's listeners, however, will usually never notice that they're being directed elsewhere. If the encoder is correctly configured, "Classic Rock 97.7" will still be displayed.

Establishing a working relationship with the tech support crew at the content delivery service, the ISP, and Web design firm will guarantee continuous and attractive service for online listeners. As listeners become more dependant on the Internet for their media intake, radio stations will be on top of the game if the Web stream is efficiently maintained.



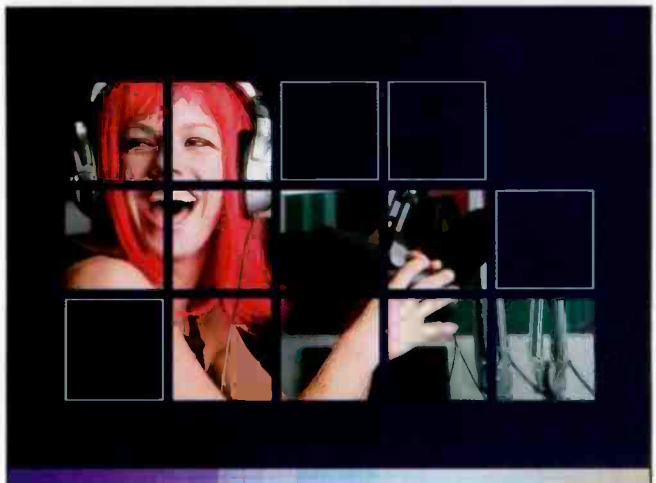
The Windows Media 9 encoder is a free and useful download.

Streaming audio explores new territory as far as legalities are concerned. The RIAA and its offspring Sound Exchange are commissioned by the U.S. Copyright Office to collect and distribute fees as a service to artists and copyright owners. Sound Exchange keeps a close eye on radio station Internet streaming. It is imperative that stations research and know the implications of streaming audio via the Internet before embarking on this form of media.

Podcasting 101

A podcast is a syndicated MP3 file available for download and playback on portable media players or computers. In 2006, Arbitron reported that 11 percent of listeners (nearly 27 million) have downloaded podcasts, more than 50 percent of teens own portable media players and the largest demographic downloading podcasts are the 34-45 age group. Essentially, podcasting is a medium that radio should use as an alternative service to its listeners.

Podcasts are not necessarily limited to the Apple Ipod. Recorded media, in show-like form available online, is a webcast or podcast. Some are professionally produced, and others are audible diary entries of college students (audio blogging). While podcasting may at first seem irrelevant to radio, enter the term on-demand radio, unof-



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Classic FM journalist Sarah Kirkup interviews opera star Natasha Marsh with the HHB FlashMic at the Classical BRIT Awards in London

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XML example

```
<?xml version="1.0" encoding="UTF-8"?>
<rss xmlns:itunes="http://www.itunes.com/dtds/
podcast-1.0.dtd" version="2.0" xmlns:dc="http://purl.org/
dc/elements/1.1/">
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   <ttl>60</ttl>
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         </itunes:email>
   </itunes:owner>
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      </itunes:subtitle>
   <itunes summary>Radio magazine is written by radio
      industry professionals for radio industry
      professionals. Radio magazine delivers in-depth
      technical expertise with the most-respected editorial
      content. Radio magazine covers the technology
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         length="size of file in bytes"/>
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         <itunes:duration>16:31</itunes:duration>
      <itunes:summary>Listen to interviews with experts
         in the radio industry as they discuss articles
         and topics from the latest issue of Radio
         magazine. This podcast provides a discussion
         on the impact Reginald Fessenden had on radio
         history, as well as an interview with Lynn Cheney,
         former president of Comrex.</itunes:summary>
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         Fessenden had on radio history, as well as an
         interview with Lynn Cheney, former president of
         Comrex.</itunes:subtitle>
      <itunes:keywords>radio, magazine, other key words
         for the specific episode</itunes:keywords>
   </item>
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ficially termed by Dan Portnoy. Portnoy is the host of *The Drop*, a podcast that has seen its share of radio airtime, highlighting independent musicians. Portnoy indicates that podcasting allows the audience to ask for media, as opposed to it being given. Suppose a listener missed his or her favorite morning show. If the show were podcast, it could be downloaded and listened to anytime.

To understand how podcasting works, two questions must be answered. How do audio files get on the Internet, and how do listeners find them? When the MP3 file is ready for Web syndication, it must be stored on a Web server. Then, an XML (Extensible Markup Language) file must be created (and preferably stored on the same server) giving all the detailed information necessary for services such as Itunes to syndicate and list the podcasts for listeners. The XML file should contain important keywords that will direct listeners to the podcast. If a listener is searching Itunes for podcasts containing "Charlotte music," and enters those keywords into a search engine, a Charlotte station using "Charlotte" and "music" in the XML file stands a good chance of appearing in that listener's search. XML files are complicated text-heavy files, but are also necessary and unavoidable. Templates are available online to show how they're made. One example is shown at left.

Apple's Itunes, the popular and free source for syndicating podcasts, provides step-by-step instructions on importing the XML file efficiently, so all the station

Resource Guide

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www.akamai.com
877-3-AKAMAI

Jetcast
www.jetcast.com
917-338-1487

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Live365
www.live365.com

Shoutcast
www.shoutcast.com

Stream Audio
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253-238-2187

Stream Guys
www.streamguys.com
877-287-2938

Stream the World
www.streamtheworld.com
866-448-4037

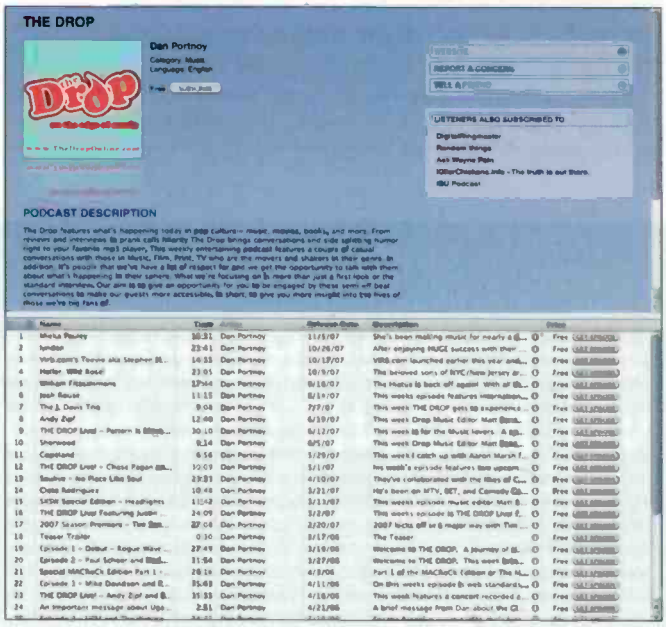
Itunes
www.apple.com/itunes

Windows Media Encoder
www.microsoft.com/windows/windowsmedia/forpros/encoder/default.mspx

Sound Exchange
www.soundexchange.com
202-640-5858

New Delivery

podcasts are correctly displayed for download. By using elements such as XML files, RSS feeds, and online services like Feedburner, listeners can subscribe to station podcasts and be notified when new podcasts are available. Feedburner is one of many feed management providers that constantly monitor servers for new material, and then notifies subscribers (listeners) via their search aggregators. Linking with a feed management provider will point listeners more quickly to the podcast when it is launched. To see and hear a podcast that uses Itunes, in conjunction with a home website, and most everything mentioned above, visit www.thedroponline.com or click on the podcast link at RadioMagOnline.com.



List all podcasts on Itunes to maximize exposure.

Tag it

In addition to feed management and XML files, meta data such as ID3 tagging is a must when introducing new media to the Web. Itunes and other free downloadable software can be used to add title, artist, date, album and copyright information to MP3 files. This is crucial when listeners download podcasts. Otherwise, the file has no name or pertinent listed information.

Online audio streaming, and especially podcasting add new elements and a great deal of bizarre lingo to our field. Radio will always be radio, but new delivery avenues must be explored and implemented. Doing some online research about these topics is a great way to delve into the details. The chances of your library readily having books on XML file generation and ID3 tagging are slim, so get on the Web and figure out how to use it!

Wygal is the programmer, engineer and Web designer for WRVL in Lynchburg, VA.

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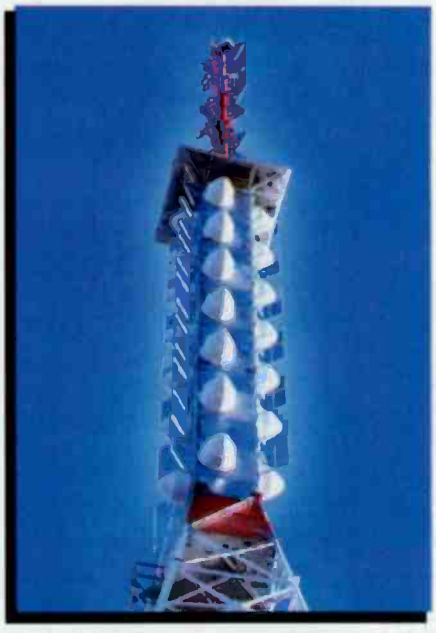

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Tennessee turnaround

WKNO-FM upgrades to HD Radio

By Pat Lane

WKNO-FM, an NPR member station in Memphis, began operations on April 1, 1972, on 91.1MHz with 40kW of effective radiated power. The station launched its HD Radio signal in the fall of 2007. Up to that point, we underwent incremental upgrades and adjustments to the original installation.

The original transmitter was an RCA BTF-20 with an RCA BFC-6 antenna located 550' above ground level on the WKNO-TV tower. In 1987, a new Continental Electronics 816R-3B transmitter was purchased to replace the original RCA transmitter. The old transmitter remained in service as a backup for a period of two years.

In 1989 a second Continental Electronics 816R-3B transmitter was purchased along with an automatic switcher/combiner unit manufactured by Dielectric, and our power was increased to 100kW ERP. These two transmitters performed quite well until they were replaced in 2007 with two Harris HT\HD+ common amplification tube transmitters for WKNO's HD Radio project.

Prep-work for HD Radio

The HD Radio project was preceded by a series of upgrades that started around the turn of the 21st century. The original BFC-6 antenna had been face-mounted on our Stainless G-7 television tower and was positioned southwest toward the major population area of our market. This arrangement provided good signal coverage to the majority of our listening area until the population began moving northeast of our site.

The original 600' WKNO-TV tower is located about 225' from the G-7 tower and was being used only for microwave antennas. The original Channel 10 batwing antenna was still on the top of this tower and had been unused since 1971. Structural engineering studies were performed and it was determined that the old Channel 10 antenna and the top 100' of this tower could be removed, and a 70' pole installed with a new WKNO-FM antenna. This kept our center of radiation at the same height of 550' as on the other tower, with a net move of 225' to the south.

The original BFC-6 antenna and transmission line were showing signs of age by this time and needed replacement. A new Shively 6810-6 antenna was purchased and installed in 2001 along with new transmission line, resulting in the elimination of the null in our coverage area.

tennessee turnaround

The original guy wires and anchor hardware for this tower, in service since 1953, were overdue for replacement. Pegasus Tower Company was selected for this project in 2006, as it had successfully changed our TV antenna for our digital television project a few years earlier.

Ready to work

We began studying the possibility of implementing HD Radio in 2007, with the foundation in place from recent tower and antenna upgrades. We had recently sold another station to our south that provided news and information programming to our audience. We felt an HD Radio transmission could provide an additional program stream to replace this service, and add other new services through a multicast configuration.

The existing Dielectric combiner switch was re-used for the HD Radio installation.

The cost of high-power solid-state transmitters steered us toward tube models. We opted for parallel Harris HT\HD+ transmitters for several reasons, but first and foremost for its common amplification design. The ability to broadcast HD Radio and analog programming eliminated the need to install a second antenna fed by a single digital transmitter. That proposition concerned us because the HD Radio/analog ratio would not have matched in parts of our coverage area.

We also saved energy by eliminating the need for mid- or high-level combining. These combining methods would have required a massive amount of RF plumbing, and we would have wasted up to 10 percent of our analog power and up to 90 percent of our digital power into a reject load. The use of common amplification also allowed us to retain our system redundancy.

Prior to delivery of the transmitters, Nina Stone, transmitter engineering assistant for WKNO-FM, and I made the trip to Quincy, IL, to witness the proofing and testing of our new transmitters. I consider this a very important step in the overall project. Common-mode HD Radio transmitters tune somewhat differently from analog-only transmitters, and it was a great learning experience to go through the procedures and ask questions with the factory technicians and engineers. We were able to learn the difference in interlock operation from our previous transmitters so as not to have a surprise during installation and testing. Seeing it all hooked up and working and taking pictures instead of relying only on printed instructions during installation was a great asset.

The ac wiring size needed to be upgraded for the new transmitters. Because the power supplies are closer to the electrical service panel than the old transmitters, less of that expensive copper wire was required for primary power for the installation. The old wiring to the previous transmitters was replaced with the three-phase 30A wiring to the new transmitter cabinets for blowers, etc. All of the interconnecting wiring (HV and control) between the power supply cabinets and the transmitter cabinets was run in conduit underneath the floor, making for a neat installation.

For safety and lightning protection, all transmitter cabinets, power supplies and equipment racks are bonded with 2" and 4" copper strap spliced with silver solder. The constant-voltage transformers for the filament circuits were bolted to the floor next to each transmitter. Dampers were retained in the transmitter exhaust ducts to allow the building to be heated by the transmitters during cold weather.

Staying out of the dark

Power supplies for the new Harris transmitters were installed in a room between the FM transmitter room and the TV transmitter room, resulting in a much smaller footprint for the new FM transmitters. The existing transmitters were removed one at a time and the new Harris

Plenty of copper and brass plumbing

Pegasus Tower replacing the tower's guy wires.

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transmitters were installed one at a time, resulting in our operation at half power level for several weeks instead of going dark during the installation.

The analog and HD Radio combining is done in the Harris Flexstar HDX exciter. The exciter has two outputs: The main output feeds one transmitter directly at up to 55W, and the second transmitter is fed from an auxiliary output through the Flexstar Boost Pro amplifier. The auxiliary output operates at very low power, which is where the Boost Pro works its magic.

The two Flexstar outputs operate independently of each other. If transmitter one goes down for maintenance, the main output is muted while the auxiliary output remains active. The Boost Pro, essentially a smart 55W amplifier, drives the second transmitter. If the second transmitter is taken down for maintenance, the Boost Pro goes dark but the exciter output to the first transmitter remains active.

We use our existing Dielectric combiner to combine the two transmitters into the Shively 6810-6 antenna. The signals are fed through 3 1/8" transmission line to the antenna. If one transmitter is taken down, the Dielectric switcher splits the signal from the other transmitter between the antenna and the reject load, sending about 25 percent of the usual power up to the antenna. That output can be bumped to 50 percent through manual or remote control over our Burk VRC-2500 units.

Transmitter phasing for combining is accomplished through a menu on Boost Pro. A phasing circuit allows us to adjust the phase of the signal coming out of Boost Pro from the front panel, relative to the phase of the signal going into the unit. This allows us to run both transmitters into the Dielectric unit, which by design is a 90-degree hybrid combiner, without having to cut and piece small bits of coax together to phase the two transmitters. A 90-degree phasing section was added to the output of the second HT\HD+ transmitter into the combiner to split any reflected power equally between the two transmitters.

We are using Flexstar Importers and Exporters at the studio to combine and transport our radio programming, which includes three HD Radio broadcast streams. The analog and HD-1 signals are also sent through an Orban

Equipment List

- Burk VRC-2500
- Caterpillar 200kW generator
- Crown amplifiers
- Day Sequerra M2
- Dielectric automatic combiner/switcher
- Harris HT\HD+, Flexstar HDE-100 Importer, HDI-100 Exporter, HDX-FM Exciter, Boost Pro, Intraplex STL HD Plus, Neustar SW4.0
- JBL Control One
- Microwave Radio Twin System STL
- Neural Audio Neustar SW4.0
- Orban Optimod 8500
- Pegasus Tower Company
- Shively 6810-6
- Triplite Smart Online UPS

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Optimod 8500 on-air processor at the studio, while the multicast HD-2/3 channels are processed by Neural Audio NeustarSW4.0 software running on the Importer. All this is multiplexed by the Exporter and sent over a 7.1-mile Microwave Radio Company (MRC) STL system to the transmitter site. The 7GHz Twin Stream unit from MRC carries analog and digital TV, and also includes a Harris Intraplex STL HD Plus system for our on-air radio signals. The Intraplex T1 circuit also provides additional digital control for our Harris Diamond TV transmitter audio through a data stream.

To accommodate HD Radio, we added several modules to our existing Intraplex chassis at the studio and transmitter sites. Intraplex DS-64NC modules were added at each site to handle digital Ethernet traffic with HD Radio signals from the Importer and Exporter. An existing Intraplex LAN extension is used for other IP connectivity, but we elected to keep the HD Radio on a separate LAN to avoid any possibility of data collisions. A PT-153 studio module and PR-153 transmitter site module were also added to handle AES audio signals for interlocking transmissions, as well as D-to-A conversion for FM transmission. These are enhanced Apt-X compressed cards that provide very high audio quality on the FM analog signal while permitting additional capacity to the LAN functions.

All Intraplex modules provide programmed dipswitches for appropriate bandwidth usage, and the upgrades were up and running after a simple plug-and-play installation. The additional bandwidth over Intraplex will eventually be used to connect the studio's Internet server to the transmitter site, using dedicated lines to connect through the studio switching system.

Our signal is very clean. The Harris real-time adaptive correction (RTAC) technology allows us to significantly exceed the FCC mask, reducing our digital sideband regeneration to below 80dB down – well below the 74dB down requirement. RTAC takes a sample of the signal output and feeds back into the Flexstar exciter to cancel distortions on the digital sideband regeneration. It removes the garbage to produce a much cleaner over-the-air signal.

Problems and solutions

Additional equipment at the transmission site includes a Crown amplifier and a set of JBL Control One speakers for live audio monitoring. Digital modulation monitoring is provided through a Day Sequerra M2. This provides everything we need for basic monitoring.

Problems have been scarce since the installation. We connected our exciter

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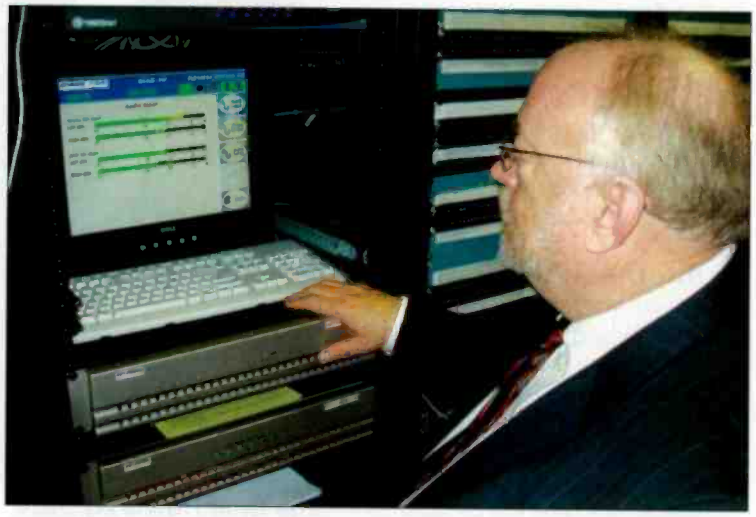
rack to the Triplite Smart Online UPS after experiencing some front-panel display lock-up; this was due to lack of clean power direct from the utility company and not the exciter, which remained live and continued to provide the digital and analog signals. We also placed one of the 24V utility power supplies that provided power to the Dielectric relay power on our UPS system to keep the transmitter interlock circuits live when transferring power to our 200kW Caterpillar diesel power generator. The generator provides enough backup power to keep everything running for hours in the event of a local power failure.



Russ Abernathy reviews HD Radio export/importer settings.

We designed an interesting solution to improve bi-directional communication between our Burk remote control inputs and the transmitter status outputs. We etched a circuit board with opto-isolator chips and Euro-block connectors and inserted it between the devices to ensure communication in both directions.

We also had challenges when connecting the modulation monitor to a sample port on the transmission line to read the stereo pilot signal. The readings were incorrect, and running a hand down the RF cable to the monitor altered the readings. A simple common-mode RF choke was constructed out of nine turns of RG-58/U coaxial cable wound on a piece of 1 1/4" PVC pipe and inserted at the RF input to the monitor.

All the heavy work of positioning the transmitters and power supplies was performed by the moving company, and two electricians completed all of the electrical work. Other than that, Nina and I completed the entire RF plumbing, interconnection and remote control wiring. Our pre-planning made the entire installation a breeze, and our on-air signals sound clean, crisp and powerful.

Lane is the transmitter supervisor for WKNO-FM, Memphis. All photos courtesy of Brad Broadus, Pegasus Tower Company.

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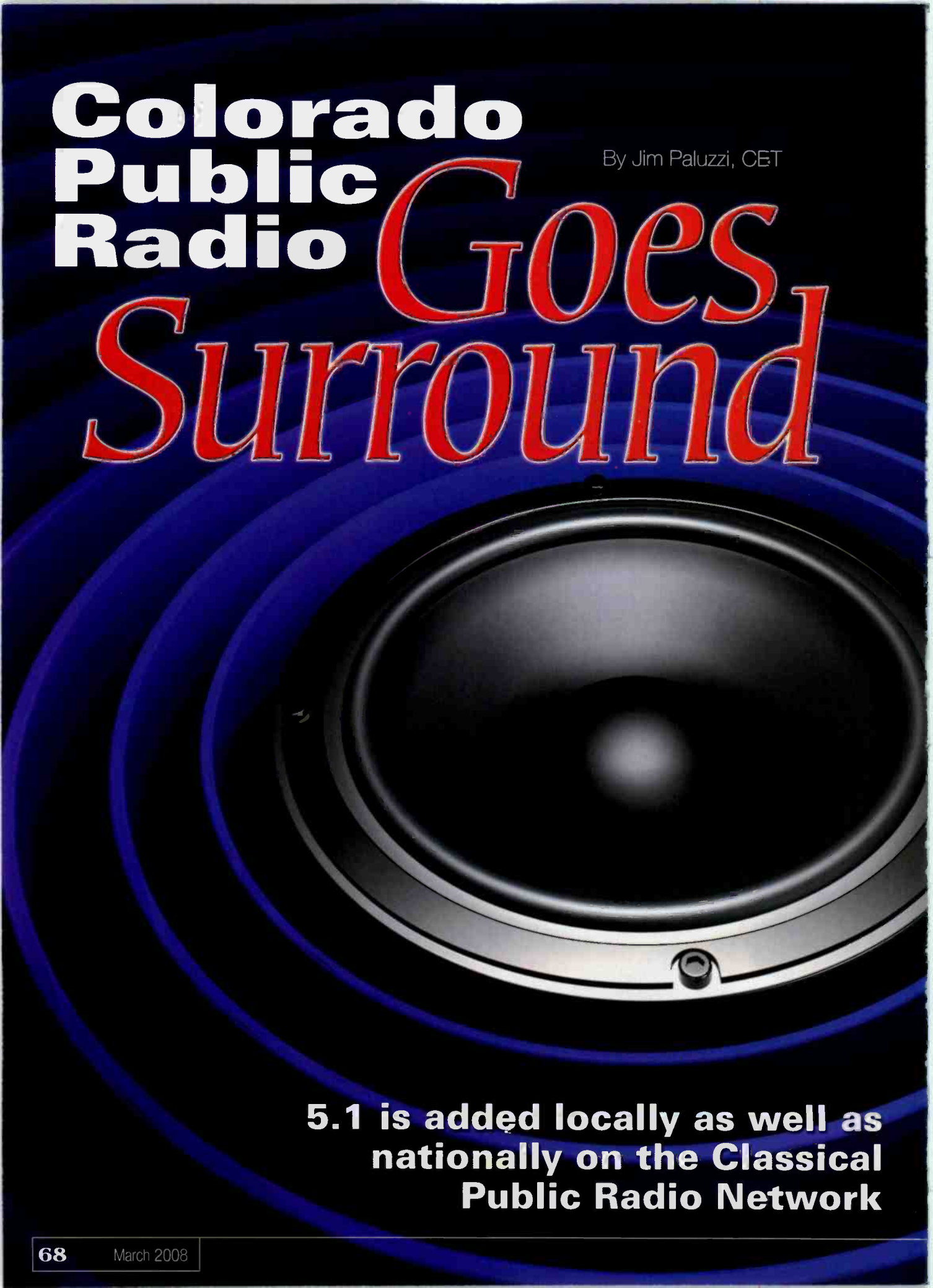
Colorado Public Radio Goes Surround

By Jim Paluzzi, CET



5.1 is added locally as well as nationally on the Classical Public Radio Network

Many of my colleagues have been predicting that surround sound will be the killer "app" for audio by the end of this decade. I, too, anticipate a 5.1 future that will provide the opportunity to augment and extend the listening experience for radio listeners. At the same time, however, this opportunity presents us with a huge challenge as many of our listeners are avid concert-goers that have heard firsthand many of the current world-class orchestras playing in acoustically optimized settings.

When I began evaluating surround technology, I had a number of mandates to fulfill as the technology specialist for CPRN, and its flagship stations, KVOD-FM Denver, and KUSC-FM Los Angeles. CPRN provides 24-hour broadcast programming and Internet streaming for its 60 public radio station network, as well as HD Radio programming distributed through NPR.

My first mandate for KVOD and the other CPRN members was finding a surround technology that would seamlessly work with everyone's existing stereo facilities. As public radio stations, our members were faced with major budget constraints that could not justify a complete re-tooling of their audio chain to accommodate separate surround audio channels.

Mandate number two required that the technology bridge the analog and digital worlds, but not be obsolete when the digital transition is completed. That also meant the technology would need to handle not only digital terrestrial broadcasts, but also digital Internet streaming.

Mandate number three, the most important of all, demanded that the 5.1 technology be easy to use and implement. The new technology had to provide our discriminating listeners with the best classical music experience, no matter what type of radio receiver. In short, our 5.1 implementation had to sound great on a conventional car radio, a home stereo system or a mono clock radio – as well as providing a solid surround sound experience for listeners using 5.1 receivers.

Getting started

We began extensive search of the marketplace, and found a number of products that covered perhaps one or two of the mandates, but not all of them. In the end, we selected Neural Audio and their Neural-THX Surround technology – because its downmix technology satisfied all our requirements.

I had heard great things about the downmix approach to combining 5.1 and stereo from Don Danko, vice president for engineering at WGUC-FM in Cincinnati. Danko said Neural's downmix had worked well with the station's existing stereo infrastructure when it had initiated surround sound broadcasting.

David Rutherford, one of the hosts for the Classical Public Radio Network, in the studio.

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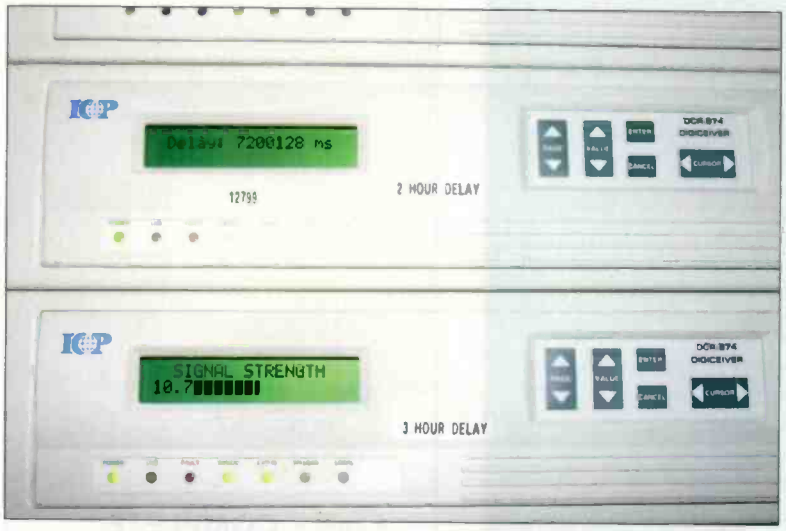
Colorado Public Radio Goes Surround

Danko had successfully tested the ability of the Neural-THX Surround Downmix system to transport 5.1 through a stereo infrastructure, because traditional stereo and 5.1 content are basically two dimensional, with both width and depth spatial attributes. The Downmix systems work by correcting overlaps of intensity, time, coherence, polarity and phase of the signal sources, allowing surround channels to be combined or watermarked into a stereo downmix for broadcast or storage.



The satellite receivers can be set to delay the programming as needed to delay the program feed for each time zone. The upper receiver here is set for a two-hour delay.

Similarly, the Neural-THX Surround Upmix system takes the stereo two-channel content and renders it into stereo, matrix-encoded stereo, or digital and analog surround. For listeners with a Neural-THX Surround enabled receiver, individual content elements are positioned exactly where they should be heard in the listening field for an exceptional surround experience.

Neural Audio had taken the initiative in expediting the creation of surround content for CPRN by encoding nearly 1,600, 5.1 classical musical pieces. Neural contacted the major players in the classical music distribution system, Telarc and Deutsche Grammophone, for permission to encode their available 5.1 content for stereo. By taking this approach, Neural was able to provide CPRN with downmixed content on a hard drive that accurately represented the original musical pieces – a great start for our transition to 5.1 broadcasting.

Steve Coghill, CPRN director of operations and program planning, heard his first Neural 5.1 recording at work through his computer and office stereo system. Because it is not a 5.1 system, he did not have the full surround sound experience. However, he has noticed a great deal of definition and clarity in the recordings.

After we received the Neural external hard drive, Coghill began to work on reviewing and classifying the content for our music scheduling system. He found Neural's cart chunk data feature was very helpful in identifying each file.

Easy going

Because the Neural content was downmixed into two-channel audio, no accommodations had to be made to the material for CPRN's Prophet Systems Nexgen (now RCS) automation system. We were able to integrate the new surround material into the Prophet system, just as we would have any other recorded musical content. Once again, the huge advantage of Neural-THX Surround 5.1 system is that the downmixed, surround audio simply travels over any existing two-channel system.

Not too long after the evaluation process was completed, I began relating our findings to Scott Henderson, CPRN's executive director. I told Henderson that Neural worked flawlessly with our stereo audio chain without any facility upgrades. He was initially skeptical, so I set up a listening demonstration, including samples of a recent performance of the Colorado Symphony Orchestra that Martin Skavish, Colorado Public Radio's recording engineer, had produced for live broadcast. After just one listening session, Henderson was a believer.

For the CPRN network, 5.1 programming is assembled at Colorado Public Radio's

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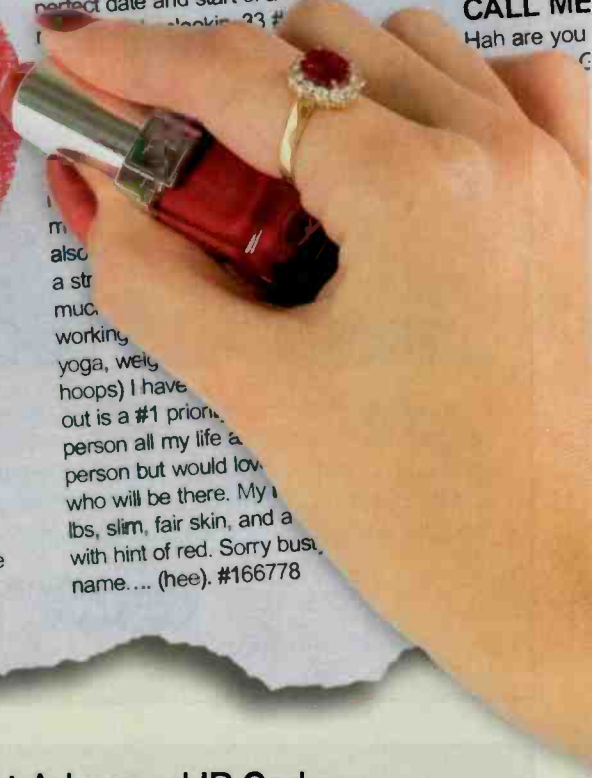

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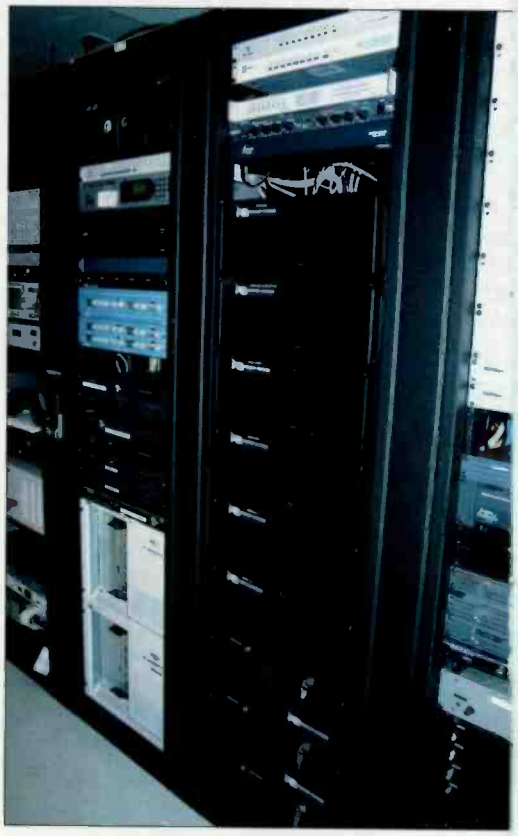
Colorado Public Radio



Because surround material is encoded to a stereo file, the facility infrastructure including the Nexgen automation system required no special accommodations.

facilities in Denver, incorporating our hosts and producers in Los Angeles, Denver and Minneapolis. The program service is uplinked via satellite to CPRN's affiliate stations throughout the country. Each affiliate station has an International Communication Products satellite receiver equipped with a circular buffer system that can delay the audio internally by 0, 1, 2 or 3 hours, so the content is properly day-parted for each time zone. This approach allows announcers to give time checks in real time (like 8:17), instead of having to say, "It's 17 minutes past the hour."

As are part of the CPRN network, Colorado Public Radio carries CPRN programming for 23 out of 24 hours of the day. We receive our audio from a satellite receiver – just like all of the other CPRN affiliates.

We are definitely sold on Neural-THX Surround. We think that our listeners will also be sold by the exceptional surround sound experience that the technology will bring to their homes and offices.

Paluzzi is VP of new media and technology, Colorado Public Radio, Denver.

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Tips, tricks, hints and more

By John Landry, CSRE

A cure for flying springs

Kirk Chestnut, CPBE, of Entercom Kansas City sent a tip that his coworker, John Morris, devised. The station uses several LPB silent mic booms and has a problem with the tension springs working their way off the posts and flying off the booms. It seems the ridge to hold the end of the spring is just not deep enough for their needs.

The fix? Replace the spring posts with 8-32 thumb nuts and a pan head machine screw. A 2 1/4" screw works well. This technique should work on other manufacturer's booms as well.

Kirk's submission makes him eligible to win a copy of *Pocket Ref*, as we announced in the February issue. Send us your idea by April 30 to be included in the drawing.

A thumb nut and screw installed on a mic boom. Thumb nuts (inset) are available at most hardware stores.

The Telular SX-7T Phonecell

Analog cellphones

Feb. 18 was the sunset date for requiring analog cellular service in the U.S. That means any bag phones and Cellcast units you might have been using for remotes may no longer work, depending on your cell service provider. It presents a bigger problem if your main or backup transmitter control uses a cellular link. Many of the older systems (manufactured and sold as remote security systems) that relied on 800MHz analog cellular links will no longer work. If you are in this position, help is on the way from Telular. The SX-5e or SX-5T Phonecell fixed cellular terminal will function on current digital cellular systems. Both provide serial data, virtual POTS as well as IP connectivity and they have an SMA connection on the back for an external antenna, if your transmitter site is close to a cellular site. The SX-5e works on GSM cellular systems while the SX-5T works with CDMA systems. A new version, the SX-7T is due soon, which will include IP connectivity. Then there will be no excuse for not having Internet access at the transmitter.

Extra pieces

Most of us are packrats. We save all sorts of things thinki we'll need them someday and a lot of times it has paid off. You can never have enough metric screws, so always remember to remove as many as you can from anything being scrapped.

In recent years I have noticed that many components – specifically switches and potentiometers are getting harder to find. Most new equipment uses tactile or rubber membrane switches. So what's a guy to do when a little box with an on/off switch and a pot for headphone level is needed? Good used switches and potentiometers should be saved.

Landry is an audio maintenance engineer at CBS Radio/ Westwood One, New York.

Do you have a tech tip? Send it to us at radio@RadioMagOnline.com

Submit your ideas for Tech Tips or the Engineer's Notebook now through April 30 and you will be entered into a drawing to receive a copy of the Pocket Ref by Thomas J. Glover. Send your ideas to radio@RadioMagOnline.com today.

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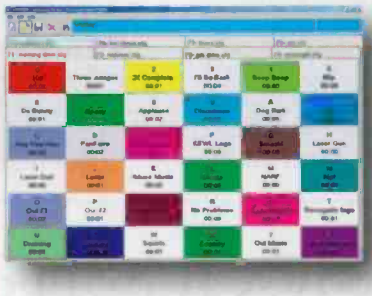
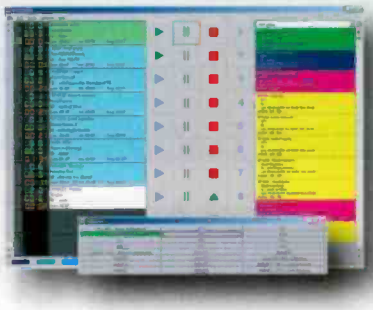


Stinger- instant acess to 288 'rapid fire' audio files

Digital Cart Player



WaveCart - the original on-screen cart machine

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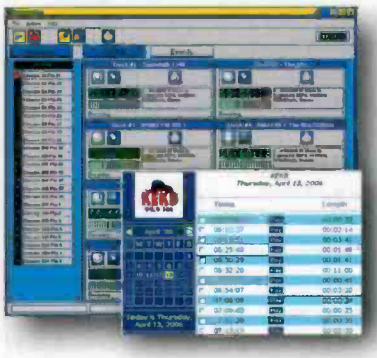

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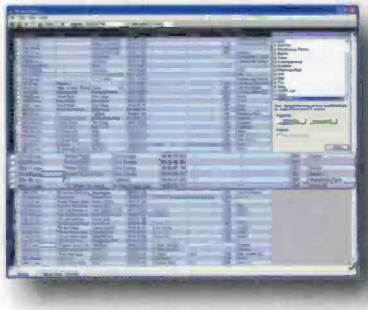

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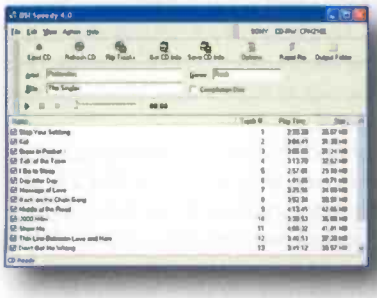

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Day Sequerra M2.2R

By Doug Irwin, CPBE AMD

Day Sequerra has updated its M2.0 HD modulation monitor, adding some nice and very useful features. I first reviewed the original M2.0 in *Radio* magazine in May 2006, and the new M2.2R model is an attractive piece of test equipment that will likely go in your facility where it can be seen by you and others.

Two rows of blue LEDs that correspond to demodulated audio make it very interesting to look at. The front panel is very clean and all local control is accomplished via a set of 10 push buttons located thereon. "Tuner band" selects the AM or FM band; "Presets" of course allows one to go to one of 20 presets for each band. Tuning is done by two buttons (one labeled up and one down). After one selects the band, and tunes to the station needed, the receiver will indicate whether or not there is an HD Radio signal present with three blue LEDs also on the front panel. These three LEDs are HD locked, multicast and delay set, which corresponds to the time alignment between the main (analog FM) audio and the MPS.

If the receiver is locked on a station with an HD Radio signal, then using the Mode-service button on the front panel will allow the user to go back and forth between MPS and SPS-1 (known to some as HD1 and HD2). Holding down the Mode-Service button for five seconds will force the radio to stay on the analog signal; in this mode, the two rows of blue LEDs indicate demodulated L and R audio, while the lower LED bar graph indicates main carrier modulation (up to 125 percent so that AM positive peaks can be read).

When the receiver is locked to the MPS (or HD1), pressing the Forcing button will make the receiver display the analog audio in the top blue LED row and the digital audio in the lower row. The left channel audio out will correspond to the analog, and the right channel the digital – including the front panel headphone out. This facilitates the adjustment of the time delay between the analog FM signal and the MPS.

When the receiver is forced into analog, pressing the data-display button will make the receiver display RBDS data on the vacuum fluorescent display; in MPS mode, the VFD will display the MPS PAD; in SPS mode, the VFD will read SPS PAD.

Performance at a glance

Analog and digital demodulator and modulation monitor

High-level and antenna inputs for both bands

LED bar graph level indicators

2RU steel chassis

Balanced analog XLR and AES3 outputs

Six alarm relays

Ethernet connectivity

Multiple measurement capability

More features

One feature that is now standard in the M2.2R is the ability to read pilot injection, RBDS injection, and 67 or 92kHz injection levels, giving it nice functionality as a piece of test equipment. It also has the ability to read synchronous AM noise. I found the front panel controls to be simple and very easy to learn.

Another standard feature of the M2.2R is the Performance Loss Monitor. A set of six relays allow the unit to signal the outside world when it detects loss of carrier, loss of audio, loss of OFDM lock (i.e., loss of digital signal), loss of RBDS data, loss of PAD and a choice between loss of multicast (MC) or delay bit. All of these alarms are configured by the same front panel buttons, and are accessible via a high-density DB15 located on the rear panel.

Remote Dashboard is Day Sequerra's proprietary software used to remotely control the M2.2R. This of course means that you need to install this application on a computer, and connect to the M2.2R by a LAN or, if the unit lives at a transmitter site, a LAN extension or WAN connection. The Dashboard provides the ability to remotely change channels on the receiver, and if HD Radio is available, the ability to re-assign the audio outputs from either analog or digital in the case of AM, or analog, MPS or SPS in the case of FM. The dashboard has 50 presets for AM and for FM as well; it also allows you to set up alarms that correspond to RF levels, analog, MPS or SPS audio. These alarms are separate from those mentioned earlier; the user is alerted to their presence by the GUI, or via e-mail.

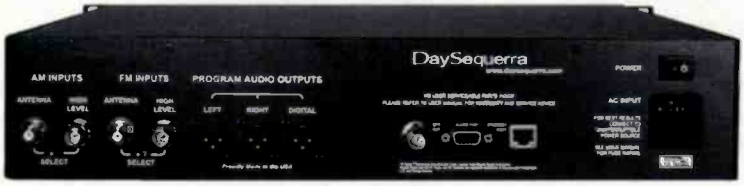
I should also note that these alarms correspond to the service the radio is tuned to at the time of the alarm: either analog, or MPS or SPS-1.

When a remote control session is in place, the VFD will read remote connection and each of the front-panel controls is locked out. This obviously prevents a local user from disturbing a remote user session. The unit's front panel LED displays still indicate the demodulated audio levels while the unit is remotely controlled.

Dashboard also allows the user to remotely look at either the decoded MPS or SPS-1 PAD data, which can also be logged (on the client computer) should the user want to do so. There is no indication of modulation or audio levels on the Remote Dashboard GUI, and therefore the majority of users will likely locate this modulation monitor in an area frequented by engineering personnel.

One of the best features of the M2.2R is the quality of the audio – especially noticeable with the demodulated HD audio. The lack of a good modulation monitor and HD Radio test equipment in general was a bit of a handicap when I first started putting HD Radio stations on the air; we had to cobble together car radios attached to outboard silence sensors. The Day Sequerra M2.2R not only addresses those early issues but also gives the broadcast engineer a powerful tool in the quest to make the best use of this new technology.

Irwin is the chief engineer of WKTU-FM, New York City.



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Editor's note: Field Reports are an exclusive *Radio* magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of *Radio* magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by *Radio* magazine.

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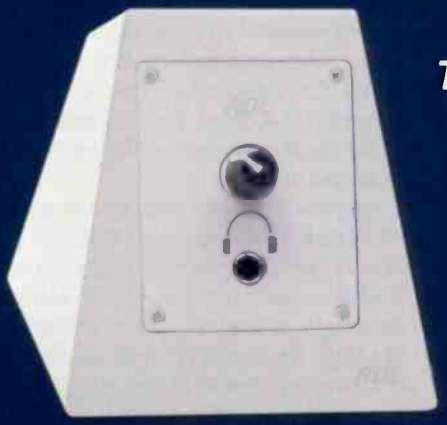

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Kowa PX-10

By Dan Israel

Some devices have a front panel that demands attention. Such is the Kowa PX-10 flash memory audio player. This box simply belongs in the studio; but is the PX-10 more than just eye candy for the control room?

You will immediately notice a lack of whirring from this machine; but there is more to this design than the absence of a hard drive and its accompanying noise. Flash-type media is arguably the optimal method for non-linear-based storage. Here, it dramatically increases the PX-10's flexibility and power by allowing completely independent media setups and off-site redundancy. Each user can tailor media and set up parameters to meet his own needs. Afternoon drive can have some independence from the morning show. How much is that worth?

On the back panel are the ac input, power switch, outputs and secondary USB port. It is not independently selectable over the front panel USB, which will automatically take priority when valid media is inserted. Outputs include analog balanced output via XLR (pin 2 hot) and AES-3 digital output via XLR, and S/PDIF IEC958 Type II digital output via RCA. A headphone output is also available. The Compact Flash (CF) slot is located on the right side of the device.

The slanted front panel of the PX-10 is where all the magic is. There are five rows of 10 backlit buttons labeled one through 50 for direct audio playback. Users of other instant playback devices will find the layout somewhat familiar. To the right of that are the transport, page and editing controls, including a small jog wheel and headphone volume control. Above is a 320x32 FLD display and recessed USB slot.

While setting up the flash drives is almost as easy as dragging and dropping, it does require the included PX-10 SW software to accomplish the task. It is not possible to create or prepare the media through conventional means or other software utilities. Nor is it possible to prepare or load media via the unit itself. Still the PX-10 can playback both lossless 16-bit WAV and MP3 files. The sample rate can be either 44.1kHz or 48kHz; however, differing format types cannot be assigned on the same page.

Performance at a glance

- USB and Compact Flash media
- WAV/MP3 compatible
- Six pages of 50 quick keys for direct playback
- Analog/digital outputs
- Backlit buttons
- Good display

The work begins

After installing the Windows-only software, you are ready to drag and drop files onto a window that represents the PX-10 and its playback buttons. Complete setups can be stored either locally or to external media. The setup information includes all playlist, media and settings needed. Transferring setups to USB or CF media is done by selecting "store" from the menu.

Once the media is prepared, playback operations are simple and intuitive. The user can select between USB or CF media. The PX-10 will take approximately 15-30 seconds to read prepared media when it is first inserted. Switching from USB to CF is about the same. Jumping between pages requires about 5-10 seconds, so the layout of the media on each of the six pages should factor this delay.

There are a few items that can be edited on the PX-10 itself. These include the playback head, tail, fade-in, fade-out and level. The fluorescent display contains a good amount of useful information (especially for its size) and is very instinctive. During playback, the display provides all of the following: L/R metering, lapsed or remaining time, graphic timeline (indicating file length, head, tail and fade in/out), and playback/standby cut title.

A few odds and ends on the PX-10: GPI start is available through a single connection on the back panel. This feature functions as a remote play switch and is not mappable to other hotkeys. Using playlists, a user can place the PX-10 in an endless playback state. Loop mode is available for direct cuts as well. Standby versus playback is indicated by the green and red bi-color state of the 50 hotkeys (frustrating color-blind users). The loop mode does not crossfade the beginning over the ending, so fade in and out points must be removed and the

loop point set precisely to prevent typical audible looping artifacts. The PX-10 SW can provide very useful (though somewhat dot-matrix like) printouts of the setups and cut location.

At this time, both USB and CF media is limited to 2GB capacity. But the ability to have six pages of 50 directly accessible cuts is probably more than a user can remember anyway. And though this limitation may someday increase (through design change or firmware upgrade), it doesn't seem likely to be much of an issue.

One note to keep in mind is the PX-10 is a player only – recording is not possible with this device. Also, there are no Ethernet or networking capabilities in the PX-10. However, the lack of hard drive or internal storage all but negates this need.

During my testing of the PX-10, I experienced a couple issues. First, the PX-10 SW can provide some cryptic dialog boxes when attempting to load incompatible formats.

I also experienced an issue with certain MP3 cuts not playing properly. After contacting Kowa, it was determined to be an issue with the PX-10's (firmware v1.02) interpretation of certain ID3 tags. I received a firmware update (v1.03) from the design team at Kowa. It took less than 15 minutes and fully resolved the issue.

The Kowa PX-10 is an excellent advancement in the world of quick-key playback. It is a solid machine whose form and function belong in the studio. The flexibility, redundancy, and noise free ambience provided by common inexpensive USB and Compact Flash media give the PX-10 a significant advantage over its competition.

Kowa

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Israel is president and CEO of Short Circuit Electronics, producer/engineer of First Run Productions, and executive producer of the Chiefs Radio Network, Kansas City, MO.

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Sample printouts from the PX-10 are available with this article online at www.RadioMagOnline.com

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The gains for HD Radio

Most AM analog stations follow the NRSC 10kHz standard meaning they actually broadcast a 10kHz signal. Believe it or not, a number of AM receivers actually get that quality, but the majority of them cut off as low as 3.5kHz. AM stereo radios required full utilization of the 10kHz signal which is why even talk shows sounded so good on an AM stereo radio. FM HD Radio signals are broadcast in, literally, CD 44.1kHz quality.

I don't know how far HD Radio-equipped stations blanket analog AM stations but I can provide you with a very educated guess that the actual receiver has a lot to do with rejecting that interference or permitting it.

In real-life situations, an AM station broadcasting an HD Radio signal will sound just as good as an FM station broadcasting an HD Radio signal on a car radio capable of receiving both signals. Only a few women (virtually no men) can actually hear above 15kHz. AM radio, in my opinion, actually stands to gain the most by HD Radio for both the sonic improvement and the elimination of buzzing that has plagued AM radio for decades.

I am on the NAB Spectrum Integrity Committee. Many broadcasters I talk with remain skeptical about the future of HD Radio regardless of whether it's on the AM or FM band. My advice to them is get over it and embrace the technology, as the alternative is very nasty. Is HD Radio perfect? No. Has it gained acceptance by listeners yet? Again the answer is no. That's the bad news; the good news is Walmart, Best Buy and others are now actually selling HD Radio receivers and the price continues to drop. The public will buy it if we give them something they want and feel they can't get elsewhere, especially for free. AM radio desperately needs the sonic quality of today's FM

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station and HD Radio provides that quality; FM stations need the extra channels HD Radio allows to create programming and provide revenue. XM and Sirius aren't our competitors; our collective resistance to change the fundamental way we do business is our real competition and we have nobody but ourselves to blame if we fail.

William J. Wertz
Wertz Media Consulting
Friday Harbor, WA

LPFM woes

Chriss, I read your note about ownership changes in a recent Viewpoint, and sense that, like me, you are not entirely satisfied with the job the FCC is doing these days.

I have had conversations with others recently about the FCC wanting to further crowd the FM spectrum with new LPFMs so that the minorities have better access to the airwaves. I think the FCC has done it again by placing itself in a bad situation. It cut back on funding for enforcement, leaving the brunt of the responsibility to police the airwaves to the licensees, and now it wants to create more interference by adding low-power stations that have very little to lose, not to mention the non-certified equipment they will probably use (because it's available and cheap). Oh, did I mention that they are proposing to lift the third-adjacent spacing rule for LPFMs too? How will the FCC even come close to enforcing the Rules with thousands of these new stations on the air? We have a good example of what will certainly happen with pirate operators.

What are these guys thinking anyway? Like you, I hope the new president will see through this haze and make sense with policy changes!

Name withheld by request

Technology update

In the February Trends in Technology, the product comparison table on IP codecs omitted some information for the Tieline IP. This codec is available in a 1RU or 2RU package, and also supports X.21/V.35 and 3G communications. Analog or AES-3 audio is supported with the appropriate interface. The codec can be controlled with Tieline software and via Ethernet, and it provides the Tieline Raw Audio algorithm for a maximum audio frequency response of 23kHz.

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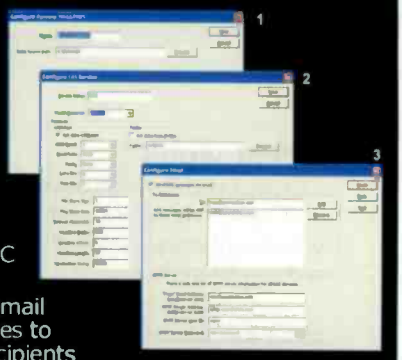

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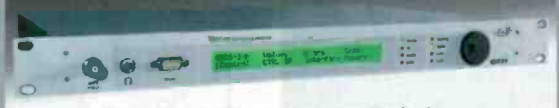

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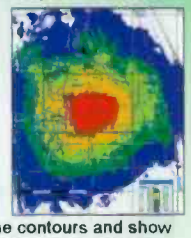
Things are no longer locked together. With multiple monitors, move the job control, station table, and other tool boxes to one screen then, expand the map to full size on another. The map is now a resizable rectangle.



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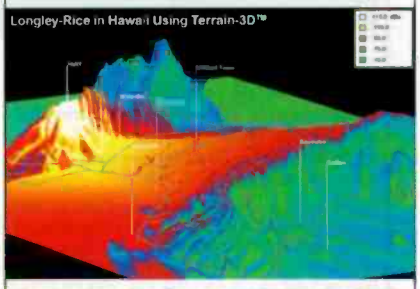

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Contributor Profile

Meet the professionals who write for *Radio* magazine.
This month:
Colorado Public Radio, page 68

Jim Paluzzi, CBT
VP of New Media & Technology
Colorado Public Radio

Paluzzi supervises CPR's IT systems. Previously he served 18 years as general manager of Boise State Radio, six years on the board of directors of National Public Radio, and currently serves on the board of the International Association of Audio Information Services, the NPR Multicast Receiver Team, and the National Radio Systems Committee. He holds a B.S. degree from Syracuse University, with a M.A. and a Ph.D from Kent State University.

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This index is a service to readers. Every effort is made to ensure accuracy, but *Radio* magazine cannot assume responsibility for errors or omissions.

by Erin Shipps, associate editor

Do you remember?

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When FM radio was introduced 60 years ago, radio manufacturers pushed hard to inform potential listeners about the new technology. Today, the same cannot be said for the HD Radio rollout.

To see more of this series of General Electric ads, visit www.RadioMagOnline.com.

Do you have interesting radio ads from the past? Tell us about them at radio@RadioMagOnline.com.

Sample and Hold

What we want in new cars

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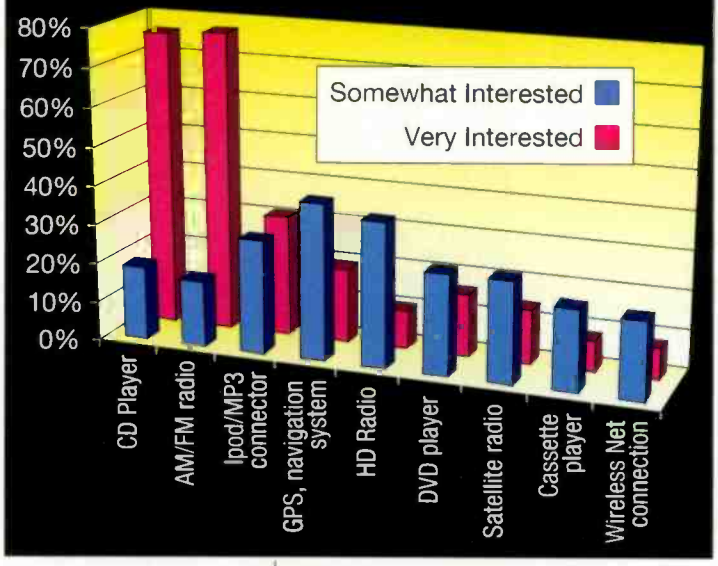

Source: Jacobs Media, Tech Survey III, 2007

That was then

In response to our December 2007 request for old staff photos, Xen Scott sent us these two 1964 photos from WTOA (FM) 97.5MHz, Trenton, N.J. Xen was a staff engineer at the time and the announcer is Phil Stout.

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