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RF Engineering
Phasors ready
Page 10

Field Reports
Telco protection with the Optelator
Page 86

Studio Technologies at the Final Four

Page 88

New Products
Tools for the trade
Page 96

Find the Mic Sweepstakes
The annual event returns
Page 6

Facility Showcase

Nassau rebuilds in New Hampshire
Page 20

On Location
KLVO broadcasts in surround
Page 78

Sign Off
How many radios were in use in 1923?
Page 112

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Contents

Radio
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December 2004 • Volume 10, Number 12

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Features

14 Trends in Technology: Test and Measurement
by Chriss Scherer
Proving performance with the latest tools.

20 Facility Showcase: Nassau Broadcasting of Manchester
by Chriss Scherer
The installation may have twists, but the end result is outstanding.

78 KUVO Surround Sound
by Mike Pappas
Surround sound broadcast history takes the stage in Denver.

103 Find the Mic Sweepstakes
A keen eye can make you a winner.

Products

Field Report: Clenney Communications Optelator II 86
by Joe Ternovan, CSRE

Field Report: Studio Technologies 210 and 220 88
By Raul Velez

Applied Technology: Digigram Exaudi 90
by Philippe Delacroix and Carl Conrad

New Products 96
by Kari Taylor

Columns

Viewpoint 08
by Chriss Scherer
Stay connected with your industry.

RF Engineering 10
by John Battison
Get into the dog house.

FCC Update 12
by Harry C. Martin
Broadcasters preserving history

Departments

Online 06
at www.beradio.com

Reader Feedback 102

Classifieds 110

Contributor Pro-File 111
Meet Mike Pappas

Sign Off 112
by Kari Taylor
Radio listeners lead in online shopping.

ON THE COVER:
As the systems used in radio evolve, so do the tools required to maintain them. Cover design by Michael J. Knust.

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Currents Online

Highlights of news items from the past month

Karmazin Named CEO of Sirius

Sirius Satellite Radio has named Mel Karmazin as chief executive officer.

DRM Steering Board Proposes to Extend DRM System

It's possible that the DRM system will extend up to 120MHz if the proposal passes.

Studer Sells First On-air 500 Modulo

San Francisco's KQED Public Radio 88.5 FM is the first broadcaster to purchase Studer's new on-air 500 Modulo.

Clear Channel Focuses on Online Content

The company wants to create a more compelling online entertainment experience.

Site Features

Innovative Product Award

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Engineer's Notebook

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Since 1998, *Radio* magazine has placed our mic icon on each cover of *Radio* magazine. In some cases it's easy to spot. Other times it's more of a challenge. Can you find the mic icon on the 13 covers from 2004?

Each monthly issue (January through December) plus the Product Source has the icon hidden on it somewhere. Gather your issues, find each icon and then enter the *Radio* magazine Find the Mic Sweepstakes to win one of three prizes.
Complete rules are available on page 101 of this issue.

Once you have found the icons, enter the sweepstakes by using the online form at beradio.com or sending a letter with the required information. Hurry! Entries must be received at the *Radio* magazine offices by Jan. 18. Enter now!

Note: The icon is not the "i" in the *Radio* magazine logo or the center of the zero in the 10 Years of Radio logo.

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Connections

The fall convention season is behind us. Between the NAB Radio Show, the AES convention and a long series of regional and state conventions, the chances are good that at least one event was in your neighborhood. I hope you took advantage of the opportunity to attend one or more.

The last convention I attended was the AES convention in San Francisco. While the AES has a slower pace for radio than the NAB or NAB Radio conventions, there was still plenty to see and investigate. The AES convention gives me a chance to see other areas of audio and look for new ideas. In some cases, a manufacturer may display a product with no intention of offering it to a radio audience, but after I ask some questions and explain how the product could be used in radio applications, the ideas begin to flow and sometimes a new market for an audience is discovered. Many times, these hidden gems will debut in the New Products section of an upcoming issue.

Many years ago, radio was the audio innovator and audio technology super user. This is no longer the case, but while radio is not leading the development of audio technology, we are still heavy users. Most often, this technology is developed for the computer, telephone or pro audio industries. We have adapted our ways to use existing technology to our advantage instead of dictating needs and usage to the technology developers.

With this in mind, one common thread that I saw at the AES convention involved high-speed data transfer. Between Ethernet, Firewire, Cobranet, Mlan and some USB, data connections ruled the day. The data connections are not being used for equipment control, but for audio transfer.

The idea itself isn't new. Voice over IP has been a buzz word for several years. The Firewire and USB interfaces are commonly found everywhere. You can't go anywhere without seeing some form of Ethernet communications. What has changed is that almost every piece of equipment had some kind of audio networking capability.

This development no doubt pleases the wire and cable manufacturers. They have the opportunity to rewire all the facilities with CAT5e or better wire.

We have used a digital audio standard for many years: AES3. This works well, but it is already being viewed as limited in capability. There are many that tout routing a facility's entire audio through computer wiring. Some are pushing using off-the-shelf computer hardware. Personally, I think the technology is a little young to entrust everything to IP transport, but that day is coming.

In small facilities, there is likely no need to implement a high-speed data network for audio, but larger facilities with extensive routing and switching needs will likely make the transition much sooner.

Choosing an audio-data system today is not an easy task. Several formats have established themselves in particular niches, while other formats are highly proprietary. The systems that are supported through multi-manufacturer alliances may have the initial edge, but the technology development cycle transitions so quickly, that today's minor player could easily be tomorrow's dominant leader.

So what's a station to do? Should you tear everything out and start over? Hardly. The technologies in popular use today work well. Take advantage of the mature applications, they are reliable and proven.

The adventurous types may boldly reach for something outside the usual. With the risk comes the potential for great success or great failure. Either way, the trend of using high-speed data paths for audio distribution will continue to evolve and develop. Just make sure you choose the right one.

Chriss Scherer, editor
cscherer@primediabusiness.com

Find the mic and win

Look for the *Radio* magazine microphone icon on every cover of *Radio* magazine. Tell us where they were in 2004 and you could win. More info is on page 6. The rules are on page 101.

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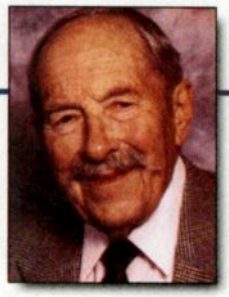

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Phasors and ATUs

By John Battison, technical editor, RF

The antenna is the last link in the circuit between the transmitter and the listener. In this link, there may be a phasor (for a directional station) and some antenna tuning units (ATU). In any case there will be at least one ATU. Let's take a look at the function of a typical ATU.

In the case of a nondirectional station, it is necessary to match the output of the transmitter, which is usually 50Ω, to the base operating impedance of the antenna. A typical antenna might have a base impedance of about 40+j100Ω.

The link between the transmitter and the antenna is a simple piece of coaxial cable that has a broad bandwidth. However, when connected to an ATU it can become part of a circuit that may introduce unexpected distortion into an AM signal. In reality, it is part of the transformer that matches the antenna impedance to the transmitter output impedance. Optimum transmission requires that the two side bands are equal in amplitude and phase so that the resultant of the two side bands falls directly on top of the carrier phasor. If this condition is met, the received signal will be a close replica of the original.

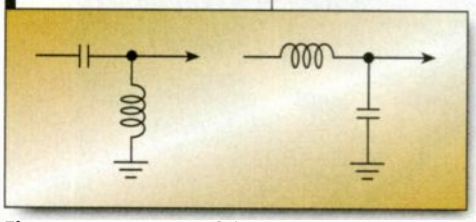

Figure 1. An L network is not normally used in a directional array phasor because its adjustment is too coarse.

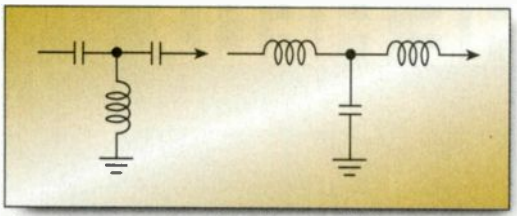

Figure 2. A tee network adds an additional series element to an L network.

There are several influences produced by the antenna tuning unit network and the antenna that can affect the bandwidth of this important link. In a vector diagram of the circuit there are three phasors, one for the carrier and one for each side band. If the amplitude or phase of any one of these is not correctly adjusted signal distortion or incidental phase modulation can result.

If one of the side bands is missing or is severely attenuated the signal envelope will not be a sine wave. The degree of distortion depends on the amplitude of the affected side band. In the unlikely event that AM stereo is being transmitted the distortion will be greater and stereo separation will be reduced.

The bandwidth of the transmitted signal will not be excessive. Even with severe distortion signal splatter and adjacent channel interference it would not occur because it is in the receiver that the carrier and side bands are combined and distortion is generated. So distortion may not be perceived on the on air monitor in the studio, but only in listener's receivers.

There are several ways to design the circuit between an AM transmitter and its antenna. Before the days of computers, pocket calculators and Burrough's calculating machines, consulting engineers used slide rules to design antenna systems. Often the first circuit parameters that gave the desired pattern or match were selected, and design work stopped. Now computers make it possible to iterate designs quickly until the best circuit values are found. In the case of nondirectional stations the procedure is relatively simple but for directional antenna systems a great deal of work is still required to ensure that unanticipated problems do not arise.

In a nondirectional AM station the base operating impedance of the antenna is of prime importance. The R part of this impedance multiplied by the antenna operating base current squared defines the operating power. The ±j (reactance) portion is transformed by the ATU to match the 50Ω coaxial cable.

It is not practical, in most cases, to develop an AM antenna with an impedance of R±j0. There are many filter techniques available to affect the desired match. The most commonly used are the L and tee, but a Pi network may be found occasionally. Even a simple shunt fed antenna usually requires a small amount of L or C to complete the match.

Figure 1 shows an L network. It consists of a reactor and a capacitor. These networks are simple to design provided that the shunt arm is placed in parallel with the larger resistance or reactance. Apart from design considerations, it doesn't matter which component is placed in the series or shunt position. As might be expected, this network introduces a certain amount of phase shift. Once the network has been built the phase shift and the transformation ratio are fixed. Changing one affects the other, and to overcome this limitation the tee network was developed.

The tee network, shown in Figure 2, has an extra series element. The L network is probably more common in nondirectional AM stations, although I prefer a tee because

it allows more latitude when setting up the system. This network is almost always used in the ATUs of directional stations because it provides easier adjustment and phase shift is variable over a range of about 90°.

Tee networks are calculated with specific values for each of the three arms. Often the capacitor value is not a stock item. Therefore, it is common to find a capacitor and inductor in series in any leg. The inductive reactance is used to cancel out the excess capacity and obtain the desired value of C. A vacuum capacitor adjusted to the correct value will sometimes provide better audio than a coil and capacitor combination, but it is more expensive.

Phasors

The purpose of the phasor is to provide an RF voltage of the correct phase and magnitude to each antenna in an array to produce the desired radiation pattern. Although the base operating impedance of each antenna is important, far more important is the impedance of the Common Point in the phasor. This is the input circuit of the phasor and is the link carrying the combined power of all radiators. The total current squared at that point multiplied by the resistance equals the total power of the transmitter and is known as I_{cp}. This is the point at which the FCC requires power to be measured.

A tee network matches the total phasor load to the transmission line. A typical three-tower system is shown in Figure 3. Immediately following the tee network is a power divider that provides the required power for each tower. These taps provide somewhat coarse magnitude control and the user is advised to specify continuously variable controls. Moving coil taps is time-consuming and requires a lot of patience. The actual type of power distribution circuit usually depends on the preferences of the consulting engineer.

The phase control for each tower drive consists of a tee network in whose series legs are continuously variable inductors coupled to move together. The shunt leg should also use a continuously variable inductor to provide easy adjustment. Normally the reference tower phasor settings are not changed once the pattern has been established correctly.

It sometimes helps to understand the working of the phasor by considering the power branching network as a simple source of RF and seeing individual phasor controls as tee networks matching the transmission lines.

It is important to realize that phasing is the main subject of concern in a directional installation. The consulting engineer calculates the required phase and magnitude of the base current in each tower to produce the desired antenna pattern. Then the phase shift introduced by the transmission line is determined, taking into account the transmission line dielectric factor. A maximum of 90° of phase shift is the usual value for a tee network in the ATU, and the anticipated phase shift in the phasing network is added.

The transmission line length is critical. Any damage to a transmission line or length change will affect the pattern. One of my clients substituted what "he thought was about" the same length of RG-8 to the particular tower and wondered why the pattern was out.

The power divider network is not considered in the phase calculations for the transmission line, phasor and ATUs because it acts only as a power source for the array towers. However, in most power dividers a small change in the power to one antenna will produce a change in the other antennas because the power distribution is altered.

The phasor is not the frightening cabinet of horrors that some engineers consider it to be. If its operation is understood, all dial readings are logged, users remember that a change to one phasor control usually results in at least a minor change in the other towers and the reference tower phasor controls are rarely moved, the phasor can usually be tamed.

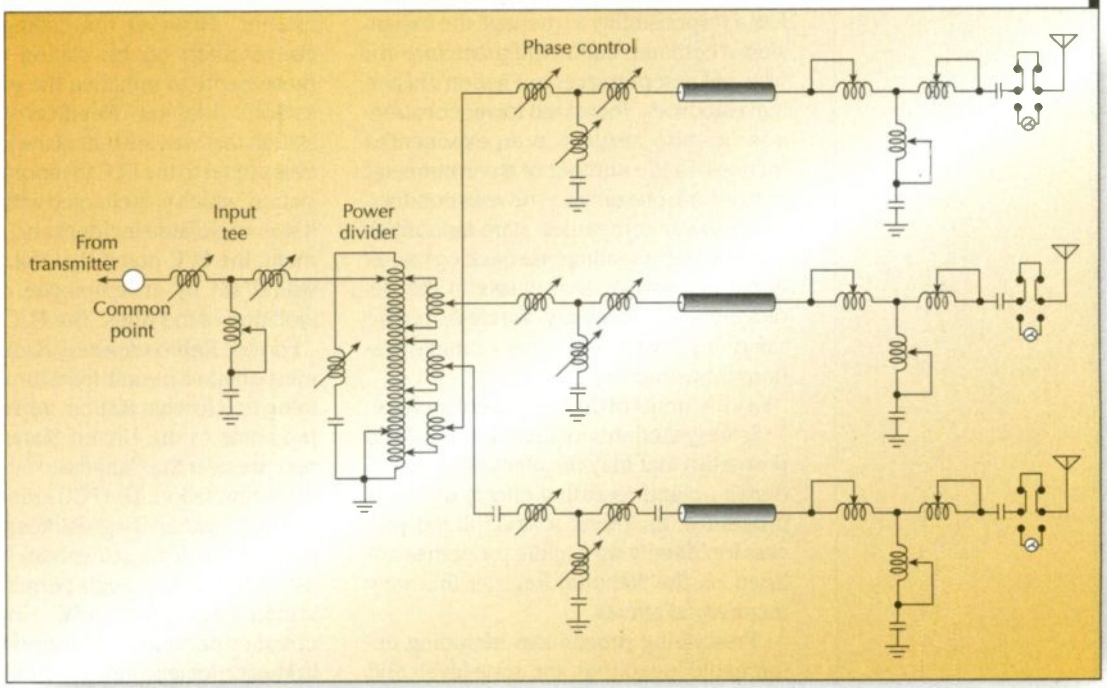

Figure 3. The various phase shifts of a phasor depend on the line lengths and the design parameters.

E-mail Battison at batcom@bright.net.

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FCC streamlines preservation review

By Harry Martin

The FCC has adopted measures to streamline the review process for communications towers under the National Historic Preservation Act. The Commission's action adopts the provisions of a Nationwide Programmatic Agreement that, when approved by the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers, will be implemented by the FCC.

The Commission recognized that, as the number of tower constructions has dramatically increased since the late 1990s, it has a responsibility to manage the expansion of communications infrastructure in a way that best preserves our nation's historical resources. Increased tower construction has also resulted in an exponential increase in the number of environmental and historic preservation reviews conducted by tower companies, state authorities and FCC staff, creating case backlogs, additional paperwork, and delays in the deployment of necessary wireless, public safety, broadcast and other communications infrastructure.

Key elements of the agreement include:

· Setting standards for identifying historic properties that may be affected by an undertaking and assessing effects on those properties, including a streamlined process for identifying eligible properties not listed on the National Register that may incur visual effects.

· Prescribing procedures including enforceable deadlines for state-level and Commission review.

· Providing forms designed to standardize filings made not only with the FCC but also with state historic preservation offices.

· Outlining procedures for communicating with federally recognized Indian tribes and native Hawaiian organizations to ensure protection of historic properties to such groups.

· Establishing exclusions from impact standards for enhancements to existing towers, replacement and temporary towers, certain towers constructed on industrial and commercial properties or in utility corridor rights-of-way, and construction in areas designated by state authorities.

The FCC is expected to have its new omnibus historic preservation review forms available by early 2005. The FCC's staff is recommending that the new forms be completed and filed with state historic preservation offices even when a tower proposal may not be considered to have major impact. This would avoid problems caused if an applicant's certification to the FCC of no impact turns out to be wrong.

Recent forfeitures

Broadcasting telephone calls. A Massachusetts DJ called a DJ from a competing station and pretended to be a listener. However, the calling DJ broadcast the entire conversation on his station without disclosing that—presumably to enhance the entertainment value for the station's listeners. Needless to say, the president of the station that was the butt of the joke was not impressed. He sent a letter to the FCC to report the incident. Although the station, which was charged with the violation, claimed that it was an isolated incident and not authorized by management, the FCC noted that this was an easy instance of a willful act by an employee of the station and was in violation of the rules. The FCC fined the station $7,000.

Foreign Rebroadcasting Permit. A U.S. broadcast station must obtain a permit from the FCC if it transmits programming to a foreign station, which in turn rebroadcasts the programs to the United States. Most broadcasters that operate near the Canadian or Mexican borders are aware of this limitation. The FCC granted a company permission to broadcast San Diego Padres games to a station in Mexico that broadcast the games back into the United States. When the company first sought permission to do this, the Mexican station operated at 5kW. However, after the company obtained permission from the FCC to ship its programming to Mexico for rebroadcast, the Mexican station increased its power in apparent violation of international agreements—and that, in turn, caused the U.S. station's international permit to become invalid. The FCC was not amused and fined the company $25,000.

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

Dateline:

Radio stations in Kansas, Nebraska and Oklahoma must file their renewal applications, biennial ownership reports and EEO program reports on or before Feb. 1, 2005.

Also on Feb. 1, 2005, radio stations in Texas must begin their pre-filing renewal announcements.

Logitek Brings Large Console Flexibility

to small workspaces

Remora-10 console at Cache Valley Broadcasting, Logan, UT

Possible Remora Configurations

Remora-4: four faders with controls for input assignment, monitors, and console functions

Remora-10 (shown): addition of six-fader module brings additional mixing capability with another stereo LED meter

Remora-16: incorporates Remora-4 base unit with two 6-fader modules

Remora-22: incorporates Remora-4 base unit with three 6-fader modules

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Proving Performance

Test and measurement

By Chriss Scherer, editor

Maintaining a radio facility is an ongoing process, and even new facilities have maintenance needs. Some aspects of equipment performance can be verified through the equipment's front-panel display, but to really understand what is going on when a problem occurs, special tools must be used. Just as a screwdriver and other hardware tools are standard in a facility's workshop, the proper test equipment should also be considered standard. And while the basic skills of evaluating system performance are still in place, the tools and the methods used today are changing significantly.

The classification of test and measurement equipment covers a broad range of equipment. This broad heading can be honed to cover routine, special or extraordinary uses. For the routine needs, some basic equipment should begin that list.

A reliable pair of headphones, an amplified speaker and a telephone test set are items that see regular use in an analog facility. These still have a place today, but with more digital signaling and routing, their use is limited.

The trusty analog audio analyzer is also limited in some ways. Because our ears are analog, there will always be some kind of analog output, so the need for some analog testing will always exist. But digital audio encoding to reduce the required bandwidth for transmission or file size for storage plays tricks on the audio stream. Lossy encoders are designed to introduce a form of distortion that cannot be perceived by the listener. Harmonic distortion and frequency response are still important to a quality listening experience, but there may be other hidden elements.

More tools and tasks

While audio and RF are still main areas of evaluation, a more recent need has been added for computer networks and IP data. Just as a voltmeter and oscilloscope are commonly found on the test bench, a LAN analyzer should be considered as another standard piece of equipment.

As digital audio and data have become more common, the time available to maintain equipment has been reduced. The newest generation of test equipment is designed to meet these challenges in various ways. Several years ago, computer-based test equipment was introduced to reduce the time required to complete the tasks. These units automated many of the functions to complete a thorough test. The process of checking a level, establishing a null for a test, then completing the test and repeating it at another frequency was reduced to seconds. In addition, these systems offered more test and measurement capabilities to a single device.

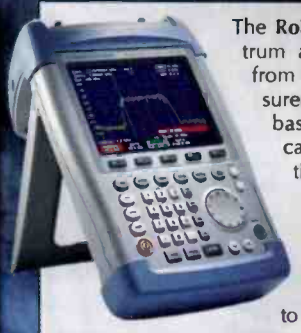
Current systems for the most part have taken one of two paths. Complete systems with a multitude of tests are widely available, but now compact and feature-specific equipment offers another option. On the workbench, the complete system can handle any need, but sometimes a quick check will suffice, and the complete system is overkill. The portable, often hand-held systems provide specific functions in a small package.

Resource Guide

A sample of some test and measurement tools

The **Fluke Networks One Touch II** can locate and resolve network problems. This hand-held unit can locate available interfaces and active ports, identify MAC, IP and SNMP names and addresses, and verify link speeds. It can pinpoint duplicate IP addresses, network misconfiguration and physical errors, display usage stats and data collisions, and analyze trends with baseline data reports. The unit also includes a cable tester to identify cable length, open conductors, crossed wires and split pairs. The unit can be used in remote location and accessed via a Web browser.

www.flukenetworks.com • 800-28-FLUKE



The **Rohde and Schwarz FHS3** hand-held spectrum analyzer provides signal measurements from 100kHz to 3GHz. The available measurement functions are suited for mobile radio base stations, on-site fault location in RF cables, IBOC measurements or lab applications. The analyzer provides four hours of continuous operation on battery power. Functions are accessed through function keys and a menu system. As many as 100 traces and setups can be stored in the unit. The device includes software to store, review and compare data.

www.rohde-schwarz.com • 410-910-7800

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While hand-held devices and integrated test systems are becoming commonplace for audio needs, digital transmission has its own measurement needs. While the first generation of IBOC modulation analyzer nears completion, existing equipment can quickly verify some operating parameters. A spectrum analyzer is an effective tool in evaluating RF signals. Considered for a long time a luxury item that only a corporate office could afford, newer models are being introduced that provide the needed capability in portable, affordable packages.

The latest trend in test equipment offers a secondary advantage that is no less important. When measurements must be repeated, ensuring that the proper settings are used each time will speed diagnosis.

The **RDL PT-ASG-1** and **PT-AMG2** are ready for portable or bench use from an internal battery or ac adapter power. The PT-AMG2 offers multiple functions for setting up, calibrating and troubleshooting any audio system. Housed in the unit are a precision tone generator, LED level meter and in-phase indicator. Mic and line-level I/Os are provided using balanced and unbalanced connectors. A built-in monitor speaker with level control is also provided. The PT-ASG1 contains the ultra stable 700Hz tone generator from the PT-AMG2 with balanced mic and line-level outputs on the XLR connector and -10dBV unbalanced on the RCA jack. Units may be used separately or together to set system gain mic-to-line, line-to-mic, mic-to-mic or line-to-line at professional or consumer levels.

www.rdlnet.com • 800-281-2683

With a Windows-based user interface, the **Gage Gagescope** controls Compuscope cards for analog signal capture. Data can be displayed, analyzed, printed and saved all from within the same operating environment. No programming is required to capture, display and generate up to 60 metering channels. As much as 2GB of information can be acquired, displayed, stored and analyzed. Data can be transferred to analysis packages such as Matlab, Mathcad and Labview. Features include FFT analysis, waveform parameters, averaging, auto save and extended math. The package operates on Windows 98, ME, NT, 2000 and XP.

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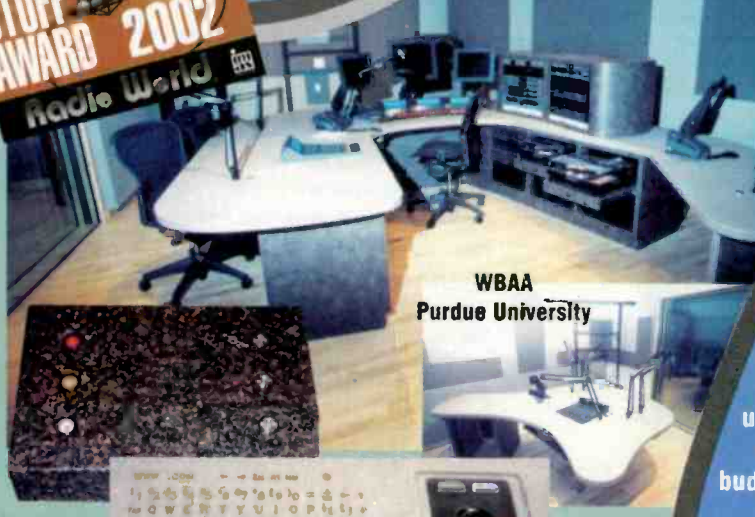

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Based on the original Audio Toolbox, the **Terrasonde Digital Audio Toolbox** offers more than 25 digital audio test, analysis and utility functions in one portable device. The DSP-powered unit features digital inputs, and digital and analog outputs, word clock in and out and a serial port. Supported digital formats include AES-3, S/PDIF, Toslink and ADAT, with bit depths up to 24 bits and sample rates up to 96kHz. Users can check lock between two digital sources and provide an analog output for monitoring. The unit also includes a digital audio cable tester that can determine the injected interface jitter for a particular cable. Other tests include digital transparency, latency, jitter, bit depth, header information, bit errors, word clock and bit clock. The digital generator creates several standard digital audio test signals.

www.terrasonde.com • 888-433-2821

The **Neutrik** series of **Minstruments** includes several tools. The Digilyzer DL1 provides analysis functions for digital audio signals. All commonly standardized sampling frequencies up to 96kHz are handled in consumer and professional formats. The Minilyzer is compatible with the Minirator hand-held audio tone generator. This palm-size test instrument continuously measures audio levels as RMS or peak levels, absolute or relative to a definable reference with selectable units. The frequency measurement resolution of 100ppm offers additional functions and acts as the base for distortion measurements. The RT-2M multitone analyzer may be integrated in network administration systems and can be remote controlled for testing and quality control of audio program channels while on air. The 160ms to 960ms multitone burst provides performance tests with plots of level, distortion, noise, phase and crosstalk vs. frequency. The receiving device captures, stores and sends back the test results to the transmitter where data is analyzed.

www.nt-instruments.com
800-661-6388

The **SLM-100** from **ATI** features a large analog meter for quick and accurate measurements. The frequency ranges from 32Hz to 10kHz, and it makes A and C weighted measurements with peak or averaging response. It includes a seven-range selector switch, calibration control and a test signal output via an RCA jack. A 9V battery supplies power. SPL ranges from 50dB to 126dB, referenced to 0.0002mbar, are possible. A threaded insert allows the meter to be mounted on a camera tripod. The unit measures 6.25" × 2.5" ×1.75".

www.atiaudio.com
800-922-8001

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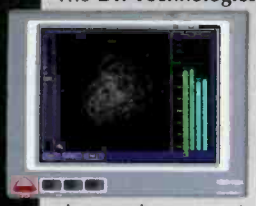

The **DK-Technologies MSD100C** is the latest addition to the company's range of master stereo display audio meters. The user interface provides three preset functions: two PPM analog input mode, two PPM digital input mode and four PPM both analog and digital mode. The color VGA screen displays audio levels and a stereo Lisajous pattern to ensure phase coherence. It has two audio input pairs; one stereo analog and one AES-3 digital that accepts up to 96kHz with a 24-bit A/D. The meter supports multiple PPM standards. The unit is powered by a wall-plug power supply.

www.dk-technologies.com
+45 44 850255

The **Ward-Beck ABB1** Audio Bit Buddy is a convenient way to monitor digital (AES/EBU, S/PDIF) and analog audio signals. Digital and analog program audio can be monitored by the headphone output while the left and right levels are displayed on LED bar graph meters. Sampling frequency, emphasis, professional/consumer format and data errors are displayed when monitoring AES/EBU or S/PDIF signals. Digital input monitors sampling frequencies from 30kHz to 50kHz automatically. The **ABS1** Audio Bit Spitter is a companion to the ABB1 and generates digital and stereo analog audio test signals. The ABS1 generates an AES/EBU digital audio signal, 1kHz or 400Hz, at the three most commonly used sampling rates of 48kHz, 44.1kHz or 32kHz. The unit may also be synchronized to an external digital reference signal. Digital signal levels of -20, -12 and 0dBFS are front panel selectable.

www.ward-beck.com • 800-771-2556

Covering the 100kHz to 3GHz frequency band, the **Anritsu MS2711D** hand-held spectrum analyzer features an input pre-amplifier (standard) and battery operation. Available options include transmission measurement for scalar analysis capability from 25MHz to 2.5GHz, a color display and a power meter. The unit weighs 4.9lbs. It includes a multilingual user interface, it can store 15 measurement test set-ups and 200 measurement traces with alphanumeric labeling and automatic time and date stamp. An RS-232 interface is built in. Measurements include channel power, adjacent-channel power ratio and occupied bandwidth measurements that can confirm the distortion level or channel power level of a transmitter. The unit can conduct a series of spurious measurements, while the field strength mode measures propagation and coverage, or pinpoints electromagnetic leakage in broadcast systems.

www.us.anritsu.com • 800-ANRITSU

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The **Audio Precision ATS-2** is a PC-based audio test and measurement system that provides performance capabilities to match specific needs and budgets. Analysis capabilities include harmonic distortion and multitone analyzers. The Harmonic Distortion Analyzer decreases an engineer or technician's test time

by quickly isolating and identifying circuit problems. The Multitone Analyzer enables fast analysis of frequency response, crosstalk, noise and distortion-eliminating errors, improving accuracy and reducing costs associated with test time. This series of performance tests is carried out in less than one second with a single acquisition. Audio Precision also offers a performance option that increases measurement bandwidth to 120kHz and includes complete digital audio interface tests including waveform and eye-pattern displays.

www.audioprecision.com
800-231-7350

The **Prism Sound Dscope III** features high-precision measurement and signal-generation for analog and digital signals. It can also provide carrier measurements, including jitter and display eye patterns. The unit runs on Windows NT or 9x. The system electronics are housed in an external unit that has a footprint about the size of a notebook PC. A flight case stores the unit and its accessories. Capabilities include FFT spectral measurement at 256k point resolution. Acquired data can be shared with other Windows applications.

www.prismsound.com
973-983-9577

The **Dorrough Stereo Signal Test Set Model 1200** is a 2RU instrument that allows instant dynamic monitoring of audio levels, balance, crosstalk, system gain, S/N ratios and program center-channel build-up. Verifying proper polarity and balance of stereo broadcast lines is a primary application. Two loudness meters are provided. Function, range and attenuation controls are set in tandem with the meters to achieve all measurements. Left and right channels are input via loop-through XLR connectors or a parallel barrier strip. The back panel also sports a line-level ¼" stereo output for connection to a scope. A front-mounted stereo headphone jack is also provided for monitoring.

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Practical form, affordable plans

By Chriss Scherer, editor

Nassau Manchester builds a showcase without breaking the bank.

Before any facility project begins, an engineer must determine the equipment and facility needs and then apply the budgetary structure. This simple plan is rarely so simple because of the unique challenges of a particular facility. When Nassau set out to build a consolidated facility for its station in southern New Hampshire, the goal was to create a reliable and functional facility without breaking the bank.

The studio facility is in Hookset, NH, which is just north of Manchester. Nassau owns nine stations in New Hampshire, five of which are housed in Hookset. Nassau acquired the nine stations when it purchased them from Vox Radio and Telemedia.

At the end of October, two of the five stations were in place: WNNH and WHOB, which Nassau purchased from Telemedia. Three more stations will move in the coming weeks: WJYY, WNHI and WOTX, which were owned by Vox. The two Telemedia stations already occupied space in the Hookset facility, but additional work was needed to prepare for the three additional stations.

The other four Nassau stations have studio facilities in Guilford, NH.

Laying plans

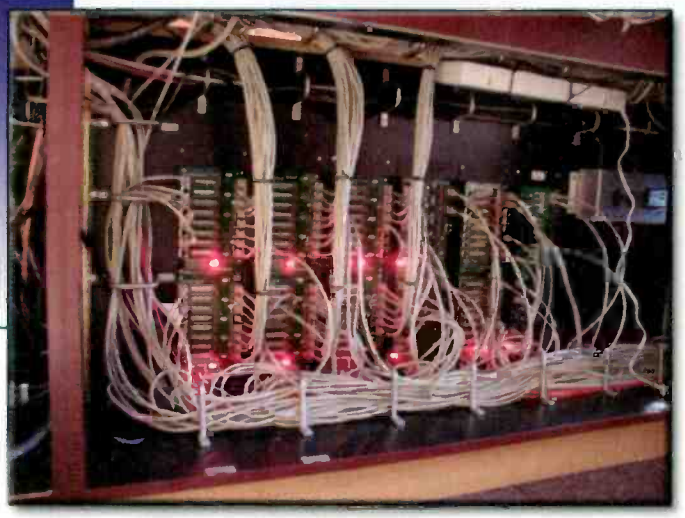
The Hookset location was originally chosen by Telemedia, and Nassau chose to stay in this area because it is between the two cities served by the stations: Concord and Nashua. While Telemedia had nearly completed its installation for the two stations, Nassau immediately decided to rework what had been started. While the facility locations had several shortcomings, the existing investment in the space and a long-term lease confirmed the decision for Nassau to modify the facility to house the additional stations instead of relocating.

The first step was to rearrange several offices to accommodate the additional studios. In all there are now nine studios—five air studios and four production studios—for the five stations.

The studios were designed for each to use one of two common layouts for on-air or production use. Because of space limitations, the fifth air studio uses the production layout. The station that

Air control 5 is set up like the production studio layouts.

Studio Hub jack panels are placed at each mic position for a headphone jack and control.



The studio end of the multiconductor tielines are mounted in the furniture.

occupies this space does not carry a live format all day, so the reduced size is not a problem.

The air studios' U-shaped furniture layouts are identical, although two studios are mirror images of the other two. The overall design goal of the reshaped facility was to provide function with a straightforward equipment complement. In keeping with this plan, analog consoles with an audio router were coupled with a rapidly deployed wiring system.

Radio Systems Millennium consoles were chosen. These were tied to an SAS 64000 router. The Radio Systems Studio Hub+ serves

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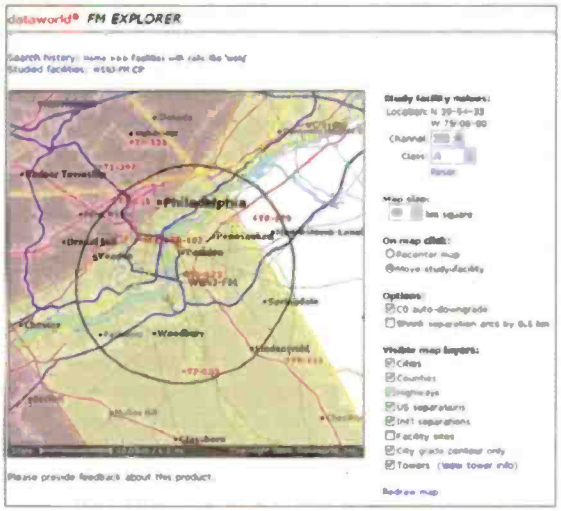

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as the wiring backbone.

While Nassau liked the features of the Millennium consoles, there was one shortcoming that had to be addressed. The original consoles had minimal telephone bus support. Dirk Nadon and Tony Gervasi of Nassau worked with Radio Systems to improve the bus system for simpler telephone feed support, such that an off-line mix can be used to take calls off the air, while a second mix can be fed to the phone when it is routed to be used on the air. This feature is available in higher-end consoles, but Nassau was impressed with the Millennium and wanted to use them in the facility. Now that the development is complete, Radio Systems now offers this capability as a standard option.

The Studio Hub system allowed fast equipment installation. By using connector panels and prefabricated CAT-5 cable assemblies, few connectors had to be soldered. The CAT-5 cables were bought in bulk, and multiple cable runs were terminated with punch assemblies. The Studio Hub system also eliminated the need to devote a large space for a punch block wall.

The facility itself had a few shortcomings that had to be addressed. First, there is no line-of-sight access to the stations' transmitters sites for wireless STLs. T1 circuits are used to connect the studios to their facilities. In one case, T1 service is not available to a transmitter site, so the STL is double hopped via a T1 to another transmitter site and then carried by wireless STL to the final destination.

Some programs are received via the AMC-8 satellite. Because of the low site elevation and high tree cover, the satellite dish had to be placed on one end of the site property and then mounted on

The end of ISDN?

By Kari Taylor, associate editor

When the project began, Nassau New Hampshire ordered five Comrex Matrix codecs with ISDN and POTS capability. One ISDN line was ordered from Verizon, the local phone service provider, and installed at the station. When Dirk Nadon, director of engineering, called to order additional ISDN lines, he was told by Verizon "sorry, we don't offer them at the location anymore."

Nadon quickly phoned Tony Gervasi, senior vice president of engineering and technology, who in turn called the corporate sales rep at Verizon and was told that "even though you have ISDN lines at that location, we will no longer offer ISDN service in your area." Gervasi then asked to speak to his supervisor, but received the same answer. Even after going up three levels, he kept getting the same answer. Finally, Gervasi received this answer: "Verizon stopped supporting ISDN lines over Pairgain amps, and since your location is just outside the three mile limit for ISDN lines, and any new service would require Pairgain amps, you're unable to get this service."

Now, Nassau has more than $30,000 worth of Comrex ISDN equipment, and another $16,000 worth of Telos Zephyrs that can't be used in its stations in New Hampshire. And, at Nassau's stations in Maine, where there are ISDN lines already in place, it is being told the same thing: "your location no longer qualifies for ISDN service."

Nassau is exploring other means with CLEC's for ISDN services, but so far it hasn't found a solution. ■

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1200-10s
ten channel

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Arrakis

The rack room houses nine equipment racks, plus two open-frame racks for the office networks and phone system.

a 20-foot pole to clear the ground clutter.

The Hookset site connects to the Nassau corporate offices in Princeton, NJ, via three T1 lines. This interconnect provides WAN access as well as system redundancy for data backups.

In the rack room

Each air studio has its own rack for processing, STL, EAS encoder and air monitor tuner. The back of each air-studio rack has three Studio Hub panels. The production studios do not have their own racks, so their blocks are mounted on the back wall.

The other racks house the office network, office telephone system, the SAS 64000 audio router, monitoring equipment and Broadcast Electronics Audiovault servers. The Audio-

Equipment List

360 Systems Shortcut
Adobe Audition 1.5
APC 1000XM UPS
APC 2200XL UPS
Aphex Compellor 320A
Beta Brite LED signs
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Dayton Industrial AFC3
Denon DN-C635
Denon TU-1500RD tuners
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Enberg BA-12
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Eventide BD500
Gepco E131675 and GA61820GFC
Harris Intraplex STL HD
Harris World Feed panel
Henry Engineering Superrelay
JBL 4408
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Radio Systems CT-2002 clock
Radio Systems Millennium
Radio Systems Studio Hub +
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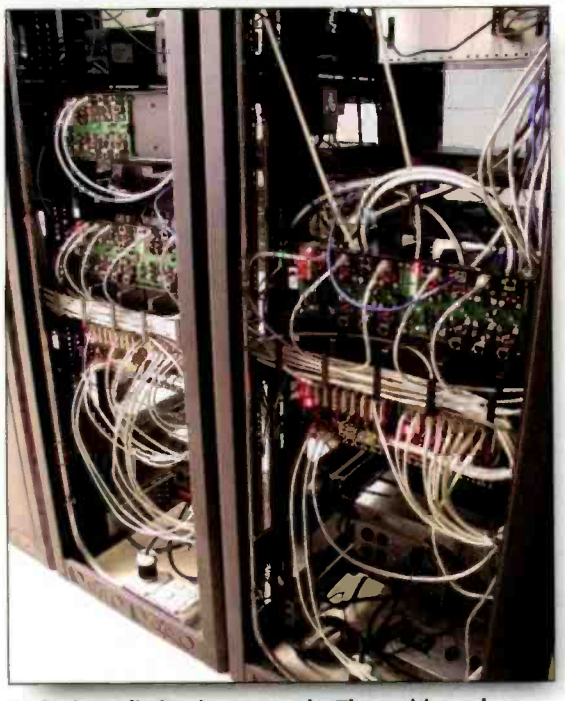

Each air studio has its own rack. The multi-conductor cable tieline is terminated on the rear-rail-mounted panels.

vault runs an NFS server and uses linear audio encoding.

The original studio installation had a 12-pair cable installed from the telephone company. Nassau added 100-pair service, which was a challenge that required coordination with the other tenants in the building.

Minor variations

While the air studios use Telos 1×6 telephone systems, the production studios did not need this level of flexibility. Instead, a Radio Systems DI-2000 phone hybrid is connected to the office telephone system through an analog extension port. This allows the phone to be used to play client spots and conduct other business functions that are more common than any on-air phone needs.

The facility construction project is not yet complete. As mentioned earlier, the final stations are moving in sometime this winter. In addition, the office area is being remodeled for the new staffs. This phase of the project includes building out an additional suite in the building for a news sales office area.

The Hookset installation is an example of a functional, modern facility that was completed within tight budget constraints. This approach has provided a facility with the necessary flexibility needed in a competitive market.

The Nassau Crew

Dirk Nadon - director of engineering, New Hampshire stations
Ron Leroux - IT director
George Bierbaum - staff engineer
Steve Ordinetz - staff engineer

Facility Focus

the technology behind Nassau Manchester

Comrex Matrix

The Comrex Matrix offers the ultimate in flexibility for remote broadcasts. Whether on regular telephone (POTS) service, ISDN lines, or GSM wireless networks, the Matrix can send high-quality remote audio to the studio from virtually anywhere. As a 15kHz POTS codec, the Matrix can connect with all Comrex POTS codecs, and with the optional ISDN module, the Matrix is compatible with most ISDN standards. When the remote site has no phone line, the optional GSM module allows the Matrix to transmit 7kHz audio with an internal GSM wireless phone. Along with the full line of Comrex codecs and telephone hybrids, the Matrix will help your station broadcast great-sounding audio from anywhere.

www.comrex.com
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Radio Systems StudioHub

StudioHub, the complete CAT-5 facility wiring solution from Radio Systems, is the wiring backbone chosen by Greater Media for its Detroit buildout. Based on IT-standard CAT-5 wiring, StudioHub simplifies facility wiring by converting the myriad of audio and remote control connectors into reliable, economical RJ-45 connectors. The system also utilized DC-Link, a phantom power system that is carried on every CAT-5 wire to power remote devices, such as headphone and mic amps, intercom systems and router controllers.

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Surround takes to the airwaves

Dianne Reeves and the Colorado Symphony Orchestra 5.1 broadcast

By Mike Pappas

On Sept. 24 KUVO radio broadcast the first-ever 5.1 surround live performance using the HD Radio system. Using the Harris Neustar 5225 (designed by Neural Audio) watermark two-dimensional downmix system, KUVO broadcast three-time Grammy-winner Dianne Reeves with the Colorado Symphony Orchestra (CSO) live.

Getting there

As the first FM HD Radio station in Colorado, KUVO was looking for ways to promote HD Radio. As part of this we teamed up with Ultimate Electronics Sound Track to raise awareness and provide our listeners with an outlet where they could obtain radios. As part of this program, Ultimate Electronics underwrote the Reeves/CSO broadcast with help from Kenwood Electronics. The funding side of the project was covered. Now we needed to address the technical aspects. I had heard a demo of the Harris Neustar 5225 system at the Neural facility in

Photo by Grant Leighton

Seattle, and I was impressed. The 5225 system is a DSP-based watermarked two-dimensional downmixing system. The 5225 is fed left, right, center, low-frequency extension (LFE), left surround and right surround via AES-3 digital inputs, and it produces an AES-3 watermarked stereo signal.

The 5225 is not a matrix system. I listened to stereo/quad systems during the early 80s, and during my career in television I used several matrix systems to make surround and they all have serious technical problems. The primary problem is a lack of image stability. With matrix systems images shift back and forth and front to back and this was not acceptable.

Other proposed 5.1 radio implementations are fully discrete. Everything is handled as six channels of audio. In a digital facility this requires three AES-3 lines per source. Modifying the KUVO facility to support discrete 5.1 was economically infeasible.

For the broadcast we created a mix in 5.1, ran it through the 5225 and shipped the downmixed, watermarked signal as conventional stereo. This would be the signal that our analog FM and stereo HD Radio listeners would hear.

The Reeves CSO concert was held at the Boettcher Concert Hall at the Denver Performing Arts Complex. We started our planning with a site survey in August.

Boettcher concert hall is a theater-in-the-round with seating on all sides of the stage. It has more than three seconds of reverb time and seats 2,500 on three levels. Our first challenges were to decide the location of the 5.1 control room and then install the ISDN lines. Additionally, we had to schedule our load-in and set up around the CSO rehearsal schedule while working with the IATSE stagehands crew. We examined the stage, the possible cable runs and the available dressing rooms to estimate the cable runs and the announcer locations.

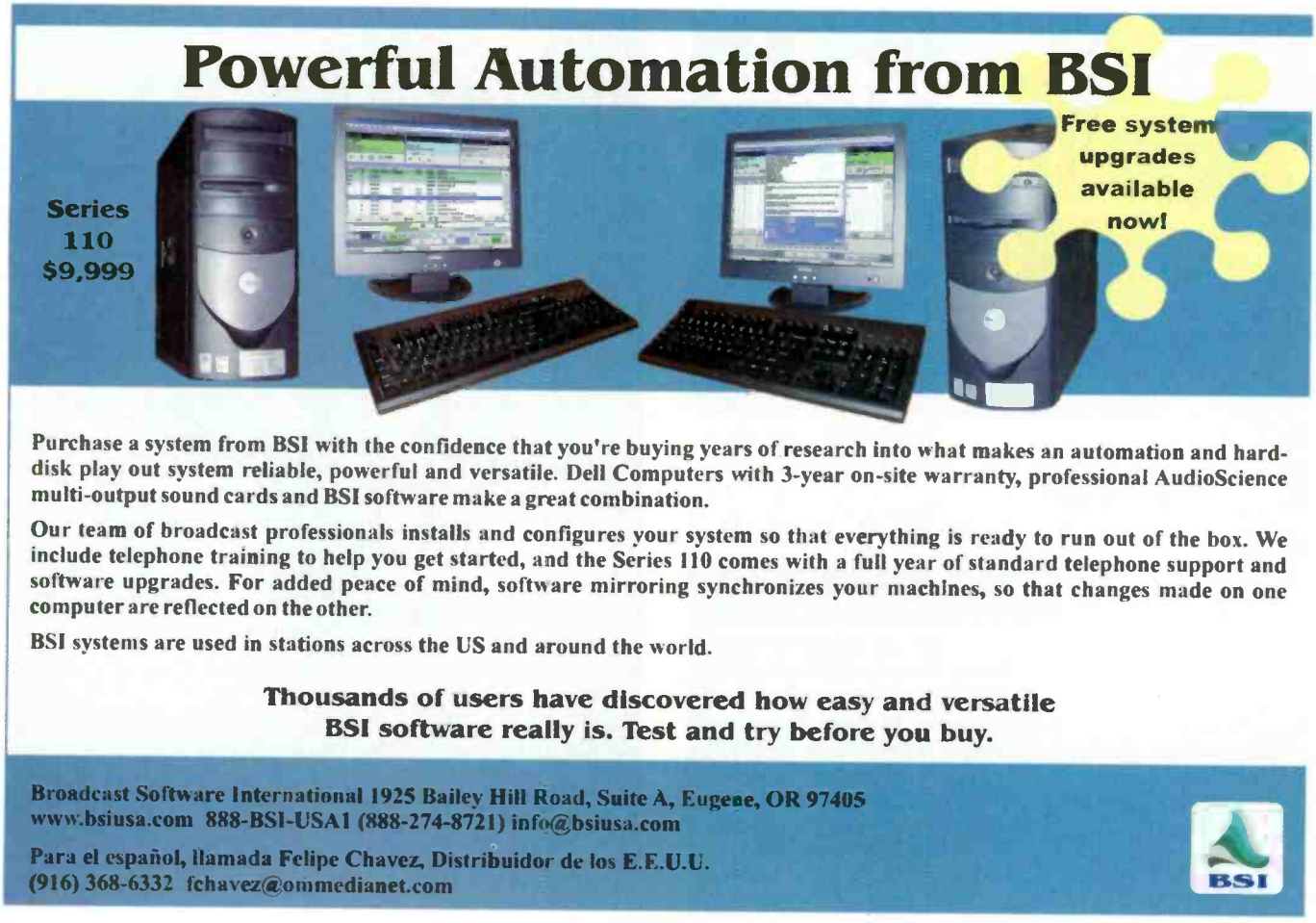
In the meantime, we prepared a block diagram of the system and started collecting the equipment we were going to need to make this happen.

Our initial plan was to use a 5.1 analog console as the music mixer. We quickly discovered that there were no small-format analog 5.1 consoles available. Because I didn't want to use a digital mixer, our backup plan was to use a mixer with left/center/right capability and use the auxiliary outputs for the LFE and rear surround channels.

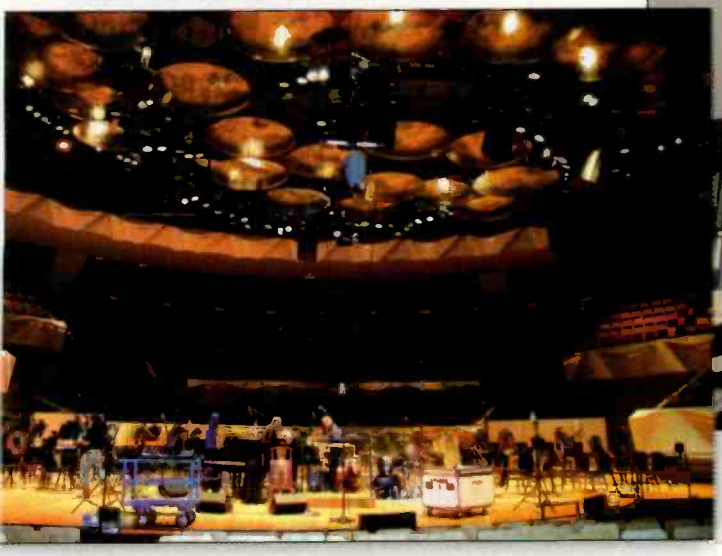
We obtained an Allen and Heath ML-3000 with 32 inputs, L/C/R capability and eight aux outputs (outputs 7 and 8 are stereo, which we used for the rear surround channels) that would cover our needs.

Bonding ISDN lines

I was concerned about the best way to get the signal back to the studio. It didn't make a lot of sense to kill ourselves making great audio at the concert hall if we couldn't get it back to the studios. I looked at bonding a pair of ISDN lines to increase the fidelity of our signal and found that APT makes a series of



Surround takes to the airwaves



The stage being set for the performance and broadcast.

Mike Pappas and Gregor Zielinsky, artist relations manager for Sennheiser, at the console during a rehearsal.

ISDN codecs that would bond up to four ISDN lines. I arranged with Kevin Campbell at APT to audition a pair of the APT Tokyo codecs. The audio quality with a pair of ISDN lines (256kb/s) while using the Apt-x Enhanced encoding was outstanding. Strings sounded like strings and the delay was less than 4ms. As a result of our testing we ordered a pair of the codecs and had ordered two ISDN lines.

We also started working on a preliminary input list and our input block diagram. We used our three Neumann Solution D digital microphones as our main L/C/R array. Our plan was to run the Solution D at 88.2kHz/28 bits and up-sample them to Direct Stream Digital (DSD) using our EMM Labs converters. DSD is the Sony ultra high-resolution digital format that samples at 64 times the sample rate of a standard CD. The DSD clock rate of 2.8224MHz is 32 times the Solution D sample rate of 88.2 and our EMM Labs converters are switchable to handle the up sampling.

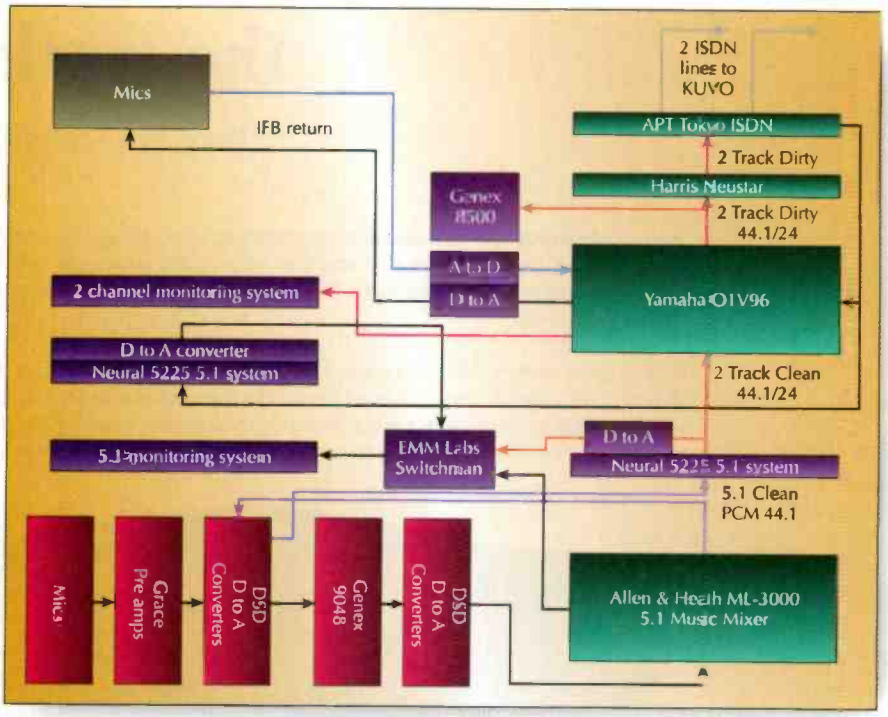
For the rear surround channels we used our Neumann KU-100 stereo dummy head microphone that we nicknamed Fritz. The union riggers hung Fritz for us about 3/4 of the way back in the hall. The mic lines were dropped at the preamp stage left.

We planned for highlight mics for the first and second violins, first viola and cello, a pair of Sennheiser MKH-800 mics for center fill, and mics for Dianne Reeves' trio. We used a total of 23 inputs.

Cue the announcers

This was the biggest remote in the history of KUVO and we were going to have a pre-concert show, first-half concert, 20-minute intermission, second-half concert and post-concert show. Programming requested the capability to have four announcers on-air with the ability to run prepackaged segments. They also wanted to provide pop-ins live from the venue starting at noon the day of the broadcast. Figuring that the music mixer (Justin Peacock) was going to have his hands more than full I decided that it would be easier to have a talent mixer located with the announcers in the back of the hall to feed a stereo sub mix. We used a Yamaha 01V96 mixer with the optional AES/EBU card as the sub mixer. A Sony and a Denon CD player were provided to run the prepackaged segments.

We decided to pre-build the system at KUVO prior to load-in to make sure that everything was going to work as planned. We had



The KUVO setup at the concert hall.

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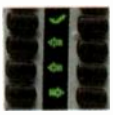

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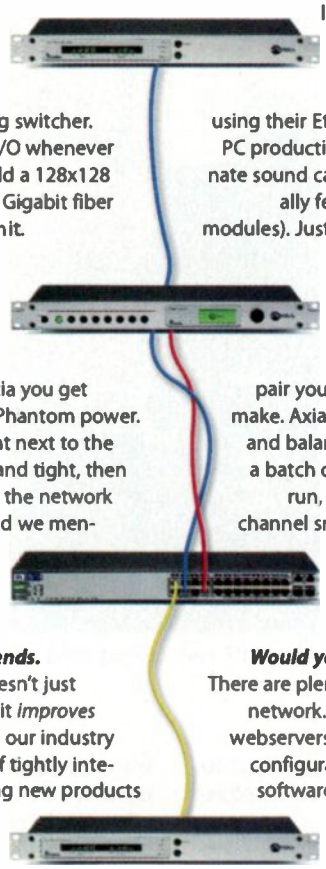

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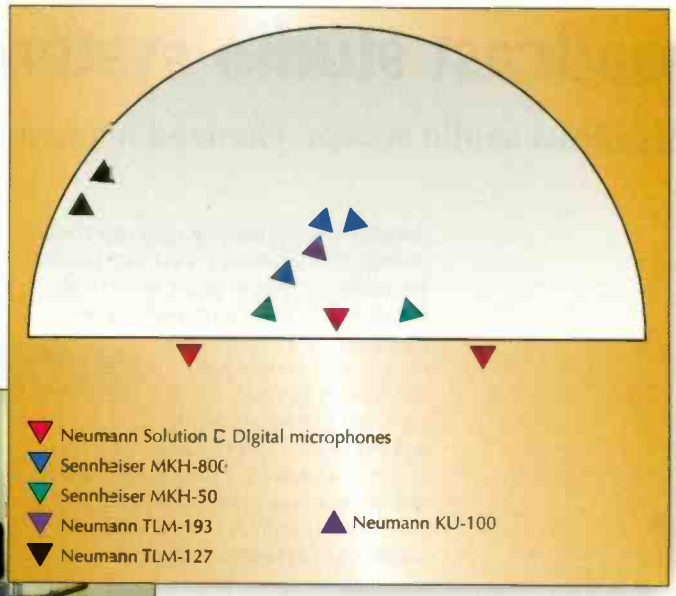
all the cables and adapters we would need to interface everything. During this pre-build we discovered that the Yamaha mixer expected all the sources to be word-clock locked. I expected the Yamaha to have sample-rate converters. This was a nasty surprise because the Denon CD players don't have sync input. Nick Caseras, the talent mixer, came up with an elegant work around using the Denon as the master clock via its AES-3 output and

The transmission rack housed the Harris Neustar encoder, APT codec, Sony DAT and some stereo confidence monitoring equipment.



The mic locations for the orchestra.

slaved the Sony CD player, which had sync input, to the Yamaha. It was a good thing we tried this before arriving at the site.

We don't do a lot of large symphony work and I wanted this to be as close to perfect as possible. I called Sennheiser in Germany and requested that they send Gregor Zielinsky to assist us. Zielinsky is a tonmeister and spent 16 years with Deutsche Grammaphon producing classical recordings. He and I worked together on several other 5.1 projects in the past. Sennheiser agreed and Zielinsky was scheduled to arrive the day of load-in.

The setup

We loaded in and built the control room on Sept. 22. On Sept. 23 we miked the stage and constructed the announcer positions. At 7:30 p.m. that day the first rehearsal started and we were ready to go. At 9 a.m. on Friday, Sept. 24 we were back with the second rehearsal. We went live with pop-in interviews with Dianne Reeves at 12:15 p.m.

The broadcast went live at 7:28 p.m., and the concert started at 7:30 p.m. We monitored the broadcast in 5.1 and confidence checked the Neural 5225 two-channel output. We also monitored our analog FM and HD Radio signals in stereo and in decoded

Two of the many mics used to capture the live event. This is the stereo pair in the center of the orchestra.

5225 5.1. The audio was out of this world. The 5225 made great-sounding stereo from our 5.1 mix and the APT Tokyo was flawless. We went back to the studio at 10:25 p.m. that evening.

Because we were all ready set up, we recorded the Saturday evening performance. It was just a matter of swapping the hard drive for a clean one in the 40-track Genex DSD recorder and hitting the record button. We knocked down after the Saturday night performance and our truck arrived back at KUVO by midnight.

We learned a lot on this project and we are looking forward to doing more 5.1 projects using the Neural 5225 system. The CSO management and Dianne Reeves were knocked out with the sound quality of the broadcast. KUVO received dozens of calls and e-mails from our listeners about how great it sounded. Surround via HD Radio is a reality now with the Neural 5225 system and you don't need to rewire your whole world to support it. This is a major breakthrough in being able to broadcast 5.1 using all of the conventional stereo equipment that is already in place.

Pappas is chief engineer of KUVO, Denver.

Microphone list

Main Middle L	MKH-800
Main Middle R	MKH-800
1st violin	MKH-50
2nd violin	MKH-800
Viola	TLM-193
Cello	MKH-50
Double Bass	MKH-40
Percussion	TLM-127
Timpani/bass drum	TLM-127
Kick	TLM-103
Drums overhead	KM-184
Piano (x2)	MKH-800
Left	Solution-D
Center	Solution-D
Right	Solution-D
Binaural head	KU-100
Reeves voice	KMS-105

Neumann and Sennheiser mics were used to capture the event.

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Clenney Communications Optelator II

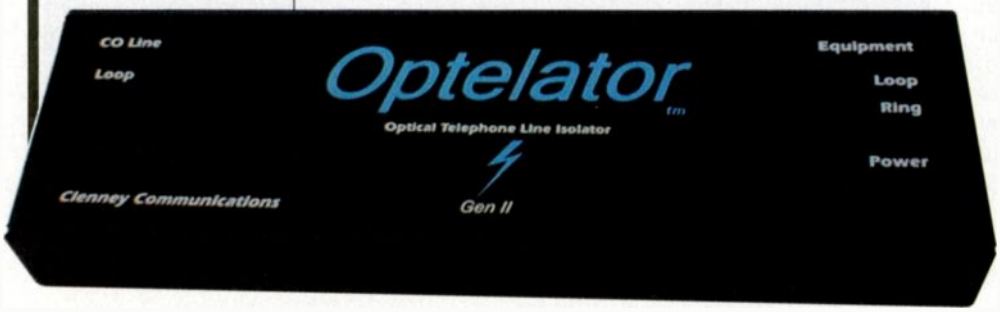
By Joe Ternovan, CSRE

During the past several years we noticed an increase in electrical storm activity. On one occasion, our telephone company-supplied T1 smartjack and Burk remote control ESI card were damaged beyond repair. Thinking that this was an isolated case and performing a visual check of the building and telco ground system, I didn't see anything that obviously changed. Then we had a second strike two months later.

We sustained substantial damage to our smartjack card cage and Burk remote control again. The Burk lost both I/O cards, the CPU board and ESI, making it virtually a complete loss. I exhaustively searched for anything that may have changed in the grounding system. Finding nothing out of place, I began beefing up the protection schemes.

The telephone company installed a terminal block that contained gas tube arrestors, and I checked and cleaned all connections leading to the building ground system. All seemed well until the third strike that next storm season.

That was enough. I looked into other means of protecting the system and found the Clenney Communications Optelator. Once installed, the Burk ESI card sustained no further damage, even when the telco T1 smartjack was hit.



Performance at a glance

- Optically isolates POTS lines
- Full-duplex operation
- Provides 75kV isolation
- Less than 1dB audio loss
- RJ-11 connections

What it is

The Optelator is a POTS line isolation device that inserts a 3¼" air gap between the telco main line and the device connected to the line. In this case, we used it in front of the ESI card on the Burk ARC-16 remote control. The two halves of the unit are connected by two optical fiber cables that connect two circuit boards to one other.

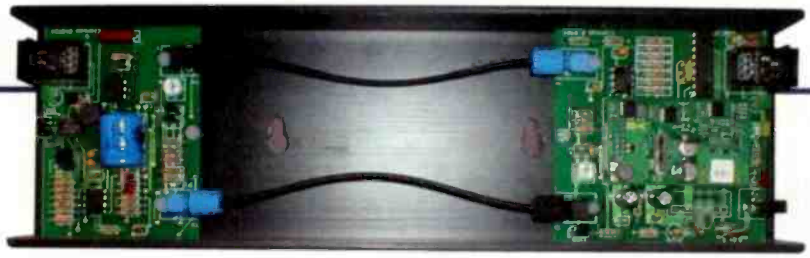
The Optelator receives power from a 24Vac, class 2 wallwart transformer that connects to the same end as the equipment that it is protecting. This end also has LED indicators for power, off hook and ring detection.

The opposite end is connected to the main telco line, and it has a black reset button and a loop LED. Both telco connections are standard RJ-11 jacks with all four pins used. The case is made from a see-through smoked plastic with dimensions of 10.5"L × 3.25"W × 1.75"D and it weighs about 1.5 pounds.

I installed the Optelator as close as possible to the remote control by attaching it to an aluminum rack panel and mounting it below the Burk's interface panels. Two RJ-11 jumpers were connected from the Optelator to the Burk and from the Optelator to an RJ-11 adhesive wall box main line mounted to the rack sidewall. The power cube was plugged into the same UPS as the Burk to ensure access if power failed and the generator failed to start automatically.

The unit requires no maintenance. The case is glued shut. There are no screws and the case has a label that reads, "Do not open, no serviceable parts." The unit carries a one-year warranty. While this may be a detractor for some, the unit worked for quite some time, preventing any damage to the remote control.

While the unit was easy to mount on my own, I would like a 19" rack-mount kit made from the same plastic, or even a redesigned case so that it can mount in a single rack space. I didn't feel comfortable mounting it on a conductive surface and Runnels cautions against it. However, we needed the unit located as close to the Burk inside the equipment rack as possible. Ideally, the plywood at the main telco entrance would be used for a mounting surface, but that is too far away to prevent a strike from being induced into the interconnect between the unit and the protected equipment. This proved to be a good choice, because the lightning was entering through equipment located in the rack next to the Burk.



Inside view of the unit showing the fiber optic protection connection.

Clenney Communications

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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.*

Peace of mind

The Optelator offers great peace of mind that it's protecting the equipment from all potential lightning damage. I recommend using one for all installations where lightning may be even the slightest issue.

For us, the Optelator bought us some time while we reviewed all buried ground connections, including the tower and coaxial grounding kits to find anything that was compromised. In the end we found and repaired several problems, but the Optelator's main telco line input side ultimately failed from repeated hits. It served its function, preventing the costly damage to the remote control.

Ternovan is the market chief engineer of Infinity Columbus, OH.

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Studio Technologies 210 and 220

By Raul Velez

I am a gearhead. If there's a technical journal or audio magazine out there, I read it. So I have a good idea of what's on the market. For years, I've been looking for the ultimate announcer box and have gone through more than a few versions of the hand-built boxes. So when Mark Haynes at Leo's Pro Audio in Oakland showed me the Model 220 from Studio Technologies and said, "you've got to look at this thing," I did. And I had to have them.

To my knowledge, there is no other box that puts the features of the 220 into a package this clean. In fact, if I were to design something myself, it would look and work a lot like the Model 220.

Performance at a glance

- Convenient mic and headphone control
- Table-top design
- Suited for remotes and sports broadcasts
- Customizable button legends
- Compact and portable

This year, I used the 220s for two of the biggest sporting events of the year. For the 2004 NCAA college basketball championship coverage, pre-game hosts Mike Francesa and Chris Russo of WFAN-AM in New York got a chance to see how well the boxes performed.

Prior to that, I worked at the Super Bowl at Houston's Reliant Stadium as part of an engineering team working for CBS Radio/Westwood One. The team included Al Rosenberg, an engineer from Detroit who served as game mixer, and Atlanta-based John Kramer, the field engineer. I mixed the pre-game, halftime and post-game segments and acted as an all-around troubleshooter. Together, we devised a game plan worthy of the big showdown. In the booth, announcers Marv Albert (play-by-play) and Boomer Esiason (color analyst) used Model 210s (with one main and one talkback output) with a third set up in a spare position. Two Model 220s with two talkback outputs were used for Jim Gray (host of the pre-game, halftime and post-game shows) and a monitor mix hub position with its mic/talkback line active.

I was able to talk down my program line, as well as to my producers and main mixer in one little box.

Feature-rich

The 220 includes many features. The low-noise, low-distortion mic preamp provides 20dB to 60dB of gain. A compressor and limiter circuit provides a 5:1 nominal slope with attack and release times of 2ms and 100ms respectively.

The 220's output transformer is designed to drive long broadcast cable runs, and the main output mic button can operate from among four modes: push-to-mute (or cough button), push-to-talk, or two alternate latching configurations that enable or disable the main output. The talkback 1 button acts as push-to-talk or latching switch (enable-disable). Talkback 2 can be disabled (when talkback 1 is used alone), or used in special momentary and alternate action latching functions that control the 220's auxiliary relay.

The 210 measures 5.6"W x 3.3"H x 8.5"L and weighs 3.4 pounds. The 220 measures 8.1"W x 3.3"H x 8.5"L and weighs 4.5 pounds. Both run on 24Vdc, which can be supplied through the power connector or through the IFB input jack. Both units have a mic input, IFB input, headphone output and main output. The 210 has a single mic input and a single talkback output. The 220 has a mic input, two line inputs and two talkback outputs. The two units are similar in function, except that the 220 adds additional inputs.

A comprehensive manual describes the operating characteristics and internal switch settings to operate the units.

In radio, there's no room for equipment miscues or misfires. Ease of use, durability and consistent performance are critical. That is why I am such a fan of Studio Technologies equipment. Plus, the products adapt to the way I work.

Velez is a broadcast engineer based in San Francisco.

The rear panels of the 210 and 220.

Studio Technologies

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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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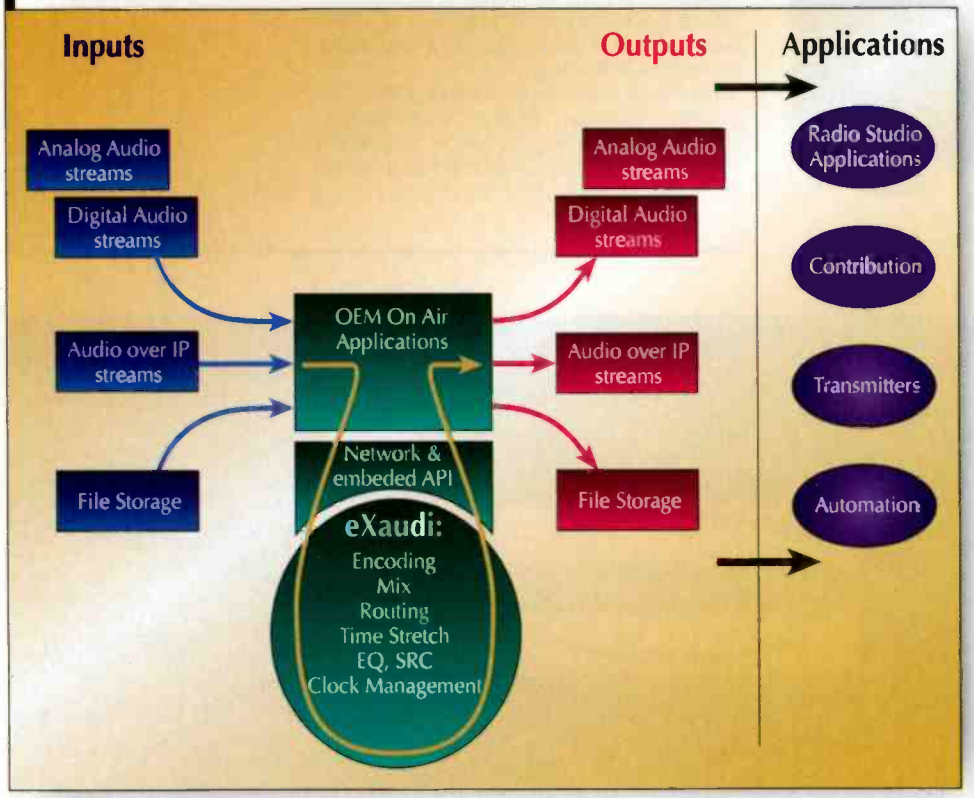
FAVORITES / BOOKMARK

Digigram Exaudi

By Philippe Delacroix and Carl Conrad

The radio industry has undergone a process of digitalization in recent years. Sound files have replaced carts and reel-to-reel tape. Digital editing workstations have supplanted scissors and razor blades. This has enabled radio automation and transformed the way radio operations are organized, changing the hierarchy of roles within the broadcast chain.



Functional flow diagram of the Exaudi.

But the broadcast workflow still consists of a chain of specific tasks with defined interaction but virtually no interoperability. The technician sitting at the on-air console has almost no link to what happens at the transmitter site. Furthermore, big broadcasters that operate nationwide networks need to manage highly complex interactions to deliver their programs, including: multiple contributions, localized programming, localized advertising, complex audio transport and remote transmitters. Using traditional technology, these tasks often turn into nightmares and each failure rapidly turns into a catastrophe.

With the advent of digitized audio on the one hand and the likelihood of ever cheaper, powerful networking technologies on the other, Digigram believes that the use of networking techniques will become more and more important in radio broadcasting.

Networking technologies have become completely synonymous with distributed computing. Now that individual computers take care of all the tasks related to radio automation, the logical evolution is integration of audio transport for program contributions and distribution. This leads to a fully integrated network-centric view rather than a PC-centric approach.

Underpinning the Internet, the IP protocol provides extremely flexible routing as well as reduced communication costs and is an accepted, manufacturer-independent standard for transporting data over short and long distances. Its full separation from the hardware layer makes it suitable for professional applications running on LAN/WAN enterprise networks. With the constant increase of available bandwidth and the huge choice of protocols available, IP offers an ideal pathway for general IT/AV convergence, being able to carry a large variety of signals (audio, control, data). Additionally, IP technologies offer multiple stream capabilities. The advent of IPv6 will bring further maturity to the technical solutions.

A new approach

With the introduction of Exaudi, Digigram addresses the future needs of the radio broadcasting industry by providing a reliable and redundant system that combines radio automation and audio transport through IP streaming in a single system.

Exaudi integrates schemes based on a network application programming interface (API), thus enabling development partners to integrate the system into their applications. Exaudi is Linux based for reliability and stability, and the units are ruggedized with full hot-swap redundant power supplies.

While third party control applications take care of the

user interface, this unit manages all low-level tasks related to audio automation and computer-assisted operation, locally and remotely, providing a comprehensive integration of the radio on-air transmission steps.

Streaming

Network technologies allow for streaming audio transport, which inherently supports routing and multicast distribution. The IP as the transport protocol in Exaudi brings a number of benefits:

- Native support of LAN/WAN technologies
- Cost reduction thanks to IP proliferation
- Full interoperability with most other equipment
- Easy mutualization and multiplexing of various streams
- Separation from the underlying physical network layers
- Support of IPv6

Many existing products for IP streaming do not address the requirements of the broadcast industry—high audio quality associated with low and constant latency—or at best address them with a lack of audio management flexibility. Exaudi ties the potential of IP networks with the native support of dedicated real-time protocols RTP, RTCP and RTSP. Quality of service ensures that proper priority and bandwidth is allocated to the stream in a shared system.

To meet the requirements of professional applications, it is vital to make sure that all audio information is broadcast simultaneously. This can only be achieved by buffering to compensate the delay and jitter between different locations added by the streaming process. Exaudi minimizes the buffering needed by implementing precise time compensation mechanisms and a proprietary connected system with a distributed NTP-based clock synchronization that ensures clock integrity between all the devices on the network.

Audio processing

The audio processing embedded in this equipment addresses three main needs: mixing, coding and improving audio quality. Exaudi takes advantage of the embedded DSP power to offer fading/cross fading, stream synchronization, coding/decoding, time stretching, mixing and routing capabilities.

Various data reduction algorithms can be implemented on the Exaudi platform: MPEG 1 and 2 layer 2, MP3, MPEG4/AAC+. Because Exaudi is an open and flexible platform it will be able to host almost all future audio coding or transcoding developments. A stream may be encoded into several different streaming formats.

All streams can be multicast streams, allowing significant bandwidth optimization and thus reducing overall costs.

Exaudi provides two levels of audio routing. One level is an embedded matrix that provides routing capabilities for any input (physical, file or IP stream) to any output (physical, file or IP stream). The other level is that the external routing between Exaudi units is inherent to the IP data network and allows for flexible audio routing from one unit to many others.

Each unit is fully remote controlled. Nevertheless, local management needs may

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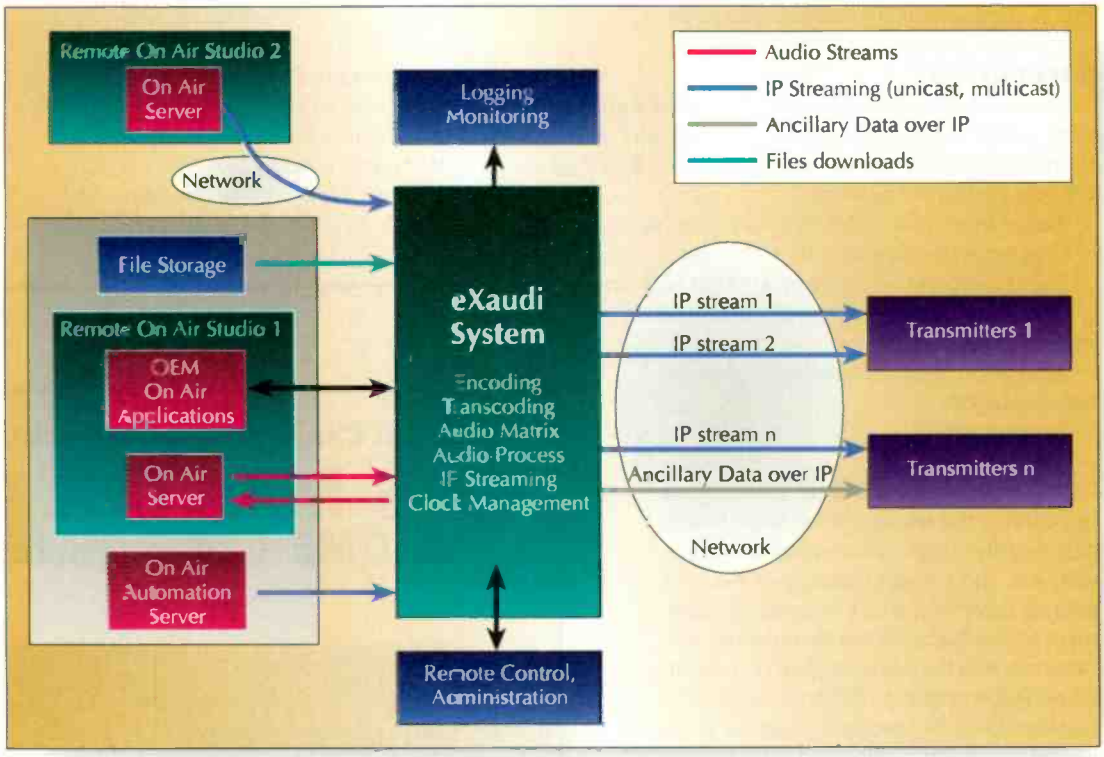

An application in the air studio.

require small, dedicated and highly specific applications to be hosted on each unit.

This approach allows for a boundary between the audio functions handled by Exaudi and the management applications that mainly take care of the HUI and other workflow related aspects. This boundary provides better system reliability by removing the risk of human error from the audio equipment.

As a consequence, these applications can be far lighter and focus on the user interfaces and workflow management functions.

Last but not least, SNMP management capabilities can provide network wide monitoring of many types of equipment and warn of system failure.

When used in the on-air studio, the system takes care of all the radio automation and audio streaming tasks. Remote controlled from the radio automation system, it manages all incoming and outgoing signals.

In addition to the main program stream, a transmitter feed, as well as ancillary streams for monitoring, logging or internal distribution may be implemented. The outgoing stream may also encapsulate service traffic used by the remote devices.

Logging and monitoring

Exaudi's remote automated recording capability is useful for logging applications ranging from competitive monitoring to

legally required logging. A unit can be instructed to record from an audio input or an IP stream and encode in real time. It can also encode streams for low level remote monitoring and audio distribution.

By locating a unit at the transmitter site, it ingests and adapts the audio stream in ways similar to on-air studio applications. These streams may be one or more main program streams fed by terrestrial or satellite links; secondary streams coming from other distant sites, for local programs or advertising; and live inputs or any other backup stream.

Exaudi applies all the required processing to the individual streams to generate the continuous program stream.

The service traffic provides information on when to switch from one program to another or when to insert localization data downloaded off-line and stored locally.

Thus, the device facilitates the installation directly at the transmitter site, which provides the broadcaster with great flexibility. The installation of a control application at its own premises gives the broadcaster, for the first time, a high level of autonomy over his network operator.

An Exaudi system can take care of everything specific to multiple localized programs. At each transmitter site, units receive programs via unicast or multicast IP streams and handle the local mixing, advertising insertion, program localization and scheduling. Localization jingles, a backup program and advertising can be downloaded at any time and stored at the transmission site.

This architecture also provides the functionality needed to assemble programs for affiliate radio stations running shared programs, while also being capable of switching to a live program interactively or at any predefined time.

The network-centric approach makes this instrument a flexible workhorse capable of handling a wide variety of tasks. Because the units are stand-alone, ready-to-use boxes, they are simpler to integrate than PC sound cards. There is no need to open a computer or to install drivers.

Exaudi sits at the link between the computer and the network but is more than just another streaming system or another codec. Exaudi is a comprehensive system providing tight integration between radio automation and audio transport.

Download a whitepaper at www.digigram.com/exaudi_whitepaper

Delacroix is managing director of Digigram, and Conrad is product manager, networked audio of Digigram.

New Products

By Kari Taylor, associate editor

www.beradio.com

On-air radio console
Audioarts Engineering

D-75: The modular console comes with four stereo busses, dual-domain outputs, sample-rate conversion on all digital inputs, and interchangeable input module daughter cards for simplified analog-to-digital field switches. The hinged meterbridge swings up for access to console dip-switch programming. LED meter displays add to the functionality of the meterbridge with full-scale digital peak plus VU metering. The switching features LED illumination and an automatic timer, and a built-in machine interface and clock come standard. The unit may also be ordered with an optional Superphone module that supports two callers. A compact, tabletop design, the console is currently available in a 13- and 21-fader mainframe.

252-638-7000; fax 252-637-1285
www.wheatstone.com; sales@wheatstone.com

Audio/MIDI/USB interface
Behringer

B-control: The two USB/MIDI-type models of the B-Control series, the rotary BCR2000 and the fader BCF2000, are fully intuitive computer-based recording tools with 32 illuminated rotary encoders for control over virtual mixers, synths, samplers and effects processors (BCR2000), or eight 100mm motorized faders for control of virtual mixers, virtual synths and samplers (BCF2000). Supporting PC and Mac software, both controllers offer four virtual groups with eight dual-mode, high-resolution encoders that feature LED rings and an additional push-to-set function with illuminated buttons that are assignable to all types of MIDI functions. These products provide 32-user presets with four encoder groups and a multifunction four-digit LED display with real-time parameter indication.

877-672-0816; fax 425-673-7647
www.behringer.com; support@behringer.de

Multipattern FET mic
Brauner Microphones

Phantom V: This is the company's first variable-pattern, non-tube (FET), large diaphragm microphone. The mic offers switchable omni-directional, cardioid and figure-eight polar patterns, as well as a 15dB pad for higher SPL environments. This product features a satin nickel finish and provides a self-noise of 8dBa, a maximum SPL of 142dB at 0.3 percent THD, and a frequency range of 20Hz to 22kHz. The unit comes with the SMV shock-mount suspension system, custom aluminum case, cable and user manual.

702-365-5155; fax 702-365-5145; www.braunerusa.com

Plug/output receptacle
MGE UPS Systems

Pulsar PDU: These units offer flexible mounting options, numerous input plug/output receptacle choices and configurations that include a maintenance bypass switch. Designed with power ratings from 500VA to 3,200VA, the new PDU is fully compatible with any UPS hosting an appropriate output receptacle. The selection of standard input plugs and line cords ensures simple plug-and-play installation, while the 2RU form factor is useful for mounting in 19" equipment racks. The unit provides standard NEMA 120Vac input plugs and output receptacles ranging from 15A to 30A and features a choice of front or rear access for input and output line cords.

800-523-0142; fax 714-557-9788
www.mgeups.com; info@mgeups.com

IBOC test set
Audemat-Aztec

NavIBOC: Audemat-Aztec has licensed Ibiquity's HD Radio technology for inclusion into its radio test and monitoring products. As a result, Audemat-Aztec will be able to assist AM and FM broadcasters in the initial transition to digital and maximize the benefits of their digital signals by offering mobile products capable of measuring coverage and analyzing the quality of HD Radio reception.

305-692-7555; fax 305-682-2233
www.audemat-aztec.com; contact@audemat-aztec.com

WAV/MP3 recorder
Edirol

R-1: A portable, 24-bit WAV and MP3 recorder and player, the unit offers direct storage to Compact Flash memory and operation from two AA batteries. The unit's dimensions are 4" × 5.5" × 1" and it weighs 10oz. The recorder is equipped with two electret mics, external line and mic inputs for quick and clean stereo capture. The recorder contains a 24-bit internal effects processor, which includes mic simulation through Roland's COSM technology, noise reducer, hum cut, 10-band equalizer, reverb and center cancel. It also includes a metronome, tuner, half-speed playback and A-B repeat to loop one section of an audio file. The device also offers a USB 2.0 port to quickly transfer files to and from the computer.

360-594-4273; fax 360-594-4271; www.edirol.com; sales@edirol.com

Phone plugs
Neutrik

NP*X: Previously introduced as the C+ series, these 1/4" phone plugs offer a chuck-type strain relief that provides higher cable retention force. The phone plugs are all metal and available in mono and stereo versions with nickel or gold-plated contacts and nickel, black or velour chrome housings.

732-901-9488; fax 732-901-9608
www.neutrik.com; info@neutrikusa.com

Telephone hybrid
Sonifex

HY-03US: The HY-03US is an analog telephone hybrid that adapts to varying line conditions, automatic signal limiting, and includes local and remote line hold switching, and remote call switching through a mixing console. The hybrid offers a balanced mic/line input of 10kΩ balanced input selectable for 0dBu clean feed line, or microphone level with adjustable gain. The unit's balanced output is 0dBu low impedance balanced output, with output gain adjustment. A line limiter, bandpass filter and output noise gate with preset threshold provide low distortion.

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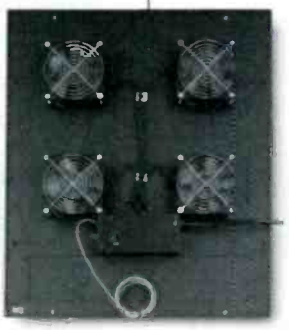
www.independentaudio.com; info@independentaudio.com

Rack cooling system
Middle Atlantic Products



Fan Control Top series: These products are comprised of integrated fans and grills as well as the company's FC-4 proportional thermostatic fan control, varying the speed of the fans and based on the enclosure's interior temperature. The four products in the series all come with fans, fan grills and fan control preinstalled. The MW-4QFT-FC fits the MRK and WRK racks and has four, 4-1/2" fans. The MW-10FT-FC fits MRK and WRK racks and has one 10" fan. The ERK-4QFT-FC fits ERK racks and has three 4-1/2" fans while the ERK-10FT-FC fits ERK racks and has one 10" fan.

973-839-1011; fax 973-839-1976
www.middleatlantic.com; sales@middleatlantic.com

www.beradio.com

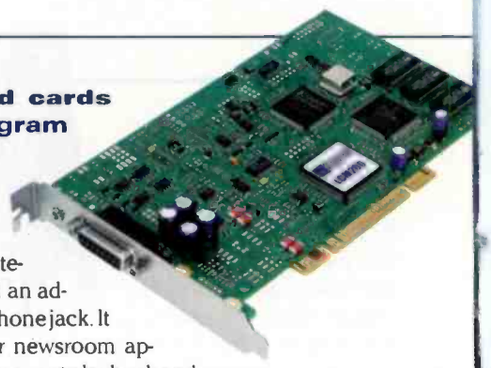
Mic/line mixer
Rolls

RM82: An eight-channel mixer in a single rackspace, this equipment is useful for sound reinforcement and remote broadcast applications. Each of the eight channels has an XLR microphone input and a 1/4" unbalanced input. The 1/4" jacks may be internally reconfigured to become channel inserts or direct outputs. Each channel has individually switchable 48Vdc phantom power. The RCA prefade output may be connected to the

RCA aux bus input for cascading two units together. This output may also be used for recording purposes. The main output is a balanced, male XLR jack.

801-263-9053; fax 801-263-9068
www.rolls.com; rolls@rolls.com

Sound cards
Digigram



LCM200 and LCM420: The LCM200 features a balanced analog stereo output and an additional headphone jack. It is designed for newsroom applications, permanent playback and editing. The LCM420 with one balanced analog stereo input and two analog balanced stereo outputs is useful for entry-level live-assist applications or broadcast automation. The second stereo output may serve as a cue output. With full-duplex operation, the cards offer simultaneous and independent record and playback capabilities, as well as real-time, simultaneous MPEG Layer I and Layer II compression and decompression during record and playback. When used with applications based on the Digigram SDK, real-time mixing of multiple sound files, level adjustment, panning, cross fade, punch-in/punch-out, scrubbing, and format and frequency conversions are performed by the card's DSP. Additionally, the LCM420 offers real-time pitch-shifting and time-stretching.

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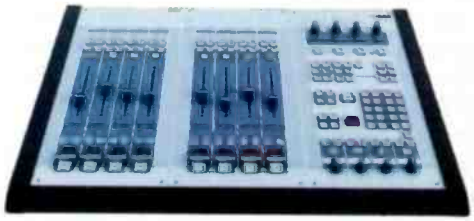
New Products

Digital on-air console
Klotz Digital

Aeon: Based on the company's Air Board concept, this flat panel console (about 1" thick) features a modular control surface allowing flexibility in console layouts and studio setup. The console offers graphic configuration software that allows individual users to configure the system to fit their own requirements. This product is available in 8-, 12- and 16-fader consoles. Each four-fader module is in its own housing. Each channel strip is equipped with a



100mm fader and a clear alphanumeric display with 16 digits in two lines, as well as large on/off buttons and free assignable routing keys and status indication LEDs. The Monitor-DSP-Master Control Module offers access to DSP functions via rotary encoders and large displays. It comprises central bus assignment, 20 assignable push-buttons for monitor sources and 10 assignable function buttons.

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Moseley's Starlink SL9003Q upgrade can now run twin 44.1kHz audio sampling rate streams on the Starlink SL9003Q-4S using 128 QAM. In the past, it has been limited to twin stereo pairs at 32kHz sampling at 32 QAM. The company has also developed a 300kb/s LAN card for use in the Starlink SL9003Q-2S. This will allow the end user to convey 44.1kHz audio and 300kb/s LAN on the link.
www.moseleysb.com

Steinberg's Cubase SL3, the latest version of Steinberg's music production software, offers advanced music composition and improved workflow. The next-generation Audio Warp engine offers import of ACID files, time-stretching and pitch-shifting. The new workspace concept allows layouts to be created for each step of the production process.
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The audio and MIDI feature set in **Pro Tools 6.7** from **Digidesign** has been expanded to deliver tempo-dependent audio placement, tempo-dependent automation, graphic tempo editing, precise control of meter changes, MIDI step input, enhanced support for instrument plug-ins, MIDI Detective and Beat Detective LE.
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Class A equalizers
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651-455-1846; fax 651-455-3224
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Arrakis

The lo-fi demise of AM radio

Today we live in a very noisy world. Most every electrical device is also a low-level RF transmitter. Clear AM reception in the average home is getting rare. And with many daytime stations authorized to sign on pre-sunrise, morning drive is a jumble of signals in the winter months in much of the country. Receiver manufacturers have realized this and most every receiver made has a bandwidth of 2.5kHz—the same as a telephone. While there are a few of us AM fans out there with wider radios, there is a grain of truth to Jeff Littlejohn's statement that he "can find no good reason to maintain 10kHz audio bandwidth." And despite the fact that my 1938 vintage McMurdo Silver Masterpiece has a 16kHz bandwidth, I cannot disagree with him, as the net result of the bandwidth reduction will eventually result in better reception for 98 percent of the listeners.

To use another example, I am a collector of old 78rpm records. While I enjoy the sound, I would have no case to argue that their 6kHz bandwidth is better than the 20kHz reproduction capable from more modern analog and digital recording media. But with properly applied technology they can sound very life-like. In fact, better than most people ever realized. Possibly this reduction in bandwidth will make some people in and out of the business realize that AM really does sound good. Kudos that AM has earned and should enjoy in its twilight years.

John Landry
CBS Radio/ Westwood One
New York

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Remote Broadcast Solutions!!!

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Find the Mic Sweepstakes Rules

Win a Neumann BCM 104 microphone, ATI ML200 mic preamp or LPB Silent Mic Boom. Find the microphone icon on the *Radio* magazine covers from 2004 and you could win.

Introduction:
NO PURCHASE NECESSARY. A PURCHASE DOES NOT IMPROVE YOUR CHANCES OF WINNING. VOID WHERE PROHIBITED BY LAW.

Sponsors:
The sponsors ("Sponsors") of this sweepstakes are Primedia Business Magazines & Media Inc. at 9800 Metcalf, Overland Park, KS 66212; Neumann USA at One Enterprise Drive, Old Lyme, CT 06371; ATI, 328 W. Maple Avenue, Horsham, PA 19044; and LPB at 311 Spruce, Camden, NJ 08103.

How to Enter:
Enter by carefully using the online form at *www.beradio.com* typing or hand writing the following information on your company letterhead or a standard 8½" by 11" sheet of paper:
1. Your name, job title, company name, address, telephone number and e-mail address.
2. A complete and accurate description of the location of the mic icon on each the following issues of *Radio* magazine from 2004 (Volume 10): January, February, March, April, May, June, July, August, September, September Product Source supplement, October, November, December. Please be as specific as possible in describing the location of the necessary mic icons from the 2004 issues of *Radio* magazine.
3. Click submit for the online form, or mail your entry to *Radio* magazine Microphone Sweepstakes, 9800 Metcalf, Overland Park, KS 66212 or fax it to (913) 514-7201. If you do not have all the necessary issues, you may obtain issue-cover copies by sending a self-addressed stamped envelope to *Radio* magazine Cover Request, 9800 Metcalf, Overland Park, KS 66212.
Note: The icon is not the "i" in the *Radio* magazine logo or the center of the zero in the 10 Years of Radio logo.

All entries (mail and online) must be received by January 18, 2005. Multiple entries are not permitted. One entry per person per mailing address and per e-mail address. Sponsors are not responsible for late, lost, damaged or misdirected mail, faxes or e-mail. Submitted entries will not be returned and become the property of Sponsors. Entries will be reviewed by the *Radio* Sweepstakes committee ("Judges") for completeness and accuracy. All decisions of the Judges are final and binding in all matters relating to the Sweepstakes.

Winner Selection and Notification:
Three (3) winners will be chosen at random from all correctly submitted entries (entries with 13 correct answers) on or around January 20, 2005. If there are no entries with all 13 correct answers, three (3) winners will then be chosen at random from all correctly submitted entries with 12 correct answers. Winners will be notified by phone or mail on or about January 22, 2005. Odds of winning depend on the number of correct, eligible and legible entries received.

Prizes:
The first winner chosen will receive a Neumann BCM 104 microphone (approximate retail value $999). The second winner chosen will receive an ATI ML200 (approximate retail value $314). The third winner chosen will receive a LPB Silent Mic Boom and riser (approximate retail value $184). **The total approximate retail value of all prizes is $1,497.** Cash will not be awarded in lieu of prizes. Prizes are not transferable or exchangeable. Substitution of prizes will not be permitted except by Sponsors who reserve the right to substitute a prize of equal or greater value if indicated prizes are not available.

Eligibility:
Sweepstakes open to all current subscribers of *Radio* magazine in the United States as of December 10, 2004, and excludes the employees and immediate family (spouses and parents, siblings, children and each of their spouses) of Sponsors, the prize manufacturers, their parents, affiliates, subsidiaries, advertising agencies and any other company involved with the design, production, or execution of the sweepstakes.

Timing:
Sweepstakes begins at 12:01 am on December 9, 2004, and ends at 12:01 pm on January 18, 2005.

Miscellaneous:
Winners release the Sponsors, the prize manufacturers and each of their parents, affiliates, officers, agents and employees from any responsibility or liability in connection with any loss, accident, or death incurred in connection with the use of or the installation of the prizes won in the Sweepstakes. The winners hereby consent to the use of his or her name and/or likeness by the Sponsors for advertising purposes without additional compensation unless prohibited by law. The verified winners may be required to sign an Affidavit of Eligibility and a Publicity/Liability Release. Any requested materials must be returned within ten (10) days of the date of notification. Failure to comply within any request in the allotted time frame will result in disqualification and the selection of an alternate winner. Any tax liabilities are solely the responsibility of the winner. All federal, state, local, municipal and provincial laws and regulations apply.
By participating, entrants acknowledge and agree to be bound by these rules, and the decisions of the Judges, which are final. Sponsors do not make and are not responsible for any warranty (including fitness for particular purpose) or guarantee with regard to any prize or portion thereof.
To obtain the name of the prize winners, send a self-addressed, stamped envelope after January 24, 2005 to "Mic Sweepstakes Winner," *Radio* Microphone Sweepstakes, Primedia Business Magazines & Media Inc., 9800 Metcalf, Overland Park, KS 66212.
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Sponsor assumes no responsibility for any error, omission, interruption, deletion, defect, delay in operations or transmission, communications line failure, theft or destruction or unauthorized access to, or alteration of entries. The Sponsors are not responsible for any problems or technical malfunction of any telephone network or lines, computer online systems, servers or providers, computer equipment, software failure of any e-mail or entry to be received by Sponsor or congestion on the Internet or at any website, any combination thereof or otherwise, including any injury or damage to entrants or any other person's computer related to or resulting from participation or downloading any materials in the Sweepstakes.

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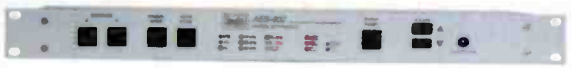

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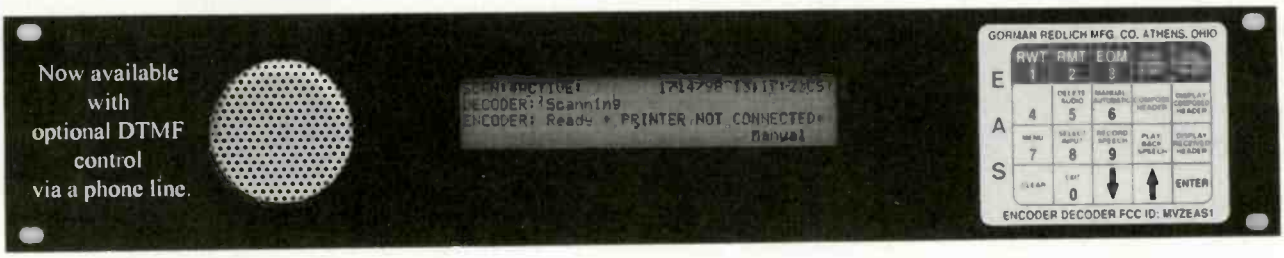

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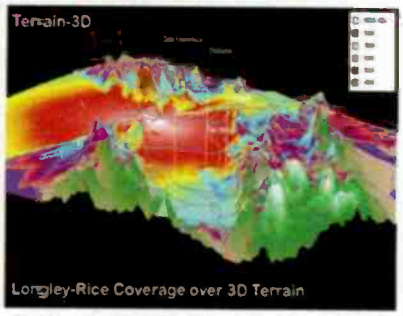

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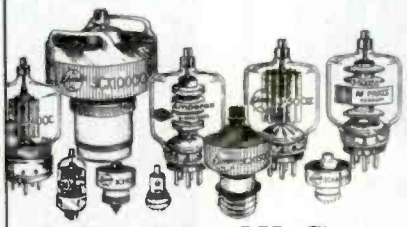

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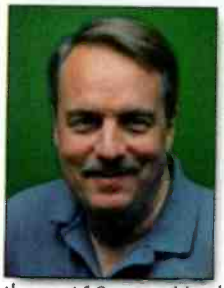
This month: KUVO In Surround, page 78.



Mike Pappas
Chief Engineer
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Pappas opened his first recording studio in 1975. He has broadcast more than 1,500 live events in the past 10 years. He also has more than 300 hours of live 5.1 Direct Stream Digital recordings to his credit. Pappas has been the featured lecturer on 5.1 surround recording techniques for the AES and has toured Germany lecturing on surround recording for Neumann and Sennheiser. He has been chief engineer at KUVO since 1995.

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Sign Off

By Kari Taylor, associate editor

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Do you remember?

The Auditronics Destiny 2000 layed claim in 1994 to be the first on-air control board that allowed a station to go from total automation to fully live with the flick of a switch. The console doubled as a production board when the system was in auto mode and could control CD jukeboxes. When in assist mode, touchscreen capability accessed a main screen, music library and spot library for quick and easy additions, deletions or rescheduling. A fast track feature offered instant access to thousands of announcements, sound effects, jingles, IDs and promos.

Sample and Hold

Radio Listeners Edge Past TV Viewers in Online Shopping

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(180+ minutes per average day)
68.4% made purchases online during the previous year

Heavy exposure to TV
(300 minutes per average day)
64.7% made purchases online the past year

Source: www.themediaaudit.com, 10/04.

That was then

In 1923, there were about a half-million radio sets in use. This number grew to more than one and a quarter million in 1924, with the public spending about $139 million for new receivers that year.

With this remarkable growth in just a few years, Congress became concerned about possible future monopolization by private interests at the expense of the public interest. So, in 1924 Congress passed a bill that asserted the government's authority to regulate radio. This bill, which presaged the Radio Act of 1927 that began regulating broadcasting, stated that the "aether," or airwaves, belonged to the people.

Source: *The Broadcasting Century and Beyond, fourth edition.*

Some popular mics from the 1920s.

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Welcome to the third annual *Radio* magazine Buyers Guide. This valuable resource has been compiled to provide you with useful information that you can use throughout the year for routine reference. While it's a part of the December issue, you can easily remove it to keep it handy whenever you need it. Of course you can also keep it with you other issues of *Radio* magazine as part of your reference library.

This print edition is just one part of the Buyers Guide. We also created an online version that is available at our website at beradio.com. Follow the links to access the latest updated information. The online version also offers several options to sort and access the information.

New this year to the *Radio* magazine Buyers Guide is the first-ever Innovative Product Awards. This is a collection of new product introduced during 2004 that demonstrate innovation for radio broadcasting. See the listing on page 42. Once you have reviewed the entries, we need your help to determine a winner. Using our online voting system at beradio.com, you can vote for your favorite in each category. The category winners will be announced at NAB2005 and published in the May 2005 issue.

When you vote, you can also register to win a *Radio* magazine t-shirt in our random drawing. The t-shirts will be mailed in February.

The Buyers Guide is created as a service to you. I welcome any suggestions you may have for future editions.

Chriss Scherer

Comments?
radio@primediabusiness.com

Chriss Scherer
editor

Index

Antennas 26
Audio Accessories 26
Audio Processing 28
Audio Routing and Distribution, inter-facility 28
Audio Routing and Distribution, intra-facility 28
Automation Systems 28
Computers and Peripherals 28
Dealers and Distributors 30
Digital Audio Workstations 30
Equipment Rental and Leasing 30
Microphones and Mic Accessories 30
Microwave, STL and RPU Equipment 32
Mixers 32
Music/Production Libraries 34
Power Products, Batteries, Generators, UPS 36
Profanity Delays 36
Racks, Furniture and Studio Support 36
Recording, Storage, Playback and Media 36
Remote Facility Control 38
RF Feedline, Waveguide and Components 38
RF Support and Accessories 39
Satellite Equipment and Services 39
Speakers, Headphones and Monitoring 39
Studio Rental 40
Subcarrier, datacasting and multiplexing equipment 40
System Integrators, Consultants and Services 40
Telco and fiber optic equipment 40
Test and Measurement Equipment 40
Towers and Tower Services 41
Transmitters, Translators and Exciters 41
Wire, Cables and Connectors 41
Innovative Product Award Nominees 42
Company Contacts 46

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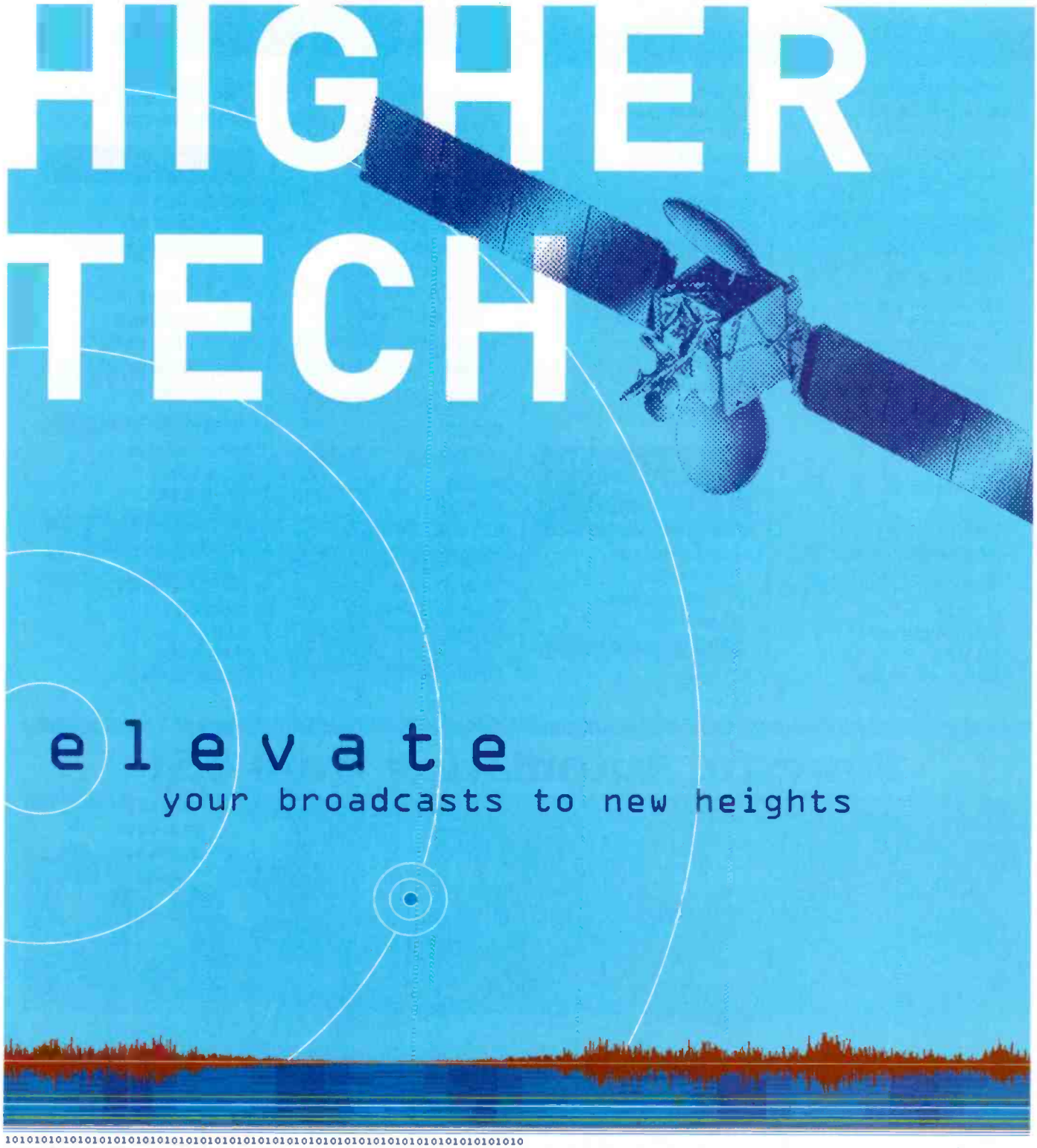

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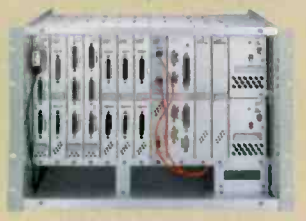

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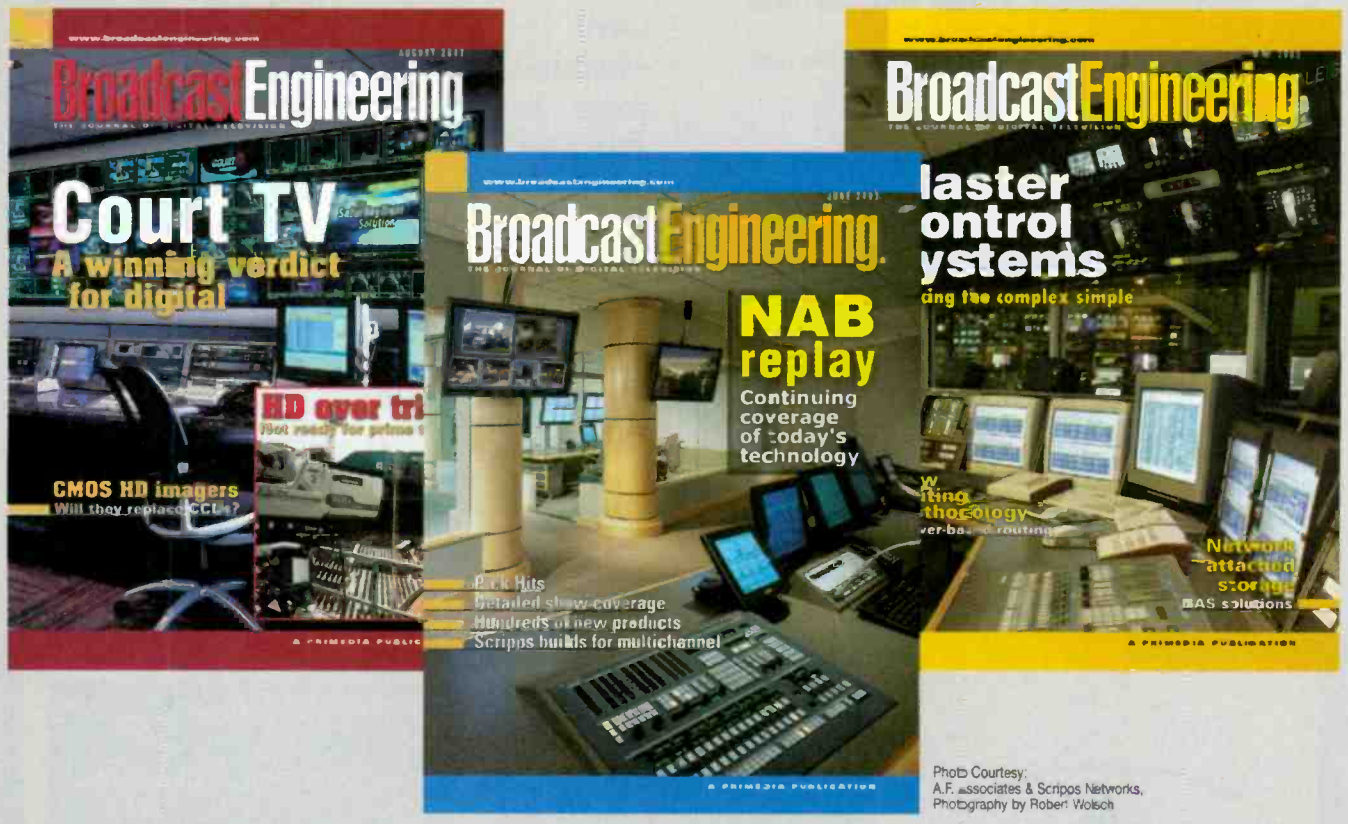

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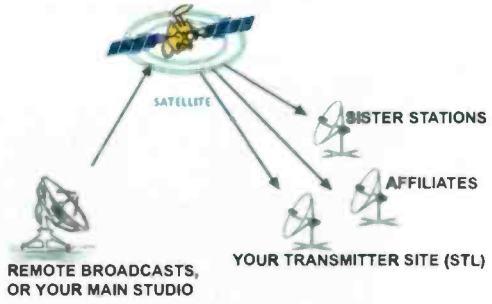

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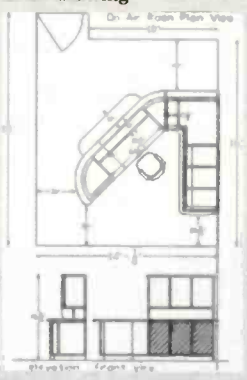

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The 1st annual

2004 Radio Innovative Product Reader's Choice AWARD

We are proud to announce the entries for the first annual *Radio* magazine Innovative Product Awards. These awards honor excellence in new product development in the radio industry. This prestigious award showcases the most innovative product introduced since Jan. 1, 2004, and recognizes the talent and commitment of the people involved in every aspect of development, from concept through sales.

These entries cover a wide range of products that are divided into several categories. These categories cover various aspects of radio operations, from acquisition to distribution to transmission.

Take a look at the entries on the following pages. Select your favorite entry from each category, and then visit the *Radio* magazine website at beradio.com to cast your vote. Click on the Innovative Product Award logo on the home page. You'll link to a ballot, where you can cast your vote.

When making your choice, please consider the originality and innovation of the product, its practicality in radio and its application.

The Innovative Product Award entries aren't the only winners, you can win too! At the end of the ballot page are fields to include your name and contact information. By completing these fields you will be entered into a random drawing to win a *Radio* magazine t-shirt. The contact information will only be used for the drawing. The information will not be used when tallying the votes for the awards. Cast your vote by Feb. 1, 2005. T-shirt winners will be determined on Feb. 3, 2005.

The Innovative Product Award winners will be announced at NAB2005 and published in the May 2005 issue of *Radio* magazine.

Chriss Scherer, editor

2004 Entries

Transmission	43
Facility Support	44
Acquisition	44
Audio & Data Storage	45

Transmission

Radio Design Labs
ACM-3

The ACM-3 is a professional test instrument to measure and monitor the level of AM noise in an FM transmitter, providing constant assurance of FM signal quality at the measurement point.

ACM-3 front panel controls allow calibrating the carrier level and setting an alarm threshold. The ACM-3 continuously monitors signal quality and provides an alert signal to the remote control when the threshold is exceeded. AM noise is displayed on a 20dB high intensity red LED string display, front-panel switch-selectable in four ranges. Rear panel switches select de-emphasis and high pass filters. In addition to the alarm function, remote outputs are provided for the AM noise value and for the carrier level.

Shively Labs
Series 2600 Bandpass Filter

The Shively Series 2600 bandpass filter was designed using inter-digital resonator technology normally found at higher RF frequencies. This design allows for a much smaller "footprint" filter while maintaining the performance of traditional cavity-type designs. The filter can be used as a stand-alone bandpass filter, or as the basis for compact branched or balanced combiner systems. The filter is an ideal choice for low power combiners for HD Radio implementation and for any site where space is limited.

Audemat-Aztec
FMB80

The FMB80 is fully compliant with the Cenelec EN50067 and the RBDS standard.

It is capable of scrolling titles of songs and artist information on any kind of RBDS car receivers using the new scrolling PS feature.

Features:

- Song title and artist information can be automatically wrapped around with text
- Text can be centered, customized and configured through a new HTML Web page
- An internal scheduler can display messages at user-specified times of day

Communication with the automation software and configuration are simplified due to serial and TCP/IP ports.

The FMB80 has an embedded Web server and supports HTTP, TELNET, UDP and TCP protocols. Firmware upgrades can be flashed remotely using the FTP.

Broadcast Electronics
4MX 50

Designed for the demands of analog and digital transmission, the 4MX 50 AM transmitter is based on patent-pending 4M Modulation developed by BE that packs unparalleled efficiency and features into a small footprint with a price to match.

The 4MX 50 boasts 89 percent overall efficiency in a typical system. You can also operate it at power levels as low as 250W. Included are unprecedented diagnostics, such as the ability to view an impedance sweep of the antenna system, as well as a spectrum analysis of the output signal. Operation is via 15" XGA graphical user interface or remotely via IP. While the 4MX 50 may be compact, it surpasses all expectations for reliability and service accessibility.

Facility Support

CBT Systems
Railight

CBT Systems' makes lighting the entire width of your rack as simple as pulling out a drawer. The light slides out on a dual rail assembly and rotates 180 degrees to direct the light exactly where you need it. When the job is done, it slides back in, flush with the rack and out of the way. The black wrinkle powder-coated steel exterior houses an array of LEDs. LEDs burn longer and brighter than traditional incandescent and halogen lighting assemblies and they won't burn your fingers. Features include: 9" slide out illumination head, 180-degrees rotation, full rack width, UL approved power source, and a power requirement of 120Vac and 240Vac. Dimensions are 19" L x 13½" D x 1¾" H and it weighs about 4.5 pounds.

Circuitwerkes
Sicon-8

The CircuitWerkes Sicon-8 is a modestly-priced, but full-featured dial-up remote control. Based on voice recording technology, the Sicon-8 can speak in your staff's language because you record your own messages.

All of the I/O, including eight channels of relays, are included on the main board so there is no need to buy anything else to use the product. It is easily operated from any dial-up telephone, an auto-answer cell phone or an audio port. A free Windows-based client program, the Sicontroller, offers full access to all of the programming and control functions via the Sicon-8's serial port.

Options available from its serial port include Internet access and X-10 device control. An expander chassis increases the total number of channels to 16.

Acquisition

Neural Audio/Harris
Neustar 5225

The Neustar 5225 is a professional mix/edit and monitoring tool used for the creation of 5.1 surround sound content that is recordable to any 2.0 format. This tool allows the user to easily downmix 5.1 content and validate the 5.1 upmix through self-contained confidence monitoring facilities. The 5225 enables content creators to produce content quickly and confidently without fear of stereo compatibility.

The 5225 allows the user to downmix, store and recover 5.1 content from 2.0 formats. 5.1 downmixed 2.0 is compatible with stereo editors, stereo processing and sweetening facilities. The 5225 delivers rock solid imaging regardless of mixing style or complexity of content. The 5225 ensures that content will be heard just the way it was designed.

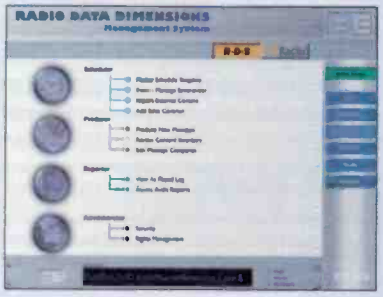
Audioscience
ASI6416

The ASI8702 is a PCI card that contains eight AM/FM tuners. The audio from each tuner is presented to the computer as a mono/stereo record stream, which may be accessed through a high speed bus master interface. The AM portion of each tuner has a medium wave tuning range of 520kHz to 1,750kHz. FM capabilities include a tuning range of 76MHz to 109MHz with software controlled stereo decoding. An RF connector on the card bracket supplies the AM/FM signal to the tuners. A DB-9 connector supplies a line level mono version of each tuner signal. The full stereo signal is available from a 50-pin header. Driver support includes Windows 2000, Windows XP and Linux. Applications for the ASI8702 include broadcast monitoring and logging, advertising verification and content identification.

Data & Audio Storage

Broadcast Electronics

Radio Data Dimensions RDS and HD Radio Data Management Suite



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Go to *beradio.com*.

Click on the Innovative Product Award logo on the *Radio* magazine home page.

Follow the link to the ballot, where you can cast your **vote**.

While you're there, **register** to win a *Radio* magazine t-shirt.

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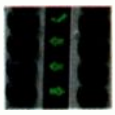

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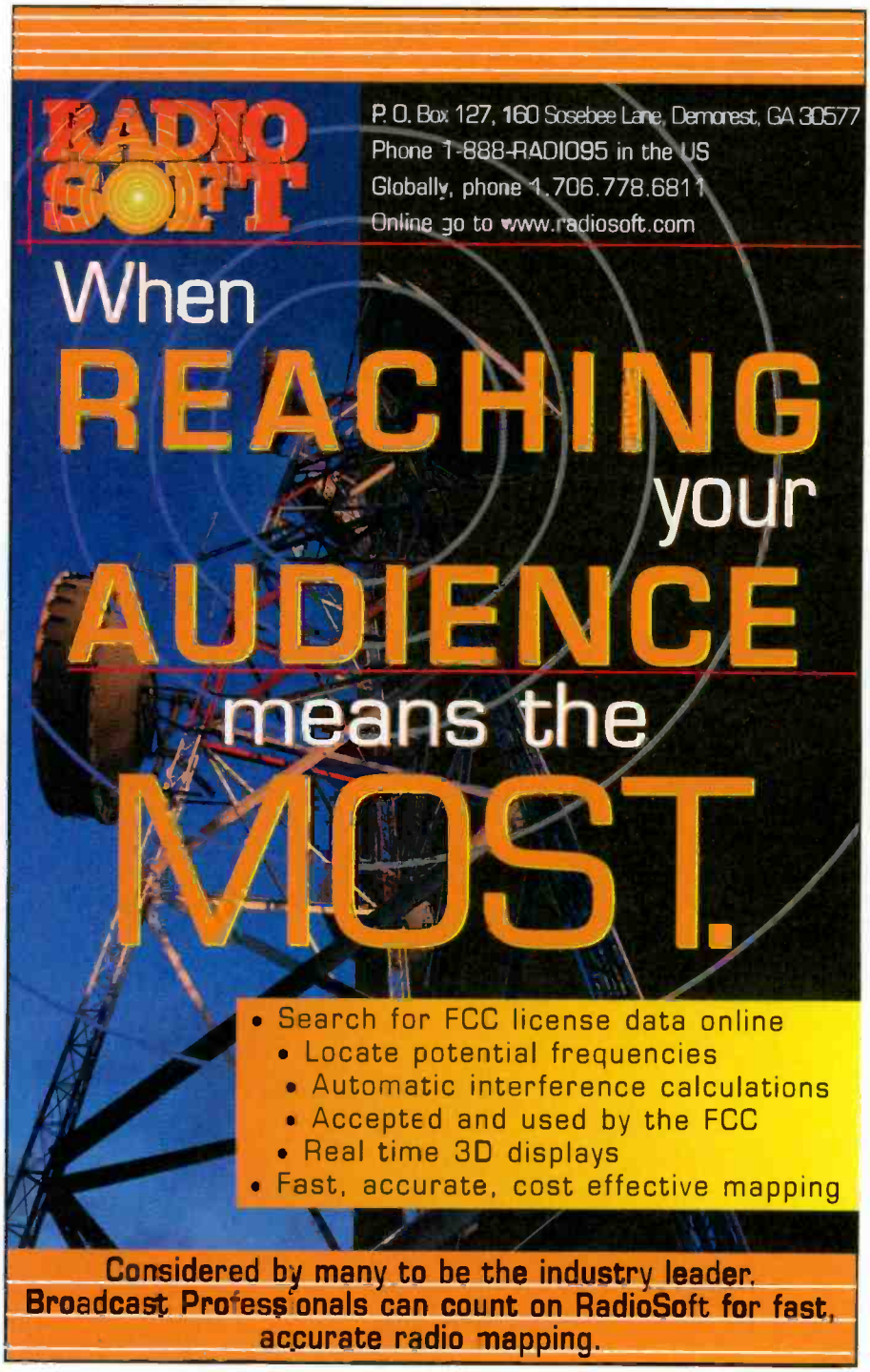

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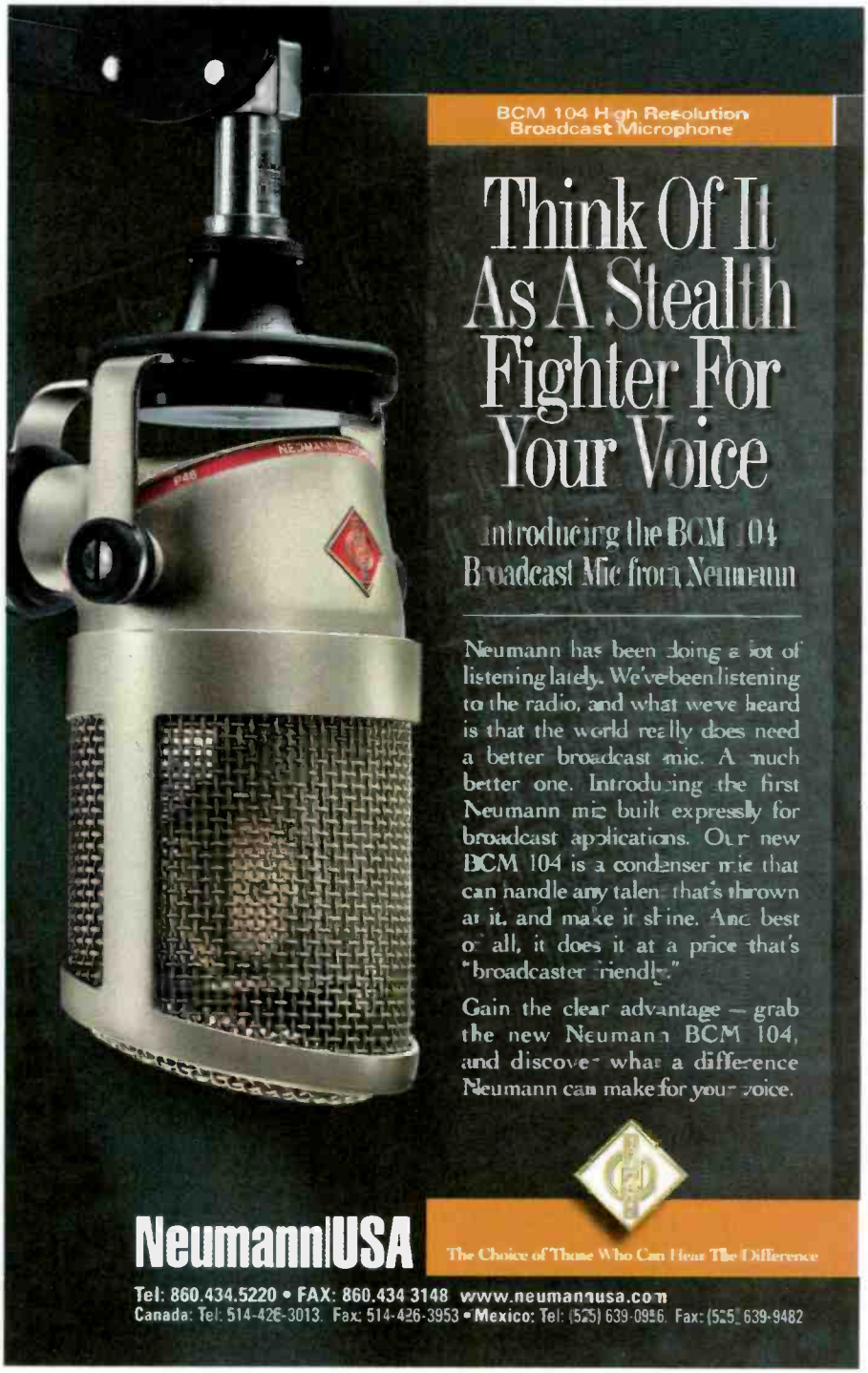

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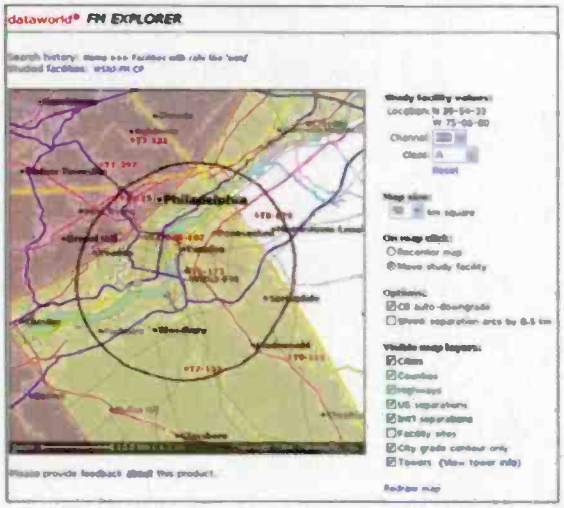

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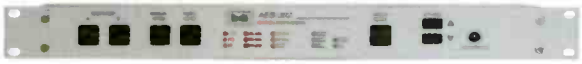

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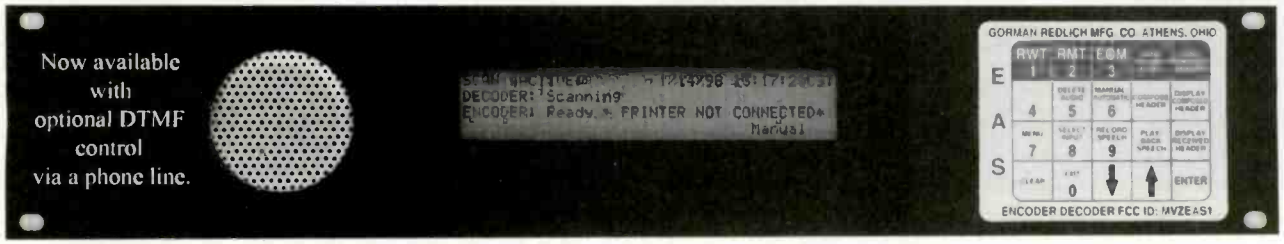

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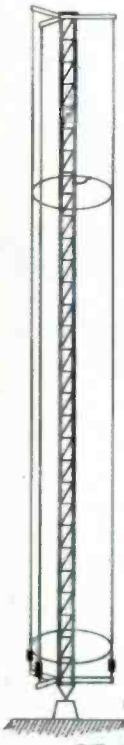

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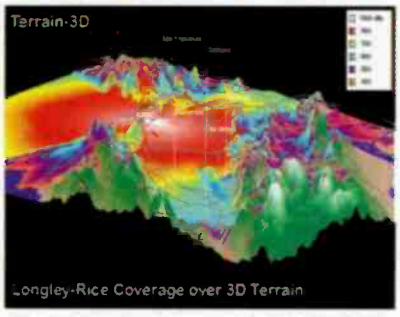

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20kW	1978	Collins 831G2
25kW	1982	Harris FM25K
25kW	1980	CSI T-25-FA (Amplifier Only)
30kW	1986	BE FM30A
50kW	1982	Harris Combiner w/auto exciter-transmitter switcher

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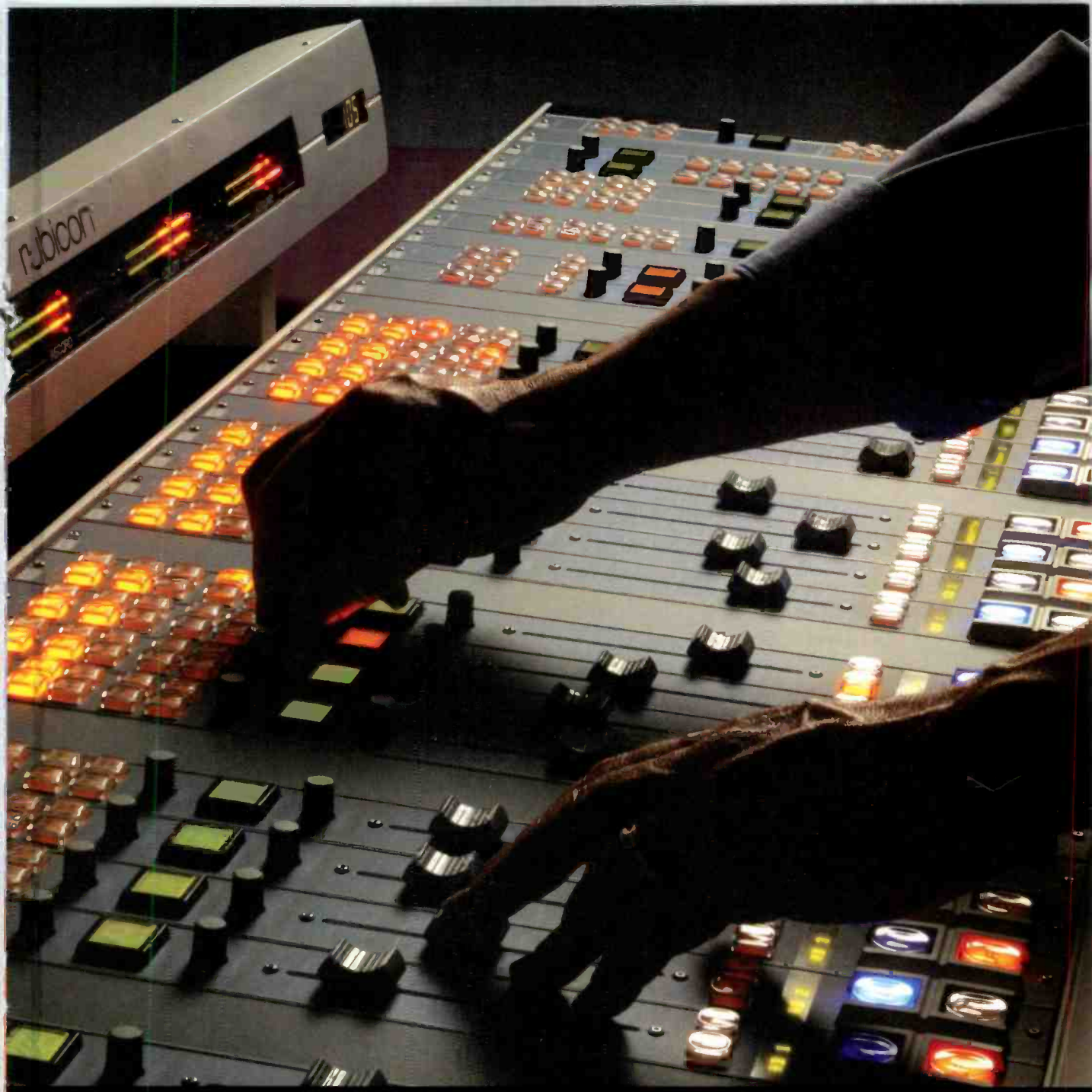

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"All the digital systems allowed some sharing of announcers, but none met all of Citadel's needs. In particular, our program directors were unhappy with the standardized corporate music library required by most brands. PDs were not even willing to renumber their music libraries to a corporate standard. Every PD had different ideas about versions, remixes, short or long versions, and even whether or not to speed up some songs slightly.

"We found the solution we sought at Scott Studios. After our initial roll-out, I contacted Frank McCoy, a principal developer and bleeding-edge user of another brand of hub-and-spoke digital system. Frank and I met with Dave Scott in Dallas, and Frank detailed the problems his former company suffered, which Citadel needed to overcome. The three of us brainstormed possibilities and came up with the perfect plan–except that what we wanted did not exist yet.

This dual-screen SS32 is at Citadel's WGFX (FM), Nashville.

"Scott Studios went to work developing the new features we needed. We began testing and fine-tuning our concept. Citadel now feels it has the best multi-market sharing system available.

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PM drive air personality Ann Perkins with Scott Studios' SS32 touchscreen at Citadel's "Crest," KRST FM, Albuquerque.

"One beauty of Scott Studios' system is when a market PD adds or changes any song in his library or log, remote market Voice Track studios are updated quickly and automatically. Also, we use only inexpensive Internet FTP and VPN bandwidth. No costly Frame Relay connections are required.

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For details, including pricing, contact Scott Studios in Dallas at 888 GET-SCOTT (438-7268) or visit www.scottstudios.com.

Text quoted excerpted from Radio World newspaper, 10/20/2004

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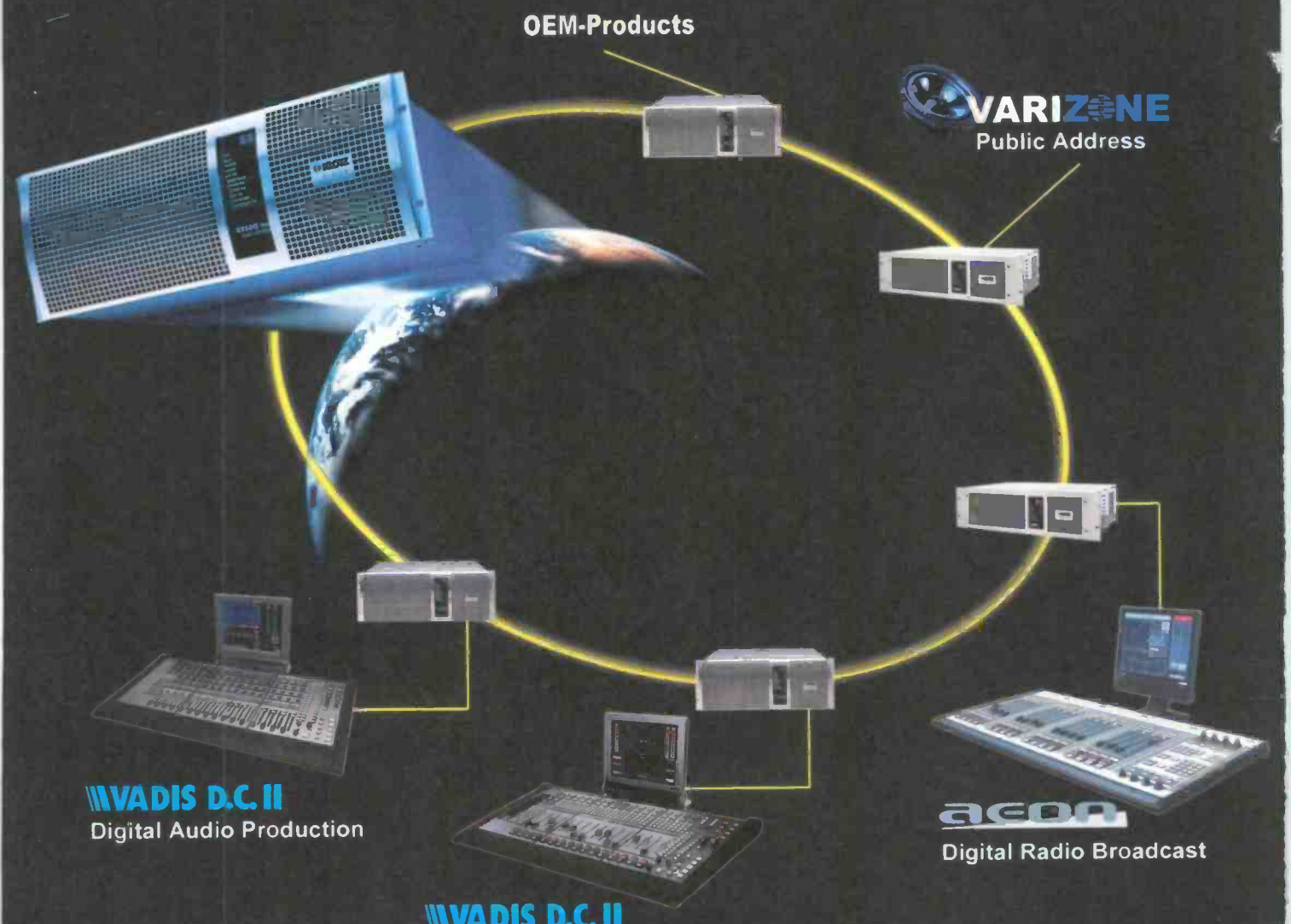

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