

# Radio

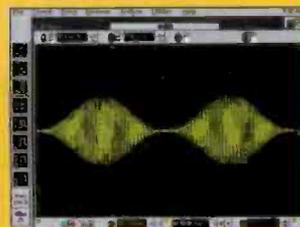
THE RADIO TECHNOLOGY LEADER

## Power-packed production

Digital audio workstations  
make it happen



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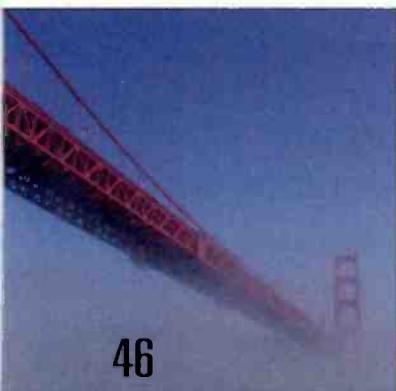
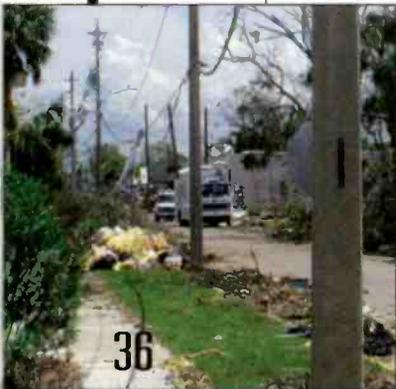
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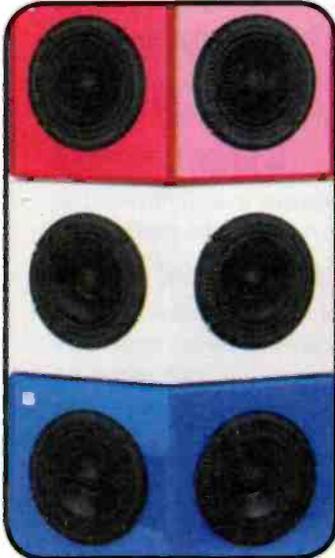
An EAS facelift?



### ON THE COVER:

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## Currents Online

Highlights of news items from the past month

### Kahn Continues Anti-IBOC Crusade

Despite revealing very little of his proposed alternative, Leonard Kahn has renewed his opposition to HD Radio.

### Microsoft Mimics Radio

MS Music has the playlists and says it's like a call-letter station, but without commercials or chatter.

### NAB, Homeland Security Begin Emergency Preparedness Campaign

For National Preparedness Month the NAB released a publication to help stations prepare.

### Results of SBE Election Announced

A new vice president and four new board members join incumbent officers and six board members in October.

### Netia Bought by Management Team

The assets of the company were bought from existing shareholder, EVS Broadcast Equipment.

## Site Features

### Step Into the Demo Room

The Demo Room features demonstrations of the newest products. This month features DAWs from Trends in Technology.

### IBOC Update

This twice-monthly e-mail newsletter covers everything IBOC and more.

### Industry Events

The *Radio* magazine Industry Events lists upcoming conventions and conferences.

### September Issue Online

Every issue of *Radio* magazine is posted on the *Radio* magazine website for easy reference.

### Applications & Solutions

Read *Radio* magazine articles sorted into technology categories; a *Radio* magazine exclusive.

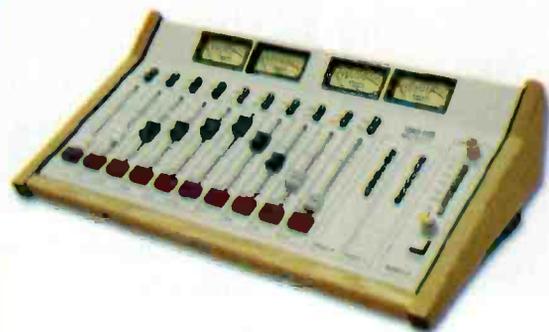


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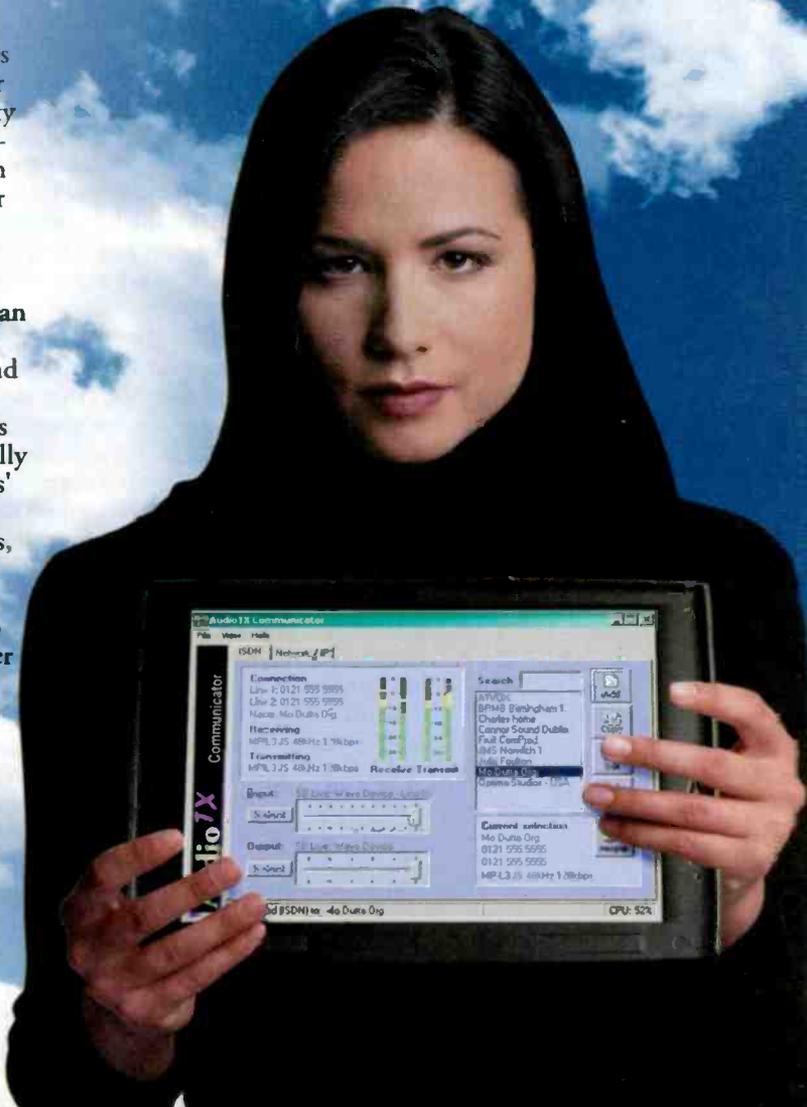
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## Retake the lead

**R**adio has many forms of competition, and some are more obvious than others. In a broad sense, anything that includes audio is competition for terrestrial radio, but there are some specific items that top the list.

Internet radio, while similar in concept to terrestrial radio, has not made its big splash yet. There are few online stations that are successful, but most of them play along with meager followings. LPFM always brings a heated debate, but it too has not eroded the influence of the traditional terrestrial stations.

The biggest competitor seems to be satellite radio, which I admit is not a revelation, but there really isn't a compelling reason that satellite radio should be viewed as such a threat.

I have watched the progress of Sirius and XM since they first began—even when they were called CD Radio and American Mobile Radio Corporation. For the first few years, terrestrial radio stations didn't even notice them. Now, the two satellite radio providers are making news announcements and cutting new deals every day.

What has caught my ear lately is that satellite radio has captured the attention of the listening audience. They see satellite radio as the new radio technology compared to terrestrial radio's antiquated system. This was validated the other morning on a TV news morning program. The hosts were discussing the current topics, and one of the contributors commented that he had just driven across the country, so he had some catch-up to do. The anchor then commented that the contributor should get XM.

While we don't know what the contributor listened to on his drive, the important point is the anchor said to get XM. He didn't mention that the contributor could have listened to local news/talk stations on his trip.

Terrestrial radio has lost its edge. How

could we let this happen? Let's take a brief look at the current state of terrestrial and satellite radio.

Satellite radio continues to show growth. Sirius topped 600,000 subscribers in September. Both providers have exclusive, recognized talent such as Opie and Anthony, Bob Edwards and John Madden. Both offer local traffic and weather for selected markets.

The latest bit of news is that XM has added a style of programming called public radio. The public radio moniker is no longer just a network, now it's a style of programming. Chances are that XM might do it better than the tax-funded version.

What does terrestrial radio have? FM can flash call letters and some other info on displays. There is a work-in-progress digital transmission system. There are too many 10-in-a-row at-work stations playing 20 songs. Terrestrial radio is not causing the stir that it should to show listeners how vibrant terrestrial radio can be.

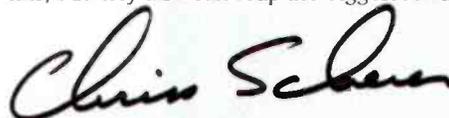
Many people believe that programming safe lists have made most stations too homogenous. This is a station choice that could easily be corrected. The bigger picture is that stations need to begin the crusade locally and carry it through nationally.

While IBOC may not be in your station's plans for some time to come, don't wait to embrace technology. FM stations can install an RBDS generator today. It doesn't need to have scrolling PS, but at least get the call letters and slogan going. Find out how to capture the song and artist info from your automation system as well. It may still be an analog radio, but activate the digital display and the listener will think you're digital.

I'm also surprised that station groups are not using the alternate frequency (AF) function of RBDS. Just because a listener drives out of the metro doesn't mean you have to lose him.

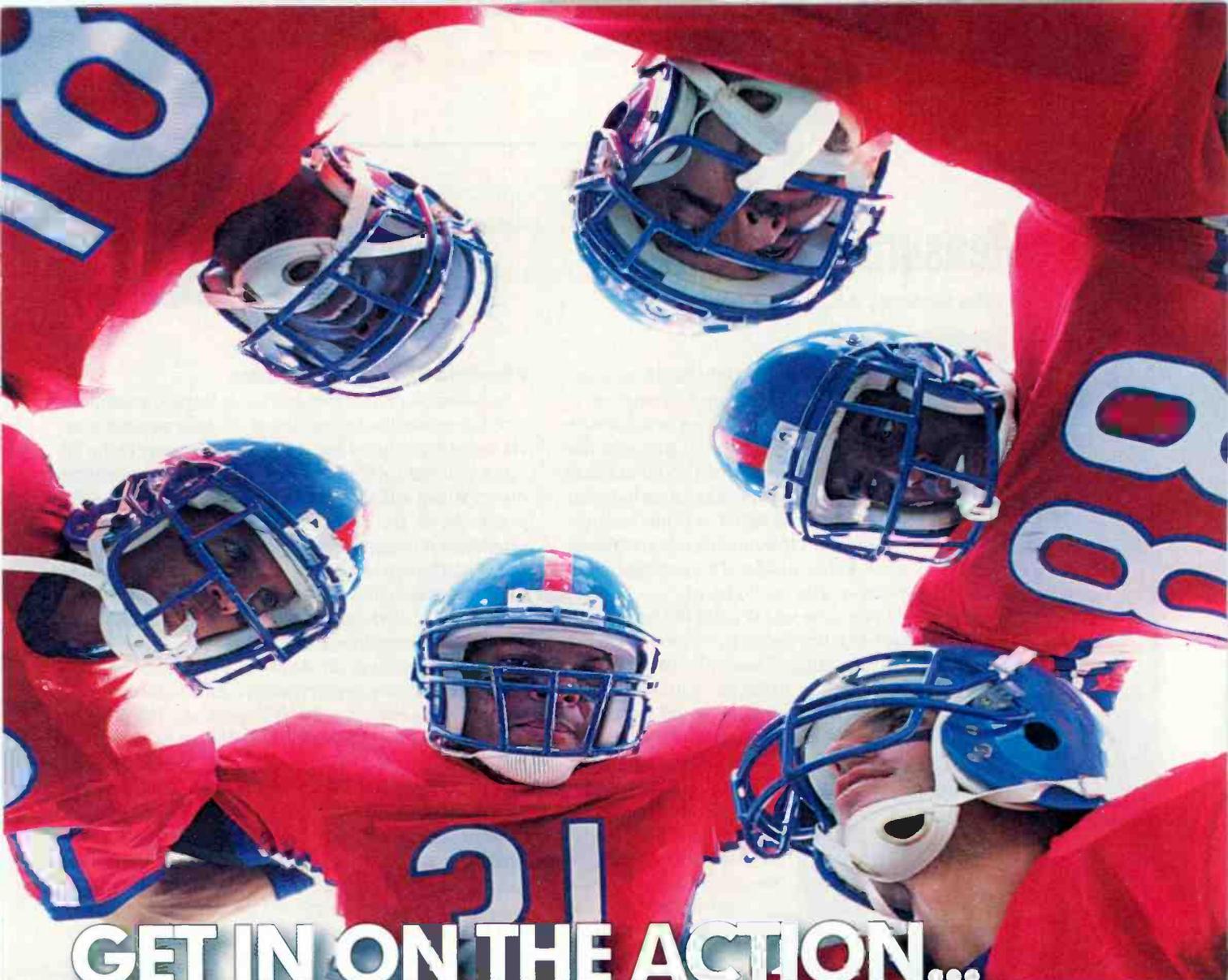
AM can't take advantage of RBDS, but there are other ways to resurrect the listener confidence through programming choices, or by helping adopt a digital transmission technology sooner than later.

We can't wait for technology to save terrestrial radio, we have to take the initiative. The leaders often take the heavy hits, but they also can reap the biggest rewards. 



Chris Scherer, editor  
cscherer@primediabusiness.com

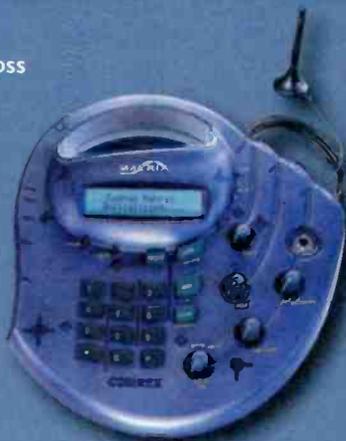
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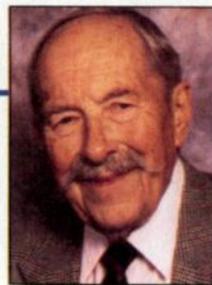
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## Measuring modulation

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

The average textbook definition of modulation reads: modulation is a process in which the frequency, phase or amplitude of a carrier wave varies in step with the instantaneous value of the modulating signal. The closer the correlation between the modulating signal and the instantaneous value of the modulated carrier wave the better the quality of the eventual reproduction of the audio signal.

In the case of AM radio, the engineer is mainly interested in a complex audio signal consisting of music or voice frequencies, and the total width of the occupied frequency spectrum includes the carrier and sidebands. The higher the modulating frequencies the broader the bandwidth will be. Amplitude modulation produces only two side bands: carrier plus and minus the highest modulating frequencies.

Sometimes the idea of AM power varying with modulation leads to misconceptions. The power of the actual RF carrier does not change with modulation. However, the total radiated power (carrier plus both side bands) with 100 percent modulation is 1.5 times the unmodulated carrier and the RMS current increases by the square root of 1.5 (1.225). At the peak of 100 percent modulation the instantaneous total RF power is four times the unmodulated carrier power. An inadequate or poorly regulated power supply can cause carrier shift at maximum modulation. Be sure that any repairs made to a transmitter power supply do not limit the peak available voltage and current.

### Modulation generation

In its basic form FM modulation can be produced more simply than amplitude modulation. As its name implies, an FM signal is produced by varying the frequency of the RF signal at the rate of the audio signal. The carrier amplitude does not vary with modulation and modulation is usually performed in the oscillator stage at a low level. This simplifies the design of the intermediate RF amplifiers. FM transmitter bandwidth is directly proportional to the amplitude of the modulating audio signal, or in other words the percentage of modulation.

Distinctly different from amplitude modulation, frequency modulation produces an almost infinite number of side bands, requiring a wider bandwidth channel allocation that necessitates operation in the VHF spectrum. The FCC has allocated a total bandwidth of 200kHz per channel. The maximum frequency swing of  $\pm 75$ kHz for 100 percent modulation leaves a 25kHz guard band on each side.

Measuring frequency-modulated signals is more difficult than for AM. In addition to reading simple modulation depth it is necessary to check such items as the 19kHz stereo pilot, SCAs and left and right channels. This means that a more complex instrument is needed.

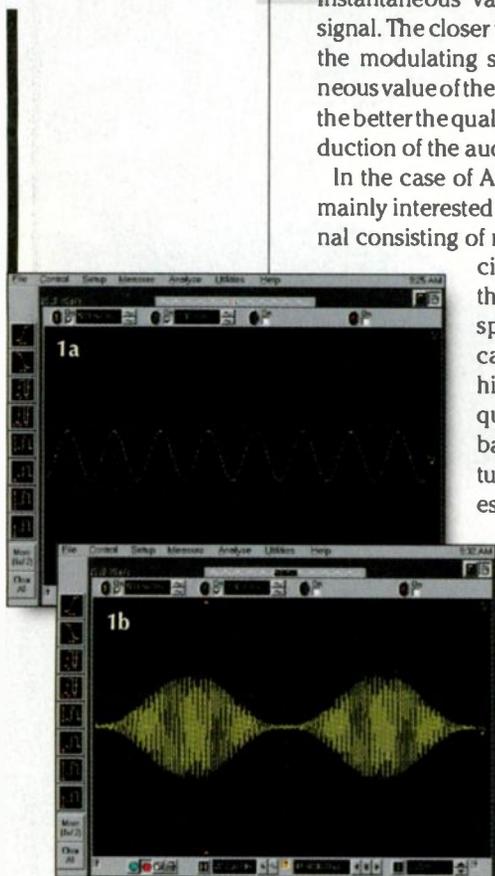
IBOC digital transmission offers the promise of high-quality, error-free radio. Instrumentation for measuring modulation and transmission values is still in the development stage and several manufacturers are offering digital measuring equipment. Unfortunately, only insufficient information is immediately available for any in-depth presentation at this time.

The FCC has established required and maximum levels of modulation for radio stations. For AM, positive modulation must not exceed 125 percent and negative modulation must not exceed 100 percent. For FM stations, 100 percent modulation applies with small increases when subcarriers are added.

Modulation measuring equipment has been on the market for a long time, but there are times when a modulation monitor is not available or the monitor's accuracy is in doubt. Amplitude modulation is measured using an oscilloscope. There are two simple methods of doing this, one measures the modulation envelope, the other method uses a trapezoidal pattern for measurement.

### Monitoring modulation

The simplest method is to connect a pickup loop to the vertical deflection plates of the oscilloscope and set the horizontal sweep to a suitable frequency that will produce a stable modulation waveform picture. A stable audio tone is required for accurate measurement, and it is essential to ensure that the RF signal is stable. If the waveform is not stable it will be impossible to make accurate measurements on the screen.



No modulation (Figure 1a) and 100 percent modulation (1b) when viewed on an oscilloscope.

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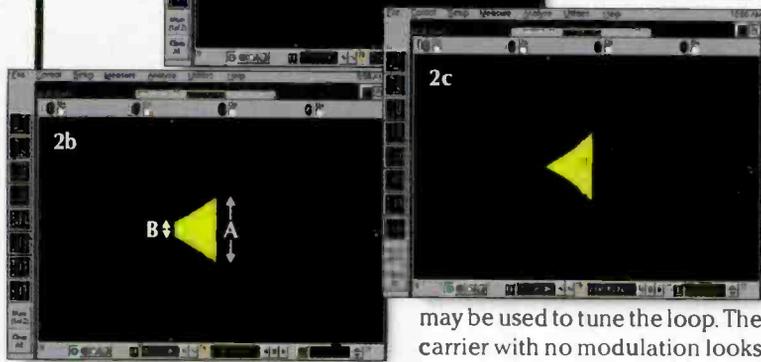


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An easy way to obtain a display of the modulated envelope is to wind a pickup loop and connect it to the oscilloscope's vertical input. Depending on the location of the oscilloscope, a short antenna with a tuned circuit



Using the X-Y feed of audio vs. RF with no modulation (2a), near 100 percent modulation (2b) and overmodulation (2c).

may be used to tune the loop. The carrier with no modulation looks like Figure 1a. Figure 1b shows 100 percent modulation. Excessive overmodulation will cause a carrier shift.

The percentage of modulation is obtained from:

$$\text{modulation \%} = 100 \times \frac{\text{wave peak} - \text{wave trough}}{\text{wave peak} + \text{wave trough}}$$

The units can be any suitable measurement.

The trapezoid method of measuring amplitude modulation is a little more complicated but seems to give more precise measurements. An RF pickup coil can be used, however using a short antenna for pickup may not be satisfactory because of random reflections.

A sample of the modulating audio signal is fed to the horizontal input of the oscilloscope. Then the amplitude of the audio signal is adjusted to produce a usable trapezoid. In the absence of modulation, a single vertical block is produced like that in Figure 2a. As the modulation level increases, the length of the trapezoid's left side decreases as shown in Figure 2b at near 100 percent modulation. The shape of the trapezoid should be symmetrical, and the top and bottom sides should be straight. Figure 2c shows overmodulation with an extended end and foreshortened trapezoid sides.

The calculation for modulation is similar with this plot, substituting B, the unmodulated value, for trough value and A for peak value.

$$\text{modulation \%} = 100 \times \frac{A - B}{A + B}$$

E-mail Battison at [batcom@bright.net](mailto:batcom@bright.net).

Oscilloscope images courtesy of Broadcast Electronics.

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## FCC looks to overhaul EAS

By Harry Martin

In response to numerous concerns raised by citizens, private organizations, and federal, state and local government agencies, the FCC has issued a Notice of Proposed Rulemaking (NPRM) looking toward improving the Emergency Alert System (EAS).

The national-level operation of EAS is controlled by the FCC, in conjunction with the Federal Emergency Management Agency (FEMA) and the National Weather Service (NWS). The FCC handles the technical end of things, ensuring that the system is up and running; FEMA, on behalf of the President, is authorized to activate the system for national alerts. Not surprisingly, the NWS originates about 80 percent of all EAS alerts. Many EAS participants also directly monitor NWS transmissions and relay notice of impending emergencies over EAS. Additionally, state and local emergency management personnel have developed their own plans, which are implemented in combination with the established EAS system.

### Room for change

FEMA has designated 34 radio stations as regional Primary Entry Point (PEP) stations, to which it distributes national-level EAS local messages. The United States is divided into 550 EAS Local Areas, each containing a main EAS source, known as the Local Primary One (LP-1). Each LP-1 monitors its regional PEP station for national level messages and serves as the point of contact for local authorities and the NWS to activate EAS.

The LP-1 stations are in turn monitored by more than 14,000 broadcast stations and 10,000 cable systems. These downstream participants are required to monitor a second designated station to prevent a failure at one station from stopping an EAS message from propagating through the system. Initiating an EAS message—at the national, state or local level—requires the participant to enter certain codes in EAS equipment. The EAS equipment automatically interrupts regular programming.

The FCC notes that two recent studies by

private committees have advocated upgrading, not replacing, EAS. Recommendations include placing a single federal agency, possibly the Department of Homeland Security (DHS), in charge of creating and overseeing an effective national warning system.

The Commission notes that EAS has never issued a national alert, even though it was originally designed for that purpose. Instead, it has been invoked for local, state and regional emergencies. Because of that, the FCC asks whether broadcasters should be required to participate in state and local alerts by making their facilities available to local emergency managers. Participants are not currently required to carry state and local alert messages.

The FCC wants to establish national guidelines for state/local EAS plans and insists that adjacent state and local jurisdictions use standardized approaches. The Commission is contemplating national guidelines for the implementation of EAS at any level. To keep messages uniform, the FCC suggests requiring that all EAS participants monitor NWS transmissions and that local or state emergency managers concur with the initiation of any alert.

The NPRM suggests a number of technical updates to the system, such as requiring that all participants modify their EAS equipment to include various emergency event codes, which are of relative recent origin. Similarly, the NPRM seeks comments on how digital technology might be used to enhance warnings and to what extent stations currently make use of the technology.

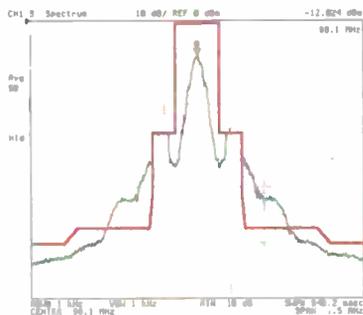
The FCC questions whether it should extend EAS obligations to digital broadcast media such as DBS, DTV, satellite DARS and digital cable. The FCC also asks whether multi-channel broadcasters, (e.g., DTV stations and IBOC radio stations) should be required to transmit EAS messages on all program streams or only on one stream. Because IBOC signals can carry text displayed by the receiver, the FCC asks whether text should be part of IBOC EAS messages.

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

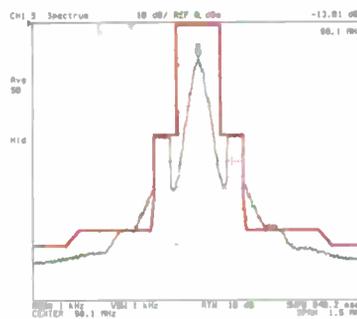
### Dateline:

Radiostations in Connecticut, Minnesota, Montana, North Dakota and South Dakota must file their renewal applications, biennial ownership reports and EEO program reports with the FCC on or before Dec. 1. Stations in Kansas, Nebraska and Oklahoma must begin their pre-filing renewal announcements on Dec. 1.

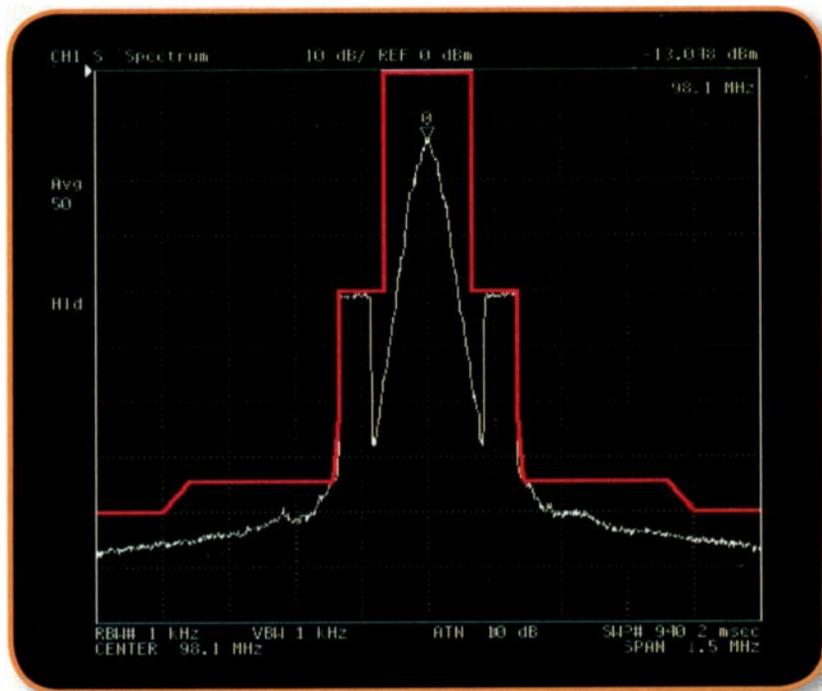
Third quarter issues and programs lists were due to be placed in all station public files by Oct. 10.



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Going...



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# Digital Audio Workstations

By Chriss Scherer, editor

## The production powerhouses

**T**he daily routine of radio production can be as simple as a voice-over and music bed, or as rich as a multi-track, multi-element mix with layers of effects. Either way, the creative processes rely on a single piece of equipment to make it happen. While it takes several elements to make a production studio an effective workspace, the centerpiece of most studios is the digital audio workstation.

The powerhouse behind any production, the DAW's hardware and software capabilities make multi-track functions routine. The significant power inside these devices can be used for basic productions or the most complex creations. The same tools can be applied to both.

Even the concepts are no longer a mystery to novice users. But before buying your usual brand of DAW again, consider the various aspects and features that are available.

The first point in maintaining audio quality in a system is the audio input. Don't cut corners on the audio section if you can help it. Most PC-based systems use a standard audio card or USB audio interface. Too often, a budget system will be assembled using the PC's on-board audio system. The embedded audio hardware in a PC is rarely of any quality. In addition, upgrading the audio hardware later can be a problem. While there may

be settings to disable the on-board audio, the settings don't fully disable the system. Hardware conflicts could occur.

If a compromise must be made, it may be possible to use a sound card with a limited number of inputs and a stereo output instead of a multi-channel audio card. Audio elements will have to be fed into the system one at a time, but in many installations, a production may be built this way anyway.

Higher-end systems use dedicated audio hardware, which usually has high performance specifications. This dedicated hardware may also offer additional features, audio format options and status or metering options.

The user interface of any piece of equipment is important. Most DAW systems have intuitive operation, but keep in mind that less-experienced users may be intimidated by large systems. Some manufacturers offer light versions of their systems that have reduced features and functions but are still practical systems. If the primary producer wants a larger system, consider installing a light version in the air staff production studio. The advantage to using a light version is that in most cases, the files created by the light or full system can be shared between each without conversion.

The interface can also be a crutch to some. Equipment users in radio tend to resist change of any kind. It's certainly easier to

## Resource Guide

A sample of some digital audio workstations.

### Orban Audicy 3.0

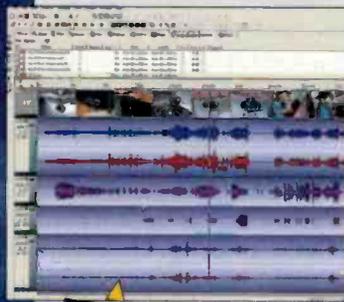


Designed specifically for radio production, the Audicy features 10 channels for 24-track editing and mixing. Work is automatically shadowed to a hard disk or removable Jaz drive, eliminating the need to regularly save a project. All audio is recorded as linear PCM without data compression. Mixes can be exported like carts directly to most audio delivery system networks. The

dedicated controller has 13 100mm faders; a large scrubwheel; 11 rotary controllers for panning, submixes, auxiliary mixes or effects; and dedicated undo and help buttons. It features four-band digital parametric EQ and Optimod compression and Bob Orban-designed noise gates and Lexicon reverb.

510-351-3500  
[www.orban.com](http://www.orban.com)

### Steinberg Wavelab 5



Now in version 5, Wavelab features multi-channel surround audio support of as many as eight channels. Surround-to-stereo down-mixing is user definable. Projects are edited in the Audio Montage window, which includes multi-channel metering and analysis. This version adds WMA Pro 5.1 and 7.1 file export and AVI audio import in addition to WAV, AIFF, AU, MP3, MP2, RAW, Windows

Media 9 and AES-31. Files can be manipulated at 32-bit and 192kHz resolution. The software supports VST plug-ins and runs on Windows 2000 or XP. CD burning support is also included.

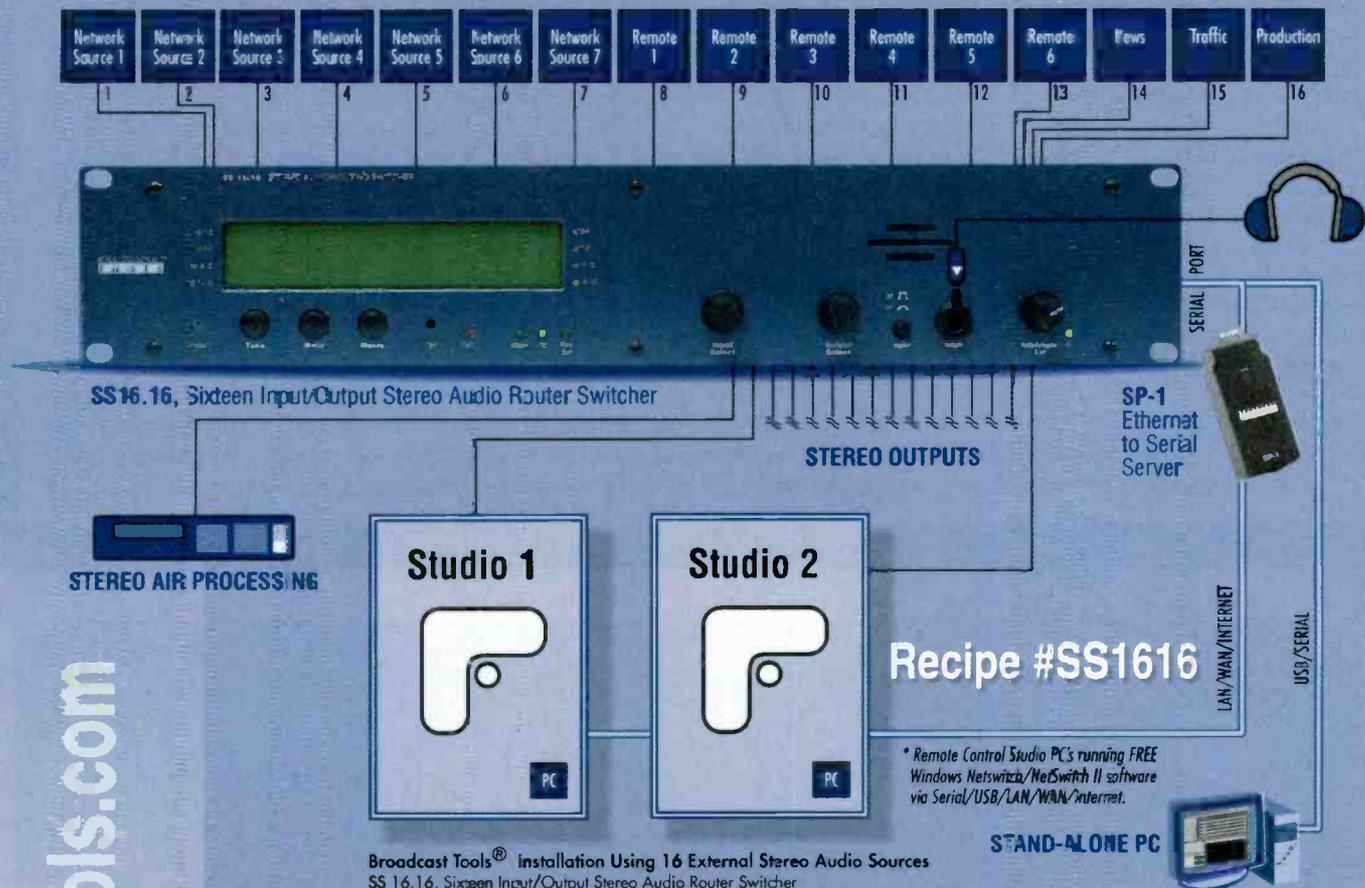
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- Sixteen user configured macros.
- Most configuration options may be set via the easy access rear panel dipswitches.
- 16 input GPI port (PIP) with LED indicator.
- 16 open collector channel status outputs or programmable via burst commands.
- Multi-turn input level controls and single turn output level controls
- Electronically balanced stereo inputs and outputs.
- Multi-drop RS-232 serial port with data activity LED.
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# Digital Audio Workstations

continue the same process without understanding what is actually being done, but if the users are willing to experiment, they may find that something better exists.

## Hard or soft?

In general, there are two styles of DAW. Both are valid approaches. The software-only systems run on user-supplied hardware. In the music industry, Macs reign for hardware, but in broadcast, the PC tends to be the popular choice. Because PCS and Windows are commonly used, maintaining a PC-based DAW instead of a Mac system makes sense.

The other approach to DAW design integrates a hardware system around the program. While a software-only system allows you to build a system around the software, the integrated hardware removes the task of building the system.

The software design usually allows for hardware updates with third-party hardware. Integrated systems may lock the user into hardware, but at the same time, there will not likely be any hardware conflicts to resolve. Many of the hardware-based systems offer plug-in cards to add functions and features.

## Added power

Plug-ins are a software approach to provide additional tools for a product, usually audio processing effects such as equalization,

compression, reverb and delay. They run on top of the host editing program. A DAW manufacturer may offer its own plug-ins, but through a few established plug-in formats, third-party plug-in packages can be used. Three common plug-in formats are VST (Virtual Studio Technology), created by Steinberg; TDM (time division or domain multiplexing), applied to DAW processing by Digidesign; and Directx from Microsoft.

Because there are so many plug-ins available, DAW support of any one format is not that critical. However, VST and Directx appear to be the most popular.

Once a production is completed, it has to be made available for playback on the air or delivery to its final destination. Some editors are made to be used in on-air applications where the file will be played from the editor, so the ability to export completed work is not as critical. If a DAW and an audio playback system do not share a common format, it is possible to play and record the audio in real-time, but that can be time consuming.

Most automation systems provide some type of file import. The DAW may be able to access the automation system network to save completed works. This may be as simple as saving the audio file in the traditional PC/network way. In some cases, the import may require an extra step. It may also be possible to save the playback file in a format that includes whatever header information may be needed for the automation system.

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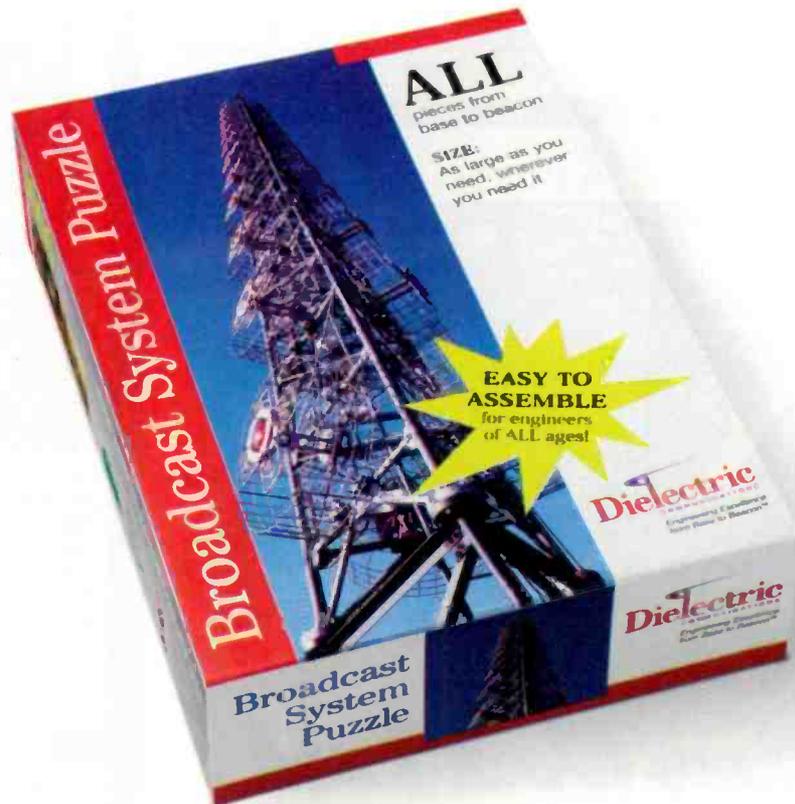
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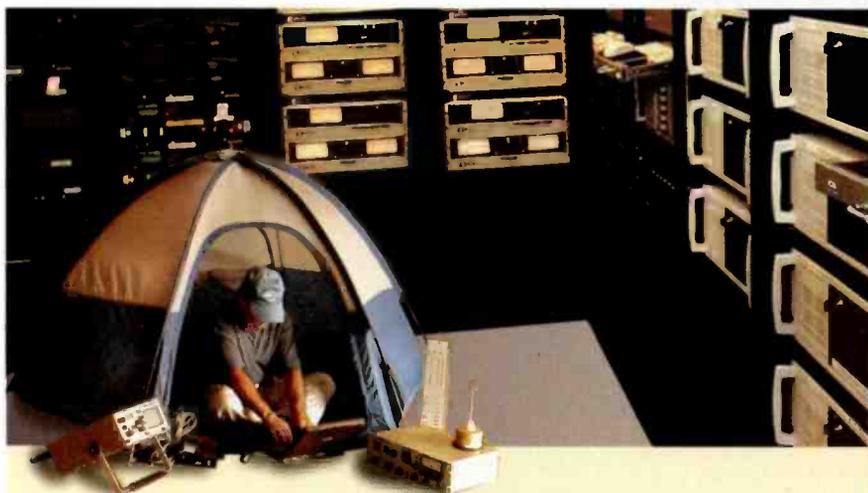
# Digital Audio Workstations



## Sadie Series 5

Several configurations are available in the product family, including the PCM4 and PCM8. The PCM4 offers four inputs and four outputs and 96kHz/24-bit audio recording. It supports AIFF, WAV and BWF files and Directx plug-ins. An optional hardware control interface with moving fader mixing is available. Projects can be saved to AIT, DDS, DLT and DVD-RAM. The system fully supports the AES-31 interchange. There are 50 levels of undo, and editing can be done down to the individual sample.

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## Roland VS-2000CD

Recording at 16 or 24 bits, the 16-bit mode provides 18-track playback and a stereo mastering track, while the 24-bit mode provides 12-track playback. As many as eight tracks can be recorded at one time in either mode. The unit features an internal 40GB hard drive,



a CD-RW drive and a USB port. As many as 320 virtual tracks are available. Eight XLR inputs with phantom power, eight TRS inputs, a 1/4" hi-Z input and a SPDIF input are provided. Each channel has a four-band EQ for any input or track. On-board effects include reverb, delay, chorus, dynamics processors and EQ. An effect expansion board allows plug-in support.

323-890-3700  
[www.rolandus.com](http://www.rolandus.com)

## Digidesign Protocols



This editor is available in two versions, Protocols HD and Protocols LE. LE runs on a Mac or a PC and includes an Mbox, Digi 002 Rack or Digi 002 I/O unit hardware interface and bundled software plug-ins and sound design tools. The HD version works with a variety of TDM hardware interfaces for audio and MIDI connections, which are controlled by the TDM software. Custom control surfaces are available, from a color-coded computer keyboard, to full console controllers that can be used as the production studio's audio control surface. Files can be shared between either version of the software.

800-333-2137  
[www.protocols.com](http://www.protocols.com)

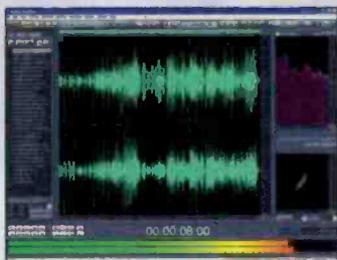
## 360 Systems Shortcut 2000



A two-track, hard-disk recorder and editor designed for fast editing and playback, the operating controls of this unit combine familiar tape machine functions and word processor labeling. The weighted jog wheel provides a simulated tape reel scrub editing, while a waveform display assists with critical editing decisions. One-handed editing is possible because of the grouping of the edit-function keys. Audio clips can be saved and recalled. Hot-Keys can immediately play 10 stored audio segments. A file conversion utility allows the unit to share files with other DAWs, and it can read and write WAV, BWF, SD-2 and AIFF file formats.

818-991-0360  
www.360systems.com

## Adobe Audition 1.5



The first upgrade since becoming an Adobe product adds several new features, including integrated CD burning, Rewire support to stream audio data in real time to other audio software products, VST plug-in support, frequency space editing to isolate, select and modify sounds in frequency and time, pitch correction, enhanced video support, time stretching through visual dragging, automatic click and pop elimination, vocal or instrumental extraction, customized keyboard shortcuts and flexible envelope scaling. In addition, a new set of royalty-free audio loops are available. Projects can be saved to surround formats. The system supports 128 tracks and accepts VST and Directx plug-ins. The ADS Red Rover (sold separately) adds machine transport controls and track information.

800-833-6687  
www.adobe.com

## Tascam 2488

A self-contained, 24-track recorder editor, audio is sampled at 24-bit resolution and 44.1kHz. Eight inputs can be simultaneously recorded into the XLR and 1/4" inputs. There are 20 faders, and each channel provides three-band EQ and access to three of the eight built-in effects processors. A 40GB internal hard disk stores projects, and a USB 2.0 port provides connection to a host computer for backup, and an internal CD-RW drive can record audio CDs. Each channel has three aux sends. The stereo output has a dedicated compressor. Four XLR inputs have phantom power. In addition, there are eight TRS mic or line inputs.

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# Digital Audio Workstations

## Audion Labs Vox Pro 3.3

The latest version of this stereo editor revises the internal database format and allows for gain increase for selected audio for one or both tracks. Other upgrades include a resizable interface from minimal to full screen; compatibility with virtually all sound cards; MP3 import and export of multiple files; streamlined administrative features; and faster access to folders containing thousands of files. All master recordings are displayed in the current users' account. Gain control volume adjustments in 1dB increments for a maximum of  $\pm 24$ dB on either or both channels can be made. Users have four customizable, default settings for advanced options. Voxpro 3.2 systems can be upgraded to 3.3 at no charge.



206-842-5202

[www.audionlabs.com](http://www.audionlabs.com)

## Sony Sound Forge 7.0



This version adds features including Directx plug-in effects automation, automated time-based recording and audio threshold record triggering, VU/PPM meters for RMS playback and record monitoring, enhanced spectrum analysis tools,



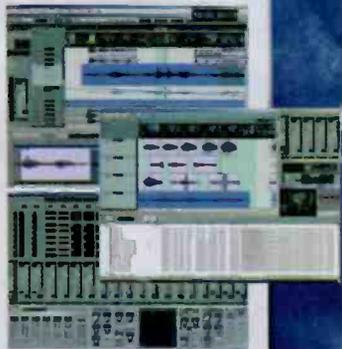
white, pink and brown noise generators, clipped peak detection and marking, Vinyl Restoration plug-in, Media Explorer, Sound Forge project file creation and support for 24fps DV video files. Audio is encoded at 8-, 16-, 24-, 32- and 64-bit depths at sample rates from 2kHz to 192kHz. Various waveform volume and pan envelopes can be applied to tracks, as can multiple types of fade curves. The software supports several file formats. It runs on Windows 2000 or XP. The Acid loop library is also available.

800-686-SONY

[mediasoftware.sonypictures.com](http://mediasoftware.sonypictures.com)

## Steinberg Nuendo

This editing software for a PC or Mac features customizable menus that allow users to hide features that are not currently needed. The controls for each track can be customized as well. It includes an array of virtual effects, ranging from standard dynamic processing and filtering to creative modulation effects or restoration processors, and it will accept VST or Directx plug-ins. Pitch and time elements can be freely manipulated. The system handles surround sound projects and supports WAV, AIFF, BWF, AC-3, Ogg Vorbis, WMA, AES-31, MP3 and Real Audio formats. 16-, 24- and 32-bit files at sample rates up to 192kHz are possible.



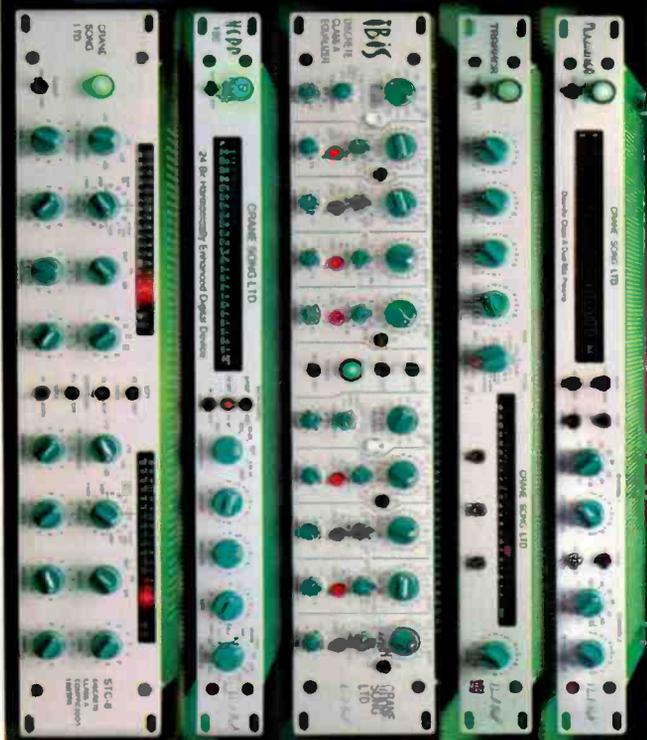
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# Move the studios?

## A CAPITAL IDEA

By **Chriss Scherer, editor**

**C**umulus Broadcasting owns six stations in the Topeka market. Until the end of August 2004, KMAJ-AM, KMAJ-FM, KQTP-FM, KTOP-AM, KDVV-FM and KWIC-FM were in three different locations around town. The stations occupied these spaces for a long time, and much of the equipment had served its useful life after many years of heavy use. The move deadline was not set by leases, but rather the desire to have all the stations moved before the beginning of the fall ratings period in September.

Of the three locations, only one was leased. There wasn't a pending lease expiration looming, but the desire to move into new studios was strong. Cumulus owned the other two buildings that were occupied and is now looking to sell those properties.

### **Only the beginning**

The studio construction project was assigned to Dave Supplee of Cumulus Harrisburg because the Topeka stations rely on the services of a contract engineer. Supplee, who supervised the Cumulus Harrisburg studio project completed in early 2003, decided to take a similar approach to building the Topeka facility.

Supplee recruited the help of three other Cumulus engineers: Gary Zocolo of Youngstown, OH, Wes Davis of Jefferson City, MO, and Kevin Hawley of Toledo, OH. But before the Cumulus team got to work, Supplee contracted Lightner Electronics and Skyline Communications to get the project started.

Skyline Communications handled the initial wiring and cable runs for IT and audio. Later, a local IT installer handled some IT elements. Lightner Electronics terminated the multi-pair studio wiring to studios, punch block wall, racks and the IT punch block wall.



## Cumulus Topeka takes a new downtown office

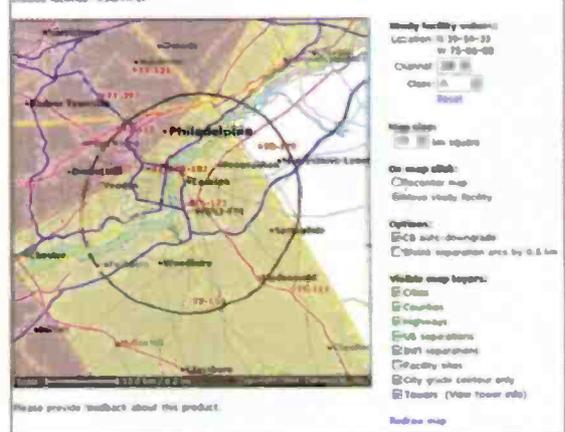
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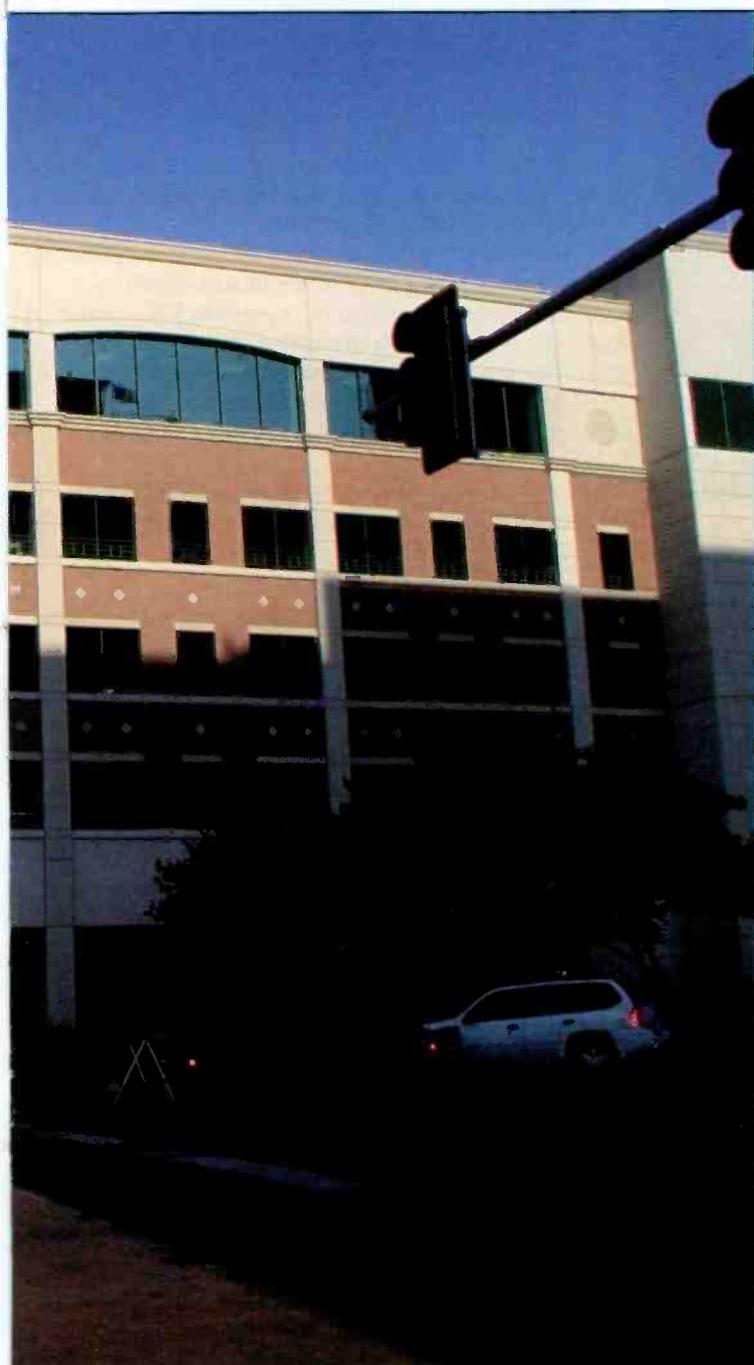


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# A CAPITAL IDEA



All the studios have a similar layout to the KMAJ-FM air studio.



By using contracted integrators at the start, the project could begin while Supplee focused on equipment orders and scheduling work crews.

Because of the heavy wear the equipment received in the previous locations, little was reused in the new studios. A few items, such as mic processors, STLs, one Audioarts console and some power amps, made the move. This was a welcome upgrade for the stations' on-air staffs, and it also allowed the facility to standardize on certain equipment, eliminating the equipment hodge-podge.

The new building has five floors, which are jointly owned in a public/private venture. The first and fifth

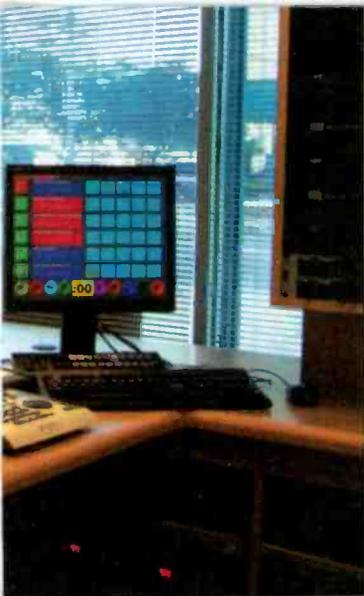
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All but one studio have a view to the street outside. This is the studio for KTOP.

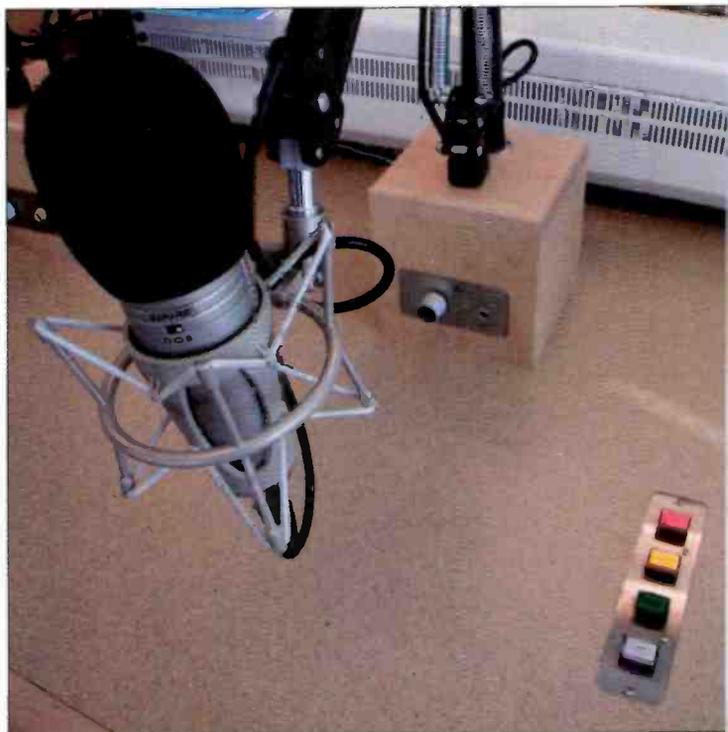
floors are office space, owned by a private landlord. The remaining floors are a city-owned parking garage. Cumulus considered leasing the fifth floor at the onset, but decided that the ground-floor location would provide better public visibility and a closer tie with the community than a lofty space would allow. It also makes the ground-floor air studios, with their large windows, a performance space for the on-air talent.

The windows in each studio were made by Industrial Acoustics, and

each studio is an isolated box from the outside walls and ceiling. Being on the first floor, traffic noise from the street outside could have been bothersome. In addition, the parking garage directly above the studio space could have been a problem—car alarms, for instance. Now that the construction is complete, the isolated construction has proven to work well. In addition, the glass in the studios is ½" thick. This adds to the noise abatement, but also provides some additional security from the outside.

### A perfect mix

The audio sources in the facility are a mix of analog and digital sources. Once a source enters a console or the audio router, it becomes digital if it was not already.



The mic booms are mounted on pedestals with headphone jacks and volume controls. Mic controls are installed on flush-mounted panels.

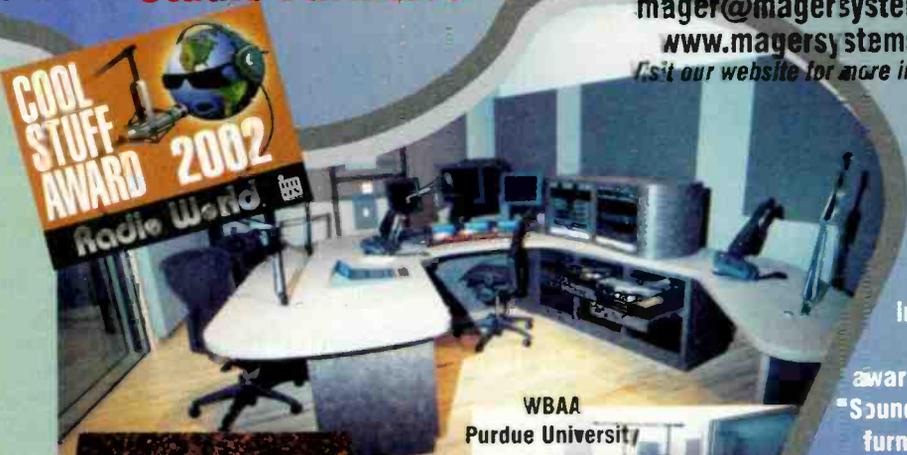


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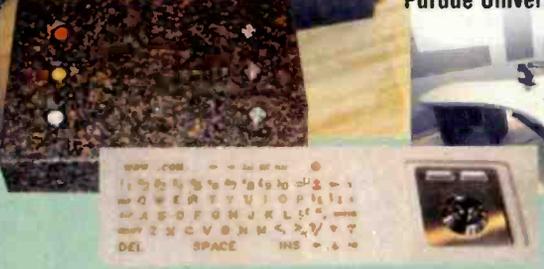
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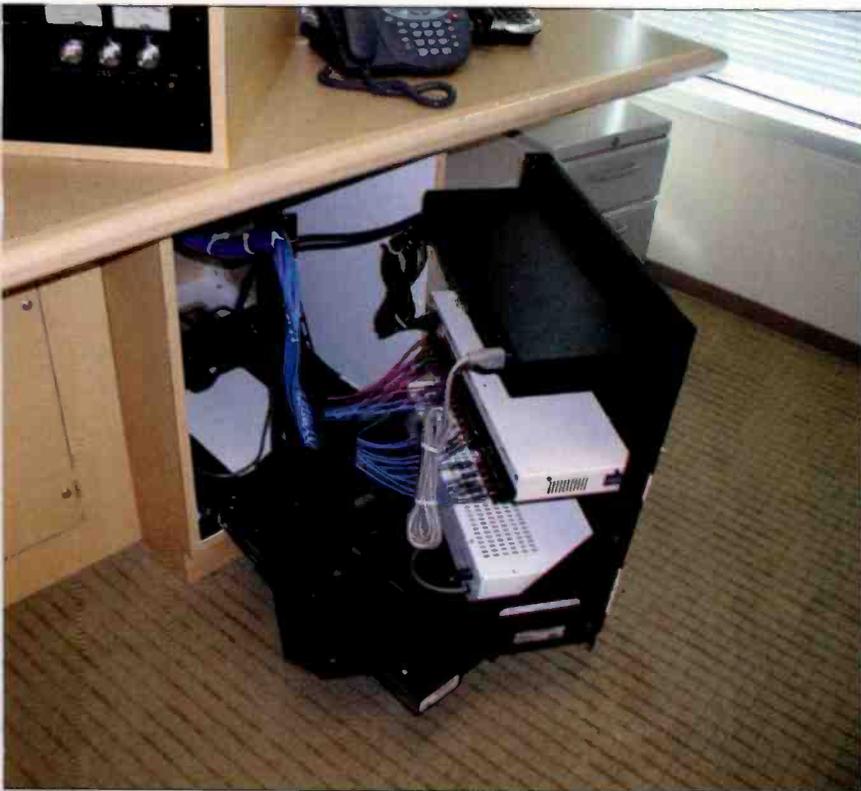
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# A CAPITAL IDEA



The Middle Atlantic slide-cut rack allows easy access to a tight space.



The Audioarts router is configured with all analog inputs and almost all digital outputs. The four analog outputs that are provided are for the one console that does not accept digital inputs, which is the Audioarts R-5 that was brought from a previous facility.

Supplee noted that one time-saving element of the router was its IP and not serial control. The team was able to use prefab CAT-5 cables and an Ethernet switch to make the connections, saving time from creating a serial network and attaching DB connectors.

The entire facility relies on a 125kW generator for back-up power. In addition, the studios have a large



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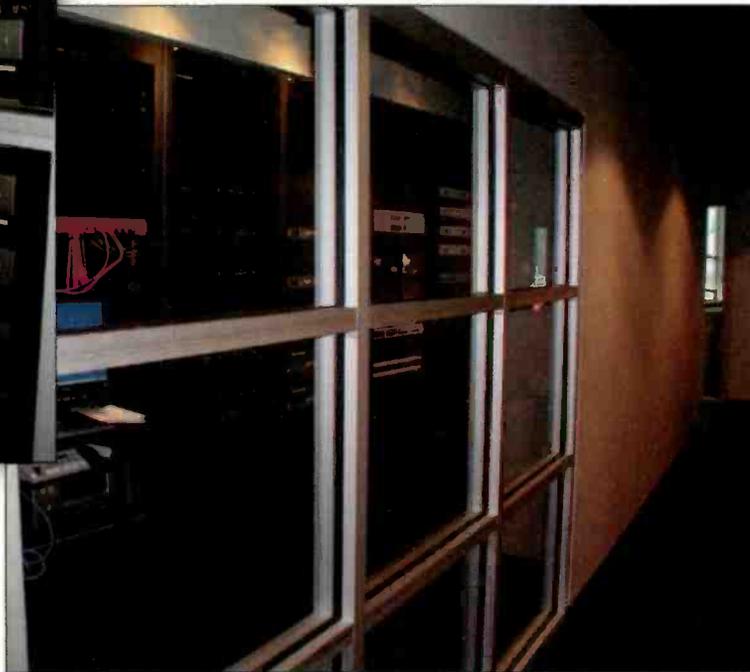
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Two views of the rack room from separate hallways.



UPS to provide uninterrupted power before the generator starts, saving the studio equipment from the momentary power interruption during transfer. By using a central UPS, the unit can be located in its own room with its own ventilation. While a UPS for each studio would provide some redundancy, this would require additional

storage space and cooling needs. Also, by locating the UPS in its own room, the cooling can be set only for the UPS, without creating an uncomfortable environment for the staff. It also removes a potential source of noise from the studio space.

With regard to noise sources in the studios, there are none. All the PCs are in the rack room and are accessed through KVM (keyboard, video, mouse) extenders. There are also no televisions in any of the studios. Instead, the general-use PCs have a TV tuner card. The audio from the general-use PC is routed to the studio console, so the TV audio is available when needed. Accessing the TV through the PC eliminates another piece of clutter in the studio.

The on-air lights are standard lighting fixtures selected by the architect. Mounted into protruding drywall boxes over the door, the flashing red lamp provides a high contrast to the white and bright green walls and are clearly visible.

### Studio ops

Each studio has a source-select panel that provides a simple method of bypassing the console to feed the output of the Scott Studios computer directly to the processing and STL. The panel also selects the feed into the Voxpro to select any combination or a mix of host and caller audio.

The audio playback system is a Scott Studios SS32. Relying on a Windows 2000 server at its hub, there are eight studio computers and a dispatch computer with a 1TB RAID array. Audio files are loaded to a local machine and then copied to the other studio

## 12,000 series

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- available in 8, 18, & 28 channel mainframes
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- mix minus bus for telephone
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# A CAPITAL IDEA

machines as needed for playback. All audio is played from a local machine. If a file is missing or corrupt it will play back from the server if needed. Each local machine can store 200GB.

In preparation for the move, jingles, liners and other audio files were copied from the old DOS system to the new server using a software utility. The music library was loaded by Scott to the new systems.

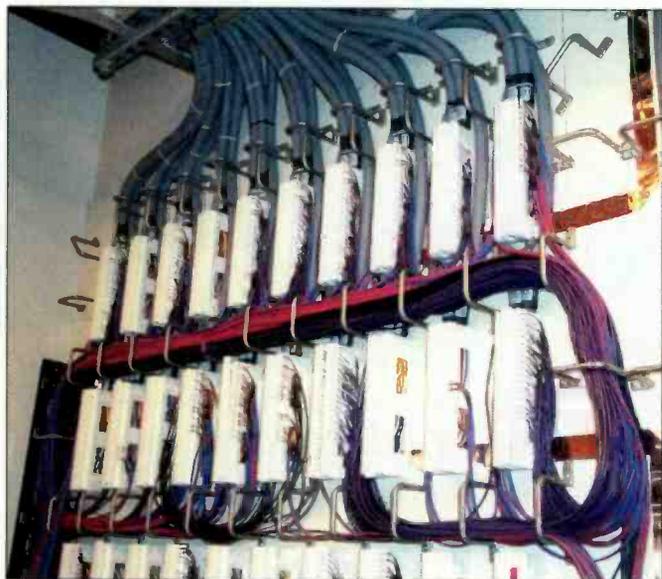
Each studio computer has dual sound cards with

## Equipment List

Adobe Audition  
Aircorp Pro Announcer 500PH mic preamp  
ATI DDA206 digital distribution amp  
Audio Science 5111  
Audioarts ADR 32 router  
Audioarts D-70 console  
Audion Labs Voxpro editor  
Audioscience sound cards  
Avocent Longview KVM  
Behringer PRO-XL HA4700 headphone amp  
Belden 8451  
Bitree patchbay  
Broadcast Tools ACS 8.2 switcher  
Broadcast Tools AVR-8  
Broadcast Tools Silence Monitor III  
Broadcast Tools SS 16.4 switcher  
Comrex Matrix  
Crown D-75 power amp  
Denon DN-950FA CD player  
Electro-Voice RE-20 mic  
ETA Systems PD8  
European Cabinetry Unlimited Furniture  
Furman PL-Plus power conditioner  
Geffen Extendit USB 400S  
Gepco 552624, E131675, 61801EZ and 552608  
Hafler P1500 power amp  
Harris CD 2001  
Henry Engineering Superelay  
Henry Engineering Twinmatch  
HHB Burn-it Plus CD recorder  
Industrial Acoustics windows  
Inovonics 530  
JBL 4401A  
Krone punch blocks  
Lucid AD 9624  
Marti STL-15C  
McCurdy AT2656  
Middle Atlantic racks, shelves, blanks and screws  
Moseley Starlink SL9003SQ  
Neutrik NP3C 1/4" TRS  
O.C. White mic booms  
Powerware 9330 UPS  
Radio Systems B.O.B.  
Radio Systems DA-4x4a distribution amp  
RAM SR64  
Sage Endec  
Scott Studios SS32  
Shure KSM-44  
Sony MDS-E12  
Sony PCM-R500 DAT  
Switchcraft ZA3MB and ZA3FB XLRs  
Symetrix 528E mic processor  
Telos 1x6  
Primary Dealer: BGS



The on-air lights are mounted over the doors. The color contrast and flashing light increase their visibility.



The punch block wall was installed by Lightner Electronics.

Audioscience ASI5111 cards. The dual cards allow talent to voice track to any system from any studio. Al Schermeister of Scott Studios handled the Scott Studios integration.

After several weeks of planning and building, all six stations were moved in a five-day period. The first two stations, KWIC-FM and KQPT-FM, moved in on Aug. 26. KMAJ-AM and KTOP-AM moved in on Aug. 28 and 29. KMAJ-FM and KDVV-FM moved in on Aug. 31. As the fall ratings period approached, the final touches were put into place for an open-house celebration that would host several invited guests, including the Mayor of Topeka and the Governor of Kansas. In a facility that is blocks from the Kansas state capital, Cumulus has completed a showcase with renewed ties to the community. 🎙️

# Facility Focus

## the technology behind Cumulus Topeka

### AudioScience ASI5111

The ASI5111 is a DSP-based PCI sound card that has balanced analog and AES/EBU inputs and outputs.

In addition a high quality phantom microphone amplifier is coupled with a sophisticated five-band parametric equalizer and compressor-limiter expander. The ASI5111

also features AudioScience's exclusive Multi-Rate Mixing (MRX) technology, which enables playback, recording and digital mixing of multiple audio streams of any sample rate to a 1Hz precision. The card has Universal PCI compatibility, working in both 3V and 5V systems.



[www.audioscience.com](http://www.audioscience.com)  
302-324-5333

### 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.

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### Scott Studios SS32



Scott Studios' SS32 is the choice of Cumulus' Topeka cluster, as well as more radio stations than the number two, three and four digital air studio systems combined. When

announcers think creatively, Scott's SS32 touchscreen enhances the flow and adds to the show. Scott cart walls are so intuitive that anything you want is effortlessly on the air in a second or two. Promos with hooks-short clips of upcoming songs-are easy to build in SS32. Remotes and news actualities are easy: SS32 auto-imports digital audio from wireless Internet PDAs, laptops, weather services and MP3s.

[scottstudios.com](http://scottstudios.com)  
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### Moseley Starlink SL9003Q



The Moseley Starlink SL9003Q has become the STL of choice for the all-digital air chain. It continues Moseley's more than 40-year legacy of leadership and innovation in aural STL products. Utilizing spectrally efficient Quadrature Amplitude Modulation the Starlink can deliver four 16-bit linear audio channels and two RS-232 data channels over narrow-bandwidth Part 74 STL channels. For HD Radio both single and twin 44.1kHz uncompressed stereo pairs using 16 QAM and 128 QAM respectively can be conveyed over a single RF carrier. Another popular HD Radio configuration allows one 44.1kHz stereo pair and a 500kp/s LAN connection for IP-based audio delivery.

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# The routing switcher gets a new twist.

(About five twists per inch, actually.)

**Everybody needs to share audio.** Sometimes just a few signals — sometimes a few hundred. Across the hall, between floors, now and then across campus. Routing switchers are a convenient way to manage and share your audio, but will your GM really let you buy a router that costs more than his dream car? Unlikely.

If you need a routing switcher but aren't made of money, consider Axia, the Ethernet-based audio network. Yes, Ethernet. Axia is a *true network*. Place our audio adapter nodes next to your sources and destinations, then connect using standard Ethernet switches and Cat-6. Imagine the simplicity and power of Ethernet connecting any studio device to any other, any room to any other, any building to any other... you get the idea.



Routers are OK... but a network is so much more modern. With Axia, your ins and outs are next to the audio, where they belong. No frame, no cards, no sweat.



Put an Axia Microphone Node next to your mics and send preamplified audio anywhere you need it, over Ethernet — with no line loss or signal degradation.

## Scalable, flexible, reliable... pick any three.

An expensive proprietary router isn't practical for smaller facilities. In fact, it doesn't scale all that well for larger ones. Here's where an expandable network really shines.

Connect eight Axia 8x8 Audio Nodes using Cat-6 cable and an Ethernet switch, and you've got a 64x64 routing switcher. And you can easily add more I/O whenever and wherever you need it. Build a 128x128 system... or 1024x1024... use a Gigabit fiber backbone and the sky's the limit.

## Put your preamps where your mics are.

Most mainframe routers have no mic inputs, so you need to buy preamps. With Axia you get ultra-low-noise preamps with Phantom power. Put a node in each studio, right next to the mics, to keep mic cables nice and tight, then send multiple mic channels to the network on a single Cat-6 cable. And did we mention that each Mic Node has eight stereo line outputs for headphones? Nice bonus.

## With a little help from our friends.

A networked audio system doesn't just replace a traditional router — it *improves* upon it. Already, companies in our industry are realizing the advantages of tightly integrated systems, and are making new products that reap those benefits. Working with our partners, Axia Audio is bringing new thinking and ideas to audio distribution, machine control, Program Associated Data (PAD), and even wiring convenience.

## Are you still using PC sound cards?

Even the best sound cards are compromised by PC noise, inconvenient output connectors, poor headroom, and other gremlins. Instead, load the Axia IP-Audio Driver for Windows® on your workstations and connect *directly* to the Axia audio network using their Ethernet ports. Not only will your PC productions sound fantastic, you'll eliminate sound cards and the hardware they usually feed (like router or console input modules). Just think of all the cash you'll save.

## Put your snake on a diet.

Nobody loves cable snakes. Besides soldering a jillion connectors, just try finding the pair you want when there's a change to make. Axia Audio Nodes come in AES/EBU and balanced stereo analog flavors. Put a batch of Nodes on each end of a Cat-6 run, and BAM! a bi-directional multi-channel snake. Use media converters and a fiber link for extra-long runs between studios — or between buildings.

## Would you like some control with that?

There are plenty of ways to control your Axia network. For instance, you'll find built-in webservers on all Axia equipment for easy configuration via browser. PathfinderPC® software for Windows gives you central control of every audio path in your plant. Router Selector nodes allow quick local source selection, and intelligent studio control surfaces let talent easily access and mix any source in your networked facility.



There's a better way to get audio out of your PC. No more consumer grade '6" connectors — with Axia your digital audio stays clean and pristine.



An Axia digital audio snake can carry hundreds of channels of digital audio on one skinny CAT-6 cable. We know you're not going to miss soldering all that multi-pair...



Control freaks of the world, rejoice: intelligent Axia mixing surfaces give talent complete control of their working environment. Reconfigure studios instantly and assign often-used sources just where they're most useful.



Scott Studios



Axia is already working with some great companies. Like Enco Systems, Scott Studios, Radio Systems, Ballys Technology Group, and of course Telos and Omnia. Check [AxiaAudio.com/partners/](http://AxiaAudio.com/partners/) to find out who's next.



**"This sounds expensive."** Just the opposite, really. Axia saves money by eliminating distribution amps, line selectors, sound cards, patch bays, multi-pair cables, and tons of discrete wiring — not to mention the installation and maintenance time you'll recover. And those are just side benefits: our hardware is about half the cost of those big mainframe routers. That's right... *half*. Once you experience the benefits of networked audio, you will never want to go back. [AxiaAudio.com](http://AxiaAudio.com) for details.



# Leading POTS Codecs Compared.

	Comrex Matrix	Tieline Commander	Zephyr Xport
Audio Bandwidth @ 24 kbps @ 19 kbps	14 kHz 11.2 kHz	15 kHz 9 kHz	15 kHz 15 kHz
Direct Internet Software Updates	No	No	Yes, via Ethernet port
Digital PC Audio Input	No	No	Yes, via Ethernet port and supplied driver
Audio Metering (XMIT/RCV)	Transmit only	One-at-a-time	Simultaneous
Audio Processing	None	Simple AGC	Digital multi-band AGC with look-ahead limiter by Omnia
Remote Control	No	RS-232 and dedicated computer	Ethernet via Web browser
Auto Dial Storage	19 Numbers	50 Numbers	100 Numbers
Frequently-Used Settings Storage	none	none	30
Standards-based POTS Codec	No - Proprietary	No - Proprietary	Yes - aacPlus (MPEG HEAAC)
Transmit-Receive Quality Display	No	Yes	Yes
Contact Closures	2	2	3
Display Resolution	120x32 LCD	120x32 LCD	128x64 LCD
Analog Cell Phone Interface	Optional	Standard	Standard
Mixer Inputs	1 mic, 1 mic / line	2 mic / line	1 mic, 1 line
Phantom Power	No	No	Yes - 12 volt
Automatic Voice-Grade Backup	No	No	Yes
Power Supply	External	External	Internal auto-switching
Local Mix Audio Outputs Headphone Line Level	Yes Yes	Yes No	Yes Yes
Direct Receive Audio Output	No	Yes	Yes
Uses ISDN at the Studio Side for More Reliable Connections	No	No	Yes - your Zephyr Xstream becomes universal POTS and ISDN codec.
Available ISDN Option	\$850.00 (adds MPEG L3 & G.722)	\$850.00 (adds G.722)	\$495.00 (adds G.722 & state-of- the-art AAC-LD for high fidelity and low delay)
List Price:*	\$3,700.00	\$3,650.00	<b>\$2,495.00</b>



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# Disaster planning

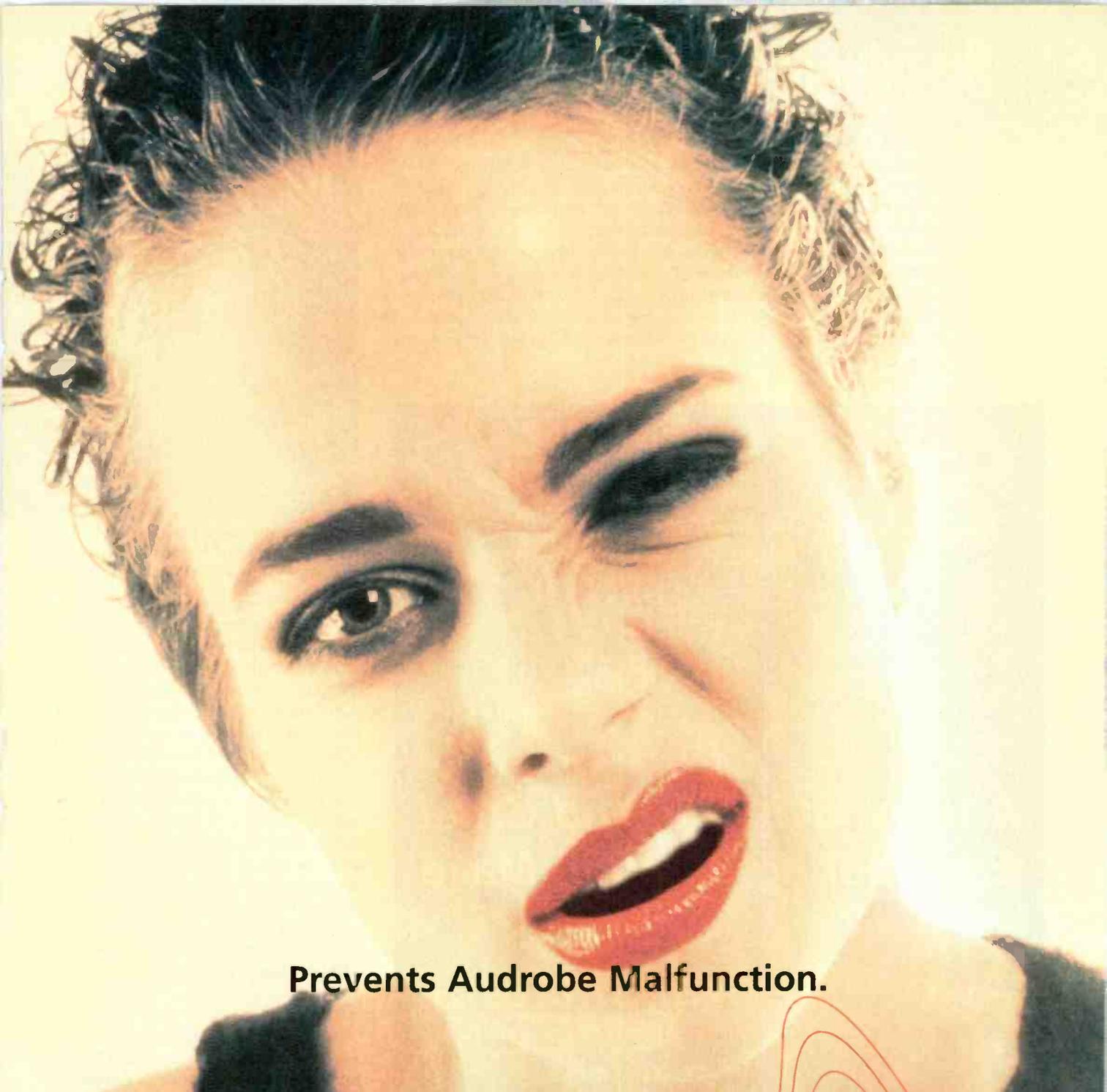
*put to good use*

By Roswell Clark, CSRE CBNT

## Hurricane Charley provides some lessons

Most broadcasters have some idea of the steps they will take during emergency situations, especially in the post-9/11 era in which we all now live. Natural disasters such as earthquakes, fires and hurricanes can be planned for in general terms, but how these disaster events play out over the course of time can make the best thought-out operational plan a work in progress. The ability to make adjustments and decisions on a minute-by-minute schedule can be the variable that will determine the success or the less-than-desirable outcome of any plan.

The Florida broadcasters' recent experience during Hurricane Charley was a case study in how reaction and preparation can affect the outcome of a disaster plan. Like most experiences, much can be learned to improve and to make the next experience a better one for the broadcaster and the public that it serves.



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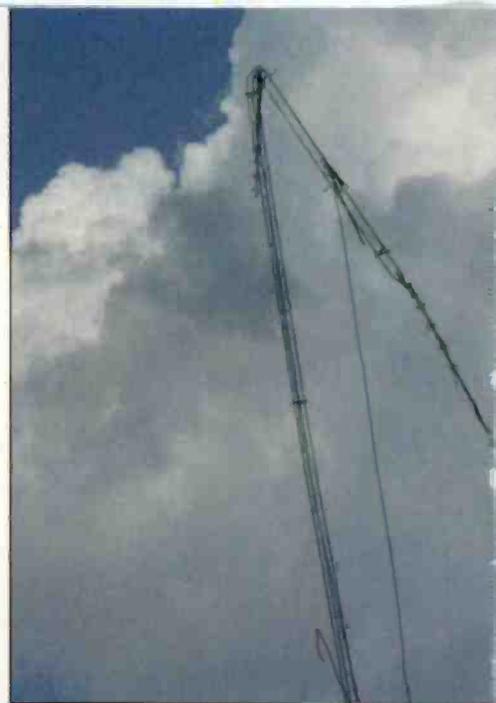
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# Disaster planning

## West central Florida

The Tampa Bay area is situated on the central west coast of Florida and is especially vulnerable to a hurricane. The geography of the region consists of low, flat coastal communities that are situated around the Pinellas County peninsula. The area has been spared from a direct hit from a large hurricane for many years, and the ongoing development has made it especially vulnerable to the effects of one now. The shallow waters of the Gulf of Mexico are conducive to a rapid rise in water temperatures over the summer months, and this same lack of depth to the water provides little ability to absorb the tremendous energy build up and resulting storm surge that occurs as storms cross through the region.



One of the more severe effects of Hurricane Charley. This tower supported two-way communications in Punta Gorda.



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Every year, emergency operations officials host seminars and informational sessions that attempt to train the media and the public on how to best plan for a hurricane and what to expect, if and when the evacuation orders are given. Because most evacuations in this region will take place across long bridges and congested highways, these orders need to get to the public quickly and clearly so that the hundreds of thousands of residents in the area can get to higher ground well in advance of a storm's landfall. Getting accurate information from the Emergency Operations Centers to the public is where the media comes in, especially radio because of its mobility of receivers.

### The storm

Every year in the informational conferences held at the Tampa Bay area EOCs, the description of the “big one” is discussed. The worst-case scenario is of a higher category rated storm passing just north of the Tampa Bay area. This scenario awakens even the most jaded listener. Landfall of such a storm, just north of the mouth of Tampa Bay, would allow the counterclockwise circulation of the hurricane to shove the storm surge into Tampa Bay where there would be no outlet for the water. This surge, coupled with the high winds and heavy rainfall would place most of the modern structures in the community under several feet of water.

On Thursday, Aug. 12, 2004, Hurricane Charley was predicted to come ashore just north of Tampa Bay as a category 4 storm on the following day: Friday the 13<sup>th</sup>.

Cox Tampa's crash box uses retired PC hardware with some new audio components. The basics for broadcasting are now in a portable package.

### What's the plan?

A yearly review of a written Emergency Operations Plan is a good idea. For Cox Radio Tampa, this year was no exception. Ironically, as the review of the Cox Radio Tampa Plan was completed with Sterling Davis, the vice president of engineering for Cox Broadcasting, we had to begin implementing our plan for Tampa. It is surprising how many small details change or evolve over a year, as we began to discover rather quickly.

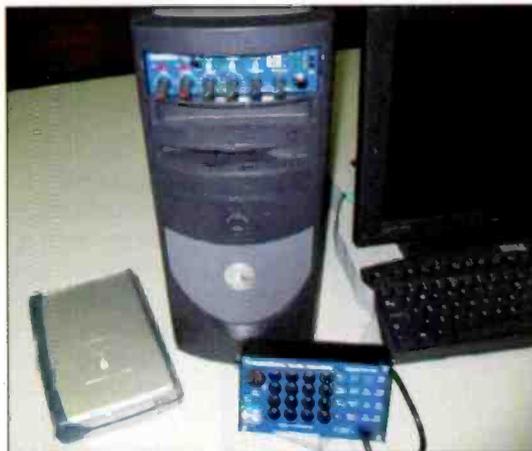
Cox Radio's Tampa studio facility is located in evacuation zone B, or the second level that will receive evacuation notices. This can be a little deceiving, because across the street from the building is evacuation zone A. Usually both zones are called at the same time, which virtually guarantees that we will fall under an evacuation order for most hurricanes.

For this reason, we have set up emergency broadcasting facilities inland to support station operations. Instead of trying to weather a storm at the transmitters site, (not exactly a safe place to be in such conditions), a reciprocal agreement was crafted with two of the area EOCs that allow us to set up temporary studios that can support the basic needs for broadcasting. The EOCs are the center for all disaster information at such times, and the ability to originate from the site also ensures the safety of the on-air staff. In return, we provide access to our SCA channels and all the related communication equipment to support EAS for the local emergency management area. This arrangement has tremendously improved the infrastructure and delivery of EAS messages to local area broadcasters and ensures that a direct connection to radio is available to the public in times of crisis. (See the MSRC Final Report for details at [www.fcc.gov/MSRC](http://www.fcc.gov/MSRC).)

Although the emergency studios are tested for functionality on a routine basis, they have never been fully activated. It was time to see if the plans held up under pressure.

Hard drive automation systems have been refined to the point that it is possible to copy an entire radio station's audio library onto a USB drive and walk out the door with it. This, in fact, is part of our plan.

We built a few crash boxes by re-using retired Dell workstations, a good mid-grade Audioscience card and the Henry Studio Drive mixer package. Not counting the cost of the Dell workstation, in this case a GX150 that was a few years old, the total system can be built for less than \$2,000 for what amounts to a complete radio station in a box. The beauty of using USB drives is that the inventory can be easily brought up to date within minutes and made available at



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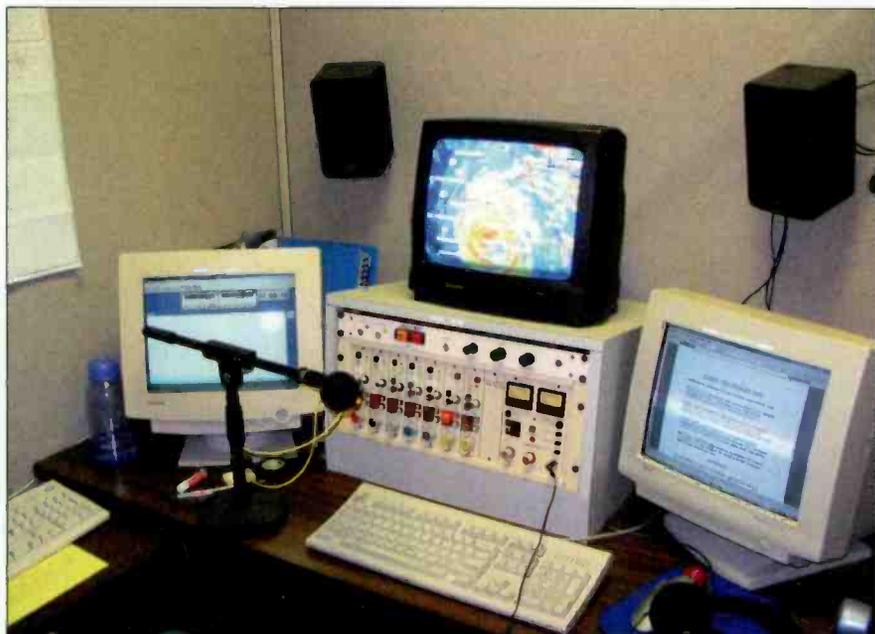
DAVID

## Disaster planning

the remote location. We deployed three crash box systems that became the disaster studios at the EOCs. Friday morning, the programming for the Cox stations was switched to full tilt disaster information originating directly from the EOC studios.

Another reciprocal arrangement with the local NBC TV affiliate was called into action as well and we began simulcasting WFLA-TV News Channel 8 on Friday from the EOC

Larry Gispert from the Hillsborough County EOC and Gregg Feagans from the Sarasota County EOC continued the activation of the EOCs. As weather information poured in, adjustments and announcements were crafted and released for broadcast to a population that was sitting on the edge of their seats. According to Gispert, the broadcasters were efficient in getting the messages out to the public without causing undue panic, but with enough urgency to cause people to take action, which is always a delicate balance.



**Top: Studio for WWRM-FM. Below: The Cox emergency studio at the Hillsborough Emergency Operations Center.**

studios when they converted to full hurricane news coverage. The ability for radio to reach traveling listeners and those without power nicely complemented the massive information gathering power of the TV station. Because we had switched to direct origination from the EOCs, we could break away from the TV coverage with our additional information as we needed to. Maintaining control of our program channel was a key goal of our plan from the beginning.

As Charley marched up the west coast of Florida heading for Tampa Bay, the discussions at the EOCs turned to planning for the effects of the storm. Discussions over blood bank supplies and body bags made the looming threat real and sobering.





Devastation at ground zero in Punta Gorda.

### Change of plans

On Friday the 13<sup>th</sup> the 2 p.m. weather briefing, announced that the storm had taken a turn to the right and would be coming ashore at Charlotte harbor, a 90 minute drive south of Tampa Bay.

The Charlotte harbor area is not unlike the Tampa Bay region geographically. Downtown Punta Gorda often floods in afternoon summer thunderstorms. The main difference is that it is not nearly as built up as the Tampa area. Unfortunately, the advance notice and preparation time that Tampa had for the storm was not a luxury that the southern area had. By the time the updated track was announced, there were only a few hours to prepare for the full force of a category 4 hurricane.

Hal Kneller, a veteran broadcaster who lives in Punta Gorda, managed to escape to higher ground but had little time to prepare his stations for what was due to come ashore soon.

The change of the storm's course also brought about a change in focus at the EOCs. A new balance was struck between preparedness and relief and recovery mode for the northern counties while the southern counties braced for the storm and quickly switched to preparation mode. Conversations between Cox station groups in Tampa and Orlando changed in terms of who might need to help and who may need the help. Long term contingency plans for possible broadcast originations via ISDN from either market were up in the air. On the local TV channels, the phrase "hunker down" became a common term which effectively described the position most were in.

The storm moved quickly (25 to 30 mph) over the coastal areas and into the interior of the state with a direct path over Orlando. It exited the state south of Jacksonville. The intensity peaked just as it made landfall but fortunately, the storm

center was relatively small and the storm surge did not build up as high as expected. Because of the intensity of the core of the storm, damage was excessive to anything in the storm's path.

The Punta Gorda-area stations suffered roof damage and STL tower failures. The intensity of the storm was strong enough to knock STL dishes out of alignment in Orlando, 130 miles northeast of Charlotte Harbor, according to Cox Director of Technical Operations Steve Fluker. Power and phone services were taken out and numerous cell towers were also damaged in the storm's path. The Charlotte area EOC suffered damage extensive

enough to require the Sarasota EOC to temporarily take over its operations. Fortunately, the Sarasota EOC was one that we had an emergency studio in that supported one of the stations that served that area, so critical information was able to continue to reach the area.

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# Disaster planning

## What about EAS?

When there is an emergency, there usually is a question about the performance of the EAS. Although hurricanes are not events that are sudden in nature, there are numerous events associated with the storms that are routed through the EAS. More than 33 tornado warnings, flash flood warnings and other messages for the area passed uninhibited through the EAS because of the direct connection from the EOCs to the tower sites for the LP stations. The system worked well enough that

a local news cable channel now boasts of the Emergency Alert System information that it has available to its viewers.

One of the key facets of a disaster plan is what steps to take during recovery. Because every disaster is unique, the available services dictate what steps can be taken. For the Punta Gorda area, the damage was extensive and help from abroad was called in. One of the benefits of consolidation is the ability to tap into distant resources quickly. Wilson Welch from the Clear Channel stations in Tampa began delivering assistance to the cluster in

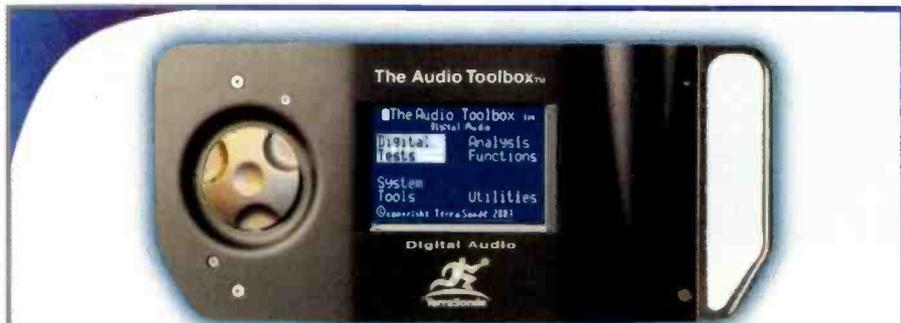
the affected area soon after the storm had passed. Items such as diesel fuel and satellite dishes had to be brought in to keep the stations running. Damage to some of the studio areas had to be secured. Later on, a sugar grower arrived at the studios with a diesel tanker truck ready to fill the station's generator supply because he heard on the air that there was a shortage.

The creative problem solving of radio engineering once again became evident after the storm passed. For example, because the area communication systems were so damaged, the Heartland Broadcasting stations operated by Kneller had to use the Marti equipment that would normally be used for sports remotes and place it into service for communications links to the two inland area EOCs in Arcadia and Wauchula. The EOC officials were able to directly feed the station updates, which broadcast in English and then translated and rebroadcast in Spanish to serve the large Spanish population in the area.

Other interesting solutions to communications challenges included the use of IP phone sets over point-to-point wireless network connections according to Welch. As part of the relief effort sent down to the area by the Cox stations, an ISDN satellite phone was shipped from the Cox stations in Atlanta by Charles Kinney and used at what was referred to as ground zero. In an area that lacked even basic cell phone service, a solid ISDN connection could be easily established that allowed full-duplex G.722 broadcasts to be available. Broadcast audio was delivered to the Tampa and Atlanta markets using the equipment.

## Relief efforts

Of course, the ultimate goal of creating the communications channels and broadcasting areas was to get information and relief to the affected citizens in the disaster zone. The ability for terrestrial radio to survive such a tremendous challenge and to also quickly and effectively serve



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**WZSP's temporary transmitter setup after its transmitter building was damaged.**

the local public interest was simply amazing to witness.

Once again, the power of consolidation came into play on the relief efforts. The Cox stations began fundraising campaigns immediately after the storm passed with on-air auctions and collection centers set up to send food and cash to those affected. Within hours, more than seven semi trailers were rolling south from Tampa to distribution centers and thousands of dollars in

donations were collected and earmarked for distribution.

### **Lessons learned**

The best teacher is experience and the reflections of those in the path of the storm are the most vivid. According to Kneller, the small market stations such as those in Punta Gorda have perhaps fewer resources to draw from compared to major markets.

Hurricanes are typically thought to be coastal events; however, this particular storm brought more damage to inland facilities than expected. The first few hours of broadcasting after the storm were lost because of inadequate preparation. Those first few hours are the most critical for the public to hear the stations. Also, a tower inspection for structural integrity is something

that should not be overlooked. Quite often, it is the STL tower, the generator or the critical satellite dish that receives the least amount of attention. Loss of such resources during an emergency situation can be disastrous.

Some Orlando stations lost power and phone service for days. Human resources are in short



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# Disaster planning

supply thanks to consolidation and the ability for automation systems to do the work of several people. In times of disaster, there is no way that a computer can replace a good broadcaster. They are probably the most valuable resource you need to be aware of. Basic communications are also a necessity. We were reminded how much we missed our two-way system when we had no cellular service. The repeater system may need to be reactivated.

Perhaps the greatest lesson learned was that the power of radio to motivate and help people should not be underestimated. People react to help others when asked and terrestrial radio is where people expect to find the information they need to make decisions on what to do and where to go for help. For this reason, a reliable



The temporary communications setup from the Charlotte County EOC for WZZS.

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broadcasting operation needs to be planned to not only remain on the air but be able to have a good connection and relationship with the emergency planners and other sources of information, such as TV stations in the area of license.

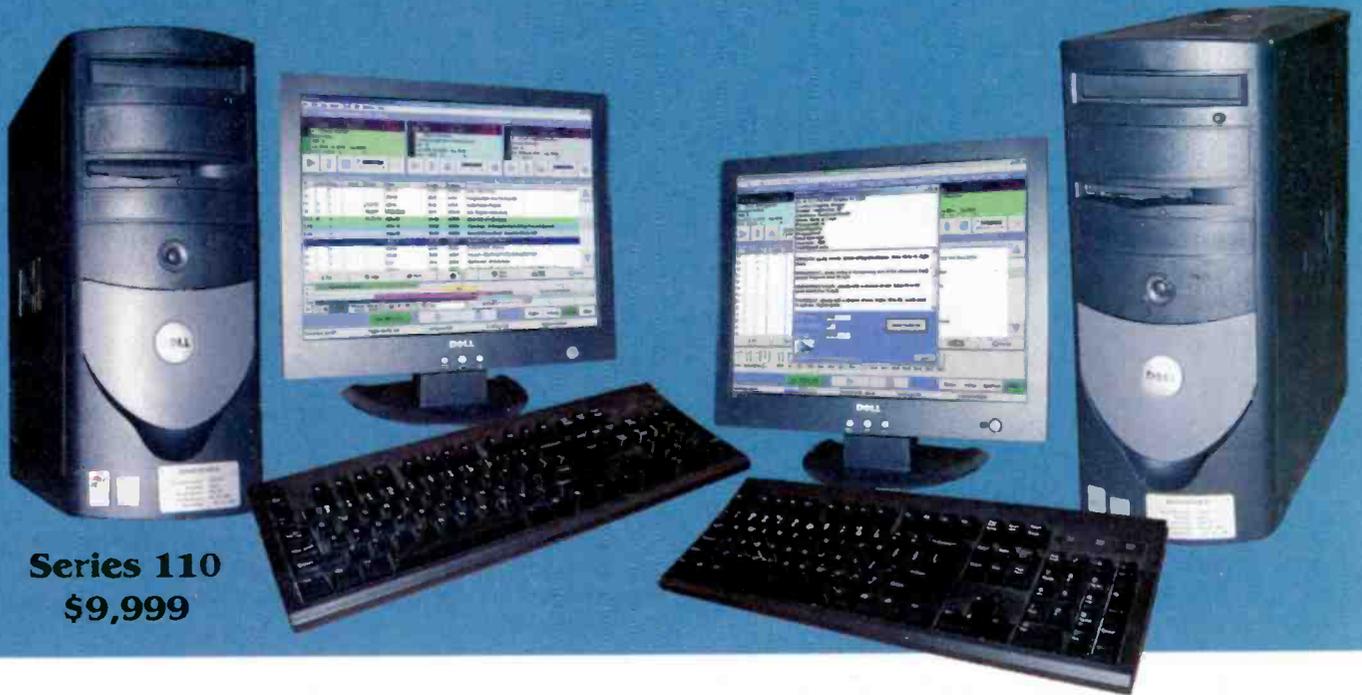
Hurricane Charley reminded Florida broadcasters that although the weatherman gets better every year, Mother Nature is always ready to throw a curve ball.

While it's impossible to plan for every emergency situation, some of the planning for Charley was put to good use when Frances and then Ivan ran their courses. The time between the storms was barely enough to prepare for the next one, but the stations made due with what they had. The emergency plan is already in place, there just isn't any dust on it.

Clark is the director of technical operations for Cox Radio's six-station cluster in Tampa, FL.

Photos by contributors Steve Fluker, Hal Kneller, Larry Gispert and Wilson Welch.

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# 117th AES Convention

By Chriss Scherer, editor

product previews by  
Kari Taylor, associate editor

## What to see, where to go

The Audio Engineering Society's pattern of alternating the fall convention between the east and west coasts has proven to be a successful formula. It returns to San Francisco this year, a city that hosts conventions well.

The theme of the convention is the Art of Audio, which stirs ideas of the creative side of originating and distributing audio. While quality audio can be defined by science, the art of dealing with audio gives it life. Radio, being an aural medium, knows this well.

The Audio Engineering Society is a strong technical organization, and because of its leading technical focus, the sessions, workshops and other convention events are packed with valuable information. Complete details on all the sessions are available from the AES website, but we have identified several events that should be of interest to radio broadcasters attending the convention. Included on page 49, is a special look at four radio-specific events that will be held during the convention.

## Session Preview

Oct. 28

### Subjective Microphone Comparisons

9 a.m. to 11 a.m.

Jürgen Wahl of Sennheiser/Neumann will analyze the variables that affect predicting a microphone's performance in actual applications. This will provide an understanding as to why microphones with seemingly identical technical specifications sound different, even when used under the same circumstances. The tutorial will demonstrate how to concentrate on less complex segments of performance behavior.

TUTORIAL

### KQED - Public Broadcasting Radio and TV Station

9 a.m. to 1 p.m.

KQED is San Francisco's primary public broadcasting outlet. First taking to the airwaves 50 years ago and this year to broadcast educational TV, KQED television and radio have been flagships of the national public broadcasting networks. Still leading the way, KQED-TV first began digital broadcasting in 2000. This tour will encompass the radio and television facilities.

TECHNICAL TOUR

### Lossy and Lossless Audio Coding

9 a.m. to 11:30 a.m.  
and 1 p.m. to 4 p.m.

This all-day session covers many aspects of audio coding in 11 presentations. Of particular interest are the papers that examine the needs of providing surround-sound encoding that ensures compatibility with stereo systems. Other papers address applications and explanations of AAC Plus and Dolby Digital Plus, evaluation and measurement of perceptual encoders, and the use of SBR with MPEG Layer II for Eureka-147.

PAPER

### Show floor hours

Thursday, October 28 ..... Noon to 6 p.m.  
Friday, October 29 ..... 10 a.m. to 6 p.m.  
Saturday, October 30 ..... 10 a.m. to 6 p.m.  
Sunday, October 31 ..... 10 a.m. to 4 p.m.

**Firewire In Studios: Benefits and Challenges**

**11:30 a.m. to 1:30 p.m.**

Richard Foss of Rhodes University, Grahamstown, South Africa moderates the panel of Jun-ichi Fujimori of Yamaha, Morten Lave of TC Applied Technologies, Bob Moses of Island Digital Media Group, Tim Thompson of Kurzweil Music Systems and Mark Olleson of Yamaha as they discuss the physical connection of devices with cable types and lengths; audio transmission with sample rates, word lengths, synchronization and jitter; device control with MIDI and other protocols; software integration of Firewire devices and software plug-in management within digital audio workstations and Mlan.

WORKSHOP

**Classic Microphones from the Golden Age of Radio**

**1 p.m. to 2 p.m.**

Barry Brose of Highland Laboratories will demonstrate some classic microphones. He will describe how they were built, how they look, how they were used and how they sound. The demonstration includes carbon, condenser, dynamic and velocity microphones. He will also discuss the invention of the cardioid microphone.

HISTORY

**Condenser mic  
Neumann**

booth 1010

BCM 104: The first product in the broadcast line, this condenser mic offers an independent, functionally-optimized design derived from 3D simulations. The large-diaphragm condenser capsule features a cardioid directional pattern with internally switchable proximity effect compensation. A second switch allows the sensitivity to be reduced by 14dB. The microphone headgrille twists off for quick cleaning. Optional, color-coded headgrilles are available. The BCM 104 has an elastic mount.

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booth 1342



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## Mastering for Low Bit-Rate Perceptual Codecs 2 p.m. to 4 p.m.

WORKSHOP

Bob Ludwig of Gateway Mastering Studios leads panelists John Arthur of Apple Computer, Bob Katz of Digital Domain and John Loose of Dolby Laboratories as they discuss the success of MP3 and AAC audio distribution and satellite radio and what needs to be done in the mastering process to plan for these codecs. IBOC also uses a lossy codec and the concepts discussed here will also apply. Some audio examples will be provided to illustrate certain points.



### Bass traps Realtraps

booth 1641

Mondotraps: Measuring 2" x 4'9" x 4" thick, these traps are made with rigid fiberglass and metal instead of foam, so they are Class A fire-rated. They can be hung with picture frame wire or can be mounted on a microphone stand. A custom stand is also available. At 40Hz the absorption coefficient is above 0.5Q when corner mounted.

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## Digital Plumbing for Studio, Broadcast and Live Audio 2 p.m. to 4 p.m.

TUTORIAL

Michael Poinboeuf of Digidesign will present an overview of commonly used digital audio interconnection technologies, including cabling, circuits, modulation theory and analysis techniques for performance measures. The interconnect technologies will include AES-3, S/PDIF and Ethernet. Cabling includes shielded 110Ω twisted pair, UTP and ScTP category cable (CAT-5/5e/6) and 75Ω coaxial cable. Circuits include clock/data recovery and PLLs. Analysis techniques and performance measures range from eye-diagrams, and transport jitter measurements, to bit-error rate (BER) estimation based on signal-to-noise measures such as NEXT, FEXT and alien crosstalk.

### Studio monitor Dynaudio Acoustics

booth 326

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## Radio @AES

The AES Convention covers audio in all its forms. While radio is a broad distribution of audio information and entertainment, there are elements of the convention that are distant from radio's view. However, there are four events this year that target radio directly.

The coordinator of the convention broadcasting events is David Bialik, a systems engineering consultant, who has arranged broadcast-related sessions for the AES for several years.

On Oct. 28 from 1:30 to 3 p.m., the session *Opportunities for the Engineer in the Digital Broadcast World* will address shifting job prospects and the training necessary for a successful career in broadcasting today. The panel will include Andy Butler of PBS, Tony Masiello of XM Radio, Glynn Walden of Viacom/Infinity, David Wilson of the Consumer Electronics Association (CEA) and David Layer of the NAB and NRSC.

On Oct. 29 from 10 a.m. to 1 p.m., Bialik will moderate the 14th *AES Digital Broadcast Radio Forum*. On hand to discuss the ongoing evolution and the future potential of digital radio will be a panel including David Layer of the NAB and NRSC, Mike Starling of NPR, Scott Stull of Ibiquity, Tony Masiello of XM and David Wilson of the CEA.

On Saturday, Oct. 30, the session *Surround Sound for Digital Radio* will be held from 9 a.m. to noon. Emil Torick will be the moderator. The panelists will include Robert Orban of Orban, Rocky Graham of Dolby Labs, Frank Foti of Omnia Audio, Robert Reams of Neural Audio, Alan Kraemer of SRS Labs and Tony Masiello of XM Radio. They will discuss the introduction of surround sound to broadcasting, and its implications on the future of stereo. The panel will also explore various 5.1 systems currently in the market and their ability to interface with existing broadcast and bandwidth restraints.

There is one final event likely to appeal to anyone with an interest in radio history. On Oct. 28 from 4:30 to 5:30 p.m., Mike Adams will present an abstract called *The Birth of Radio Broadcasting: Charles Herold and the First Radio Station*. In 1909—10 years before licensed broadcasting and the first use of the word 'radio'—an obscure inventor living in the Santa Clara Valley created a broadcast station. His design was based on a radio-telephone and used a water-cooled microphone comprised of six carbon buttons in a telephone-like handset.

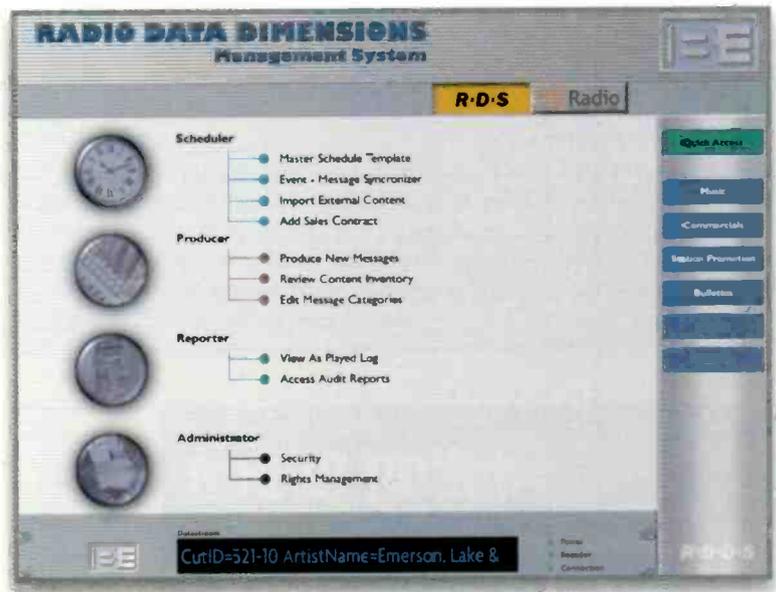
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**Architectural Acoustics  
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**9 a.m. to 11 a.m.**

WORKSHOP

Moderator David Schwind of Charles M. Salter Associates will host panelists George Augsburger of Perception, Russ Berger of Russ Berger Design Group, Tomlinson Holman of TMH and Jan Voetmann of Delta Acoustics. They will review aspects of good architectural acoustic design practice for new facilities. Topics for discussion, in the form of project case studies, will include planning considerations and design criteria, internal and external sound isolation, the use of noise criteria (NC) and room criteria (RC), noise reduction, structure-borne noise, proper HVAC system design and room shape and its influence on acoustics.

**Lossless Audio Coding: MPEG and De-facto Standards**

**11:30 a.m. to 1:30 p.m.**

WORKSHOP

Jürgen Herre of Fraunhofer IIS and panelists Peter Craven of Algol Applications, Ralf Geiger of Fraunhofer IDMT, Tillman Liebchen of the Technical University of Berlin and Werner Oomen of Philips will detail the popularity of using lossless audio coding in the context of high-definition audio and archiving. This workshop will also provide an overview of widely used current systems for lossless audio coding and their applications. It will pay special attention to the technology developed by the ongoing MPEG work on this topic, which provides a number of novel features compared to existing systems, such as combined lossy/lossless audio coding, fine grain scalability and compression of floating point audio.

**Digital audio cable  
Gepco International**

booth 528

**DS series:** This 110Ω digital audio, twisted-pair cable is available 24 and 26 gauge sizes and in multi-pair and single-pair configurations. The cable has been engineered for the highest bandwidth and performance requirements of high-resolution digital audio sample rates. All DS series cables are rated up to 25MHz to meet the AES3-2003 specifications. The cables feature minimal attenuation, low-jitter and a 110Ω impedance that remains stable when the cable is bent or flexed. The cable is more flexible than similar cable designs. This series replaces the previous generation of cables, the 5500 series.

800-966-0069; fax 847-795-8770; [www.gepco.com](http://www.gepco.com); [gepco@gepco.com](mailto:gepco@gepco.com)

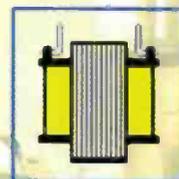
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## Grounding and Shielding

11:30 a.m. to 1:30 p.m.

Bill Whitlock of Jensen Transformers demystifies the black art of grounding and interfacing. His tutorial will focus on the real sources of system noise and ground loop problems that routinely overlook or ignore the basic laws of physics. Balanced and unbalanced audio, ac power distribution and safety, code compliance and common-impedance coupling will be covered. A simple troubleshooting method that uses no test equipment and can pinpoint the exact location and cause of system noise will be described.

WORKSHOP

## Condenser mics

Audio-Technica booth 1302

Pro series: The Pro series line comprises 11 models. The Pro 31/Pro 31QTR, Pro 41 and Pro 61 all feature high-energy neodymium magnets, Magnalock switch design, two-stage ball-type headcase, gold-plated XLR-type connector, and the AT8470 Quiet-Flex stand clamp plus a 3/8"-27 to 3/8"-16 threaded adapter. The Pro 31 cardioid dynamic mic is designed for close-up vocal performance and is



available in two models for compatibility with consumer and pro electronics, Pro 31 (XLR-XLR cable) and Pro 31QTR (XLR-1/4" cable). The Pro 41 cardioid dynamic mic features a step-up design providing natural, full-range vocal reproduction. The Pro 61 hypercardioid dynamic mic offers extended frequency response and hypercardioid polar pattern. The Pro 63 cardioid dynamic mic features a high-energy neodymium magnet structure, a cardioid polar pattern and a two-stage headcase to reduce wind noise and popping. The Pro 24 stereo condenser mic offers a pair of cardioid elements in X-Y configuration provides the spatial impact and realism of a live sound field.

330-686-2600; fax 330-686-0719  
www.audio-technica.com; pro@atus.com

## SPL meter

ATI-Audio Technologies booth 422

SLM-100: This meter features a large analog meter for quick and accurate measurements from 32Hz to 10kHz with A and C weighted measurements with peak or averaging response. It includes a seven-range selector switch, calibration control and a test signal output. A 9V battery supplies power. A threaded insert allows the meter to be mounted on a camera tripod. The unit measures 6.25" x 2.5" x 1.75".

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## Neumann BCM-104

By Rich Parker, GSEC

**V**ermont Public Radio has grown over the years into a statewide news and cultural service. We wanted a standard microphone setup for all of the studios to ensure a consistent sound for all our productions. For many years, VPR hosts used Neumann U-89 microphones in the production and on-air studios, supplemented by a small contingent of Electro-Voice RE-20s and RE-27s for on-air guests. As the number of VPR productions has increased, so has the demand on these quality condenser microphones. This meant a lot of moving mics around between studios, and eventually some damage to the fragile Neumann spider mounts occurred—with the replacement cost just for a single mount being \$300.

With four main production studios, an on-air studio, a live performance recording studio and some field recordings of cultural events, a live recording opportunity required more mics than were left in the closet and recording engineers would have to juggle equipment. We needed more mics, and while we knew our staff would have

a number of good quality mics available so it was a major undertaking to find a new standard when announcers are already comfortable with what they have. I heard from my public radio colleague Mike Pappas at WUVO in Denver that he was trying a new Neumann broadcast microphone that sounded great and listed for less than \$1,000. Because we were already familiar with the sound of large capsule Neumann condensers, I quickly called our vendor and asked for a couple of units to demo in the studios.

That microphone was the new Neumann BCM-104, a large-capsule, single-pattern, pressure-gradient condenser mic optimized for broadcast use. The BCM-104 is a relatively new offering from Neumann, which is touted as being “especially designed for speech reproduction at close range.” The appearance of the mic is quite a change for Neumann. It’s a visually appealing unit with a hefty grill and body with an offset mic cable input that makes it immediately clear which is the business side of the mic.

### The inner workings

Under the easily removable head grill is a classic, large-diaphragm K 104 capsule and transformerless electronics. Both are suspended by an elastic mount to reduce noise being transmitted from the boom. Inside it looks much like any other of Neumann’s single-capsule condenser mics, with the main difference being the inclusion of an integrated screen-mesh pop filter around the capsule in a tensioned mount that can easily be removed by hand for cleaning. The construction of these mics is solid so any worries about having a high-quality condenser mic in an on-air booth are greatly reduced. Removing the head grill is quick and easy, and even getting the hang of removing the mesh windscreen for cleaning is a snap.

We conducted A/B tests against our U-89s with various staff announcers and the reviews were generally positive. The sound of these mics is warm, open and uncolored and compares favorably with our previous mics. One of the immediate advantages we noticed with the BCM-104 was the form factor. The integrated mount eliminates the need for the cumbersome spider mount, which can be fragile and visually bulky. In addition, we found that the 89s really needed a pop filter of some kind, which only added to the visual clutter. The compact design of the BCM-104 makes it a more visually appealing unit, particularly in interview situations where guests and hosts are facing each other in the talk studio.

The new mic also helped solve one problem we often experienced; with switches for multiple pattern settings, roll-off choices and attenuation located in plain view on the 89’s body, things would get changed from time to time, caused by accident while handling or moving the mic between studios or by announcers who were sure that

### Performance at a glance

- Large-capsule, transformerless condenser
- Sturdy, compact design
- Excellent mounting system
- Integrated pop filter
- Offset connector
- Color coded head grills available
- Concealed filter and attenuation switches
- 138dB SPL capability

loved to standardize on the familiar U-89s, we also knew that we couldn’t justify almost \$3,000 per mic plus mounting hardware to outfit our studios adequately.

We began testing several microphones in the \$1,000 price range to see if we could come up with another standard microphone that would fit our needs. There are

they knew best how to set up the mic (and naturally forgetting to set it back to normal for the next announcer on duty). With a single cardioid pattern and the attenuation and hi-pass filter switches mounted safely out of harm's way inside the body, the 104s have made life much easier for the engineering staff.

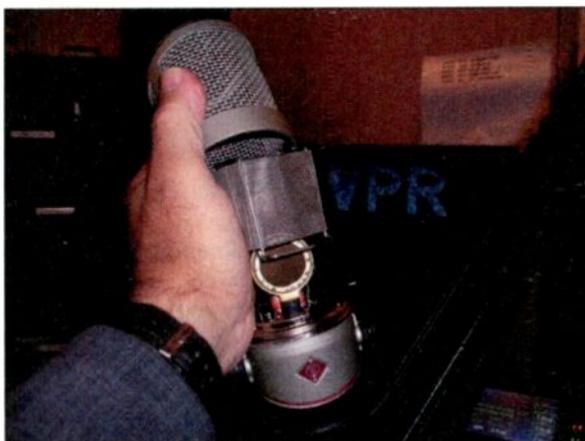
### Overall sound

The strength of these mics is their transparent and open sound, but in some cases that can be a disadvantage, depending on the announcer. Although the initial reaction from most of the staff was positive, there was a bit of a learning curve for some of our announcers. Because we no longer used the bulky grey foam sock the mics immediately sounded much brighter and more present (Neumann specs for the WS89 foam windscreen used on our U-89s list 3dB of roll-off at 15kHz). There is an ever so slight 2dB rise from 3kHz to 5kHz, and coupled with the missing attenuation from the foam sock to which everyone had grown accustomed, the transparent and slightly brighter response was not optimal for every announcer. Voices that tended to be sibilant before were more so. On the other hand, announcers with great radio voices could even work the mics a bit further back and get a fantastic sound from them. The built-in hi-pass filter works well to compensate for proximity effect bass boost when working the mic closely, while still retaining a warm, open and pleasant sound.

It will take some additional experimentation to get things just right for everyone and, in extreme cases, we may elect to still provide some announcers with a foam windscreen to compensate for their particular voices or to compensate for poor mic technique, which in some cases had been masked by the large foam windscreen on the 89s. The 104's internal pop filter works quite well, but there are some extreme cases that even it can't handle adequately and so a foam sock may be needed.

Neumann claims the 104s have been optimized to minimize the effects of head movement, but some of our talk studio board ops noticed that non-broadcast professional guests can get off mic more easily than with the RE-20s we previously used, so we may decide to keep those mics available in the studio if needed, as they do seem to be a bit more forgiving in that regard. In addition, the 104s are so transparent that they have actually exposed some small quirks in our processing and air chain that we will address.

Overall, these mics sound quite good, and we have been able to achieve a standard look and sound throughout our facilities. As we continue to learn ways to maximize the unique qualities of these mics in our environment, I think



The mic can be disassembled to clean or replace the mesh grille.

even our few remaining skeptics will be won over. With a street price of less than \$700 each we were able to purchase a dozen units to completely outfit our air, production and remote studios, freeing the U-89s for our recording engineers to use full time. With the BCM-104, fans of the classic Neumann sound can now outfit their studios with a solid mic without breaking the bank.

*Parker is director of engineering for Vermont Public Radio.*

## Neumann

P	<a href="tel:800-434-5220">800-434-5220</a>
F	<a href="tel:860-434-3148">860-434-3148</a>
W	<a href="http://www.neumannusa.com">www.neumannusa.com</a>
E	<a href="mailto:sneumlit@neumannusa.com">sneumlit@neumannusa.com</a>

**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.

# Field Report



www.beradio.com

## Kroy K4100

By Mike Rogers

**W**here do you begin telling a story about a wiring labeler and make it exciting? Labeling can be an extremely time-consuming and tedious part of a wiring project. With the Kroy, I found that its versatility and flexibility keeps simple projects simple, and large projects stay under control. I received the Kroy K4100 just before Ed Treese, Union Broadcasting's chief engineer, and I started building the Kansas City Royals studio for Union Broadcasting, so the timing was perfect.

There are several features of the K4100 that I found important. For instance, the unit features a 300 dpi-resolution printer for crisp printing. This thermal-transfer

load them to the Kroy and print. The Kroy comes with KLDS software that is compatible with Windows 95/98/2000/XP, and it includes the drivers and serial cable to make the process easy. The second important feature is the ability to store files on the K4100 itself. If you make a mistake, which we all know seldom happens, you can retrieve the file and print it again.

The wiring experience was a little different from what we were accustomed to. We usually print the labels, then use heat shrink to seal them and then solder the connector. This method works well and will continue to work well, however, we opted to use the self-laminating wire wraps to label the studio. The laminated wire wraps allowed us to move fast. And in the event of a mistake, we could pull the wrap off and re-label. The self-laminating labels allowed us to create the wiring paths and label them later, instead of halting the process along the way to add a heat-shrink label before assembling the connector.

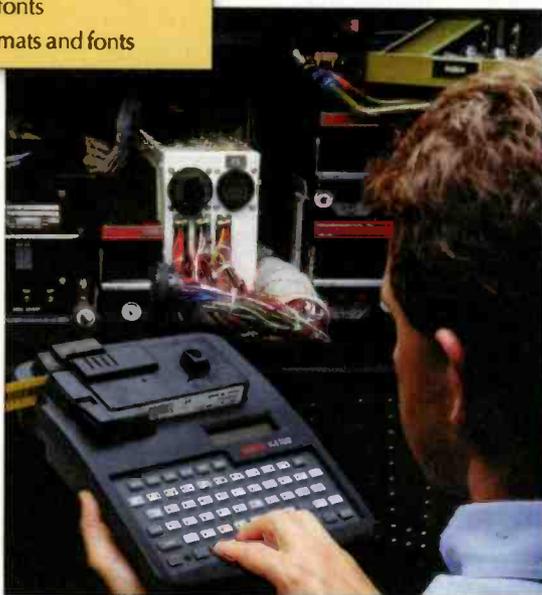
### Performance at a glance

- Print graphics, logos, bar codes and data records
- Audible key clicks
- Real time clock with time/date stamping ability
- Two line x 16-character LCD display
- 6 to 72 point printing
- Downloadable and scaleable fonts
- On-board memory to store formats and fonts

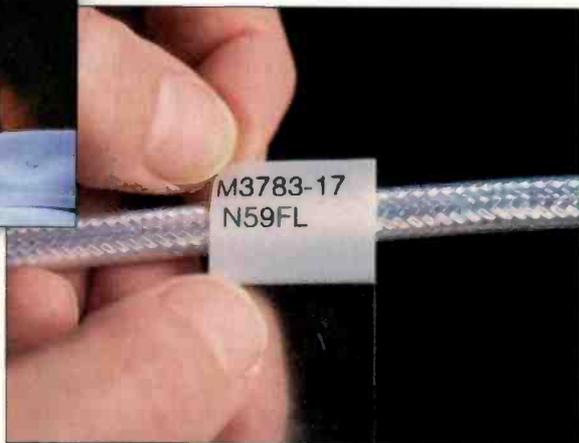
### Standing out

There was one application where I thought the K4100 really shined. We had to clean up computer cables and some past wiring in the main engineering room. That would have meant cutting off connectors, re-labeling and re-soldering all the connectors. However, with the self-laminating wire wrap we just pulled off the old labels and added the new label. We moved our wiring easily and quickly. This alone saved many hours of time.

The K4100 offers all the same highly advanced features as the K5100 hand-held portable, but in a desktop model. Because the tape cartridge supplies are interchangeable with either printer,



printer also automatically sizes text to fit a label, provides two-line printing and offers point sizes from six to 72 points. This allows for easy handling in a variety of applications. One of the two important features, in my opinion, is the ability to design the labels on the computer and then down-



The self-laminating labels can be applied without removing the cable connectors.



Cartridges are available for adhesive labels, self-laminating tapes and shrink-tube applications.

you can use the same supplies for both printers. The cartridge supplies are designed to withstand chemicals and outdoor temperature extremes. One point that I was concerned about was its upgrade ability, but the Kroy K4100 has flash firmware. You can download the firmware from the website or send the unit to Kroy for the upgrade.

Some other key features include the ability to print graphics, logos, bar codes and data records, to use continuous and die-cut media, a built-in cutter and feed control, audible key clicks, a real-time clock with time/date stamping ability, alpha/numeric sequencing (A-Z, 1-999), thermal transfer and direct-thermal printing, a two-line x 16-character LCD display, downloadable and scaleable fonts, 10 resident bar codes and on-board memory to store formats and fonts.

I would like to point out one item that is not a problem with the product itself, but in its operation. Be observant and take care in loading the cartridge. If you follow the directions, you won't have a problem. But if you are in a hurry and slap the cartridge into the unit and kink the ribbon, minor problems could occur. Other than that, I thought the Kroy K4100 did what it advertised. In my opinion, the major strength of the K4100 was its flexibility, especially if you have different applications. And of course, if you need to

do a minor clean-up project, rest assured that project will not turn into a major re-wire because of the limitations of labeling.

Rogers is a contract engineer in Kansas City.

## Kroy

P	216-426-5600
F	216-426-5601
W	www.kroy.com
E	info@kroy.com

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# New Products

By Kari Taylor, associate editor

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## Router selector Axia Audio



**Selector Node:** A router control device built specifically for the Axia IP-Audio networking system, this unit allows operators to scroll through available audio streams, or use one of eight buttons to select audio sources. In addition, the Router Selector node features audio inputs and outputs to connect local audio equipment. The scroll wheel also doubles as a volume control for the front-panel headphone jack. Back panel features include XLR and RJ45 jacks for analog and digital audio I/O, a sync port to connect to a house master clock and an auto-switching fanless power supply for silent in-studio use.

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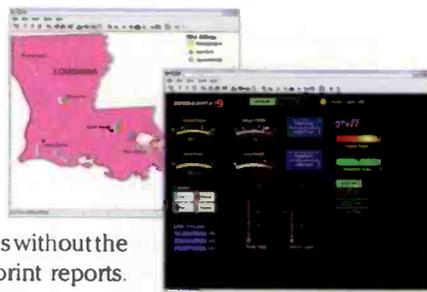
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## DAW controller

### Mackie

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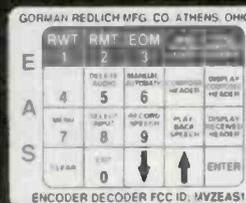
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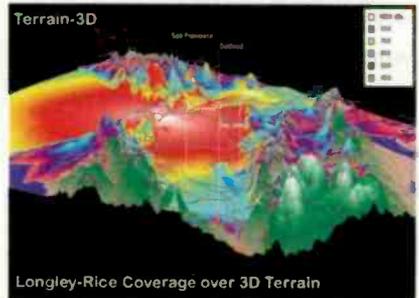
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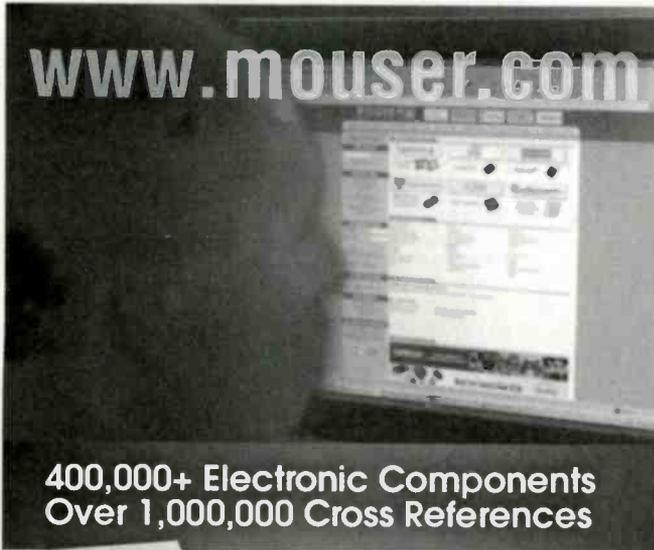


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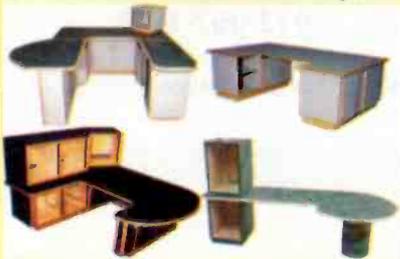
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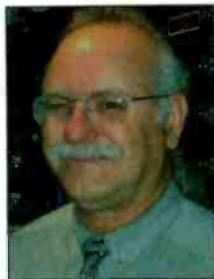
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Meet the professionals who write for *Radio* magazine.

This month: Field Report, page 52.



**Rich Parker, GSEC**  
Director of  
Engineering  
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Starting as a board-op at WKYU, Parker switched to engineering when told "I never want to hear your voice on the air again." At WHYY in Philadelphia he worked on *Fresh Air* and *Christmas with the Philadelphia Singers*. His credits as a free-lance recording engineer include recordings for *Performance Today*, the Curtis Institute of Music and a Philadelphia Orchestra live broadcast. VPR's chief engineer since 1997 and now director of engineering, he has overseen VPR's growth from three to six stations. An SBE member and SANS certified security professional, he manages VPR's computer networks and explores new technologies.

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Crane Song Limited	22	715-398-3627	<a href="http://www.cranesong.com">www.cranesong.com</a>
D.A.V.I.D Systems	40	866-41-DAVID	<a href="http://www.latitude-edition.com">www.latitude-edition.com</a>
Danagger Audio Works	50	888-892-8346	<a href="http://www.danagger.com">www.danagger.com</a>
Dataworld	27	301-652-8822	<a href="http://www.dataworld.com">www.dataworld.com</a>
Dielectric	19	866-DIELECTRIC	<a href="http://www.dielectric.com">www.dielectric.com</a>
ESE	41	310-322-2136	<a href="http://www.es-web.com">www.es-web.com</a>
Eventide	37	201-641-1200	<a href="http://www.eventide.com">www.eventide.com</a>
Harris Corp. Broadcast Div.	3	800-622-0022	<a href="http://www.broadcast.harris.com">www.broadcast.harris.com</a>
Henry Engineering	18	626-355-3656	<a href="http://www.henryeng.com">www.henryeng.com</a>
Kintronic Labs	12	423-878-3141	<a href="http://www.kintronic.com">www.kintronic.com</a>
Liquid Acoustics	5	714-690-5934	<a href="http://www.liquidacoustics.com">www.liquidacoustics.com</a>
Mager Systems	29	623-780-0045	<a href="http://www.magersystems.com">www.magersystems.com</a>
MDOUK	7	+44-12-1248-0200	<a href="http://www.audiotx.com">www.audiotx.com</a>
Mediatouch	55	888-665-0501	<a href="http://www.omt.net">www.omt.net</a>
Moseley Associates	33	805-968-9621	<a href="http://www.moseleysb.com">www.moseleysb.com</a>
Nautel Electronics	15	902-823-2233	<a href="http://www.nautel.com">www.nautel.com</a>
Neumann Microphones	39	860-434-5220	<a href="http://www.neumannusa.com">www.neumannusa.com</a>
NPR Satellite Services	23	202-513-2626	<a href="http://www.nprss.org/be">www.nprss.org/be</a>
Radio Soft	21	888-RADIO95	<a href="http://www.radiosoft.com">www.radiosoft.com</a>
RAM Broadcast Systems	43	847-487-7575	<a href="http://www.ramsyscom.com">www.ramsyscom.com</a>
rf Software, Inc.	47	352-336-7223	<a href="http://www.rfsoftware.com">www.rfsoftware.com</a>
SCMS, Inc	20	800-438-6040	<a href="http://www.scmsinc.com">www.scmsinc.com</a>
Scott Studios	1, 33	888-GET-SCOTT	<a href="http://www.scottstudios.com">www.scottstudios.com</a>
Sine Systems	42	615-228-3500	<a href="http://www.sinesystems.com">www.sinesystems.com</a>
Stevens Billington	50	+44-1825-890111	<a href="http://www.stevens-billington.co.uk/usa">www.stevens-billington.co.uk/usa</a>
Studio in a Box	12	203-438-7213	<a href="http://www.radiofacility.com">www.radiofacility.com</a>
Telos Systems	34, 35	216-241-7225	<a href="http://www.telos-systems.com">www.telos-systems.com</a>
TerraSonde	42	888-433-2821	<a href="http://www.terrasonde.com">www.terrasonde.com</a>
TFT, Inc.	51	408-943-9323	<a href="http://www.tftinc.com">www.tftinc.com</a>
TieLine Technology	11	888-211-6989	<a href="http://www.tieline.com">www.tieline.com</a>
Wheatstone	2, 67, 68	252-638-7000	<a href="http://www.wheatstone.com">www.wheatstone.com</a>

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# Sign Off

By Kari Taylor, associate editor



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Photo by Ben Weiss, CPBE

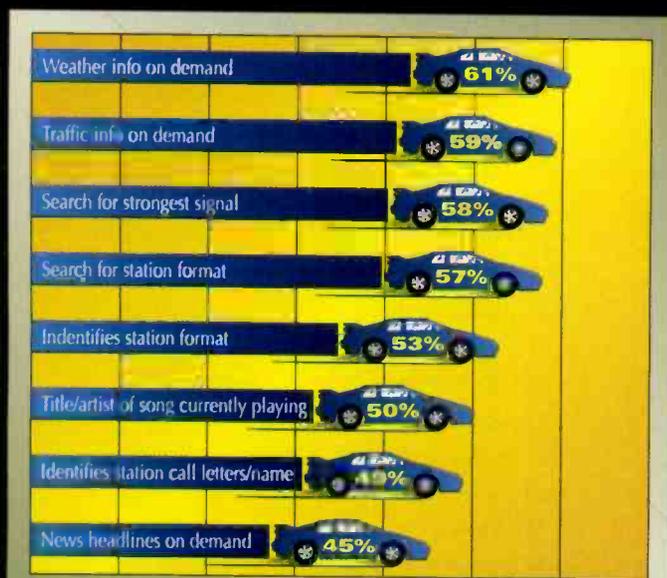
## Do you remember?

This PrestoRecording K8 turntable, manufactured around 1941, provided a 10W output and used a pair of 45s in push-pull for the output. There was an adapter with a second turntable and shaft that would stand on top of the K turntable, and with a second playback arm on a pedestal, would enable duplicate records to be made. This locked the turntables together, and no wow was introduced as the speed was locked together.

At a cost of \$275, the K series remained in the catalog from about 1936 to the demise of the company in 1965.

## Sample and Hold

### Are Listeners Interested in Radio Display Technologies?



Percentage of people "very" or "somewhat" interested in this type of technology

Source: Arbitron/Edison Media "The National In-Car Study," March 2004, News/Talk P1s.

## That was then



Established in 1885, the Northern Electric and Manufacturing Company began as a small Canadian telephone equipment supplier. Based in Belleville, Ontario, the company primarily manufactured products for use by Bell Telephone Company of Canada, although it also made some consumer electronics products such as radios, TV sets, console radio-phonographs, hi-fi amplifiers and movie theater sound equipment.

In this picture, which dates back to February 1965, is a Northern Electric transportable production center—or as some may say "two turntables and a microphone." The unit offered two 12" turntables, full cue, monitor and switching facilities and six inputs with plug-in pads for high and low input options. For maintenance purposes, an engineer just had to remove three screws and all the parts were easily accessed.



More.

*The Wheatstone GENERATION-5  
has the POWER and FEATURES  
Stations Demand the MOST*

# LOTS More!

**Our Generation-5** provides your operators with a straightforward traditional control surface coupled with all the benefits of digital technology. It gives you the flexibility of system-wide source, mix and destination control (any signal *anywhere*), a powerful mix-minus section and a complete event store, name and recall system. One wire from this surface can control THOUSANDS of wires in your technical operations center.

And while the G-5 *feels* like an analog console, its DSP-based mixing engine keeps your digital sources digital while converting analog sources to switched digital, eliminating crosstalk and noise. It can furnish remote and telcom functionality on any input fader without fear of feedback—a real plus in back-to-back

daily operations. Its built-in graphic displays keep operators on top of things with just a glance. And since the entire system is software based, you can accommodate any format with a press of a button.

Like all our Generation Series consoles, the G-5 has complete failsafe options available, such as automatic fail-over DSP and CPU cards and redundant power supplies. We can even provide scheduling software and studio mounted satellite cages that can be configured to mix independently from your main routing system.

At **WHEATSTONE** we've built and sold over a thousand digital audio consoles. The G-5 is a culmination of all that experience. Benefit from our expertise—choose **WHEATSTONE!**

 **Wheatstone**



# Behind Every GOOD CONSOLE There's an EVEN BETTER ROUTER

## GENERATION 4

*A Straightforward, Easy-to-Use Control Surface*

There's no long learning curve required to immediately start using this traditional layout specifically envisioned for operators of all skill levels.

**BRIDGE TECHNOLOGY** enables the GEN-4 surface to operate far beyond the limits of its studio mainframe. Integration with the Bridge digital audio network router provides systemwide access to all station on-air and off-air audio resources via inter-linked CAT-5 or fiberoptic cable. And of course, we all know **EXPERIENCE COUNTS!** With over eighty Wheatstone Generation control surfaces already operating in the field, you can be assured your installation will proceed smoothly and on time.



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