

# Radio

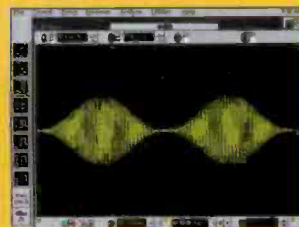
THE RADIO TECHNOLOGY LEADER

## Power-packed production

Digital audio workstations  
make it happen



### RF Engineering



Measuring modulation  
Page 10

### Facility Showcase

A capital location for  
Cumulus Topeka  
Page 26

### AES Preview



A peek at the sessions  
and products  
Page 46

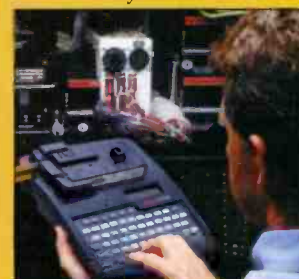
### Storm Track

Preparation and repair  
after a hurricane  
Page 36

### Field Reports

VPR tries the Neumann  
BCM 104  
Page 52

The Kroy K4100 in action

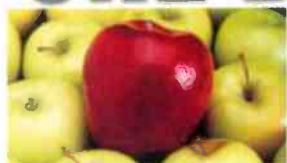


Page 54

### Sign Off

Consumer interest in radio  
display technology  
Page 66

## ONE DIGITAL SYSTEM STANDS OUT



1-888-GET-SCOTT  
www.scottstudios.com

## Scott Studios



YEARS OF RADIO

A PRIMEDIA Publication

# ANY SOURCE TO ANY FADER!



## THE AUDIOARTS ENGINEERING D-16 *IT LOOKS EXPENSIVE — BUT IT'S NOT!*

THIS NEW RADIO CONSOLE from Audioarts combines the benefits of a ROUTER and an AUDIO CONSOLE into one COST-EFFECTIVE digital package, letting you route any input to any fader or to any monitor feed, with all sources clearly shown in bright LED dot matrix displays right above the faders and monitor level controls.

A COMPACT TABLETOP DESIGN, the D-16 has the features you need: both analog and digital PROGRAM and AUDITION stereo outputs, 2 MONO analog outputs, 14 input faders plus 2 caller faders, 4 mic preamps, control room and studio monitoring, built-in cue and headphone amps (with concealed headphone jack) — even four internally generated mix-minus outputs!

WITH 24-BIT A>D and D>A inputs and outputs and sample rate converters on every AES digital input, the D-16 will work with virtually any digital source gear you have. It can run your source machines too (up to eight of them) — all opto-isolated. Its DSP DIGITAL METERING simultaneously displays VU columns and peak hold fullscale digital so you can be assured of pristine performance. Its powerful caller tools generate mix-minuses automatically, and you can program any of its four MXM outputs to be pre or post fader.

And with Wheatstone's extensive digital background and reputation you can be assured that the D-16 is a great console!



**AUDIOARTS® ENGINEERING**

252-638-7000 / [www.audioarts.net](http://www.audioarts.net) / [sales@wheatstone.com](mailto:sales@wheatstone.com)

copyright © 2004 by WHEATSTONE CORPORATION

# We're Reshaping The Future Of Radio From A Solid Foundation Of Leadership.



The newest force in radio was forged from a rich heritage of leadership that is decades strong. We're bringing a breath of fresh air and a re-energized spirit to an industry we helped to build. At Team Harris Radio, we've brought together the industry's largest and most comprehensive range of products, services and people dedicated to advancing radio. All working together in perfect harmony and focused on the success of your business. From our innovative products to our forward-looking services, management tools and expert support teams, we're dedicated to our mutual future of pioneering and growth. So whether your audience is around the corner or around the world, Harris Radio is on the air with the resources you need to succeed.

To learn more about the new Harris Radio Team, call us at **800-622-0022** or visit us at [www.broadcast.harris.com](http://www.broadcast.harris.com).

T H E   N E W   H A R R I S   R A D I O   T E A M   I S   O N   T H E   A I R



AM/FM



AUDIO CONSOLES



DIGITAL RADIO



BROADCAST STUDIO



HIGH POWER AM



SYSTEMS & SERVICE

## Features

- 16 Trends in Technology:  
Digital Audio Workstations**  
*by Chriss Scherer*  
The power behind productions
- 26 Facility Showcase:  
Cumulus Topeka**  
*by Chriss Scherer*  
A tour of the new facility in the Kansas capital
- 36 Disaster Planning**  
*by Roswell Clark*  
Preparation pays for some Florida stations.
- 46 AES Preview**  
*by Chriss Scherer and Kari Taylor*  
Get ready for the AES Convention.



## Departments

Online 06

at www.beradio.com

Field Report: Neumann BCM 104 52

*by Rich Parker*

Field Report: Kroy K4100 54

*by Mike Rogers*

New Products 56

*by Kari Taylor*

Classifieds 64

Contributor Pro-File 65

Meet Rich Parker

Sign Off 66

*by Kari Taylor*

Two turntables and a microphone



## Columns

Viewpoint 08

*by Chriss Scherer*

Retaking the lost edge

RF Engineering 10

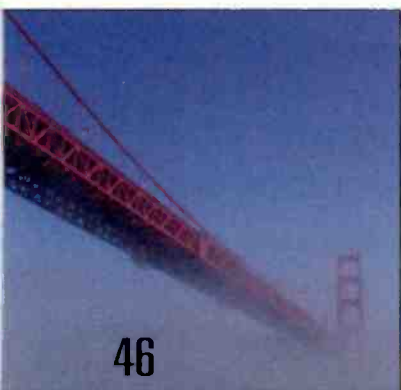
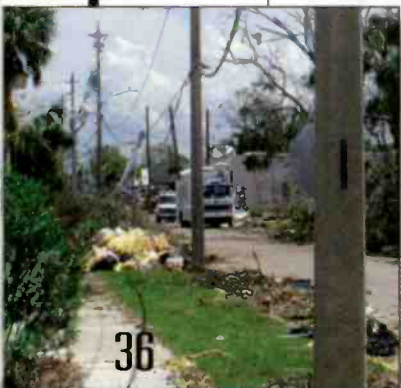
*by John Battison*

Modulation demystified

FCC Update 14

*by Harry C. Martin*

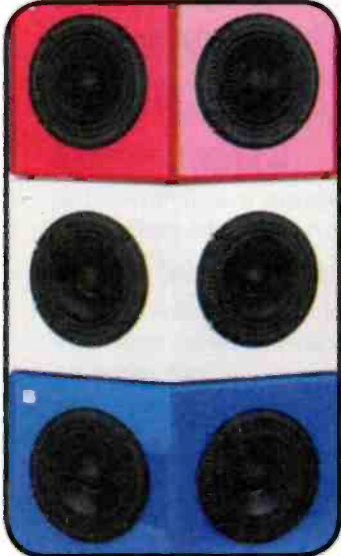
An EAS facelift?



### ON THE COVER:

The modern tools of production are fast, accurate and flexible. The list of available features and options is extensive, and so is the Resource Guide in Trends in Technology. Cover design by Michael J. Knust.

*True Sound is...*



- Semi-isobaric design
- Dual 5.25" drivers
- 8.5" x 15" x 8.25"
- 200 watts RMS cap.
- .25" Acrylic construction

The most unique and versatile book shelf speaker available today. The LB-100 utilizes liquid gel technology for increased performance and an outstanding sound. The compact design allows for easy placement in the listening environment. Available in over 35 different colors to choose from. Call us or visit our web site for a dealer near you, or to request a catalog.

See why we say **Big Sound...Little Package!**



714-690-5934

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

## 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.



## 1200 series

## ...radio consoles

- available in 5, 10, & 15 channel models
- DC controlled, no audio on faders
- high performance analog design
- socketed ICs for ease of repair
- mix minus bus for telephone
- Penny & Giles slide faders

**T**he 1200 series of analog consoles for on air & production Radio applications are feature laden and reliable. DC control of audio means there is no audio on faders or switches for maximum life & reduced RF interference. Use of P&G slide faders, 10 million operation on/off switches, and only the best components makes the console durable and reliable. Features such as the mix minus bus for interface with a telephone hybrid makes the 1200 ideal for professional studio applications.



only **\$3,495**

1200-10s  
ten channel

970-461-0730 [www.arrakis-systems.com](http://www.arrakis-systems.com)



Arrakis

# LIVE AUDIO OVER IP NETWORKS AND THE INTERNET. NOW.

**Studio-Transmitter Link (STL)  
Programme Distribution  
Ad-Hoc & Permanent Audio**

**Broadband Internet  
LAN/WAN, ADSL, Cable  
Wireless Networks  
T1/E1, ATM, Satellite**

using

AudioTX Communicator is a broadcast-quality, robust and reliable IP network codec.

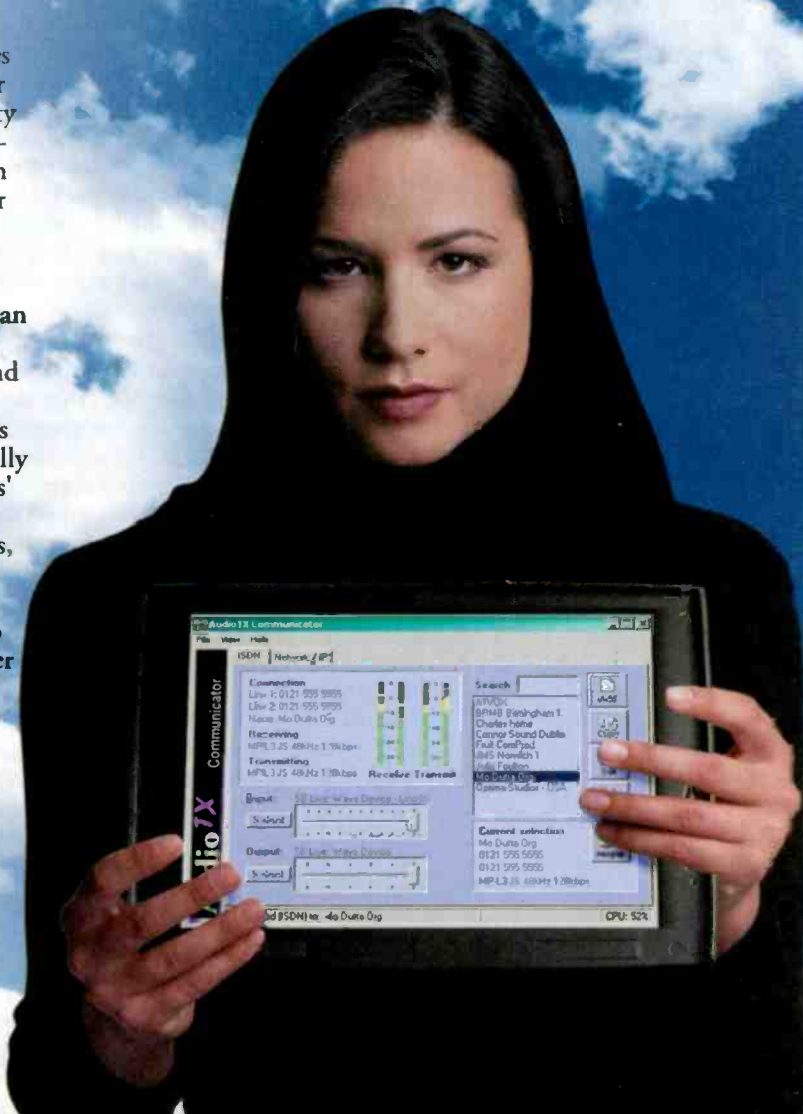
Communicator works over any IP network - whether a private, dedicated, network or the Internet.

From LANs and WANs to ATM or a Satellite link, T1/E1 or over the internet using Broadband ADSL, DSL, Cable Modem or other high speed connection.

The availability of new Satellite Broadband services means you can use Communicator to get live, audio absolutely anywhere.

Communicator includes everything you need for robust, broadcast-quality audio. It includes auto-fallback/reconnect to an alternate IP network, or via ISDN, in case of network failure.

Communicator is also an ISDN codec, with MPEG Layer 2 & 3 and G.722 coding plus G.711 telephony and is compatible with virtually all other manufacturers' units for outside broadcasts, studio links, voice-over work, reporting and news-gathering, using studio PCs or existing reporter Laptops.



**Audio  
TX**  
Communicator

[www.audiotx.com](http://www.audiotx.com)  
email: [sales@audiotx.com](mailto:sales@audiotx.com)  
Tel. +44 (0)121 256 0200 (GMT)

## 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.

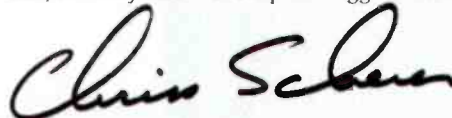
Many people believe that programming safe lists have made most stations too homogenous. This is a station choice that could easily be corrected. The bigger picture is that stations need to begin the crusade locally and carry it through nationally.

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.

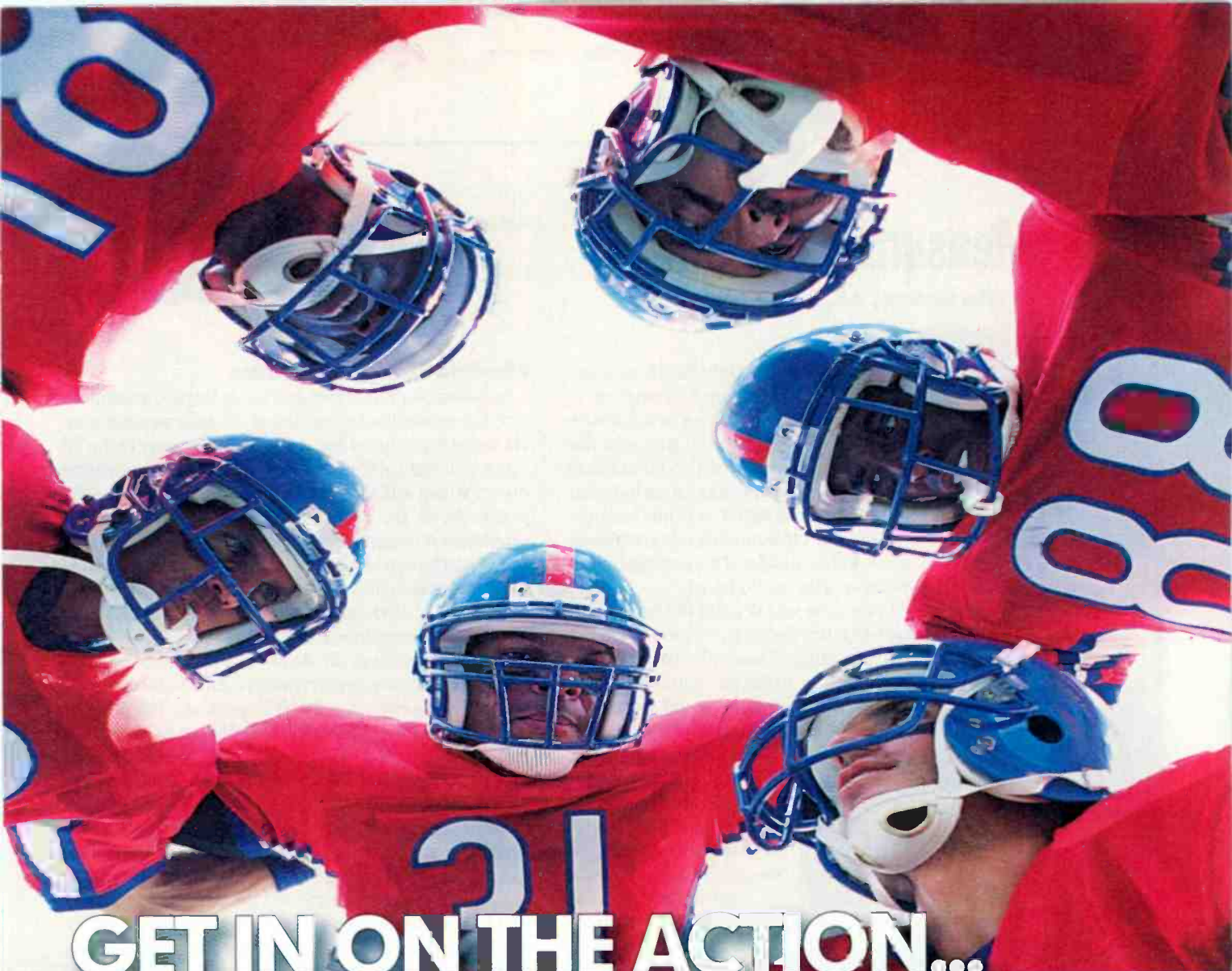
We can't wait for technology to save terrestrial radio, we have to take the initiative. The leaders often take the heavy hits, but they also can reap the biggest rewards. 



Chris Scherer, editor  
cscherer@primediabusiness.com

**Send comments to:** E-mail: [radio@primediabusiness.com](mailto:radio@primediabusiness.com)  
Fax: 913-967-1905





# GET IN ON THE ACTION... ON OR OFF THE FIELD.

## **Matrix Portable:**

Delivering the sound of the coin toss to listeners around the world is as simple as pressing a button. Only the advanced Comrex Matrix POTS codec delivers the highest quality audio and superior connection reliability over both standard wired and GSM wireless phone connections. Our road-proven design and construction, plus ease of operation and real-world features, make Matrix your best choice for all your POTS and ISDN remotes. The results? Your listeners hear the collision, the grunting, the exhalation, and the sound of victory.



## **Matrix Rack:**

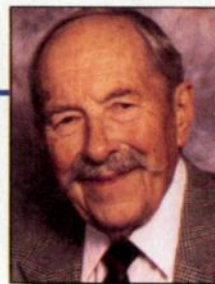
Sure all the action is in the field, but a great remote needs a great home base. And there's nothing better than the Matrix Rack. It's compatible with POTS and ISDN with ALL Comrex codecs as well as those from nearly everyone else. Perfect for receiving those calls from the field. Make the Matrix Rack the center of communications for ALL your remotes.

Grab your audience by the ears and give them the full experience—not just a story.

Doing a remote? Put Comrex on the line.

# COMREX

Toll Free: 800-237-1776 • [www.comrex.com](http://www.comrex.com) • e-mail: [info@comrex.com](mailto:info@comrex.com)  
19 Pine Road, Devens, MA 01434 USA • Tel: 978-784-1775 • Fax: 978-784-1717



## 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 frequen-

cies, 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.

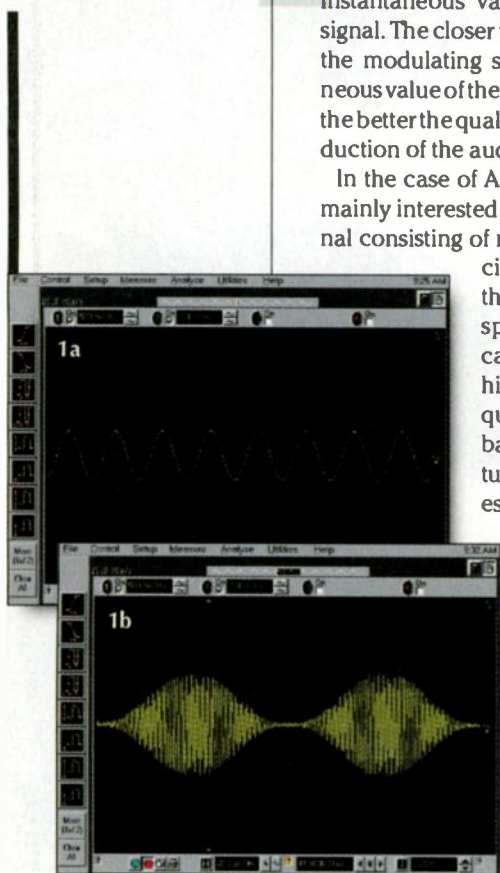
IBOC digital transmission offers the promise of high-quality, error-free radio. Instrumentation for measuring modulation and transmission values is still in the development stage and several manufacturers are offering digital measuring equipment. Unfortunately, only insufficient information is immediately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

# Commander G3

Modular Stereo POTS • ISDN • GSM Codec

## Introducing the new Tieline Commander G3

At Tieline, we've taken a fresh approach to audio codec design. Now you can customize your audio codec to suit your exact needs for remote broadcasts and STLs. You only pay for what you need and we're the first to be compatible with most major ISDN and POTS codecs in your rack.

Think of the new Commander G3 as a codec foundation with two expansion slots which accept your choice of POTS, ISDN and GSM modules. You simply buy what you need.

For example, if you need a mono 15kHz POTS codec, simply buy the Commander G3 with a POTS module for one low price. Need 15kHz Stereo or dual mono over POTS? Just add another POTS module.

If you're looking for a mono/stereo ISDN codec without POTS, you can buy a Commander G3 with an ISDN module only. It comes with G.711, G.722, and Mpeg Layer 2. Tieline's "Music" algorithm also delivers an astounding 15kHz stereo over a single ISDN B channel! You can always add a POTS or wireless GSM module later if you need.

Need a stereo ISDN STL with automatic failover to 15kHz mono POTS? Buy the Commander G3 with POTS and ISDN modules plus Tieline's new Freedom Failover software kit.

Plug in the GSM module and deliver up to 7.5 kHz over GSM networks and up to 15 kHz over HSCSD wireless networks.

Control your remote talent's mic input gain from the studio and send simultaneous audio, serial data and relay activation in either direction.

We've even created digital matrix router software which enables you to cue audio off air, create a local audio intercom, and talkback to the studio all without interrupting your broadcast.

The new Tieline Commander G3 is simply the world's most powerful, flexible and customizable codec. It's even compatible with your Comrex\*\* Vector, Matrix, Blue and Musicam Liberty POTS codecs.

Every Tieline codec comes with a two year warranty plus the support of an experienced engineering team with more than 25 years in the broadcast industry right here in Indianapolis. That's why hundreds of stations, major radio groups and networks across America use Tieline to deliver audio every single day.

Hurry, free demonstration Commander G3's are limited. Call your favorite broadcast dealer or call us at 800-950-0750 to book your free demo.

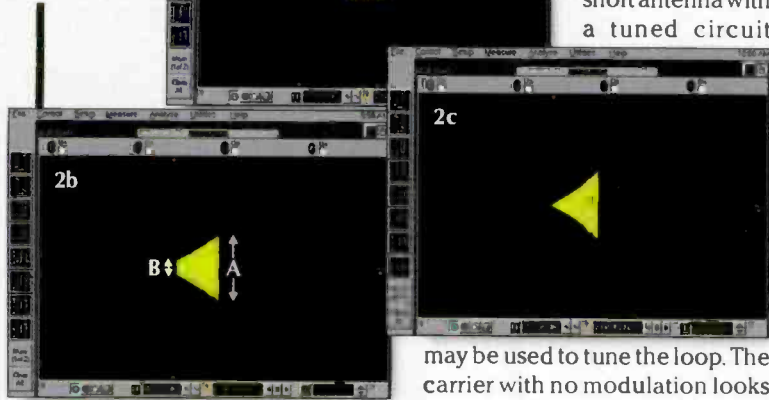


**Tieline**  
TECHNOLOGY

\*\*Comrex and Musicam are registered trademarks of each respective corporation

Call: 800 950 0750  
[www.tieline.com/be](http://www.tieline.com/be)

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 over-modulation (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.

## Kintronic Labs, Inc

OFFERS A COMPLETE LINE OF AM/MW DUMMY LOADS RATED FOR CARRIER INPUT POWER + 140% PEAK MODULATION CONTINUOUSLY

DL-5/10/20  
INDOOR UNIT



DL-25/50  
INDOOR UNIT



DESIGNED FOR LONG LIFE WITH LOW MAINTENANCE. KINTRONIC LABS HAS DUMMY LOADS IN CONTINUOUS SERVICE FOR OVER THIRTY YEARS.

Phone: (423) 878-3141 Fax: (423) 878-4224

Email: [ktl@kintronic.com](mailto:ktl@kintronic.com) Web Site: [www.kintronic.com](http://www.kintronic.com)

## NEW

Save Time!  
Save Money!



"Plug And Play"

A Complete Broadcast Studio  
A Complete Production Studio

Efron Computerized Studios, LLC offers you a complete prefabricated, radio studio customized to your needs.

NO ENGINEERING COSTS  
NO CONSULTING FEES

The furniture arrives in sections & bolts together. The hardware is pre-installed. The wiring harnesses are in place.

FULL BROADCAST	LOW POWER
AM or FM	RELIGIOUS
TALK SHOWS	COMMUNITY
MUSIC, SPORTS	INTERNET RADIO

Plug together and PLAY!

CONTACT: Call Now!

GEORGE SULLIVAN  
1-233-438-7213  
[gsullivan@radiofacility.com](mailto:gsullivan@radiofacility.com) [www.radiofacility.com](http://www.radiofacility.com)




# AKG ACOUSTICS

You don't want to  
mess with success.  
So when you equip  
your studio, keep things  
the same, only better.

Introducing the next generation C 414 family. With **15 new features and enhancements**, everything's changed but the sound. Check out our video at [akgusa.com](http://akgusa.com).

615.620.3800 or [akgusa.com](http://akgusa.com)



The tools of the trade.



## 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.

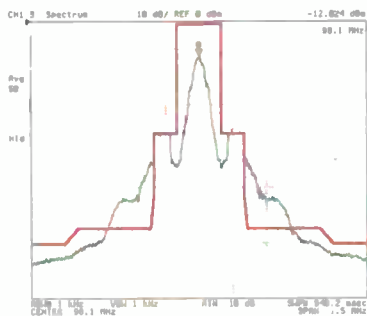
The FCC questions whether it should extend EAS obligations to digital broadcast media such as DBS, DTV, satellite DARS and digital cable. The FCC also asks whether multi-channel broadcasters, (e.g., DTV stations and IBOC radio stations) should be required to transmit EAS messages on all program streams 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.*

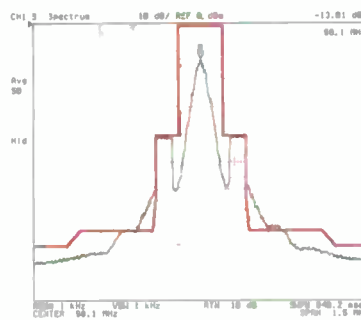
### Dateline:

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.

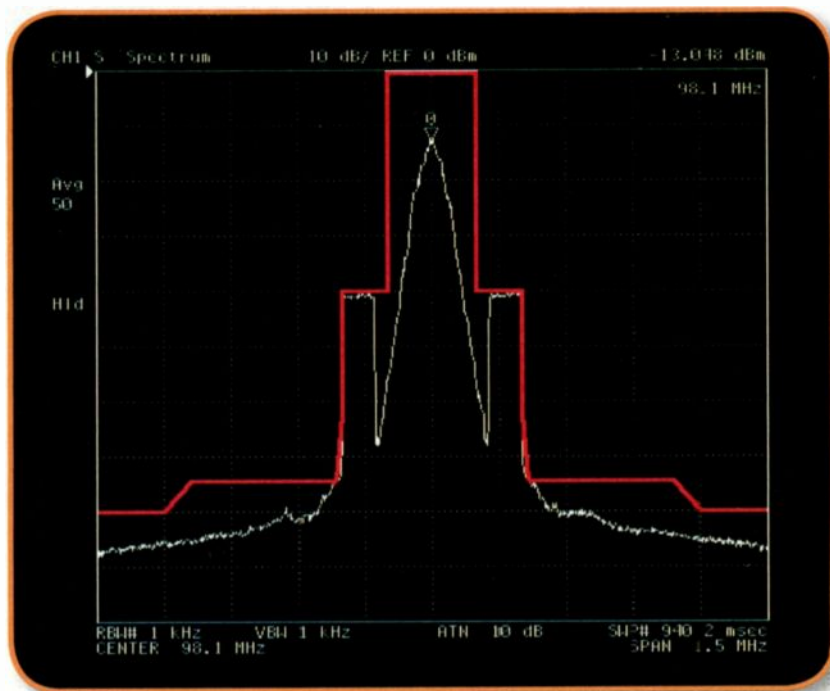
Third quarter issues and programs lists were due to be placed in all station public files by Oct. 10.



Going...

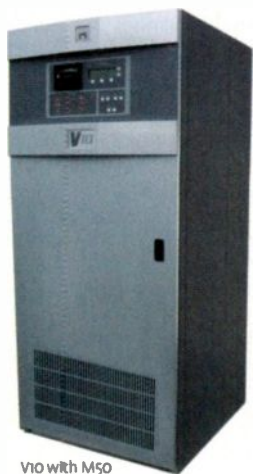


Going...



**Gone.**

## Introducing Nautel's Newest Cutting Edge FM Technology – Digital Adaptive Pre-Correction



V10 with M50

Worried about not meeting the HD Radio™ mask requirements? After all, you wouldn't want to interfere with someone else's signal. Nautel's new M50 digital FM exciter samples the all-digital or hybrid HD Radio™ output of the V10, 10 kW FM transmitter and dynamically applies digital adaptive pre-correction. This means no expensive external bandpass filter and no additional tuning. Even better, because the M50 continuously monitors and adjusts the RF output, your performance is optimized regardless of environmental changes and your signal will always be within spectral limits.

To learn more about how we can perfect your HD Radio™ signal, visit our website [www.nautel.com](http://www.nautel.com).



**SIMPLY THE BEST ENGINEERED TRANSMITTERS**

# 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

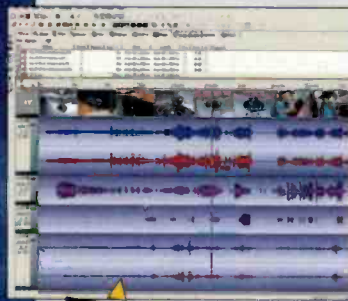


Designed specifically for radio production, the Audicy features 10 channels for 24-track editing and mixing. Work is automatically shadowed to a hard disk or removable Jaz drive, eliminating the need to regularly save a project. All audio is recorded as linear PCM without data compression. Mixes can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

877-253-3900  
[www.steinberg.de](http://www.steinberg.de)





# Solutions Cookbook

INNOVATIVE PROBLEM SOLVING TOOLS FOR BROADCAST

NEW SS16.16



www.broadcasttools.com

Use the affordable SS 16.16 as a stereo analog audio router and cut costs by replacing racks of distribution amplifiers and associated equipment in your broadcast facility. For example, compare a single SS 16.16 audio router costing under \$2,600 to a typical 16 stereo source-by-eight studio facility: 16 stereo distribution amps at \$400 per unit, plus two stereo switchers per studio, at \$500 each, is \$14,400 in hardware costs alone...not to mention other costs, such as wiring, hardware and labor. With the SS 16.16 most installations require no additional wiring or hardware.

The SS 16.16 is configurable and accessible from each studio or anywhere, via the Internet using our SP-1 and FREE NetSwitch/NetSwitch II Windows OS control software. The 2-RU SS 16.16 is even equipped with a 16 GPIO port for use with automation systems.

## PRODUCT FEATURES

- Stereo routing of any one input to any/all outputs.
- Headphone amplifier with front panel jack and level control.
- Front panel monitor speaker with mute switch and level control.
- 40 x 4 back lit LCD display with user programmable nine character input descriptions.
- Internal audio activity/silence sensor monitors output channel sixteen. A front panel ACT indicator and rear panel open collector are provided. Sensitivity set at -34db.
- Two front panel encoder controls are provided. One each for input/output channel selection.
- Power-up selection of channel configuration, mute or last source selected.
- 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.
- Multiple unit inputs may be cascaded to expand outputs.
- Depluggable screw (EURO) terminals for ALL connections.
- Logic functions via microprocessor with non-volatile memory
- External tri-voltage universal switching power supply
- 2-RU chassis



Manufactured with  
Pride in the USA

Ph: 360.854.9559 • Fax: 360.854.9479  
support@broadcasttools.com  
www.broadcasttools.com

**BROADCAST**  
tools

# 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.

# StudioDrive makes your PC a studio-in-a-box!



StudioDrive is a 6-input stereo mixer that makes your PC a self contained fully integrated studio! Perfect for radio automation, newsrooms, PC edit suites, emergency studios, remotes, LPFM.

- Mic input w/ remote
- 4 stereo Line inputs
- Telephone coupler
- Mix-minus built in
- Monitor system w/automatic muting
- AIR Monitor input
- Mic Tally controls On The Air lights
- Headphone output

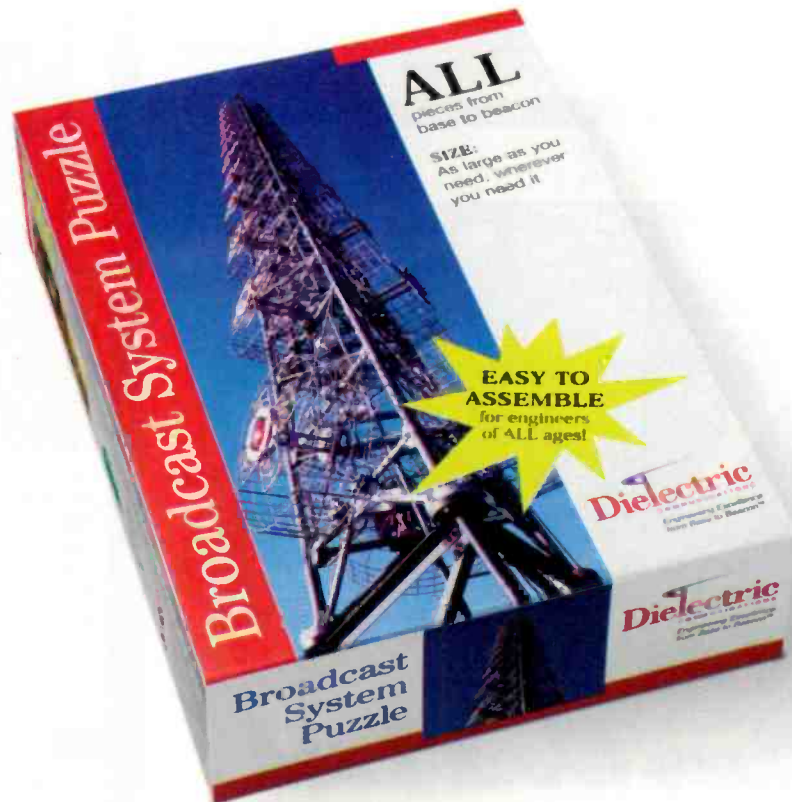
Call BGS for great deals on Henry products! [www.bgs.cc](http://www.bgs.cc)  
352-622-7700



**Broadcasters  
General Store**



# Radio and TV broadcast systems made simple.



**D**ielectric has all the essential pieces to make your TV or radio project anything but puzzling. From design and site surveying, to excavation and construction, rigging and maintenance — we'll connect you with everything you need from the transmitter output, including:

Towers • Rigid or flexible transmission lines • Lighting • Antennas • Combiners • RF Systems

*The warranty you want. The capability you need. The experience you demand.*

Put Dielectric to work on your next project and watch everything seamlessly come together in picture perfect fashion.



**Dielectric**  
COMMUNICATIONS

Engineering Excellence  
from Base to Beacon™

# 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.

615-327-1140 • [www.sadie.com](http://www.sadie.com)



## Reduce Your Work Load Save Time and Money With SCMS!

- ❖ 28 Years of Personal Service
- ❖ Extensive Rental Fleet
- ❖ Experienced Technical Staff
- ❖ Rep for 600+ Companies
- ❖ New & Rebuilt Audio & RF
- ❖ Trade-ins Welcomed

Mid-South Sales:  
**Bob Mayben**  
Voice: 877-391-2650

Central Sales:  
**Bernie O'Brien**  
Cell: 731-695-1714

West Coast Sales:  
**Doug Tharp**  
Sales: 866-673-9267

Mid-West Sales:  
**Mary Schnelle**  
Sales: 1-800-245-4307

South-Atlantic Sales:  
**Art White**  
Sales: 770-632-1295

North-East Sales:  
**Jim Peck**  
Sales: 315-623-7655

## CORPORATE SALES OFFICE Pineville, N.C.

Call: **BOB, MIKE,  
ERNIE or MATT**

Toll FREE 1-800-438-6040  
1-704-889-4508

Fax 1-704-889-4540  
e-mail [sales@scmsinc.com](mailto:sales@scmsinc.com)  
[www.scmsinc.com](http://www.scmsinc.com)



## 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 S/PDIF 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.



323-727-7617 • www.tascam.com

# RADIO SOFT

101 Demorest Square, Ste. E, Demorest, GA 30535  
Phone 1-888-RADIO95 in the US  
Globally, phone 1.386.426.2521  
Online go to www.radiosoft.com

# When REACHING your AUDIENCE means the MOST.

- Search for FCC license data online
- Locate potential frequencies
- Automatic interference calculations
- Accepted and used by the FCC
- Real time 3D displays
- Fast, accurate, cost effective mapping

Considered by many to be the industry leader.  
Broadcast Professionals can count on RadioSoft for fast,  
accurate radio mapping.

# Digital Audio Workstations

## Audion Labs Vox Pro 3.3

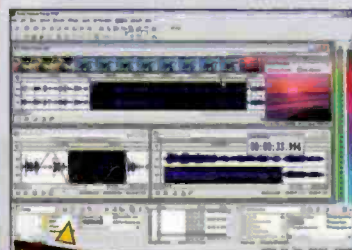
The latest version of this stereo editor revises the internal database format and allows for gain increase for selected audio for one or both tracks. Other upgrades include a resizable interface from minimal to full screen; compatibility with virtually all sound cards; MP3 import and export of multiple 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,



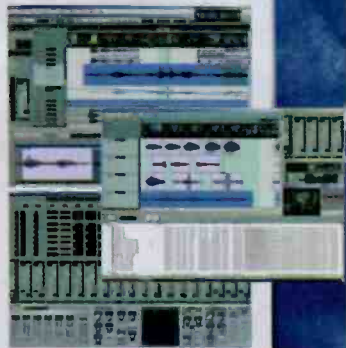
white, pink and brown noise generators, clipped peak detection and marking, Vinyl Restoration plug-in, Media Explorer, Sound Forge project file creation and support for 24fps DV video files. Audio is encoded at 8-, 16-, 24-, 32- and 64-bit depths at sample rates from 2kHz to 192kHz. Various waveform 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.



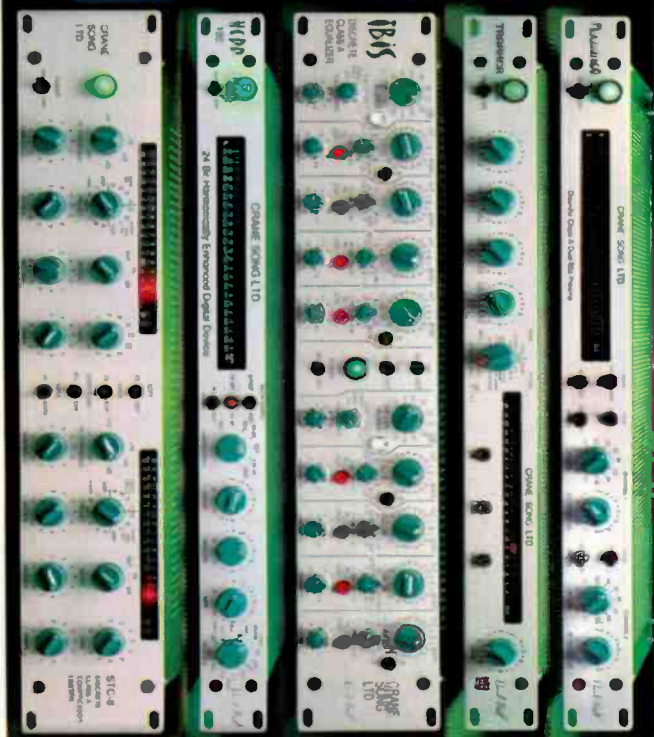
877-253-3900

[www.steinberg.de](http://www.steinberg.de)

# CRANE SONG LTD.

Bring Your Signal Processing  
to a higher level

[www.cranesong.com](http://www.cranesong.com) 715 398 3627





# a NEW way to do Radio Automation...

## a business AND technology 'Solution'

# \$100 per month



Xtreme 'SOFTWARE'  
powerful Windows PC soft-  
ware for live air, automa-  
tion, scheduling, and pro-  
duction

### FREE System configuration...

send us your approved PCs and we will load software, configure, and network test your PCs. This is a free service in the Xtreme 'Solutions' program.

### FREE Factory training...

Arrakis maintains training studios in its corporate headquarters in Fort Collins, Colorado. The Arrakis Xtreme 'Solutions' program provides free training at its studios in Fort Collins. Come visit our beautiful facility nestled in the foothills of the Rocky Mountains and enjoy the area's hiking, biking, skiing, canoeing and other recreational activities.

### FREE Telephone support ...

the Xtreme 'Solution' provides sophisticated support for station personnel by phone, email, web, and other electronic means. Training, maintenance, repairs, and routine support are provided free of charge within the Xtreme 'Solutions' program during business days and hours.

### FREE Hardware replacement...

if the Arrakis 'Bridge' hardware should fail for any reason, Arrakis will replace it under our monthly 'Solutions' program at no charge.

### FREE Software Upgrades...

one absolute certainty is that PC technology evolves at a furious rate. Operating systems are only one example... Windows 95, 98, Me, NT, 2000, and now XP. Automation software is no exception. Each year sees a new version costing hundreds or even thousands of dollars. With the Xtreme 'Solutions' program, you receive the new versions at no charge.

**No down payment**

**Return at any time**

**Free Factory training**

**Free Hardware support**

**Free Telephone support**

**Free Software upgrades**

**Free Hardware upgrades**

**Free PC and Network setup**

**( just add a PC, we do the rest )**

## the XTREME 'Solutions' program

**live on air, hard disk automation, satellite automation,  
scheduling, & production**

Xtreme is a complete solution for live & automated On Air Radio systems. Pay one very low monthly fee, and we do the rest. We supply the audio hardware, software, and support, while all that you supply is the PC. Without a large initial equipment investment there is no financial risk or capital expense: the old automation system can be upgraded out of current operating costs. With free system configuration and training you receive the help you need to make a smooth transition to the new system. With free hardware replacement, ongoing repairs are worry free. Free telephone support helps train new staff, and free software upgrades means you have the latest product features at no cost. The only hardware that is not included is the PC computer and we can help you with that too... also for free. The 'Bridge' hardware supplied by Arrakis contains the audio sound cards, routing switchers, and control logic so that the PC requires NO special hardware or setup. This means that the PC can be off-the-shelf, and unmodified so that it is easily serviced locally. The Xtreme 'Solutions' program is per workstation for complete redundancy and backup. Imagine an AM/FM combo with production room for only \$300 per month. With more than 15 years of automation experience and thousands of Arrakis automation systems in the field around the world, Arrakis can provide you with the solution that meets BOTH your business AND technology needs.



Download a free demo from our website.

a better  
**TECHNOLOGY**  
solution...

**No custom PC required**

**Use an unmodified, off-the-shelf PC**

**No third party sound cards, switchers or logic**

**The Arrakis 'Bridge' IS the sound cards, switcher, & logic**

**If the 'Bridge' fails for any reason we replace it FREE of charge**

... a **BETTER** way to do Radio Automation

Xtreme 'BRIDGE'  
a 16 x 3 stereo routing switcher,  
dual PC sound cards, &  
control logic



**A** typical automation system for Radio today is a complex mixture of products from several companies. The software is from the automation company, the PC from a second company, the sound cards from a third company, and the switcher from a fourth company. This type of system is a nightmare to support, repair, and upgrade. As BOTH a hardware and software manufacturer, Arrakis has solved this very real problem by designing a product that we have named the 'BRIDGE.' The 'Bridge' contains the sound cards, switcher, and logic in a single plug in box that is external to the PC. It literally creates a "bridge" between the networked world of the PC and the audio world of the radio station. Because the PC has no special cards, it can be supported by a local PC technician. Because the bridge is a broadcast style product, it can easily be installed and supported by your local radio engineer. Finally, because the bridge is included in our 'Xtreme Solutions' program, it will simply be replaced if it has a problem of any kind. Better by design, XTREME-digilink is a new and BETTER way to do Radio Automation.

**\$100 per month**

**...the risk free automation system**

**XTREME~digilink**

970-461-0730 [www.arrakis-systems.com](http://www.arrakis-systems.com)



# 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


# New! FM Explorer

## Online Visual Allocation Tool

Always Current - No Data Downloads - No Software to Buy

dataworld® FM EXPLORER

Search settings: Home USA Facilities with calls like 'WJLA'  
Studied facilities: 9530 FM CH



Study facility visibility:  
Location: 39-50-33  
to 39-50-00  
Channel: 95.3  
Class: A  
Reset

Map style:  
 km squares

On map click:  
 Center map  
 Show study facility

Options:  
 CB auto-downgrade  
 Show separation area by 0.5 km

Visible map layers:  
 Cities  
 Counties  
 Interstates  
 IUS separations  
 IRTI separations  
 Facility sites  
 City grade contour only  
 Towers (View tower info)

dataworld.com

# dataworld®



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

800-368-5754

[info@dataworld.com](mailto:info@dataworld.com)

PO Box 30730, Bethesda, MD 20824

MONITORING TO THE POWER OF 8.



The ultimate audio monitoring card. Times eight. AudioScience makes broadcast monitoring easier than ever with the amazing ASB702/8733 8-channel tuner adapter boards. Monitor, log, verify ads and identify conversion 8-audio channels simultaneously from just about any source: AM, FM, even TV (ASB703). An onboard 225MHz DSP processes the audio and routes it out thru DB-25 and 50-pin connectors. Drivers for Windows 2000, XP and Linux are available. Custom configurations available. Call us at +1-302-324-5333 or go to [www.audioscience.com](http://www.audioscience.com)

©MULTI-FREQ BROADCAST

AUDIOSCIENCE  
Real Monitoring  
Real Evidence

# 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

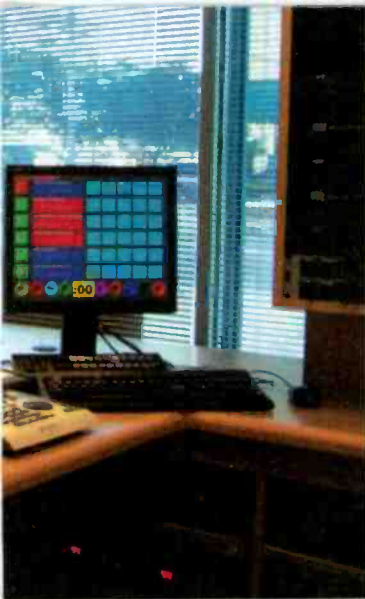
V2 Software  
 Now Shipping

Just because its **compact** doesn't mean it has less **impact**. You're reading this aren't you?

**DSPX**, the 1RU sized **FM-IBOC-HD-NET** processor from **BW**. Small box, small price, **BIG** sound.

Now available from broadcasters general store.  
 For more info or to arrange a demo contact BGS on 352-622-7700

**DSPX DIGITAL AUDIO BROADCAST PROCESSOR**  
 4 band rms agc - 4 band dynamic limiters - dual use outputs - lookahead limiting - distortion controlled clipping - composite processing - bass enhancement - rs232 and IP control  
 real time clock for scheduling - remote trigger port - factory and user presets - digital and analog IO - flash upgradable - much much much more.  
[www.dsp-x.com](http://www.dsp-x.com)



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.



**MAGER SYSTEMS INC.**  
The Best in Sound Furniture

## Custom Studio Furniture

TEL: 623-780-0045  
FAX: 623-780-9860  
mager@magersystems.com  
www.magersystems.com  
*Visit our website for more information*

Since 1979 Mager Systems, Inc. has been custom designing and fabricating **award winning** furniture for the broadcast industry nationwide. We are still the innovators and leaders in **solid surface tops** and applications which comes with a **10-year warranty**. Our complete **one-stop-shop** includes installation, **turnkey rewiring**, switches and components, conference rooms, reception desks, and office furniture. Our blending of art form with cutting edge techniques, and a clear understanding of each client's application allows us to produce your **showplace** tailored to your budget.



**WBAA  
Purdue University**



Touch Sensitive Switches & Keyboards

MAGE introduces our new award winning "Sound Choice" furniture. Our modular in stock furniture boasts unsurpassed quality for the economical budget with a 10-year limited warranty. See details on our website.

# 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



## Acoustics First<sup>®</sup>

### Materials To Control Sound And Eliminate Noise



The 1014 AcustiKit<sup>™</sup>

The 1014 AcustiKit is the small control room package with real studio Art Diffusers<sup>®</sup>. Acoustics First combines these in one box with Cutting Wedge<sup>®</sup> foam, Bermuda Triangle Traps<sup>™</sup> and specific instructions for installation. The 1014 AcustiKit is everything you need for a 10' X 14' control room, without buying more than you need.

Toll Free 1-888-765-2900

Web: <http://www.acousticsfirst.com>

## Brand New!



### DT-90 Telephone Controlled Audio Switcher

---

4 x 1 Mono Audio Switcher

Also ....

- Listen to selected audio on phone
- Control four independent momentary/latching relays
- Built-in mic — Listen to remote location
- Access code
- Set number of rings
- Convenient plug-in terminal strips
- LED status indicators
- Conex reliable ... 1 year warranty

www.conex-electro.com

CONEX

ELECTRO  
SYSTEMS



1602 Carolina St. P.O. Box 67 Bellingham, WA 98227  
360-734-4323 FAX 360-676-4822  
EMAIL [conex@conex-electro.com](mailto:conex@conex-electro.com) **800-645-1061**

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

## ...radio consoles

- available in 8, 18, & 28 channel mainframes
- modular, high performance analog design
- DC controlled, no audio on faders
- socketed ICs for ease of repair
- mix minus bus for telephone
- Penny & Giles slide faders

**T**he 12000 series

of modular analog consoles for on air & production Radio applications are feature laden and reliable. DC control of audio means there is no audio on faders or on/off switches for maximum life & reduced RF interference. Use of P&G slide faders, 10 millicon operation on/off switches, and only the best components makes the console durable and reliable. Features such as dual mix minus buses for interface with telephone hybrids makes the 12000 ideal for professional studio applications.



price reduced, system 12  
shown above...

only **\$4,695**

970-461-0730 [www.arrakis-systems.com](http://www.arrakis-systems.com)



**Arrakis**

# 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.

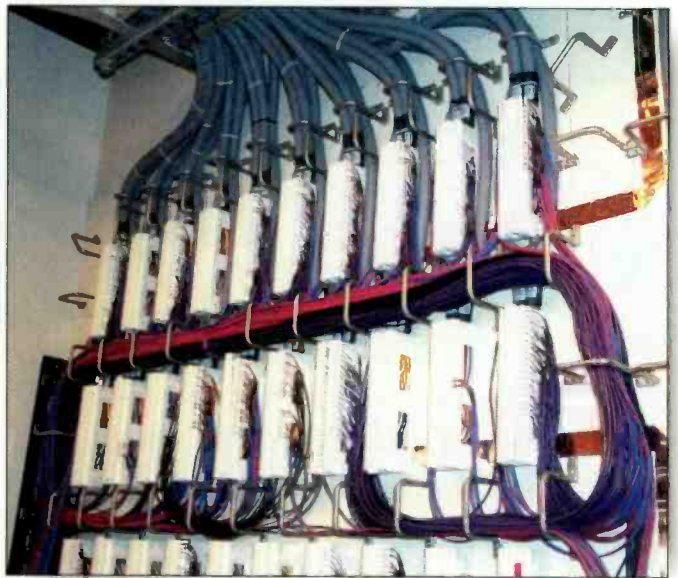
Each studio computer has dual sound cards with

## 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

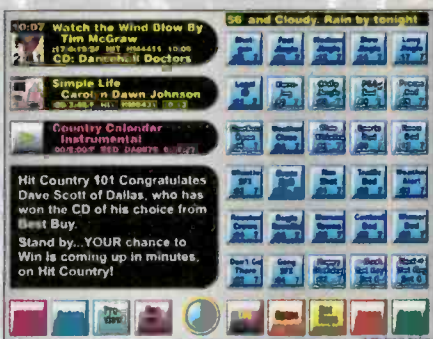
The Comrex Matrix offers the ultimate in flexibility for remote broadcasts. Whether on regular telephone (POTS) service,



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.

[www.comrex.com](http://www.comrex.com)  
800-237-1776

### 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)  
888-GET SCOTT

### 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.

[www.moseleysb.com](http://www.moseleysb.com)  
805-968-9621

# 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, Balys 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>



The world's most advanced POTS codec  
is also the world's lowest priced POTS codec.

*Telos*  
AUDIO | NETWORKS

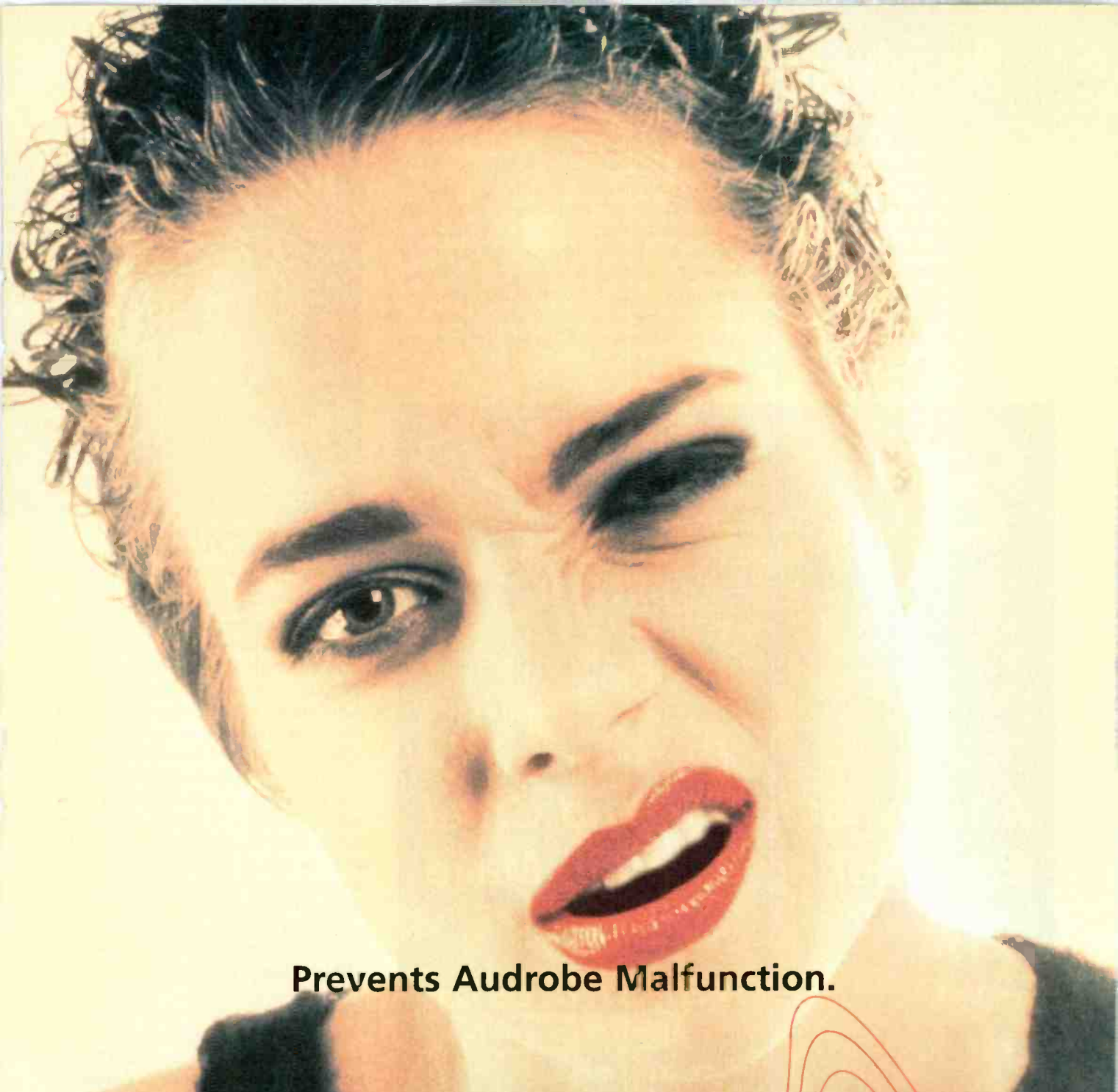
# Disaster planning *put to good use*

By Roswell Clark, CSRE CBNT

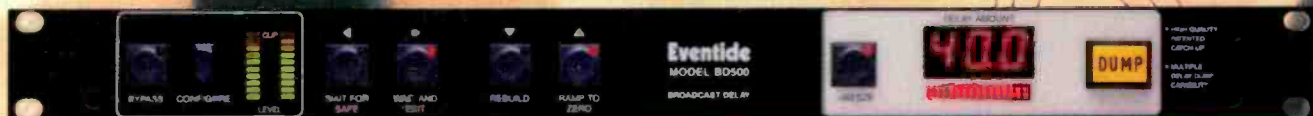
## Hurricane Charley provides some lessons

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.



Prevents Audrobe Malfunction.



Suffering from Cursing Callers? Foulmouthed Fanatics? Lewd Loudmouths? Obscene Orators? Profane People-in-the-Street? The Eventide BD500 profanity delay cures all of these ills!

Its new 40-second delay also protects against slander and transgressions more subtle than those famous "seven words." What's more multiple DUMP segments give you the ammo to dispatch the Serial Sinner.

Take advantage of the decades of experience and trust behind every Eventide DUMP button. Protect your station with the BD500 profanity delay.

**Eventide®**

BROADCAST DIVISION

One Alsan Way  
Little Ferry, NJ 07643  
(201) 641-1200

[www.eventide.com](http://www.eventide.com)  
[broadcast@eventide.com](mailto:broadcast@eventide.com)

Eventide is a registered trademark of Eventide Inc. © 2004 Eventide Inc.

# 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.



*Continental Electronics™*

**Turning Great Ideas Into  
Exceptional Innovations**



**Artistry, Science, and Great  
Engineering Blend to Make**

**“Awesome Transmitters”**

DRS BROADCAST TECHNOLOGY



**DRS**

TECHNOLOGIES

800.733.5011

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

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.

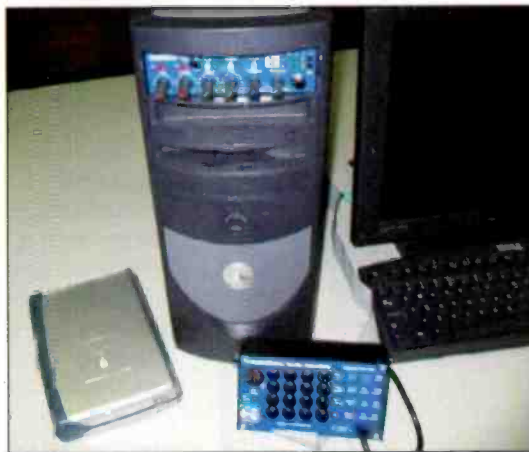
Cox Radio's Tampa studio facility is located in evacuation zone B, or the second level that will receive evacuation notices. This can be a little deceiving, because across the street from the building is evacuation zone A. Usually both zones are called at the same time, which virtually guarantees that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



BCM 104 High Resolution Broadcast Microphone

## Think Of It As A Stealth Fighter For Your Voice

Introducing the BCM 104  
Broadcast Mic from Neumann

Neumann has been doing a lot of listening lately. We've been listening to the radio, and what we've heard is that the world really does need a better broadcast mic. A much better one. Introducing the first Neumann mic built expressly for broadcast applications. Our new BCM 104 is a condenser mic that can handle any talent that's thrown at it, and make it shine. And best of all, it does it at a price that's "broadcaster friendly."

Gain the clear advantage - grab the new Neumann BCM 104, and discover what a difference Neumann can make for your voice.



# NeumannUSA

The Choice of Those Who Can Hear The Difference

Tel: 860.434.5220 • FAX: 860.434.3148 [www.neumannusa.com](http://www.neumannusa.com)  
Canada: Tel: 514-426-3013. Fax: 514-426-3955 • Mexico: Tel: (525) 639-0956. Fax: (525) 639-9482



Record.  
Manage.  
Edit.  
Schedule.  
Broadcast.  
Distribute.  
24/7.

Call toll free

1-866-41-DAVID (32843)

or visit our website at:

[www.latitude-edition.com](http://www.latitude-edition.com)

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.



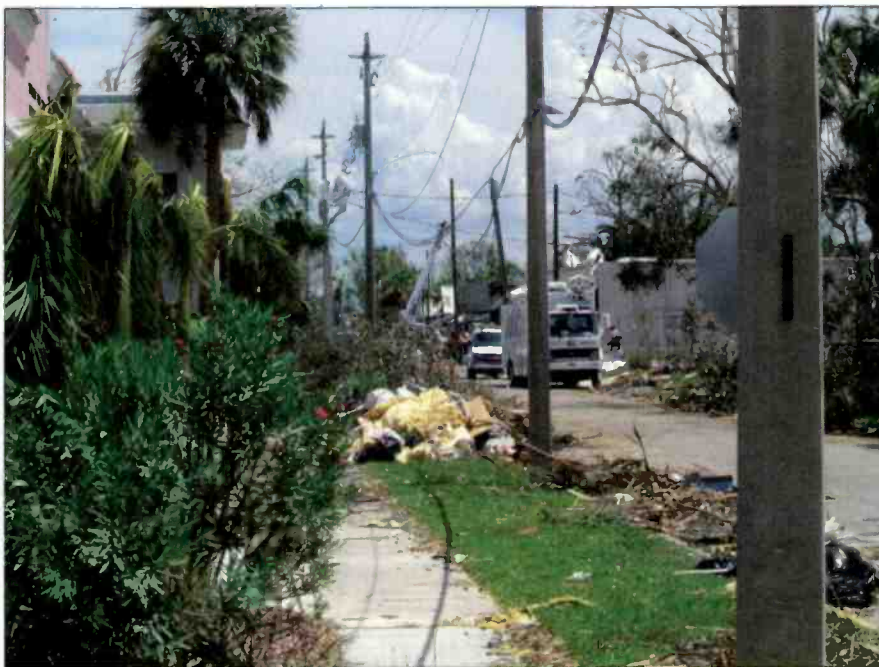
**Top: Studio for WWRM-FM. Below: The Cox emergency studio at the Hillsborough Emergency Operations Center.**

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.

Now You Can Have Higher Accuracy Plus Value

## GPS MASTER CLOCK & TIME CODE GENERATOR



### QUALITY STANDARD FEATURES:

- SMPTE/EBU, ESE, IRIG-B, ASCII Time Code Outputs • 1PPS Output
- 8 Satellite Tracking • Battery Back-up • GPS "Lock" Indicator
- Automatic Daylight Savings Time Correction • Time Zone Offset • Antenna
- 45 nanosecond accuracy • 3 Year Warranty • Plus More, for just **\$2495**

### AVAILABLE OPTIONS:

- Parallel BCD Output • 1 KPPS • 10MHz Output • 220 VAC • 12-35 VDC
- Video Inserter • Video Sync-Generator • Hourly contact closures



142 Sierra Street • El Segundo, CA 90245 USA  
 Phone (310) 322-2136 • Fax: 310.322.8127  
[www.es-e-web.com](http://www.es-e-web.com)

# 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

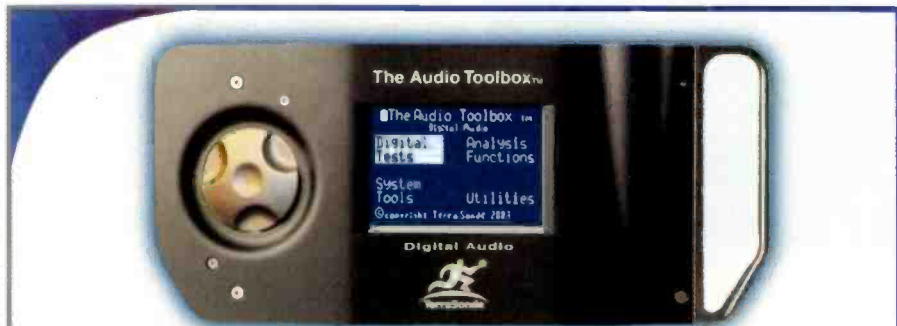
the affected area soon after the storm had passed. Items such as diesel fuel and satellite dishes had to be brought in to keep the stations running. Damage to some of the studio areas had to be secured. Later on, a sugar grower arrived at the studios with a diesel tanker truck ready to fill the station's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



**Q: Your digital audio feed pops and clicks and drops out unexpectedly. And, the problem is intermittent. Which tool do you reach for to troubleshoot it?**

- A:
- 1) My Audio Precision System. Oh wait...we don't have one, the station bought a car instead.
  - 2) Tools?...digital audio is perfect so it must be sunspot activity.
  - 3) **The Digital Audio Toolbox!**

Our Digital Audio Toolbox is the only digital audio tester in its price class that is stereo 24-bit/96k capable, includes all hardware inputs and outputs (including ADAT®), is truly portable and is very affordable for all sizes of broadcasting stations. Tools include: Jitter Meter, Lock Tests, Digital Capture, Latency Test, Clock and Sample Counter, Bitscope, Digital Watchdog™, Digital Distortion Meter, Jitter FFT, Pass Mode and more



For more information about how the Digital Audio Toolbox can solve audio problems at your station, please call 888-433-2821 or visit [www.TerraSonde.com](http://www.TerraSonde.com)


## Product Showcase



### Model DAI-2 Dialup Audio Interface

- perform unattended remote broadcasts
- DTMF operated controller with relay outputs
- fully programmable output on any key press
- momentary and/or maintained relay outputs
- four logic inputs with programmable output
- balanced audio input and output with ALC

# innovative solutions

 Sine Systems, inc.

615.228.3500

more information: [www.sinesystems.com](http://www.sinesystems.com)



**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



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

**FAVORITES / BOOKMARK**

## Expect MORE From Your AM Transmitter



**Armstrong Transmitter X-1000B**

Made in USA

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

Built with dual hot-swappable 500 Watt RF modules capable of 150% modulation, X-1000B can bring that major market sound to your radio station. Engineered with the latest technological innovations, X-1000B offers high reliability, built-in redundancy and it is HD Radio® ready.

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

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

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



Tel 315-673-1269 / [sales@armstrongtx.com](mailto:sales@armstrongtx.com) / [www.armstrongtx.com](http://www.armstrongtx.com)

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

## 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.

## Customer Specific Solutions for your acoustic environment



Blackbird Studio, Nashville  
Photo by Glen Rose  
Design by Michael Cronin



**ACOUSTIC SYSTEMS**  
A Division of ETS-LINDGREN

Contact us at:  
**800.749.1460**

[www.acousticsystems.com](http://www.acousticsystems.com)  
[info@acousticsystems.com](mailto:info@acousticsystems.com)

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.*

# Powerful Automation from BSI



**Series 110**  
**\$9,999**

Purchase a system from BSI with the confidence that you're buying years of research into what makes an automation and hard-disk play out system reliable, powerful and versatile. Dell Computers with 3-year on-site warranty, professional AudioScience multi-output sound cards and BSI software make a great combination.

Our team of broadcast professionals installs and configures your software and hardware so that everything is ready to run out of the box. We also include telephone training to help you get started and the Series 110 comes with a full year of standard telephone support and software upgrades. For added piece of mind, software mirroring synchronizes the two machines so that changes made on one computer are reflected on the other.

BSI systems are used in stations across the US and around the world.

**Thousands of users have discovered  
how easy and versatile BSI software  
really is. Test and try before you buy.**

**Broadcast Software International**

1925 Bailey Hill Road, Suite A, Eugene, OR 97405

www.bsiusa.com 888-BSI-USA1 (888-274-8721) info@bsiusa.com

Para el español, llamada Felipe Chavez, Distribuidor de los E.E.U.D.  
(916) 368-6332 fchavez@ommedianet.com



# 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.

860-434-5223; fax 860-434-3148; www.neumannusa.com; neumlit@neumannusa.com



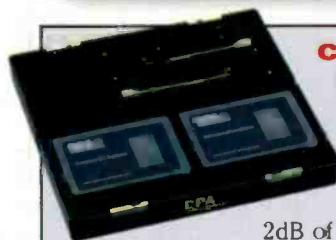
**Compact microphone**

**DPA Microphones**

booth 1342

3521: This cardioid stereo kit provides stereo pickup capability in a small space.

The 3521 includes two 4021 compact cardioid microphones matched within



2dB of frequency response, sensitivity and self-noise. Originally designed for use inside a piano, the mic pair can be used in other applications where space is limited or a low-profile is needed. The kit is supplied in a sturdy carrying case and includes a combination XY/ORTF holder, two gooseneck mounts and two magnet bases for mounting on metal surfaces. The mics use the same capsule as the standard series DPA 4011 microphone, but are pre-amplified using a built-in, miniaturized, thick-film-mounted FET-amplifier.

303-823-8878; fax 303-823-5830; www.dpamicrophones.com; info@dpamicrophones.com

# Maximize your FM Station!

New!

## Success Starts with rfInvestigator V2.5

The software that works as hard as you do.

rfInvestigator V2.5 is our most flexible program yet.

- Display Audemat-Aztec Navigator 100 & Navigator 007 field surveys.
- Export propagation jobs for display in other mapping programs
- Import contour information from other programs for your use.
- One set of TOPOI Maps is Included with the program.

**Display and Printing Improvements**

- Set colors and line weights for easier to read maps
- Invert colors easily for faxing
- Create your own map labels
- Variable job scan range
- Display ESRI Shape Files

**"DA Design Tool" Improvements**

- Completely redesigned to work faster
- Set your own antenna design limits
- New booster designer

**PL-SERVER**

With this advanced module you can create path-loss files for propagation analysis in rfInvestigator.

**DB-BUILDER**

is a "behind-the-scenes" utility program that downloads data from the FCC website and creates databases for our various products. **Never buy** another database!

Check out our other fine products on [www.rfsoftware.com](http://www.rfsoftware.com) Today!

Call 352-336-7223 for information. On-site Training Available

**rfSoftware, Inc.**  
innovative engineering tools

## 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.

860-210-1870; [www.realtraps.com](http://www.realtraps.com);  
sales@realtraps.com

## 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

BM5A: The two-way active speaker is powered by two 50W amps and operates within a frequency response of 50Hz-21kHz. The speaker was designed with a 6.7" woofer and 1" soft dome tweeter. The exterior has been redesigned, just as the drivers have undergone fine-tuning.

+45 87-427000; fax +45 87-427010

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



## Radius-Xp

...studio furniture

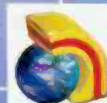
- all plastic surface & trim design
- modular for flexibility
- highest quality materials
- precision crafted
- professional features
- many options available



**T**his studio furniture line is engineered for studio decors where non-wood trims are a design goal. Available in a wide variety of colors, this furniture will complement any size market application. The modular design enables the furniture to be ordered in almost any configuration that can be imagined.

970-461-0730 [www.arrakis-systems.com](http://www.arrakis-systems.com)

only **\$2,995**



**Arrakis**



## 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 14<sup>th</sup> 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.

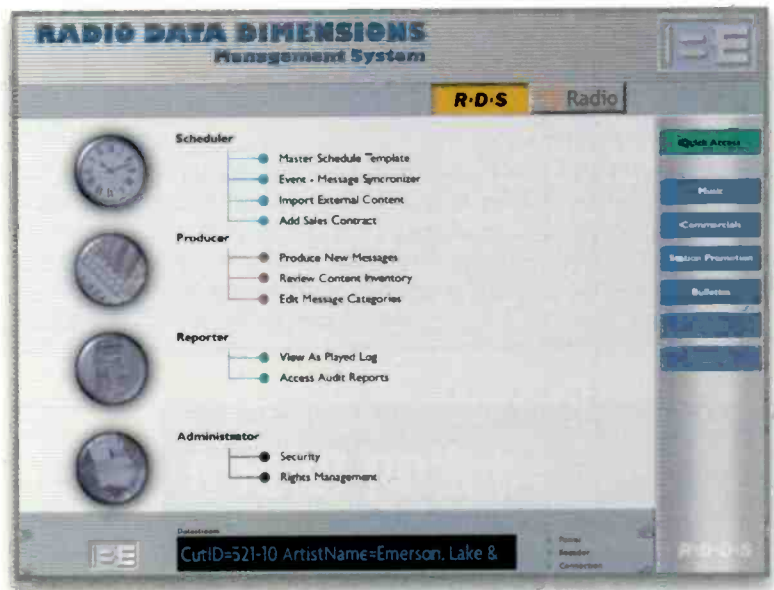
### Gate/compressor

**Drawmer booth 602**

**DSL424:** This gate/compressor

combines two noise gates and two soft/hard knee compressors with variable threshold limiting in a 1RU, four-channel toolbox. From the front panel, users may configure the unit as four stand-alone processors or as a stereo linked pair of compressor/limiters with a stereo linked pair of gates. Each channel may be operated as a hard or soft gate with switchable attenuation and LED indication of mode status. Frequency-selective gating is offered using variable low- and high-pass filters. Each channel combines an auto attack/release compressor with a threshold peak level limiter on the output, adjustable from 0dB to 16dB above system level. A high-resolution bar graph displays meter gain reduction and output level simultaneously. Balanced 4dB XLR in/out connectors are provided, with 1/4" jack key inputs.

702-365-5155; fax 702-335-5145; www.drawmerusa.com; sales@transaudiogroup.com



## Radio Data Dimensions: Making radio read and write.

If you're not taking advantage of RDS on your analog FM channel, you may be losing listeners and revenue. BE's Radio Data Dimensions simplifies feeding your station's branding, title and artist information, sponsorship and promotional messages, Amber Alerts, and more. Increase income and listener loyalty using text messages with traffic, weather, or even gas prices from third-party providers. Part of BE's Total Radio Program and Data Integration, Radio Data Dimensions puts you in control of today's RDS and tomorrow's HD Radio opportunities in one integrated management suite.

Contact BE to put your data to work for you.



Broadcast Electronics, Inc. • 4100 North 24th Street, P.O. Box 3606, Quincy, Illinois 62305-3606 U.S.A.  
Telephone: (217) 224-9600 • Fax: (217) 224-9607 • E-Mail: bdcast@bdcast.com

Broadcast Electronics, the BE logo and AudioVisual are registered trademarks of Broadcast Electronics, Inc.  
HD Radio is a registered trademark of Ibiquity Digital Corporation.

**Architectural Acoustics  
for Film and Broadcast Studios**

**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; gepco@gepco.com

**Finding peace  
of mind just  
got a whole  
lot easier.**

Take the original Plan B's winning combination of digital silence detector, instant audio replacement and user friendly remote control. Add internet connectivity and a host of audio storage options like Compact Flash™ and hard drive and you get the amazing new Plan B *Deluxe*™ — the most flexible program line protection system ever built. Transfer audio files directly from your automation system. Create a custom backup mix for each daypart. Receive alarm notification by email. View detailed failure reports online. All this and more, plus Plan B's unsurpassed ease of use.

Call your dealer or visit [www.danagger.com](http://www.danagger.com)  
Danagger Audio Works 1-888-89-AUDIO

**Audio Transformers available in the USA  
from Stevens & Billington Limited**

**For More Information  
Please Visit**

[www.stevens-billington.co.uk/usa](http://www.stevens-billington.co.uk/usa)

## 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".

800-922-8301; fax 215-443-0330

www.atiaudio.com; sales@ataudio.com



## The Broadcast Industry's **FIRST** 6-channel UNcompressed Digital STL



MODEL 460 DIGITAL STL TRANSMITTER



MODEL 467 DIGITAL STL RECEIVER

## Advanced Technology, Only From TFT

- 6 UNcompressed Program Channels, maximum
- PC Configurable from Front Panel for Frequency, I/O, Alarms, LCD
- Supports 48, 44.1, as well as 32 ks/s Sample Rates
- 256 QAM, 64 QAM, 16 QAM Modulation
- AES/EBU or Analog I/O - Built-In Sample Rate Converters
- Major/Minor Alarms on both Transmitter and Receiver
- 3.125 kHz Step Size

**TFT** INC



Phone: (+1)408-943-9323

FAX: (+1)408-432-9218

www.TFTInc.com e-mail: info@tftinc.com

1953 Concourse Drive, San Jose, CA 95131



## 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.

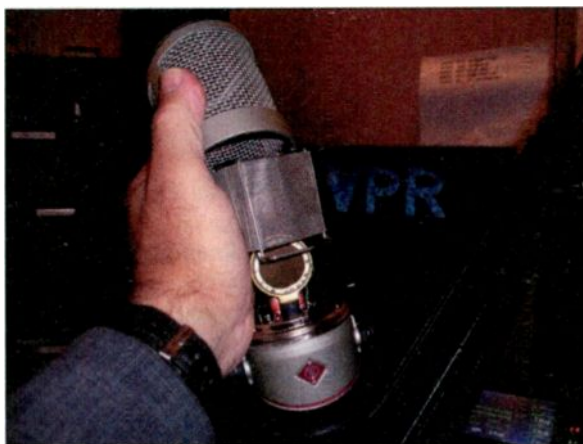
### Overall sound

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

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

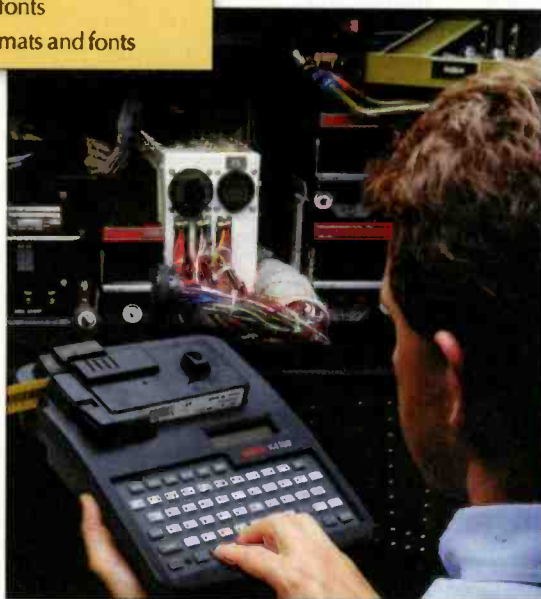
### Performance at a glance

- 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

**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.

Looking for a new Digital Audio System? Why not try the

# ORIGINAL

**DBC** Delmarva Broadcasting Company



### Broadcast Automation Software

It's no lie - iMediaTouch is the original automation system, introduced back in 1985! Our list of 'firsts' in radio is unprecedented - from our broadcast automation system, to our industry leading digital logger and our award winning Internet streaming software. Our iMedia product lines provide complete solutions for radio.

iMediaTouch is the choice for radio station clusters. We make the most innovative and easy-to-use content sharing software on the market!

Purchase iMediaTouch and we guarantee your station will be prepared for the future of radio.

"In 1992 we began a search for an automation system that would provide us with the reliability and flexibility at a fair price. By mid-year, we had determined that only the iMediaTouch System would do all the things we needed with the many different formats and devices with which we operate."

**Bob Mercer - Operations Manager**  
 Delmarva Broadcasting Group - Wilmington, DE

#### iMediaTouch features:

- Non-proprietary hardware, use any audio card, any PC
- Supports MP2, MP3, PCM, WMA, APTx and Dolby!
- Live Assist, Satellite or Full Automation
- Complete website integration with XML or HTML output
- On-Air Promo builder for on the fly promos
- CD Ripper and complete production tools for automation
- On-Air studio or Production studio Voice tracking
- On-Air Phone bit editor with full producer capabilities
- Proven on XP Pro since 2002! Supports Windows 2000 & NT

The Original. The Standard. The Innovator. omt technologies

To find out more, call us Toll Free 888 665 0501 or visit [www.imediatouch.com](http://www.imediatouch.com)

# New Products

By Kari Taylor, associate editor

www.beradio.com

## 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.

216-241-7225; fax: 216-241-4103

www.axiaaudio.com; inquiry@AxiaAudio.com

## Digital stereo encoder Proflin



**SFY:** The SFY is the new generation stereo encoders with integrated

RDS encoder and advanced audio limiter. Features of this encoder are: digital AES/EBU audio input; RDS-UECP data input; MPX limiter according ITU-R for broadcast application; and RS-485 and IP port for remote control and advanced measurement and alarm functionality.

+31 26323 6969; fax +31 26323 3952

www.proflin.nl; info@proflin.nl

## High-visibility warning light CBT Systems

**Dual Lens On-Air Light:** The retro style, aluminum light mounts on the wall or ceiling and offers visibility from three different approach directions. The unit's Plexiglas windows, which are available in blue or red, can be illuminated by a single 120V bulb or two 12V bulbs. Standard legends include on-air and recording. Custom lens colors, legends, color powder-coated finishes and a 220V option are also available. All units are UL approved.

858-536-2927; fax 858-536-2354

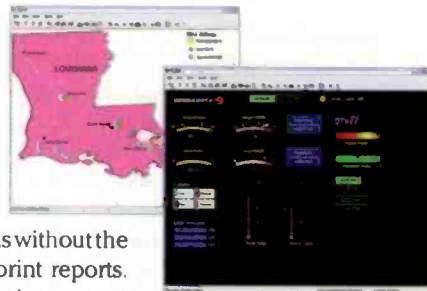
www.cbtsystems.tv; doreen@cbt-net.com



## Remote control software Burk Technology

**Lynx 5:** Real-time data updates provide up-to-the-second site conditions from the transmitter remote control system.

In custom views, a new tool is available for on-screen trend analysis. A historical graph displays multiple channels, allowing quick reviewing and comparisons without the need to view and print reports.



Expanded options in custom views allow even more customization for displaying site data on the screen. The software includes all of the features in Lynx 4, including automatic report printing, customized logging and user-definable access levels.

800-255-8090; fax 978-486-0081; www.burk.com; control@burk.com

## Metal ceiling tiles Illbruck/Sonex Acoustical Div

**Squareline:** Constructed of expanded metal with an acoustic foam insert, these ceiling tiles are now available in two patterns: Squareline Standard and Squareline Medium. These ceiling tiles are an alternative to the traditional linear or perforated metal ceiling. The tiles can be installed at virtually any stage of construction and the expanded metal is made from galvanized, powder-coated steel. Installation in 15/16" grid systems is quick and easy with one side of each tile having a notch cut-out for directional purposes. These tiles provide sound absorption qualities.

800-662-0032; fax 612-521-5639

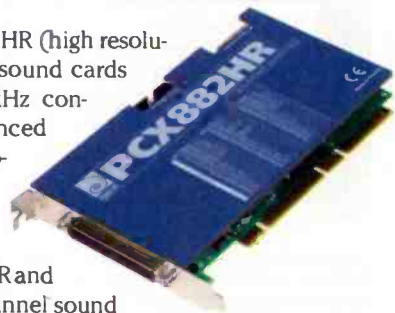
www.illbruck-sonex.com; sales@illbruck-sonex.com

## High-resolution sound cards Digigram

**PCX HR series:** The HR (high resolution) series of PCX sound cards features 24-bit/192kHz converters, more advanced functions, more processing power and greater flexibility for custom developments. The PCX882HR and PCX881HR multichannel sound cards offer hardware sample-rate converters on all inputs for simultaneous recording of digital signals with different sampling frequencies, a 66MHz/64-bit PCI interface and a more powerful on-board DSP. Eight inputs and eight outputs are provided—digital I/Os in the PCX881HR and analog and digital I/Os in the PCX882HR. Maximum levels of the analog inputs and outputs are +24dBu.

703-875-9100; fax 703-875-9161

www.digigram.com; input@digigram.com





## Music testing service

### Comquest

**Personal Music Test:** This service enables stations to obtain more accurate information, including the ability to rate songs according to real world terminology vs. number ranges, and required minimal lengths of tracks that must be heard before scores can be accepted. Full results are made available to program directors online immediately and on CD within 24 hours. Specific features of the service include touch screen technology that minimizes respondent fatigue and maximizes personal interaction and variable burn capture, which identifies variable song rating and burn score collection.

619-659-3600; fax 619-659-3800

[www.comquestmusictesting.com](http://www.comquestmusictesting.com); [ggorton@ComQuestMusicTesting.com](mailto:ggorton@ComQuestMusicTesting.com)

## Portable multi-track recorder

### Sound Devices

**744T:** This high-resolution audio recorder is intended as a replacement for digital and analog tape-based portable recorders. The four-track unit writes and plays audio files with bit depths of 24-bits or 16-bits, and with sample rates from 44.1kHz to 96kHz, including pull-up sample rates. It is designed specifically for high-bandwidth, high bit-rate digital media applications.

608-524-0625; fax 608-524-0655

[www.sounddevices.com](http://www.sounddevices.com); [info@sounddevices.com](mailto:info@sounddevices.com)

## DAW controller

### Mackie

**Big Knob Studio Command System:** This product is a source selection and communications box for DAW-based studios. The prominent feature of the device, a large volume knob, provides easy access for precise level adjustments. The system also features three buttons for quick switching between three sets of studio monitors, a built-in talk-back microphone, input source select for as many as four stereo sources, dual headphone outputs with an independent headphone mix bus, as well as mono, mute and dim switches. Rear-panel connections include a dedicated DAW mix input as well as three independent two-track stereo inputs, each with variable gain control as well as +4dB and -10dB selection buttons. Three two-track stereo outputs also provide +4dB and -10dB selection buttons.

800-898-3211; fax 425-487-4337

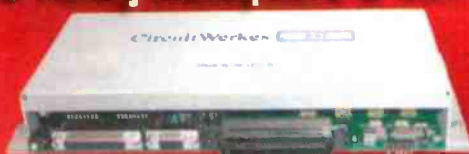
[www.mackie.com](http://www.mackie.com); [productinfo@mackie.com](mailto:productinfo@mackie.com)



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

# Control Freaks!!

## New Relay Multipliers & Converters Distribute Control Where It's Needed



### The pREX Programmable Relay Multiplier & Function Converter

- ▶ Has 12 optocoupled inputs and 16 microprocessor-controlled relay outputs.
- ▶ Control any output or a group of outputs from a single input or from a group of inputs using logic modes like AND, OR, XOR, NOR, NAND, NXOR, Interlocked, etc.
- ▶ Output modes include: Momentary, Toggled, Leading or Trailing Edge, Pulse Stretching up to 45 hours, Input Debounce, Maximum OnTime, Minimum OnTime and more.
- ▶ Serial port for programming or controlling the relays using either terminal program or free GUI.
- ▶ 50-pin telco connector for instant punchblock connectivity. Telco block/cables also available.



### The REX Affordable Relay Expander/Multiplier

- ▶ The REX accepts a wide variety of Input signals & converts them to contact closure outputs.
- ▶ REX's optocoupled inputs can be driven from active high or low incoming signals.
- ▶ Each of the six inputs controls four SFST relays for a total of 24 outputs.
- ▶ The REX features a 50-pin telco (RJ-21) type connector that interfaces directly with prewired telco punchblocks. Type 66 telco punchblocks & cables are optionally available.

For more info visit  
[www.circuitwerkes.com](http://www.circuitwerkes.com)



CircuitWerkes, Inc. - 2805 NW 6th Street, Gainesville, Florida 32609, USA. 352-335-6555

## Use Once a Day to Alleviate Traffic Congestion



### Traffic and billing made easy with the affordable Traffic C.O.P. for Windows™

Take the headache out of controlling traffic with Traffic C.O.P. for Windows. Whether it's scheduling logs, printing invoices, or managing receivables, the Traffic C.O.P. will work for you. And, because it's Windows based traffic software, you get a modern, reliable and easy to use program—all backed by the superior customer support of Broadcast Data Consultants.

**Isn't it time you get rid of congestion?**

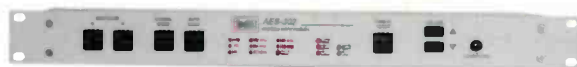
Call for your FREE CD demo today, or for more information, please visit our web-site.

**Toll Free: 800-275-6204**  
**www.broadcastdata.com**

Broadcast Data Consultants,  
51 South Main Ave., Suite 312, Clearwater, FL 33765



## The AES-302 Digital Audio Switcher/Distribution System



- Two Input Switcher**
- Automatic or Manual Switching**
- Optional Silence Sensor**
- Status Monitor with Memory**
- Front Panel Headphone Jack**
- High Quality 24 bit 96 KHz D/A Converter**

Introducing the next generation digital audio switcher from BDI. Now you can have complete confidence in your signal path with the AES-302. Feed main and back up AES streams to the inputs and the selected feed is routed to four digital outputs and an analog stereo output. If a fault occurs, the automatic switcher selects the alternate feed. There is extensive front panel error and operational status and a headphone jack for confidence monitoring. The AES-302 has a remote control interface for easy attachment to remote control systems. The AES-302 is future proof too. The digital components mount to a plug in pc board which can be upgraded in the future should digital audio standards be enhanced or your requirements change. Call your local broadcast equipment dealer to order. Call us or visit our website for detailed information.

**Broadcast Devices, Inc.**  
**Tel. (914) 737-5032 Fax. (914) 736-6916**  
**Website: www.Broadcast-Devices.com**



## OMNIRAX BROADCAST FURNITURE

Custom Image Room Furniture



Force 36 MF



### Why Omnirax?

- Excellent collaborative custom design ability, so you get exactly what you want
- Unique combination of style, functionality and ergonomics
- Fanatical attention to detail
- 15 years of experience
- 100% satisfaction guaranteed

P.O. Box 1792 Sausalito, CA 94966  
800.332.3393 415.332.3392 FAX 415.332.2607  
[www.omnirax.com](http://www.omnirax.com) [info@omnirax.com](mailto:info@omnirax.com)

## Acoustics First® CUTTING WEDGE® ACOUSTICAL FOAM



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

**TOLL FREE**  
**1 888 765 2900**

## Tieline TECHNOLOGY



**Tieline i-Mix G3 delivers Athens games to millions of American sports fans.**

**Read the full story.**

[www.tieline.com/be/athens](http://www.tieline.com/be/athens)

**Order your free demo today**

Buy simplicity,  
reliability and service.

**EAS**  
Price \$1750.00

Equipment in-stock  
for immediate delivery.

Phone 740-593-3150

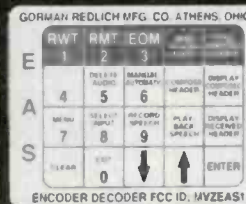
**GORMAN-REDLICH MFG. CO.**  
257 W. Union St. Athens, Ohio 45701

FAX 740-592-3898

Now available  
with  
optional DTMF  
control  
via a phone line.



SEARCH ACTIVE: 1-14-98 13:17 CST  
DECODER: Searching  
ENCODER: Ready \* PRINTER NOT CONNECTED \*  
HARVARD



- 5 two-way RS inputs/outputs for computer, remote signboard & character generator
- 6 audio inputs on standard models. All audio inputs & outputs are transformer isolated from encoder-decoder board
- Automatic interruption of program audio for unattended operation
- 4 line 40 character LCD display with LED backlighting
- 20 key keypad to program unit, set modulation level, set input levels
- Now available with optional built in character generator which can crawl alert messages and station ID on the hour
- Will handshake with automation equipment
- 2 year warranty
- 2 minutes of digital audio storage
- 25 pin parallel printer port for external printer
- 52 terminals on the rear to interface with other equipment by removable plugs
- BNC fitting with 600 OHM balanced audio cut for second transmitter

Web Site: [www.gorman-redlich.com](http://www.gorman-redlich.com) • E-mail: [jimg@gorman-redlich.com](mailto:jimg@gorman-redlich.com)

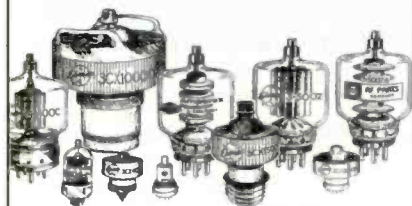
• Also available: weather radios, antennas for weather radios, crystal controlled synthesized FM digitally tuned radios, remote signboards, cables for interconnection, Character generators.



**RF PARTS™**  
COMPANY

- ✓ Audio
- ✓ Broadcast
- ✓ Industrial
- ✓ Communications

Audio Tubes • Transistors  
Modules • Gasfets • Coax  
Capacitors • Rectifiers



Svetlana • Taylor • RFP • Eimac  
Amperex • MA/Com • Motorola  
Toshiba • Thompson • Mitsubishi

- Se Habla Español
- We Export



760-744-0700 • 800-737-2787  
Fax: 760-744-1943

E-mail: [rpf@rfparts.com](mailto:rpf@rfparts.com)

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



Your #1 Source  
For Quality  
Used Radio  
Broadcast  
Equipment.

View our latest list of equipment on-line at:  
<http://www.baycountry.com>  
or call and we will fax it to you.

All equipment sold with a 15 day return guarantee.

7117 Olivia Rd. • Baltimore, MD 21220 • Ph: 877-722-1031 • Fax: 786-513-0812  
<http://www.baycountry.com> • e-mail [info@baycountry.com](mailto:info@baycountry.com)

**dataworld** (R)



**Engineering Tools**  
Feasibility Studies  
Longley-Rice RSL  
Maps & Population  
Area-to-Locate Studies

**Marketing Tools**  
Custom Mapping  
Demographic Reports  
Zip Code Pinpointing

**Management Tools**  
DataXpert™  
Coverage Maps  
FLAG<sup>SM</sup> FCC Monitoring  
LMA/Duopoly Studies

[www.dataworld.com](http://www.dataworld.com) [info@dataworld.com](mailto:info@dataworld.com)  
800-368-5754 • 301-652-8822 • fax: 301-656-5341

Gallery Radio  
[www.beradio.com](http://www.beradio.com)

## HIGH VOLTAGE RECTIFIERS

**Nobody Knows Them Better Than We Do**

Once again, HV Components/CKE brings you a reliable retrofit rectifier package for your transmitter that saves you money and delivers the performance and reliability you've come to expect from us. Our Model 51016 shown here is a three-phase full wave bridge designed to easily drop into your AM, FM or television transmitter. Conservatively rated for power supplies of up to 12 KV and 9 amps output, this retrofit package fills the bill for most any application.

**WE HAVE CCA RECTIFIERS**

**QUICK, COST-EFFECTIVE & EXPERT SOLUTIONS**



[www.rectifiers.com](http://www.rectifiers.com)  
**800-649-6370**

**Going Digital? Go GoldWAV!**



26,000 songs in 16 bit, 44.1 stereo .WAV files with all the song data embedded.

Also available in GoldDrive MPEG Layer 2, Mode 2

And with the purchase of any GoldWAV or GoldDrive library you can acquire a matching, back-up, GoldDisc library for half price.



GoldDisc - GoldDrive - GoldWAV  
The World Plays Our Music!

www.TMCentury.com  
972.406.6800 ■ TMC1@TMCentury.com



*If lightning strikes on your tower are causing equipment damage and lost air time - the cost of Stati-Cat system may be recovered during your first lightning season.*

**AFFORDABLE - RUGGED LIGHTNING PROTECTION**

*The Stati-Cat Lightning Prevention System*

provides a continuous, low-resistance discharge path for the static electric charge on tall structures. DISSIPATION POINTS ARE 1/8" STAINLESS STEEL RODS (not wires) ground to needle sharpness.



Write or call toll-free for a free brochure!  
P.O. Box 2548, Farmington, N.M. 87499-2548  
Call 888-325-5336 Fax (505) 326-2337  
cortanacorporation.com  
cortana1@earthlink.net



**REMEMBER THE CORTANA FOLDED UNIPOLE ANTENNA? WE STILL MAKE IT WITH THE SAME HIGH QUALITY MATERIALS AND WORKMANSHIP. IT FEATURES...**

- **BROAD BANDWIDTH** for better sound,
- GROUNDING ANTENNA** for lightning & static electricity,
- ELIMINATES ISOCOUPERS** in VHF & UHF antenna lines,
- BEST ANTENNA FOR DIRECTIONAL ARRAYS.**

ALSO

**DETUNING SYSTEMS FOR ANYTHING THAT DISTORTS YOUR AM COVERAGE PATTERN: TOWERS, POWER LINES, TANKS OR ANY METAL STRUCTURE.**

FOR INFORMATION CALL, FAX OR WRITE:

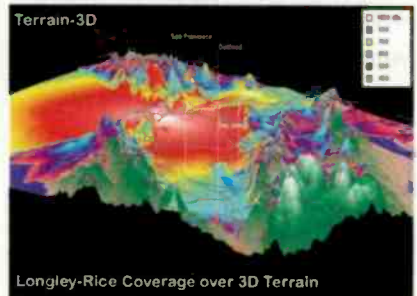
**nott ltd.**

4001 La Plata Hwy  
Farmington, NM 87401



phone 505-327-5646 fax 505-325-1142

## Broadcast Engineering Propagation Software



Professional software packages for FCC applications and predicting coverage.

- Create stunning "real-world" coverage maps and interference studies using Longley-Rice, PTP, Okamura/Hata and FCC with Probe 3™.
- Search for FM channels under spacings and contour protection using FMCont™.
- Prepare AM skywave and groundwave allocations studies and map FCC contour coverage using AM-Pro™.
- Plot STL paths and coverage over 3D terrain with Terrain-3D™.



The leader in broadcast engineering consulting software.

www.v-soft.com 800 743-3684



# Towers Above the Rest

Monopoles  
Guyed Towers  
Self-Supporting Towers  
Structural Analysis  
Tower Reinforcing

Since 1943, ERI has provided excellence in engineering, reliability in service, and years of manufacturing integrity.

**Our past experience is your future guarantee.**

Electronics Research, Inc.  
7777 Gardner Road  
Chandler, IN 47610  
812-925-6000 [www.ERInc.com](http://www.ERInc.com)

## Transcom Corporation AM & FM Transmitters

Visit our new internet site at [www.fmamtv.com](http://www.fmamtv.com)

Fine Used AM & FM Transmitters. Authorized Representatives for all major equipment manufacturers. Let us send you a customized quote!

### USED FM TRANSMITTERS

1kW	1998	Harris Quest <b>Solid State</b>
1.5kW	1987	BE FM1.5A
3.5kW	1988	BE FM3.5A
3.5kW	1992	Harris HT3.5
20kW	1978	Collins 831G2
25kW	1980	CSI T-25-FA (Amplifier Only)
25kW	1982	Harris FM25K
30kW	1986	BE FM30A
50kW	1982	Harris Combiner w/auto exciter- transmitter switcher

### USED AM TRANSMITTERS

1kW	1998	Continental 314D <b>Solid State</b>
1kW	1983	Harris MW1A <b>Solid State</b>
10kW	1986	Harris MW10B
50kW	1985	Continental 317C2
50kW	1986	Nautel AMPFET 50 <b>Solid State</b>

### USED EXCITERS

Harris DIGIT, 2002  
BE FX 30  
Continental 802B  
**\*New\*** 20 watt-synthesized

### NEW TV TRANSMITTERS ANALOG AND DIGITAL

VHF and UHF, 10 W to 10 kW  
TV Antennas  
TV STL

### USED TV TRANSMITTERS

1kW UHF 1992 Acrodyne  
10kW UHF 1999 Itelco T614C  
(Like new-60 hrs. of use)

### USED MISC. EQUIPMENT

Audio Amplifiers:  
BGW 85  
Crown D-75  
Audiometrics Stereo Distribution  
Amplifier  
Belar AMM3 Modulation Monitor  
**\*New\*** Denon 720R Cassette Player  
Mosely remote controls  
Potomac Phase Monitor AM 19  
w/sampler  
Potomac Phase Monitor 1901  
Digital 2Twr  
Sola Voltage Regulator 60hz  
1KVA s-phase

**AND MUCH MORE.....  
CALL US FOR A QUOTE !**

P.O. Box 26744, Elkins Park, PA 19027  
800-441-8454 (215-938-7304) Fax 215-938-7361

## Mini Mix 8A

**Proven...Affordable...**

**Reliable.**

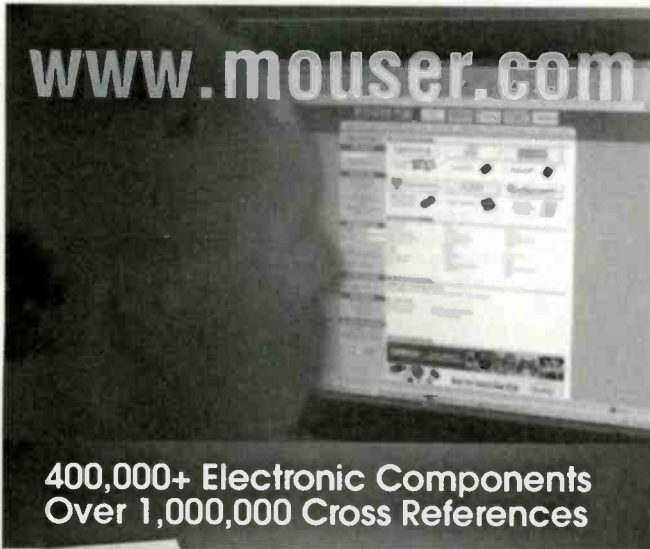


# AUTOGRAM

## 800.327.6901

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

## www.mouser.com



**400,000+ Electronic Components  
Over 1,000,000 Cross References**



New Products,  
New Suppliers,  
New Technologies,  
New Catalog Every 90 Days!

# MOUSER

ELECTRONICS

(800) 346-6873 www.mouser.com

Mouser® and Mouser Electronics® are trademarks of Mouser Electronics, Inc.



Our client list continues to grow. We would like to Thank-You for your confidence and your purchases.

We now have in stock, SHURE, SM-5B, wind screens. These are from the OEM vendor and are priced at \$60.00 per set. Make the best voice over microphone, new again!

We recondition Pacific Recorders BMX I-II-III, AMX, ABX and RMX mixing consoles. Let us re-work your console's modules. Obtain that added value from a proven winner. Quality built products last and last and last!

Check our WEB site for great buys on pre-owned broadcast gear. All equipment is repaired, tested and shipped with the manual.

Stretch your broadcast \$\$\$ on quality, pre-owned equipment....sold with a warranty.

TEL 800-300-0733 • FAX 231-924-7812  
WWW.MOORETRONIX.COM

## Affordable Custom Broadcast Furniture



Delivered  
and  
installed  
by



### STUDIO TECHNOLOGY

529 Rosedale Road  
Suite 103  
Kennett Square, PA 19348

TEL: 610-925-2785 • FAX: 610-925-2787

email:sales@studiotechology.com  
www.studiotechology.com

# There is only



# to advertise

Call to find out how advertising  
in Radio magazine can work for you!

Steven Bell • 913-967-1848  
sbell@primediabusiness.com

## 50 Ways to Love Your Levels

*More than 50 VU meter configurations for mono, stereo and surround*

Logitek's accurate, easy to read meters inspire confidence in your audio levels. See the full line at [www.logitekaudio.com](http://www.logitekaudio.com) or call 800-231-5870.



For Advertising  
Information

Contact Steven Bell

913-967-1848

[sbell@primediabusiness.com](mailto:sbell@primediabusiness.com)

## Marketplace

### EAS MONITORING

YAGI ANTENNAS

### WEATHER CHANNEL

FREQUENCIES 162.0? MHZ

### FM FREQUENCIES

88 TO 108 MHZ

ALL FREQUENCIES FROM 88

TO 1000 MHZ AVAILABLE

### SAMCO ANTENNAS, INC.

(817)-336-4351

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

email:[samyagi@flash.net](mailto:samyagi@flash.net)

## Nexus Broadcast

Quality Equipment, Low Price

Frequency Agile - Digitally Synthesized  
Temperature & VSWR Protected  
120 - 220 volts - Front Panel Controls  
Stereo Generator/Processor (Optional)  
One Year Parts & Labor Warranty

20 W Exciter	\$850	100 W Exciter	\$1795
250 W Exciter	\$2995	100 W Amp.	\$ 995
250 W Amp.	\$1795	500 W Amp.	\$3955
1KW Transmitter	\$5995	1KW Amp.	\$5495

Order Toll Free 800-219-7461

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

P.O. Box 433 - Mt. Vernon, TX 75457

# Radio<sup>®</sup>

Find out how advertising in the  
Radio Marketplace section can work for you!!

Call Jennifer Shafer  
800-896-9939 • [jshafer@primediabusiness.com](mailto:jshafer@primediabusiness.com)

## AM Ground Systems

Reliable, On-Time Installation  
Quality Workmanship  
Ground System Construction,  
Evaluation & Repair

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

1-877-766-2999

# Radio Classified

## Professional Services

www.beradio.com

**Structural Analysis**




**Electronics Research, Inc.**  
7777 Gardner Road  
Chandler, IN 47610  
(812) 925-6000  
www.ERInc.com



**Applied Wireless, Inc.**  
... providing options.  
PO Box 926  
New Market, MD 21774  
tel: 301.865.1011  
fax: 301.865.4422  
email: kevinmc@appliedwirelessinc.com  
www.appliedwirelessinc.com

Kevin McNamara  
President & CEO

**JOHN H. BATTISON P.E.**  
CONSULTING BROADCAST ENGINEER,  
FCC APPLICATIONS AM, FM, TV, LPTV  
Antenna Design, Proofs, Fieldwork  
2684 State Route 60 RD #1  
Loudonville, OH 44842  
419-994-3849 FAX 419-994-5419

## For Sale



**AcousticsFirst™**  
Toll-Free Number: **888-765-2900**  
Full product line for sound control and noise elimination.  
Web: <http://www.acousticsfirst.com>



4006 BELT LINE SUITE 160 ADDISON TEXAS 75001 972/661-5222 www.rbdg.com

- RECORDING AND BROADCAST FACILITY DESIGN
- ARCHITECTURE/INTERIORS FOR ACOUSTICAL SPACES
- ROOM ACOUSTICS AND SOUND ISOLATION
- NOISE AND VIBRATION CONTROL

**RUSS BERGER DESIGN GROUP**

## Bookstore

**READ ALL ABOUT IT!**

**SOCIETY OF BROADCAST ENGINEERS**  
**SBE Members can purchase technical books at up to 20% off retail**  
www.sbe.org • (317) 846-9000, x24

## For Sale

**"DESIGNED TO FIT!"**  
... "In Your Studio & Your Budget!"



HIGH QUALITY STUDIO FURNITURE & RACKS!  
STANDARD OR CUSTOMIZED SYSTEMS!  
GREAT STYLING AND FUNCTIONALITY!  
PRE-BUILT STURDY MODULES - FAST SETUP!  
SAFELY DELIVERED CRATED TO YOUR STUDIO!  
**"EXPRESS STUDIO'S"™ NOW FROM \$1995!**  
**CALL US AT 800-775-3660**  
SEE US AT [spacewise.com](http://spacewise.com)  
**SPACEWISE® STUDIO FURNITURE INC.**  
"We're Broadcast Experienced"™

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

Contact Jennifer Shafer  
for Classified Advertising  
800-896-9939  
[jshafer@primediabusiness.com](mailto:jshafer@primediabusiness.com)



**A PRIMEDIA Publication**  
[www.beradio.com](http://www.beradio.com)  
[radio@primediabusiness.com](mailto:radio@primediabusiness.com)

Editor - Chriss Scherer, CSRE CBNT, [cscherer@primediabusiness.com](mailto:cscherer@primediabusiness.com)  
Technical Editor, RF - John Battison, PE., [batcom@bright.net](mailto:batcom@bright.net)  
Associate Editor - Kari Taylor, [ktaylor@primediabusiness.com](mailto:ktaylor@primediabusiness.com)  
Sr. Art Director - Michael J. Knust, [mknust@primediabusiness.com](mailto:mknust@primediabusiness.com)  
Assoc. Art Director - Robin Morsbach, [rmorsbach@primediabusiness.com](mailto:rmorsbach@primediabusiness.com)  
Technical Consultants - Harry C. Martin, Legal  
Kevin McNamara, CNE, Computers and Networks  
Mark Krieger, CBT, IBOC, Contract Engineering  
Russ Berger, Broadcast Acoustics  
Donald L. Markley, PE., Transmission Facilities  
Senior Vice President - Peter L. May, [pmay@primediabusiness.com](mailto:pmay@primediabusiness.com)  
Publisher - Dennis Triola, [dtriola@primediabusiness.com](mailto:dtriola@primediabusiness.com)  
Marketing Director - Christina Heil, [chell@primediabusiness.com](mailto:chell@primediabusiness.com)  
Vice President of Production - Lisa Parks, [lparks@primediabusiness.com](mailto:lparks@primediabusiness.com)  
Sr. Director of Production - Curt Pordes, [cpordes@primediabusiness.com](mailto:cpordes@primediabusiness.com)  
Group Production Mgr. - Julie Gilpin, [jgilpin@primediabusiness.com](mailto:jgilpin@primediabusiness.com)  
Production Coordinator - Dana Hohn, [dhohn@primediabusiness.com](mailto:dhohn@primediabusiness.com)  
Classified Ad Coordinator - Michelle Hooper, [mhooper@primediabusiness.com](mailto:mhooper@primediabusiness.com)  
VP Audience Marketing - Jerry Okabe, [jokabe@primediabusiness.com](mailto:jokabe@primediabusiness.com)  
Audience Marketing Dir. - Barbara Kummer, [bkummer@primediabusiness.com](mailto:bkummer@primediabusiness.com)  
Audience Marketing Mgr. - Sonja Rader, [srader@primediabusiness.com](mailto:srader@primediabusiness.com)

### MEMBER ORGANIZATIONS

- Sustaining Member of:
- Acoustical Society of America
  - Audio Engineering Society
  - Society of Broadcast Engineers
  - Member, American Business Media



**PRIMEDIA**  
Business Magazines & Media  
COO - Jack Condon, [jcondon@primediabusiness.com](mailto:jcondon@primediabusiness.com)  
Executive VP - John French, [jfrench@primediabusiness.com](mailto:jfrench@primediabusiness.com)  
Sr. VP Business Development - Eric Jacobson, [ejacobson@primediabusiness.com](mailto:ejacobson@primediabusiness.com)

**PRIMEDIA Inc.**  
745 Fifth Ave., NY, NY 10151  
Chairman - Dean Nelson, [dean.nelson@primedia.com](mailto:dean.nelson@primedia.com)  
President & CEO - Kelly Conlin, [kelly.conlin@primedia.com](mailto:kelly.conlin@primedia.com)  
Vice Chairman & General Counsel - Beverly Chell, [beverlychell@primedia.com](mailto:beverlychell@primedia.com)  
SUBSCRIPTIONS: Free and controlled circulation to qualified subscribers. Non-qualified persons may subscribe at the following rates (prices subject to change): USA and Canada, 1 year, \$50.00, 2 years, \$95.00, 3 year, \$140.00. Outside the USA and Canada, 1 year, \$65.00, 2 years, \$125.00, 3 years, \$185.00 surface mail (1 year, \$105.00, 2 years, \$205.00, 3 years, \$305.00 airmail delivery). For subscriber services or to order single copies, write to Radio, 2104 Harvell Circle, Bellevue, NE 68005 USA; call 866-505-7173 or 402-505-7173; or visit [beradio.com](http://beradio.com).  
ARCHIVES & MICROFORM: This magazine is available for research and retrieval of selected archived articles from leading electronic databases and online search services, including Factiva, LexisNexis, and Proquest. For microform availability, contact ProQuest at 800-521-0600 or 734-761-4700, or search the Serials in Microform listings at [proquest.com](http://proquest.com).  
REPRINTS: Contact Joel Banda at Wright's Reprints to purchase quality custom reprints or e-reprints of articles appearing in this publication at 877-652-5295 or 218-419-5725. Instant reprints and permissions may be purchased directly from our website; look for the iCopyright tag appended to the end of each article.  
PHOTOCOPIES: Authorization to photocopy articles for internal corporate personal, or instructional use may be obtained from the Copyright Clearance Center (CCC) at 978-750-8400. Obtain further information at [copyright.com](http://copyright.com).  
PRIVACY POLICY: Your privacy is a priority to us. For a detailed policy statement about privacy and information dissemination practices related to Primedia Business magazines and Media products, please visit our website at [primediabusiness.com](http://primediabusiness.com).  
EDITORIAL, BUSINESS and CORPORATE OFFICE: Primedia Business Magazines & Media, 9800 Metcalf, Overland Park, KS, 66212; 913-341-1300; [beradio.com](http://beradio.com), [primediabusiness.com](http://primediabusiness.com).

Copyright 2004, PRIMEDIA Business Magazines & Media Inc. All Rights Reserved.

<b>LIST RENTAL SERVICES</b> <b>Marie Briganti</b> Statistics Phone: (203) 778-8700 x146 Fax: (203) 778-4839 <a href="mailto:primedia@statistics.com">primedia@statistics.com</a>	<b>EDITORIAL REPRINTS</b> <b>Joel Banda</b> Wright's Reprints Phone: (877) 652-5295, ext. 106 <a href="mailto:jbanda@wrightsreprints.com">jbanda@wrightsreprints.com</a>
---	--



## Sales Offices

### NATIONAL SALES DIRECTOR

**Steven Bell**

Phone: 913-967-1848 Fax: 913-967-7249

E-mail: sbell@primediabusiness.com

### EUROPE/UK

**Richard Woolley**

Phone: +44 1295 278 407 Fax: +44 1295 278 408

E-mail: richardwoolley@compuserve.com

### CLASSIFIED ADVERTISING

**Jennifer Shafer**

Phone: 800-896-9939, 913-967-1732

Fax: 913-967-1735

E-mail: jshafer@primediabusiness.com

### Online Sales & Marketing

**Samantha Kahn**

Phone: 212-462-3401 Fax: 913-514-7006

E-mail: skahn@primediabusiness.com

## Contributor Pro-file

Meet the professionals who write for *Radio* magazine.

This month: Field Report, page 52.



**Rich Parker, GSEC**  
Director of  
Engineering  
Vermont Public  
Radio  
Burlington, VT

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.

**Radio**  
THE RADIO TECHNOLOGY LEADER

Written by radio professionals  
Written for radio professionals

Radio, Volume 10, Number 10, ISSN 1542-0620 is published monthly and mailed free to qualified recipients by PRIMEDIA Business Magazines & Media Inc, 9800 Metcalf, Overland Park, KS 66212-2216 (primediabusiness.com). Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Canada return address: DP Global Mall, 4960-2 Walker Road, Windsor, ON N9A 6J3. Additional resources, including subscription request forms and an editorial calendar are available online at [beradio.com](http://beradio.com). To order single copies call 866-505-7173 or 402-505-7173.

POSTMASTER: Send address changes to *Radio*, P.O. Box 2100, Skokie, IL 60076-7800 USA.

# Advertiser Index

	Page Number	Advertiser Hotline	Advertiser Website
Acoustic Systems	44	800-749-1460	<a href="http://www.acousticssystem.com">www.acousticssystem.com</a>
Acoustics First	30	888-765-2900	<a href="http://www.acousticsfirst.com">www.acousticsfirst.com</a>
AKG Acoustics	13	615-620-3800	<a href="http://www.akgusa.com">www.akgusa.com</a>
Armstrong Transmitters	44	315-673-1269	<a href="http://www.armstrongtx.com">www.armstrongtx.com</a>
Arrakis Systems	6, 24, 25, 31, 48	970-224-2248	<a href="http://www.arrakis-systems.com">www.arrakis-systems.com</a>
AudioScience	27, 33	302-324-5333	<a href="http://www.audioscience.com">www.audioscience.com</a>
Broadcast Electronics	49	817-735-8134	<a href="http://www.bdcast.com">www.bdcast.com</a>
Broadcast Software International	45	888-BSIUSA1	<a href="http://www.bsiusa.com">www.bsiusa.com</a>
Broadcast Tools	17	360-854-9559	<a href="http://www.broadcasttools.com">www.broadcasttools.com</a>
Broadcast Warehouse	28	+44-208-540-9992	<a href="http://www.broadcastwarehouse.com">www.broadcastwarehouse.com</a>
Circuitwerkes	57	352-335-6555	<a href="http://www.circuitwerkes.com">www.circuitwerkes.com</a>
Comrex	9, 33	978-784-1717	<a href="http://www.comrex.com">www.comrex.com</a>
Conex Electro-Systems	30	800-645-1061	<a href="http://www.conex-electro.com">www.conex-electro.com</a>
Continental Electronics	38	800-733-5011	<a href="http://www.contelec.com">www.contelec.com</a>
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>

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

www.beradio.com

# Sign Off

By Kari Taylor, associate editor



www.beradio.com



Photo by Ben Weiss, CPBE

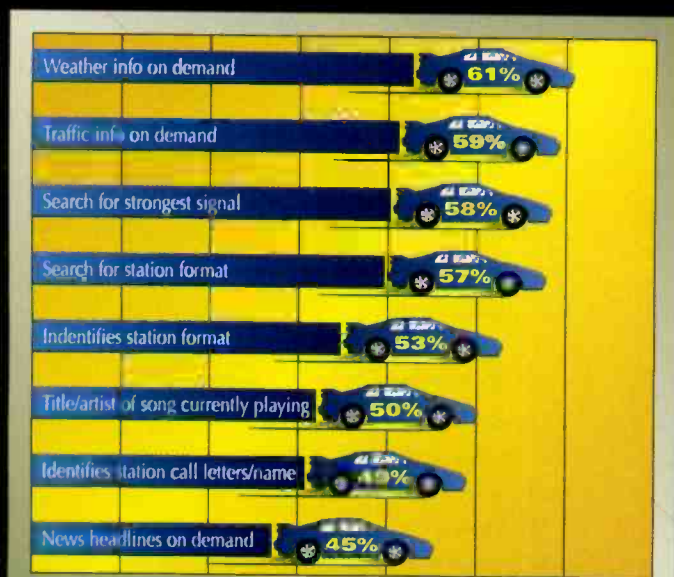
## Do you remember?

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.



the digital audio leaders

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

 **Wheatstone**

Copyright © 2002 by Wheatstone Corporation