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March 2003

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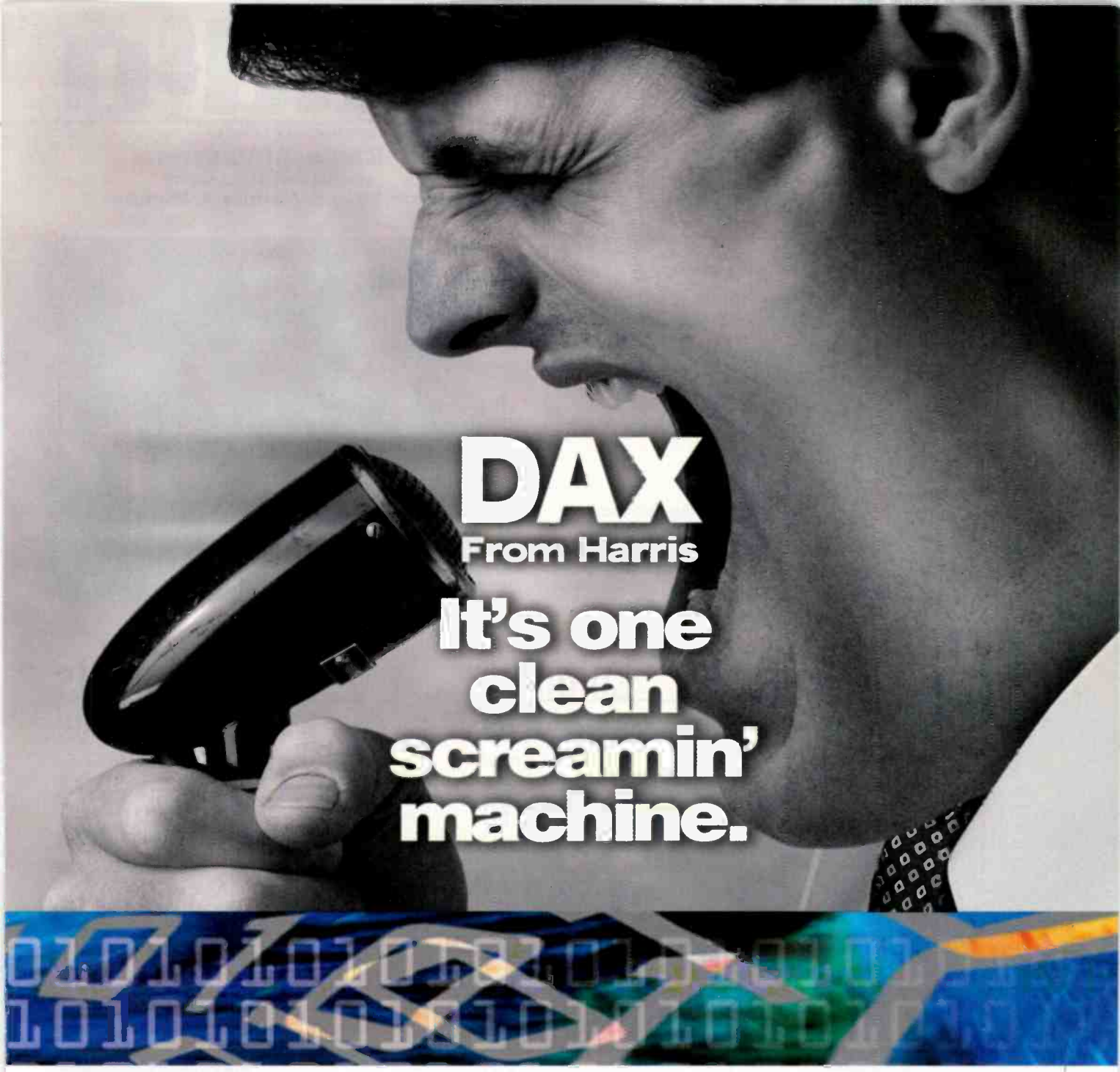

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To learn more about DAX transmitters and other Harris extreme digital products, visit **www.broadcast.harris.com.**

For more information, call us at 1.800.622.0022 or click on www.broadcast.harris.com

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HARRIS

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Radio™
THE RADIO TECHNOLOGY LEADER
Radio Magazine
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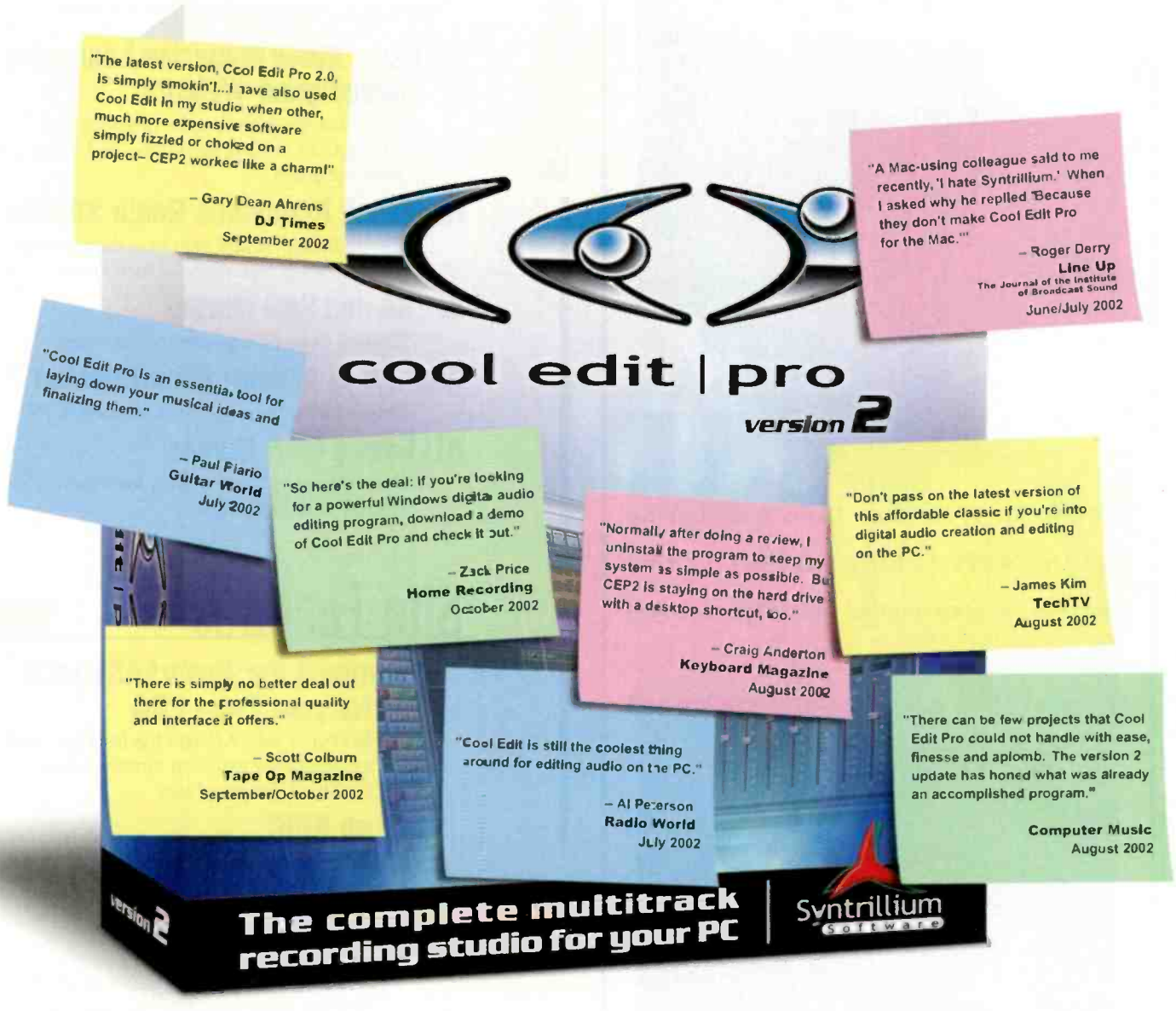
Field Reports

ON THE COVER:
From mic to antenna, get a first look at some of the new products that will be unveiled at NAB2003.
Cover design by Michael J. Knust.

Don't take our word for it.
Stick with what the pros say.



cool edit | pro

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Currents Online

Highlights of news items from the past month

All-new: *Radio* magazine Launches Redesigned Website

The URL is the same, but the design is new. Your favorite features are there—and some new things too.

Rock Hall Renovates Radio Studio

The studio for visiting stations is dedicated to the memory of legendary DJ Alan Freed.

AFTRA and SAG Merge

The two trade unions vote to join forces.

Andrew to Acquire Allen Telecom

Merger strengthens Andrew's position in RF

ATI Gets a New Owner

David Day buys the company from Sam Wentzel and Ed Mullins.

Site Features

Download the *Radio* FASTtrack for your Palm PDA

Find your way throught the floor fast with our exclusive exhibitor directory and FASTtrack for your Palm.

Eye on IBOC

Follow the transition to digital transmission as we track the stations that have commenced HD Radio broadcasts.

Currents Online

All the news, business, people, product and Internet radio news that you can use. You want the information that matters, and *Radio* magazine brings it to you.

Engineer's Notebook

Just added to this collection of handy tools are Grady Moates' tower light monitor circuit and a way to read AM modulation with an oscilloscope.

Industry Links

Radio history, associations, schools and references are all here.

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Ahead of the curve

Throughout the course of any given week, and especially at conventions, I have the opportunity to talk with readers about the business of radio. Some of these readers are seasoned veterans with many years of experience, others are green newcomers just learning their way around. Their duties range from basic equipment maintenance to station management and higher. All of them have an interest in the technology of radio; the same technology that we cover in every issue and online.

Our conversations may cover a wide range of topics, but at some point, the specifics of today's state of radio technical operations usually comes to the forefront. This is where I have a chance to complete the communications cycle and use the information backhaul for feedback on the technology that we bring you every month. This helps me to stay in touch with what is important to readers like you.

It's obvious that this is a dynamic industry, and it is changing with the world around it. But even though the changes are many, the basic needs of those responsible for the technical operation of the facility remain the same. Everyone needs the right tools for the job. Our goal at *Radio* magazine is to provide you with some of those tools.

Many of the people with whom I speak feel that ongoing education is important, but there is just not enough time to fit it into a busy schedule. We all agree that staying on top of technology issues is paramount to a successful career. We fill that need in many ways by helping you to learn about new products to make your job easier and providing you with application ideas and solutions that you can use every day. We're in a dynamic business. Time is a critical part of our lives. You need current, accurate and timely information—and you need it fast.

A year ago we started making incremental improvements to make *Radio* magazine more useful with our layout redesign. In January, we relaunched our website at www.beradio.com. The old layout worked, but we knew that it could be better. We listened to you, crafted concepts into real applications and relaunched a more useful and useable site. But we didn't stop there. When you have a good thing going it's easy to sit back and rest. In doing so, you are bound to stumble. Well, we're not resting.

Our next step was to focus on what you have told us was the most useful to you. We cover the news and industry happenings online, where you can read it everyday, and we bring you information about products and applications in print every month. We have always focused on practical information in print, but thanks to your input, we are going to bring you more of what you have told us is important to you.

Look for more articles about technology applications and actual installations. We'll do this by bringing you more Field Report, Facility Showcase, Applied Technology, On Location and Trends in Technology articles. All of these will highlight the products and technology used in radio facilities like yours to give you the best ideas that you can apply today.

To further help you find what you want, we have enhanced the cover design to provide more detail about what's in each issue. You've told us that after you have read an issue of *Radio* magazine you keep it on the shelf and use it as a reference throughout the year. Now you will be able to find what you're looking for even faster. (Of course, you can also use the search function on our website to locate articles and information.)

To top it off, Harry Martin's FCC insight, John Battison's RF transmission expertise and Kevin McNamara's studio and IT mastery add to the wealth of information we bring you every month.

Through surveys, your letters and personal conversations, we're bringing you more of what you told us you like. We have always taken great care to bring you the real meat of any topic. We're still doing that, only now it's more concentrated than ever.

It's all part of our continuing effort to keep you informed, up-to-date and ahead of the curve.

Chriss Scherer, editor
cscherer@primediabusiness.com

Send comments to: **E-mail:** *beradio@primediabusiness.com*
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Who does Doug Lane rely on Comrex?
Because he can.
Power user Doug Lane relies on Comrex codecs for all of his remotes. Responsible for major league basketball broadcasts, Doug reports that in the ten years they've been using Comrex equipment, they've never lost a game. With 29 teams and more than 80 games annually plus playoffs, that's over 15,000 perfect broadcasts. Doug also specifies Comrex codecs every weekend during basketball and football season at his stations.
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—Doug Lane, ISDN Technical Consultant to the NBA and NHL and Technical Director for WEEI
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Environmental, ground system problems

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

As the FCC continues to delete mandatory measurements and checks from the Part 73 rules, some unintentional traps are opened for the unwary engineer. Over the years old-timers have become accustomed to making rather comprehensive log entries of such things as basic current, common point current, monitor point measurements and similar operating parameters. As a result of this, values are checked regularly and therefore operation should comply with the Commission's requirements. Should an inspection occur, the odds are that the transmitting system will be found to be operating in compliance with the rules. In any case, a comprehensive operating history of the station is available to successive engineers.

Use a field strength meter to not only take monitor point readings, but also to track problems due to reradiation.

On the other hand, many newer engineers may read the revised FCC rules and fail to register the fact that a rule says "must be within limits," or similar words. Sometimes the assumption is made that the system is operating within limits and regular checks are not made because they were not mandated. The end result is that an inspector arrives to find an operating parameter is out and a pink ticket is issued. Or, after several years of normal operation the engineer finds one or more of his operating parameters out of limits. The unfortunate thing is that no one knows when the change occurred, because no one kept a log or even checked the meters on a regular basis.

Let's assume that the chief engineer decides to do a monitor point check on a DA system. He finds that one point is way out of limits. When he checks old logs, he finds that this particular point has been going out for a long time. This actually occurred on one station where I was called in, and we found the point had been going out slowly for three years, but the original proof value had been entered from time to time.

We examined the area of the questionable monitor point and discovered that a large pile of rusted iron, mainly consisting of iron girders and iron pipes, had accumulated within several hundred feet of the monitor point. A quick trip to the dump area with a field strength meter quickly confirmed my suspicions that the high field strength measured at the monitor point was due to the accumulation of this rather tall pile of iron. It was a relatively easy matter to select a new monitor point and file the necessary paperwork to change location. As a precaution, a skeleton proof was run on this radial and showed that some points were up slightly, but only the monitor point had been out of limits.

Detriments to conductivity

Sometimes environmental changes cause field strength to decrease because conductivity has changed at the location of the specific point, or between the point and the transmitter. This may be caused by urban spread as built-up areas intrude over a radial, or maybe by the construction of interstate highways, or even large commercial and manufacturing construction.

The result of all this construction is that large areas of concrete wall, paving and similar material extend along the radial between the station and the monitoring point. Ground conductivity decreases and signal strength drops.

Cases of reduced monitor point value or lowered radial values that have constricted and decreased critical coverage contours are much harder to deal with. The loss of signal strength has probably been caused by an actual change in conductivity that is beyond the control of the licensee.

If the problem concerns only a single monitor point, the best solution is to pick a new point. If the whole radial is down, there is not much that can be done, short of moving the transmitter. If a radial is badly damaged due to environmental changes in conductivity, it might be possible to augment a DA pattern to increase radiation in that direction to restore the original service. This would be an expensive undertaking and might require a new proof.

Such a situation would be more likely to occur to a long-existing station. The ground system of a station could be contributing to the reduced field strength due to deterioration. Look at the radials, especially those in the direction of reduced signal strength, as well as the copper around the base of the tower.

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VoxPro PC edits as fast as you can move. With our reliable functionality, smaller control panel (8 X 10 inches) and bigger editing window (on a PC monitor) customers say they get three or four edits done in the time it used to take them to do just one on competitive editors.

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VoxPro PC

VoxPro PC - What audio editing is coming to.

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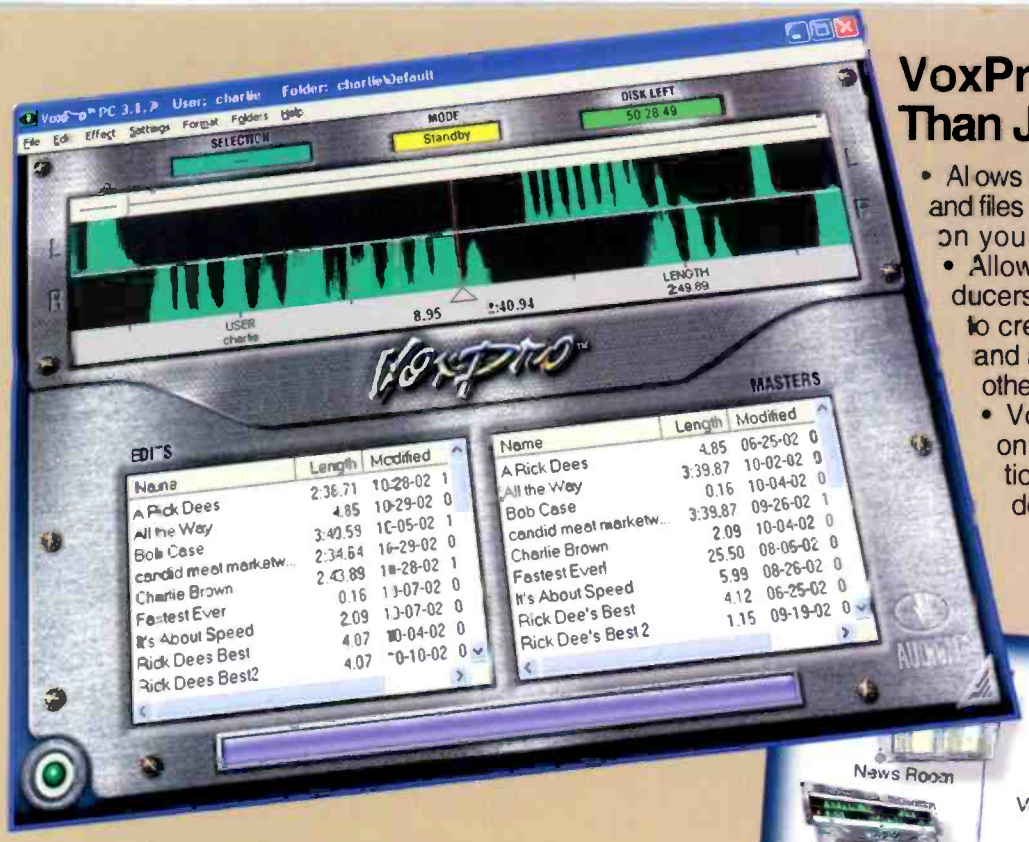

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About VoxPro PC

VoxPro PC software provides fast digital editing of voice and phone recordings on PC's with Windows® 2000 or XP. VoxPro PC software uses a computer keyboard or an optional control panel to execute its easy-to-learn features.

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- Imports all popular file formats including MP3.
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- Automatically separates host/caller talk-over using VOICESLIP™.
- Networks on NT, Novell or peer-to-peer networks.
- Scrubs audio using jog wheel or buttons.
- One-button Insert Record automatically sandwiches new audio into existing recordings.
- Lists recordings on single screen and sorts by name, length and last modified time.
- Copies or moves ***multiple*** files from folder-to-folder and user-to-user.
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- Provides unlimited undo's and redo's that remain active for the life of the file.
- Remotely starts Record, Play, Play from Beginning and Stop.
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- Opto-Iso tally to console for HotKey play.
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VoxPro PC

What They Are Saying

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"My nationwide, phone intensive program totally relies on VoxPro PC's speed and stability. I couldn't part with it. Thank you Audion!"
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System Requirements

Pentium III or higher, Windows 2000 or XP, USB or serial port (for control panel), 128 MB RAM (256 MB for XP), DirectX 8 compatible sound card with non-emulated WDM driver, CD-ROM, 20 GB Hard Drive (15 hrs of record time per 10 GB), SVGA monitor 800 X 600 w/16 bit color.

Available at your favorite distributor, or call 206-842-5202 x 204

A field-strength readings may change during hot or cold months.

Many stations place a large expanded copper screen round the base of the tower where the current is highest. Sometimes traffic, digging and other construction work damages ground systems. Take a field strength meter and walk the ground radials in the reduced field strength direction to see if they are intact and still there. The current at the end of the radials is usually low. However, if there are no indications of signal in the end sections of the radial it could indicate radial breaks closer to the tower base.

Avoiding potential problems

I have often wondered if a variation of the sacrificial anode system, such as those used on boats, might be useful in protecting a ground system. There are different metals, such as iron guy wire anchors and metal ATU Cabinet supports, within the radial system's region. A ground system covers an extensive area and the copper wires may pass through several regions of different chemical composition. Electrochemical currents could flow and erode sections of copper. Such a system is available for automobiles as well as boats, and is reputed to work quite well.

Assume there will be a small ground-system resistance loss when calculating radiated power. Keep in mind that a comparatively small ground system resistance can make a large difference in radiation. When measuring base operating resistance, include any losses in the ground system and also any other losses in the antenna circuit.

If salt or chemicals have been used to improve the ground connection, renewing the salt or chemicals may solve the problem. At the same time the ground electrodes should be examined for deterioration.

If we have a 5Ω ground system resistance and an antenna current of 10A we have 500W of RF dissipated in the ground. If the total measured operating base antenna impedance is only 35Ω the useful 30Ω would radiate only 3kW of RF. Ground system losses often exceed this value, especially in older stations where there has been substantial deterioration due to radio damage and copper erosion.

Temperature can also cause misleading and troublesome results. I have always felt that it is best to make initial proofs of performance in cold weather. In such weather ground conductivity seems to increase. It is not unusual for a DA that was performing properly during hot summer months subsequently to become out of tolerance on one or more points during winter when the ground is covered in snow.

E-mail Battison at batcom@bright.net.

Commissioner Adelstein sworn in

By Harry Martin

Jonathan Adelstein (pronounced "ADD-dull-steen"), a Democrat, joins Republican Commissioners Kathleen Abernathy, Kevin Martin, Chairman Michael Powell and Democrat Michael Copps on the FCC. Although the White House nominated Adelstein for the position in November 2001, he sat in the wings for a year waiting for Congress to confirm his nomination, which occurred in November 2002. The 40-year-old former senior legislative aide and history professor was sworn in on Dec. 3, 2002. He will complete the term of departed Commissioner Gloria Tristani, which expires June 30 of this year. It is assumed that he will then be reappointed for a full term.

Adelstein made his debut speech as a Commissioner at the Future of Music Coalition Policy Summit 2003 in Washington, D.C. on Jan. 6. He accompanied R&B legend Lester Chambers on the harmonica and, as a musician and a Commissioner, spoke of his soft-spot for community-oriented broadcasters, his cautious approach toward media ownership and his fear of the impact over-consolidation could have on diversity and localism. He also said in a statement on the date of his swearing-in that his goals include enhancing competition and efficiently managing the public spectrum. Additionally, he has emphasized the need for broadcasters to take advantage of technological advances such as broadband, wi-fi, satellite radio and digital cable to take their programming to more people and allow the marketplace of ideas to flourish.

For the seven years immediately preceding his Commission swearing-in, Adelstein was senior legislative aide to Senator Tom Daschle (D-SD), who was majority leader of the Senate for much of that time. Unfortunately, since Daschle has not focused his attention on broadcast issues, we do not know where his former aide may stand on broadcast matters. It is noteworthy, though, that Adelstein had the strong support of the National Association of Broadcasters, whose president said in a published statement that Adelstein has "a firm grasp of broadcasting and telecommunications issues and a "commitment to public service."

EEO rules in place

The FCC's new EEO rules will become effective March 10 2003. The new rules require the filing of a number of report and the routine maintenance of a considerable number c records concerning recruitment efforts. In particular, broadcast station must file a Broadcast Equal Employmer Opportunity Program Report (FCC Form 396) with it renewal application. And annually on the anniversar date of its renewal application deadline, the stati- mus place in its public file—and on its website, if it h an EEO public file report.

Spring thaw for MX applicatio

There appears to be a proposal before the Comm. ers to resolve the issue that has brought processing c mutually exclusive applications between commercial an noncommercial applicants to a screeching halt. No sooner had the FCC started to implement its auction processes fc broadcast permits than the U.S. Court of Appeals in Wash ington D.C. slammed the door on those processes, as long as they contemplated that noncommercial applicants might have to participate in auctions. The court found that the FCC could not force noncommercial applicants to participate in auctions, even when the facilities up for bidding are commercial licenses. The Media Bureau staff has presented to the full Commission a draft, which, if adopted, could end the freeze and start applications moving through the process again.

On a different topic, the Commission has launched a simplified version of its Electronic Comment Filing System (ECFS). The new ECFS Express is supposedly easy to use, requiring minimal input from consumers. It's participation made easy. The Commission hopes the new system will make the rulemaking process accessible to anyone with a computer.

This initiative is a part of the Commission's on-going efforts to make its processes available to the public.

Martin is an attorney with Fletcher, Heald & Hildreth, PLC., Arlington, VA. E-mail martin@fhhlaw.com.

Dateline:

April 1 s the deadline for biennial ownership reports for stations in Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas.

Renewal applications are due June 1 for radio stations in the District of Columbia, Maryland, Virginia and West Virginia. The Commission plans to make form instructions available on its website before the deadline.

NAB Extra!

What to see at NAB2003

The *Radio* magazine NAB Extra! is your guide to finding the new products debuting at NAB2003. Is there a specific product you are looking for? Or are you attending to see what the latest technology has to offer? The NAB Extra! will help you decide which products are a must-see at the show.

Tube microphone & amp
Audio-Technica

Booth N2212

AT3060: This mic operates on standard 48V phantom power, and as a result does not require a separate power supply and cable, making it as easy to set up and use as a standard condenser microphone. The mic features a large-diameter diaphragm cardioid condenser element, delivering high sensitivity and smooth sound with low overall noise levels. A nickel-plated brass baffle provides element stability and optimizes sensitivity. The tube used in each mic is hand-selected and aged to maintain peak performance; the tube is shock-mounted to dampen mechanically induced vibration. Electronically, the mic includes a large coupling transformer to provide linearity at low frequencies. Its precision valve design delivers the traditional warmth of the classic tube microphones.

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Air and production workstation
Broadcast Software International

Booth N2654

Series 200: This system includes an air and a production workstation. The system includes two Dell 17" flat panel monitors. The series uses the Windows 2000 platform, and includes Simian digital automation, Wavecart digital cart machine, Stinger instant audio, Speedy CD-to-PC ripping and Syntrillium's Cool Edit Pro 2.0 128-track digital editing software. Simian can be used for music on hard drive and satellite automation, as well as live-assist or a combination of all three. It offers easy voice tracking and is compatible with most traffic systems. Wavecart and Stinger are useful for a variety of live-assist functions. The workstation includes two AudioScience 4344 professional sound cards.

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www.bsiusa.com; info@bsiusa.com

Digital on-air radio control surface
Wheatstone

Booth N2804

Gen-9: This radio control surface is an extension of the Bridge digital audio network routing system. Bridge engine components allow as many as 256 mix buses in one rack mount system. Multiple components can be linked to form a networked system, making it useful for large station integration projects. The system provides total integration of routing, machine logic and communications.

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www.wheatstone.com; sales@wheatstone.com

TCP/IP codec
Audio Processing Technology

Booth N3204

Worldnet Chicago: This Apt-X-only TCP/IP codec features the company's data compression algorithm. It offers UDP and TCP capabilities and a feature set designed for broadcasters who are considering networking audio over WAN/LAN infrastructures. This product is an option for broadcasters considering next generation data transportation for studio-to-studio links and studio-to-transmitter links.

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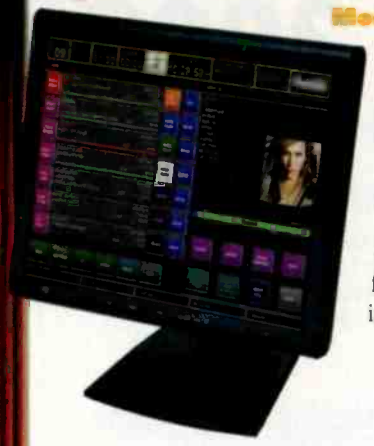

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Imediatouch v.2: New features added to the four core Imediatouch modules include on-screen recording and voice tracking, front sell/back sell information, audio audition inside the audio library, show log fade out and repeat and playback while recording long files. Production tools include an easy-to-use interface, improved search engine capabilities, improved editing functions on .WAV, MP2 and MP3, an automated visualization file feature and automated level adjust.

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Console system

Harris

Booth C404

Vistamax: A scalable Pacific console system, it is a hub that enables all console resources and audio assets to be shared throughout the network: Audio is connected to only one console in the networked system, but becomes available throughout the entire facility. An integrated system, it is a cost-effective alternative to networked systems. It is modular, scalable and designed for on-the-fly configurability. The console connects BMXdigital or other consoles to its hub via fiber or CAT-5 connections with an architecture that ensures the shortest physical path between sources and destinations. The platform simplifies network audio management, reducing the need for standalone routers, distribution systems and long multi-pair bundles.

800-622-0022; fax 513-459-3890; www.harris.com; broadcast@harris.com

Wireless network

Comrex

Booth N2526

Matrix Wireless Module: Broadcasters can transmit remote audio over a wireless network without needing a telephone line or

a separate wireless phone with this module. The module incorporates a GSM wireless phone, a 2W power booster and the firmware to transmit high-quality audio over GSM networks, all enclosed in compact housing. An external antenna comes with the module. With its optional battery kit, this module can broadcast in the field for as long as seven hours.

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www.comrex.com; info@comrex.com

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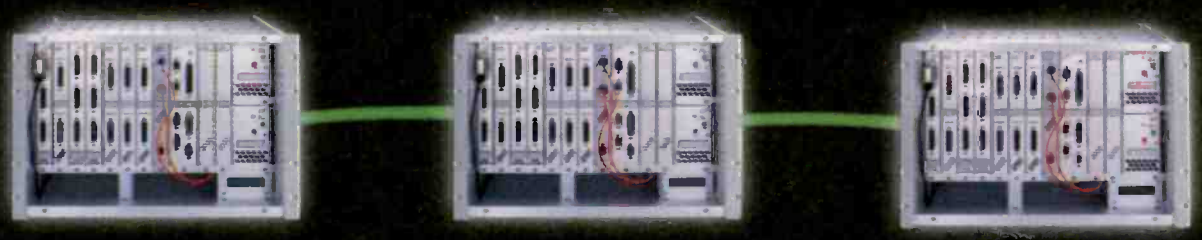

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Networking audio throughout your facility has never been easier. Logitek's Audio Engines use high speed fibre optic networking to give you instant access to any audio source connected to any Audio Engine in your network. Why settle for only 64 channels of networking when you can have 10 times that number?

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www.logitekaucio.com

Logitek

Digital with a Better Difference

NAB Extra!

Three-way powered monitors
TC Electronic
Booth N2926

Dynaudio Acoustics Air 20: The three-way design of this monitor combines Dynaudio 221 technology with digital TC technology, and it integrates into any Air network. The design also offers control of directivity and thus minimizes reflection effects from the console, floor or similar planes. It features a 1.1" Softdome tweeter and polypropylene 5.5" midrange and 10" woofer drivers.

805-373-1828; fax 805-379-2648
www.tcelectronic.com; info@tcelectronic.com

Content delivery system
Pristine Systems
Booth N3313

CDS32 Pro: Running on Windows 2000 or XP, this system offers live assist, satellite automation, music-on-hard-drive, remote control access and unlimited walk-away time. It supports all traffic and music scheduling software, but also includes a spot set editor and music scheduler. It operates manually or uses script automation. The Satellite Automation systems offer all the features of the Live Assist system plus satellite automation functions for multiple satellite networks. The Music Log system is designed to operate live or automated. It features in-context voice tracking for live sound.

310-831-2234; fax 310-831-6287; www.pristinesys.com; sales@pristinesys.com

Profanity delay
MDO UK
Booth N3022

Arse!Delay: Up to 30 seconds of broadcast-quality stereo profanity delay is possible with this system. During a live program, the operator can control the entire system with just two buttons. This all-software PC accessory offers several features. The large, full-color display on the PC screen provides status information on the current level of delay, audio levels, mode and user options. Countdown clocks to cue points are also shown clearly on screen. The system can be controlled with a mouse, using user-defined keyboard hotkeys or using external keypads, which can be built into existing control surfaces in studio areas.

+21 248 0200; fax +21 248 5109; sales@mo.dutta.org

Yagi antennas
Kathrein, Scala Division
Booth C3438

YA7-FML and YA7-FMH: These yagi antennas are designed for professional FM transmit and receive applications. The antennas may be used alone or in stacked arrays for higher gain, increased side-lobe suppression or custom azimuth patterns.

541-779-6500; fax 541-779-3991; www.kathrein-scala.com; broadcast@kathrein.com

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Registered ISO 9002
E-mail: info@nautel.com or visit www.nautel.com

NAB Extra!

CD player
Denon Electronics
Booth N2918

DN-C615: This CD player features preset programmability and enhanced multi-format playback of various formats including standard compact discs, CD-R/RW and MP3-encoded discs. It features a shock-proof memory for uninterrupted playback. The player displays CD encoded text through a flowes out display. A new inclusion is the high-speed instant start function, which allows for instantaneous playback when a key is pressed. Standard features include track search, frame search and direct track selection via the front-panel 11-key pad. A user preset component of the player allows users to set pre-tailored playback functions, such as playback moce and auto cue. Playback speed is adjustable via the front panel controls for pitch change up to +/-12 percent.

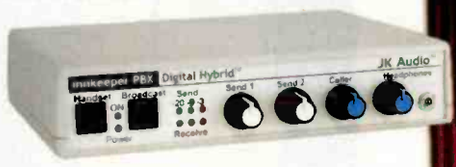
973-396-0810; fax 973-396-7459; www.del.denon.com

Countertop console
Audioarts Engineering
Booth N2804

R-55: An analog on-air countertop console, this console is designed for small- to mid-sized markets. A visually clean, simple layout aids error-free operation. The fully modular console features a 12-input channel mainframe, control room, studio and headphone monitor outputs. Master outputs are provided for stereo PGM and AUD, and mono 1 and 2 buses. The series features pointer-style VU meters, a built-in timer and cue speaker, full logic and all-electronic switching.

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

Desktop digital hybrid
JK Audio
Booth N2237



Innkeeper PBX: This personal desktop digital hybrid is capable of providing talk show-quality phone interviews. The hybrid allows the user to send mic and line level signals into a PBX telephone system, while maintaining separation between the user's voice and the caller. The stereo output jack on the back of the unit provides the user's voice on one channel and the caller's voice on the other channel. The balanced XLR output jack contains only the caller's voice. This product can turn a multi-line digital phone system into a simple talk show controller. Other applications include telephone interviews, talk shows, church PA interface and conference room full-duplex applications.

800-552-8346; fax 815-786-8502
www.jkaudio.com; info@jkaudio.com

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NAB Extra!

Studio monitors

Tannoy

Booth N2052

Ellipse 8 and Elipse 10: Both monitors feature Wideband technology. Each features an 8" Dual Concentric or 10" Dual Concentric unit with SuperTweeter. Both monitors are active designs and have a frequency response extending beyond 40kHz. The cabinet enclosures are acoustically and mechanically non-resonant. Both monitors are time-aligned with three-way active systems. Each system's 90-degree horizontal dispersion affords a wide sweet spot for practical working across the length of the console. Discrete MOSFET power amplifiers provide ample power with low noise and distortion.

877-426-4TGI; fax 519-745-2364; www.tannoy.com; litplease@tgina.com

Silence eliminator

Danagger Audio Works

Booth N2519

Plan B: Combining the functions of an audio loss detector, a CD/MP3 player and a talking remote control system, the Plan B provides a backup system to eliminate dead air caused by equipment failure or human error. On detection of an interruption, the unit switches its built-in disc player online and then dials until it makes contact. The user controls the Plan B and any external equipment connected to the unit's three auxiliary relays or status inputs. The unit can provide as much as eight hours of backup programming. Other features include an alarm siren with external mute, a tabulating failure memory and a safety switch to prevent accidental activation.

888-892-8346; fax 250-763-2902; www.danagger.com; info@danagger.com

Audio storage and playback system

Prophet Systems

Booth SU5369

Nexgen Digital ver. 3.0: The latest version of this storage and playback system contains a wide array of customer-driven enhancements and improvements. The scheduling software, Musicgen, integrates into Nexgen, offering more potential data to the on-air screen, as well as the ability to fill short hours with music. Delivering files via WANcasting is made easier with bulk file feeds and off-peak time delivery. Increased tracking capabilities in the WANcasting module allow the user to distinguish data recordings. The digital reel-to-reel element now includes features to control external hardware. Individual user button-bar settings can be locked. Missed commercial lists are automatically delivered by e-mail.

800-658-4403; fax 308-284-4181; www.prophetsys.com; sales@prophetsys.com

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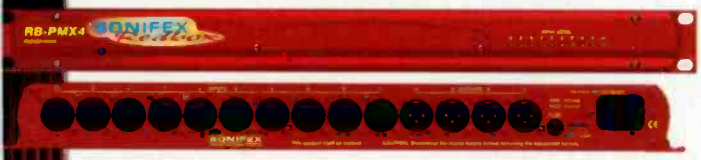
NAB Extra!

Rack-mount mixer



Sonifex Ltd
Booth C133

RB-PMX4: The RB-PMX4 is a 10 mono input to four mono output pre-set mixer. Each of the four outputs has a 10-way DIP switch associated with it to select which of the 10 inputs is routed to it. The DIP switches are enclosed in a screw-on cover on the front panel to guard against accidental changes. This mixer is useful for installations where a set-and-forget, small mixer is needed. The XLR inputs and outputs are electronically balanced and can be wired unbalanced. Each output is individually buffered so that a short circuit on one will not affect the others. Each input has its own gain control, which is a preset potentiometer accessible through the front panel. This provides gain adjustment of -8dB to 18dB.

207-773-2424; fax 207-773-2422; www.independentaudio.com; info@independentaudio.com

Time-fit enhancement

Scott Studios
Booth SU5471

Stretch & Squeeze for SS32: The Stretch and Squeeze option lets the user produce a commercial and instantly adjust it (plus or minus 20 percent) to the ideal 30- and 60-second lengths for the network. It can also speed up music pacing without hurting pitch. Different tempos can be applied to any category, shift, day or season at a moments notice. This enhancement can be applied to existing spots and music immediately with no redubbing required. It also allows the user to add extra commercials in time-shifted network talk shows.

800-SCOTT-77; fax 972-620-8811; www.scottstudios.com; info@scottstudios.com

Miniature click-on cable hangers

Andrew
Booth C2630

Click-on Hangers: These hangers facilitate easier and less expensive installation of small Heliax coaxial cables, and braided cable runs. Each hanger can accommodate two runs of cable. The hangers are stackable, making it easy to install as many as six runs of cable, even in confined spaces. The mini hangers are suitable for cable installations on towers, roofs and walls or within buildings.

800-DIAL-4-RF; fax 708-349-5444; www.andrew.com; rose.wolski@andrew.com

NAB Extra!

Single-tube FM transmitter
Broadcast Electronics
Booth N2604

FM-25T: This transmitter can be used as a standalone 25kW transmitter or two can be combined for as much as 50kW of output power. Features of this product include a folded halfwave cavity that eliminates the need for a plate blocking capacitor and sliding contacts; a remote transmitter diagnostic system for complete remote monitoring and logging of all transmitter operations; proportional VSWR foldback for continuous operation into loads up to 3:1 VSWR; and a 500W solid-state IPA that can be used as a standby transmitter.

217-224-9600; fax 217-224-9607; www.bdcast.com; bdcast@bdcast.com

The *Radio* magazine Pick Hits
Who will win the most presitigious radio technology award of the NAB convention? Find out at the show and in the June issue.

Data transceivers
Multidyne
Booth C276

FMX-230: This flexible transceiver can connect multiple devices in a fault-tolerant drop-and-insert network. There is no limit to the number of nodes present in the network. Using packet data transmission technology, this transceiver can transmit and receive data at speeds as fast as 112kb/s throughout the network. Each unit is capable of receiving data from an uplink or downlink and then retransmitting the data to the respective uplink or downlink direction. With an embedded micro-controller in the unit, all configurations and equipment settings can be managed through the network monitoring system. Control signals that are used to control the data path are user-programmable and feature master, sub-master and slave node settings, anti-streaming logic, poll and respond data transmission timing, data rate and data terminating.

800-4TV-TEST; fax 516-671-3362
www.multidyne.com; info@multidyne.com

Remote control software
Burk Technology
Booth N2338

Lynx 4: Use this software to maximize a GSC3000 or VRC2500 transmitter remote control system. This software is included when you buy a new unit. By offering simple site setup and control, customized logging and a feature set built for flexibility, this product gives the user the power to control a site easily. Access all the sites on one screen with dockable windows that present all the information logically. Multi-site control is convenient and efficient, with each site selectable from an expandable menu. Switch views from one site to the next with a click, while keeping alarms and events for the entire system in plain sight. Offers a real-time event list to provide immediate notification and detailed logging of user and site activity.

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

Stereo mixer
Henry Engineering
Booth N3101

Micromixer: This four-input, two-output stereo mixer for line-level audio sources is useful for combining two stereo sources or four mono sources to a stereo output. Microassign switches permit any input to be routed to the left, right or both outputs. The ac power supply is built in, so wall warts aren't needed. As many as three units can be mounted in a 1RU rack shelf.

626-355-3656; fax 626-355-0077
www.henryeng.com; info@henryeng.com

Website enhancement services
Enco Systems
Booth N2546

Enteractive: This Web-based service allows broadcasters to enhance a listeners' online experience and retain them longer by using interactive tools. It also allows broadcasters to derive revenue from the listener base and NTR revenue from clients through Short Message Service texting on mobile phones. By implementing a range of services from requests to dedications to contesting, listeners can interact with the station to the level desired by the station from perceived control of music played, to actual control of music played. Mine demographic information from listeners and put the gathered information to work generating revenue and obtaining data from these most active listeners. Works with analog and IBOC digital radio.

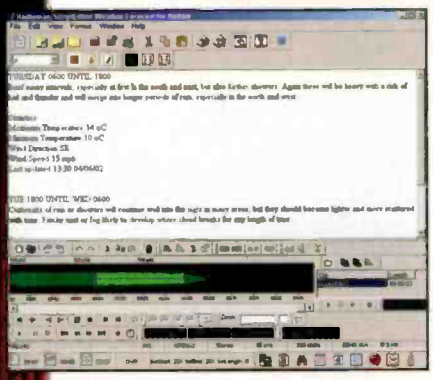
800-362-6797; fax 248-827-4441; www.enco.com; support@enco.com

NAB Extra!

Audio storage and playback system

Jutel

Booth SU7237



Radioman R5: A scalable and flexible system for digital media, the latest generation of Radioman software enables content to be transmitted simultaneously through multiple output streams, for example online and over-the-air. Radioman R5 integrates programming and broadcast planning, digital audio production, reporting, archiving as well as program transmission into a single package. The main advances in this system are its Media Asset Management (MAM) features that provide information management and copyright control. The system can be scaled for small or large operations. Jutel Radioman software is sold internationally through IBM network and is a part of IBM's Digital Media Factory.

+35 8-8-551 4801; fax +35 8-8-551 4810; www.radioman.fi; sales@radioman.fi

Auto answerer

Broadcast Tools

Booth N2350

STI-II: The hybrid interfaces a single POTS line to user equipment while providing full-duplex audio quality. It is equipped with a programmable serial port, allowing control and monitoring via the users computer and software. This product makes those remote call-in recordings a snap while eliminating the DTMF tones. Features include balanced audio input and output, DSP delay processing for DTMF tone removal, front panel control of line seizure and drop and LED monitoring. Additional features include caller ID, call-progress monitoring of busy, CPC, dial tone, reorder off/on hook and loss of loop. Relays are provided for most front-panel indicators.

877-250-5575; fax 360-854-9479; www.broadcasttools.com; bti@broadcasttools.com

Digital console upgrades

Logitek

Booth N2931

Audio Engine enhancements: The Audio Engine is a modular product based on a card cage architecture. Updates to the digital console include a firmware release, version 3, which enables a number of standalone audio routing functions. The firmware also expands the number of available mix-minus buses to 24 and increases the stereo mix bus count to eight. The capabilities of the Supervisor software for the Audio Engine have also been increased. Supervisor now features a UDP network connection in addition to the existing TCP/IP connection.

877-231-5870; fax 713-664-4479

www.logitekaudio.com; info@logitekaudio.com

Make your move into radio's future:

Otari's New DB-10 Digital On-Air Console.

High-resolution digital audio is now becoming a demanding fact-of-life for today's top-market radio operations. To meet this challenge, Otari introduces the new **96 kHz DB-10 Digital Broadcast Console**. The fully expandable DB-10 is the most advanced and reliable small-format digital On-Air console available, specifically designed to meet the needs of broadcast professionals. Its ergonomically refined control surface features ten (10) fully configurable input channel faders. Choose from Analog Inputs (Stereo and Mono) or Digital Inputs (AES/EBU and S/PDIF) for a maximum of 16 active channel paths in total, with 4 microphone inputs always available on faders 1 to 4. The DB-10 also features the EMG Emergency bypass function, which protects you in the event that one of your digital input sources should fail.

The DB-10 provides 99 password-protected snapshots, and 9 project settings for easy recall. Multiband selectable equalization, compressor/limiter dynamics, 2 AUX, 2 TEL, and 2 PGM busses as well as two digital mix minus (N-1) busses, are available on all channels. The DB-10 handles sample rates from 32kHz to 96kHz using the highest quality sample rate converters. Synchronization can be achieved via internal or external 48kHz word clock, providing a reliable digital lock every time.

Up to 4 DB-10 consoles can be cascaded together to provide additional channel inputs as needed. When cascading DB-10 consoles, both the talkback and Emergency Bypass signals are shared between all consoles, allowing for one man operation. All of this in a compact footprint perfect for small studios, while also being expandable for use in larger facilities. Furthermore, the DB-10's portability makes it the perfect choice for OB trucks.

Need computer backup? DB-10's console snapshots, project settings, and GPIO data can be quickly saved and recalled using a standard PC serial link. The outboard power supply unit supports 100-240VAC and optionally 24VDC. And by adding another optional power supply unit, the DB-10 can be redundantly duplexed for failsafe operation. If your station's been waiting to provide "all digital" content, here's the on-air console solution to take you securely into radio's future. The **Otari DB-10** delivers digital technology today - with the simplicity, reliability and familiarity of analog's past.

Microphone courtesy of Audio-Technica

www.otari.com

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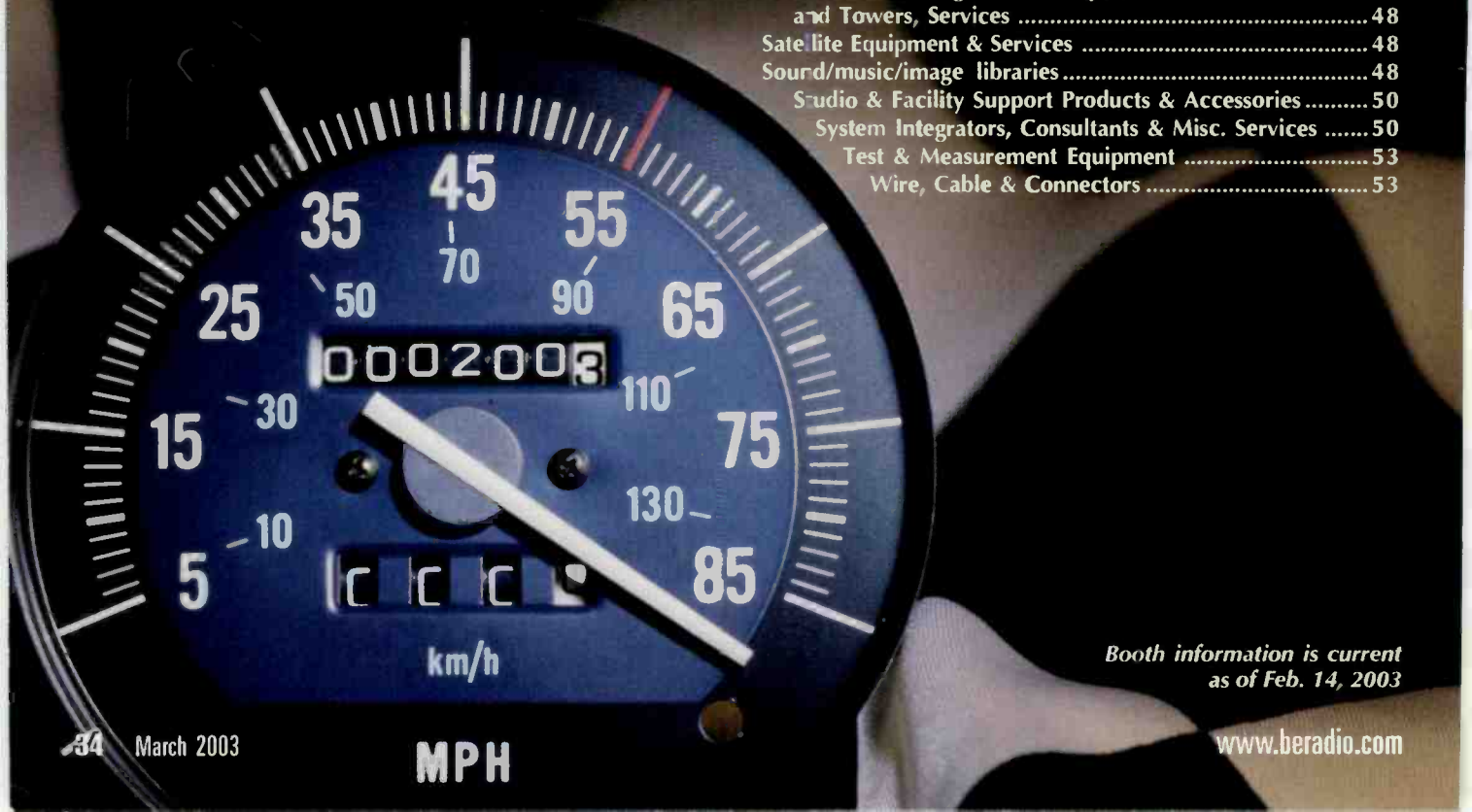
Get on the FASTtrack for NAB2003

Your time at the NAB convention is precious. Don't waste it wandering around the show floor hoping to find what you're looking for. Use the *Radio* magazine FASTtrack instead. This exclusive *Radio* magazine feature organizes the show floor into specific product categories, and then arranges the exhibitors by their booth numbers. With this, you can quickly chart the shortest course through the show floor. An alphabetical radio exhibitor listing can be found on the show-floor map in this issue.

FASTtrack Index



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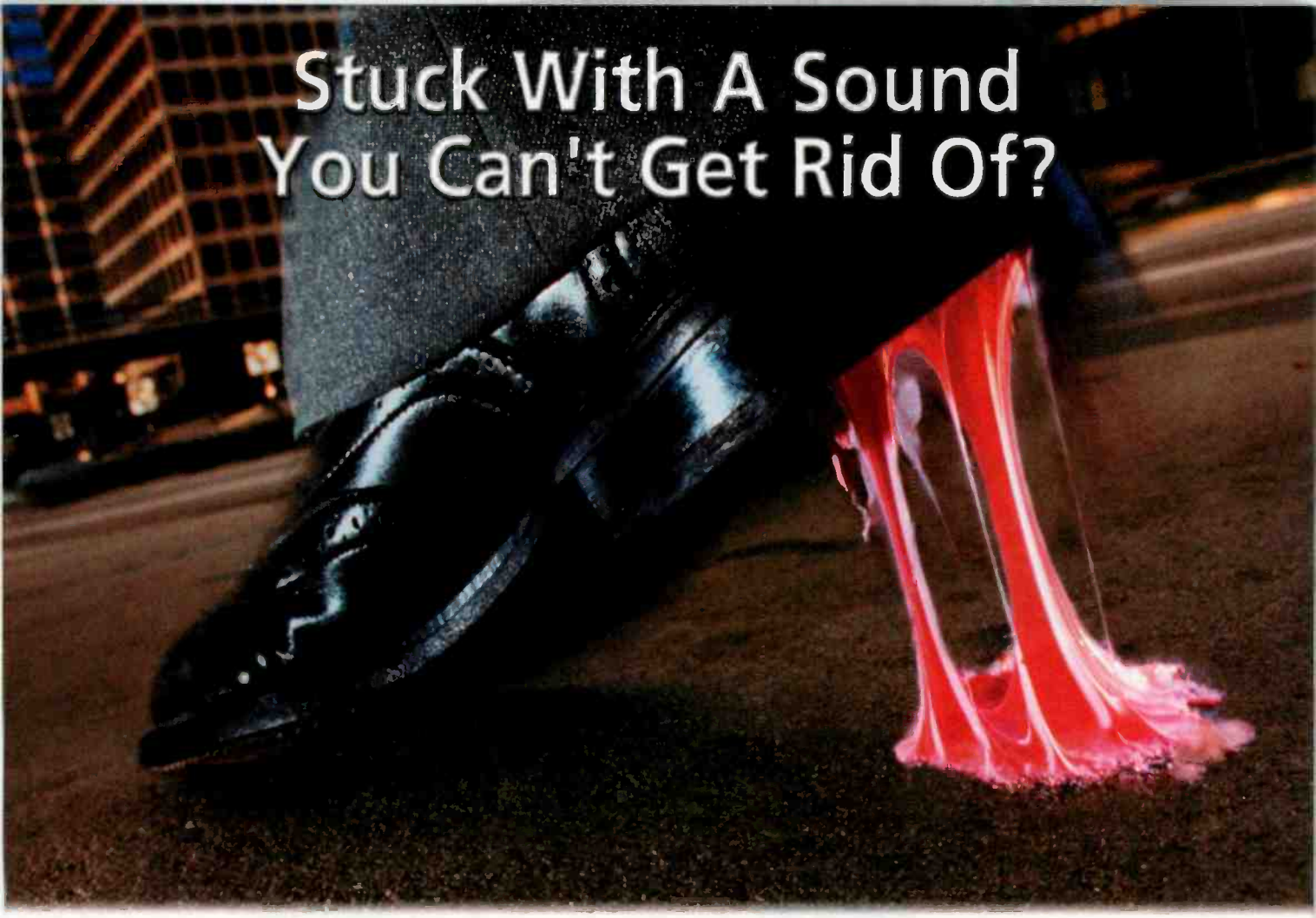

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AEV N2460
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Audio Mixers-Studio, Recording

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Panasonic ..... C 904
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Broadcast Software Int'l N2654
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Junger Audio N3015
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SRSWOWcast Technologies SU4857

Audio Recording, Storage & Playback

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RCS C2509
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Sony Electronics ..... MM 80
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Scott Studios N2701
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Fairlight USA	SL1635
Microboards Technology	SL1652
Primera Technology	SL2409
Sony Electronics	SU4015
Sprague Magnetics	SU5301
Scott Studios	SU5471
Disc Makers	SU6626
Dalet Digital Media	SU7137

Audio Routing & Distribution

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AEQ	N3146
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SRSWOWcast Technologies	SU4857

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Enco Systems	N2546
Broadcast Electronics	N2604
Arrakis	N2638
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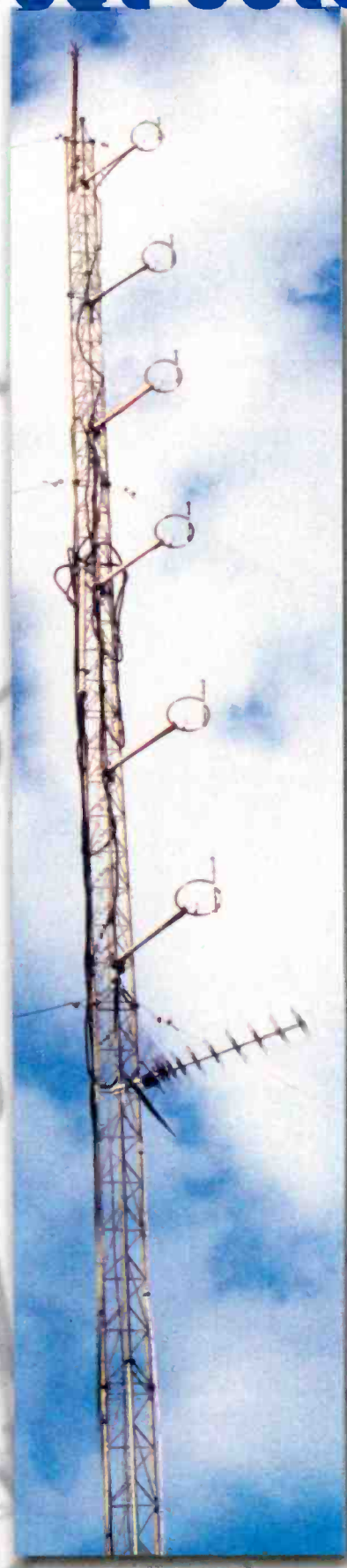

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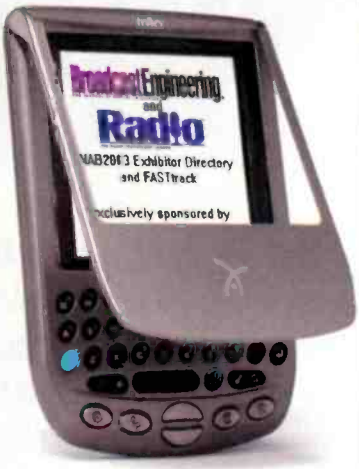

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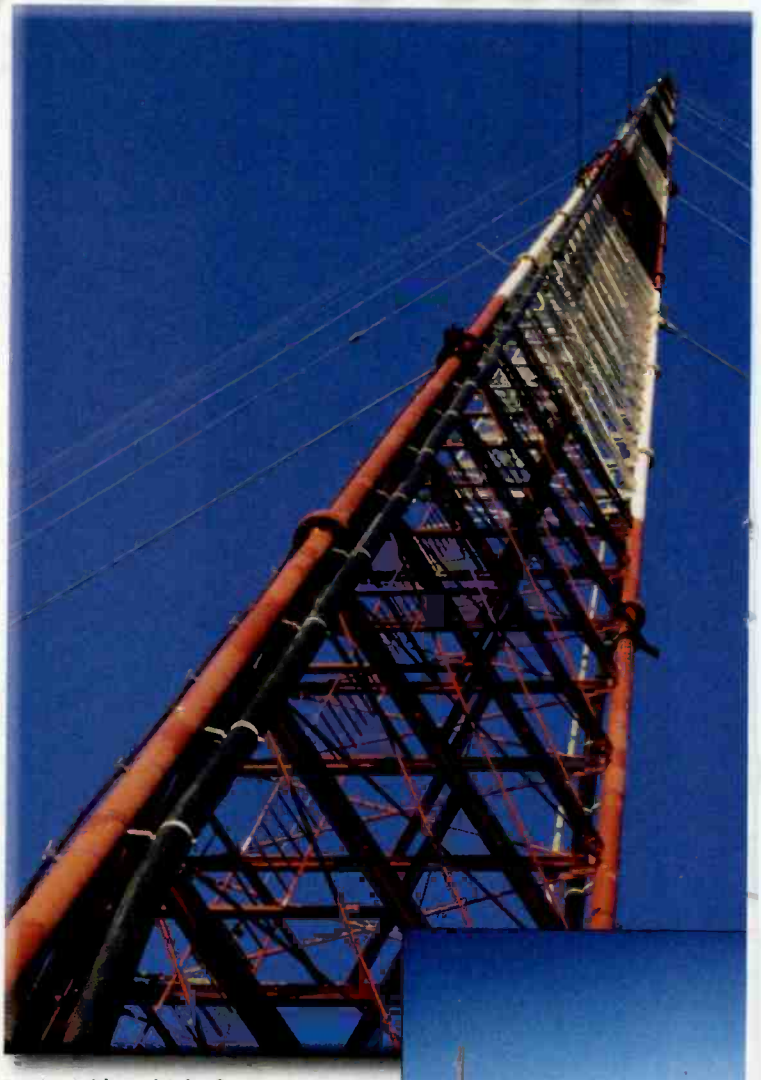
Building a better

By John Battison, technical editor, RF

Today's broadcaster faces a new kind of challenge, not only in the commercial market but also against prejudiced zoning boards and homeowners who have a distaste for towers. It seems like no one wants anything to do with a tower. Regardless of whether it is a tower for AM, FM or television the objections arise. In addition, the EPA's non-ionizing radiation requirements also have to be considered.



The Kinstar test antenna on 1,680kHz.

FM antennas by virtue of their transmission technology require medium to tall towers. AM antennas vary in height according to frequency requirements. Both suffer from public dislike. As public rejection of tall towers has increased, radio engineers have been paying more and more attention to AM antenna design requirements in an effort to develop shorter AM antennas that are as efficient as their taller brethren.

It is unfortunate that the antenna structure—the last item in the transmission chain—can have the greatest influence on coverage. All the other stages of the chain are controlled by the broadcast engineer, but today John Q. Public is putting in his ten cents worth of problems and frequently tries to control the height and location of broadcast antenna structures. Luckily, there are some choices for a broadcaster who wants to install or modify an AM antenna structure. While almost any metallic structure can be made to radiate if properly driven, good engineering practice requires specifically designed radiators.

The quarterwave tower is probably the engineer's favorite. When used as a folded unipole, series fed or shunt fed, it offers good efficiency, easy mathematics and a reasonable price. Often lighting is not required. It requires a ground system whose diameter is about twice the height of the tower. Quite often the ideal place for a tower is unavailable because of a tower height restriction or a ground system requirement that calls for too much space.

If, for engineering design and station coverage reasons, higher radiation efficiency is required a tower might go as high as 5/8 of a wavelength. The days of building a new Franklin tower or other anti-fading design are over because opposition from anti-tower factions flares up at the thought of a tower that might be one wavelength tall. This is another factor that has to be considered when seeking maximum ground-wave coverage with freedom from fading.

The tower itself can affect signal quality. Efforts to use a smaller cross-section tower in an attempt to reduce visibility and appease the anti-tower crowd could result in a comparatively skinny tower with a high Q, narrowband response and consequently poor audio. In the case of a directional station, these effects could be more pronounced, especially in areas of tight nulls.

Efforts have been made to develop shorter, efficient AM radiators. Over the years many engineers have worked on the problem of reducing the size of AM antennas and also attempting to control skywave radiation. A number of years ago, the late Oggie Prestholdt, PE, who was CBS's top RF engineer, retired and joined George Adair's firm of consulting engineers. He designed and built an experimental controlled skywave antenna. Unfortunately, this did not quite perform as planned, possibly due to the

radiator

vagaries of skywave transmission.

There have been other attempts to reduce the physical size and skywave radiation of AM antennas, but not a great deal of success has been achieved. More recently the CFA and the EH antennas have received a considerable amount of publicity, but so far neither has received full FCC approval. Elaborate plans were made to test the CFA antenna at a site in Shropshire, England. Ben Dawson, PE, and several other professional engineers had planned to make comprehensive field test measurements of this antenna's performance. Unfortunately construction of the test site has been indefinitely delayed. However, Dawson said that another higher power site on the Isle of Man, which had been initially denied, has now been approved. With hope, these tests will eventually be made.

Think thin

The latest development in the area of low-profile antennas is the Kinstar, invented by Dr. James Breakall of Pennsylvania State University, and is being developed by Tom King of Kintronics. The design has been tested at scale frequencies of 1.3GHz, 440MHz and 52MHz. A full-scale model was erected on 1,680kHz at the Kintronics

antenna test site, and the results showed excellent agreement with theory and the scale-model tests.

Preliminary tests showed that the antenna's efficiency was close to the commission's requirement of 313.6mV/m for a quarterwave antenna. King said that the vertical radiation characteristic is the same as that of a quarterwave antenna and that the Commission has accepted the Kinstar for broadcast use. At present, a proof-of-performance similar to that for a DA proof is required.

The Kinstar concept is really quite simple and I'm sure that a lot of engineers are kicking themselves—myself included—for not thinking of it themselves.

The dimensions are frequency-sensitive; however, even at the low-end of the AM band, a height of only 144 feet is required. This should also eliminate lighting requirements in most cases.

Building a better radiator

Four telephone poles, placed in a square with 200ft sides, support a cage consisting of four vertical and four horizontal elements. A fifth telephone pole in the center of the square supports the intersection of the four horizontal elements. There are four vertical radiators, each with top loading sections that intersect, but are insulated from each other at the center of the square.

The vertical elements are insulated from the supporting pole and are series fed. The purpose of the poles is merely to suspend this cage. Presumably a metal mast could be used in each corner, which could also form the vertical radiating element, and the horizontal top loading conductor could be attached directly to the top of this mast.

Each of the four radiators is excited in phase. A quarterwave section of regular transmission line is used to obtain the necessary phase shift and impedance transformation The whole assembly forms a radiator with a low Q, broad bandwidth and excellent VSWR. The radiation pattern is similar to that of a quarterwave monopole. The fields produced by the vertical radiators add in phase, and the currents in the horizontal top loading elements are out of phase and cancel out.

For the purpose of the test, a standard 120-radial, quarterwave ground system was used.

Other forms and functions

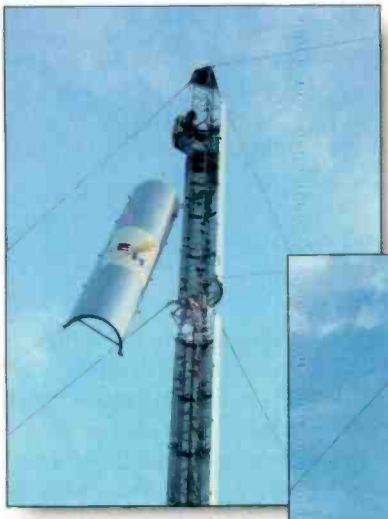
A new AM station in Ireland that has experienced problems obtaining clearance for a relatively short tower is considering the use of a Delta antenna. This is supposed to result in reduced height and provide adequate base operating impedance. The proposed antenna consists of two short masts supporting a horizontal cage antenna. Each end of the cage is connected to a sloping cage. These two cages meet at an insulated point on the ground midway between the two supports. This forms the driving point for the antenna. Unfortunately, I have been unable to obtain further information at this time on the application.

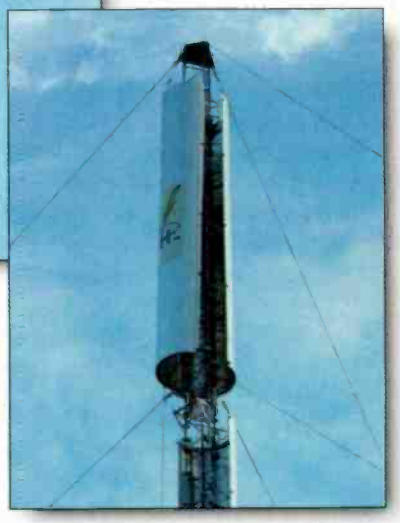
Detail of the EH antenna phase-shift network.

Ted Hart, the inventor of the EH antenna, is about to conduct tests on his antenna design with a radiator on 1,520kHz in Eatonton, GA,

about 85 miles southeast of Atlanta. The construction of this antenna is interesting. In some shots it looks almost like a vertical dipole—and in fact it is.

The inventor states that a ground system is not required and that ground wave radiation is a function of the height of the antenna and that more power is required as the antenna's height is reduced. With a proper phase-shift network between the antenna elements, the familiar Hertz dipole antenna will function as an EH antenna. This requires a 90-degree phase delay between the current and voltage applied to the antenna so that E and H fields are in phase.





The EH antenna as it was being assembled.

Hart will have more information available on his website at www.eh-antenna.com as his tests continue.

Up the dial

FM station towers are subject to the same harassment as AM broadcasters. Fortunately, the actual FM antenna does not require the support to be part of the radiator. Therefore, it is possible to mount an antenna on an existing tall building, or even add a mast to such a building, and obtain the required height.

There is a wide selection of FM antennas. The wind loading produced by various types frequently plays a large part in antenna choice. Antenna location, gain, directivity, side lobes and sometimes vertical beam width usually determine the choice of antenna.

The FM panel antenna is versatile and probably produces the best circular pattern when properly installed. It can also be useful when directional patterns are required. In many locations multipath has to be dealt with and antenna choice can become critical. Vertical beam width, null fill and antenna gain are interactive and great care is required in balancing these factors.

With the deployment of IBOC taking its first steps, a station's antenna will move to a higher level of importance. The tests on new AM designs show promise of a reduction in the physical space required. On the FM side, issues of using separate antennas have been discussed and so far disallowed by the FCC. A middle ground has been explored by feeding analog and digital carriers in a panel-antenna combiner with good results.

Wheatstone Bridge

By Greg Davis, CBNT

In 2000, Cumulus began building a new facility for its stations in Houston, which is one of the company's largest markets. This project would later become a showcase for the entire company. The primary design goal was that versatility and reliability would be emphasized on the studio end of the project. We also wanted the studio to be state-of-the-art. Likewise, I cover several stations in the region and having to drive a couple of hours to fix problems isn't practical, so having flexible and reliable studios was important. The goal was to have sufficient backup plans in place to prevent extra trips between Beaumont, TX, and Houston. The company needed an audio router to link as many inputs as possible—and it had to be easy to use. We also wanted to keep as much of the audio in the digital domain as possible, while still being able to seamlessly integrate the existing analog sources into the digital infrastructure around which our facility was built.

Performance at a glance

As many as 2,048 input and output signals
Interconnects with Wheatstone consoles
Variety of processing modules and I/O modules
Fiber optic or CAT-5 multi-unit connection
Sample rate converters on all digital inputs
Reduces wire and cable needs

An important part of this infrastructure was the Wheatstone Bridge digital audio network router. This unit allows the user to interconnect almost every source and destination in the facility and allows selection with the turn of a dial or via TCP/IP. The basic system consists of a power supply and 4RU main card cage. The cage design offers a rear backplane that accepts the input and output connector cards, while the processor cards slide easily into the front. This design seems to be ideal for switching cards between each other for troubleshooting, or switching components to replace a dead audio source. The backplane is a dual-sided connection point for the front and rear components. The rear I/O card is inserted to match with its corresponding processing card in the front. Cards can easily be swapped. The backplane connectors are fixed and are the only potential point of failure.

When first installed, we had a problem with one of the backplane connectors. When the audio from our satellite receiver disappeared, we tracked the problem down to the backplane. A call to Wheatstone support resulted in a manufacturer tech coming to visit us to replace the component. The problem was an isolated case and we were able to easily work around it.

Deep integration

The design plan included Wheatstone D-5000 digital consoles in each studio, which would interface directly with the router. An optional console module makes routing control accessible and easy. The router and console interface updates the console channels' LED labels to indicate the selected sources, greatly increasing user friendliness. In addition, the router is smart enough to block changes when the fader is turned on, thereby eliminating the accidental switch of a source while it is still live.

Two types of audio input cards can be used for AES-3 digital or analog 24-bit A-D input. In addition, 24-bit digital or 24-bit D-A analog output cards are available. The AES-3 cards have sample-rate converters on every input. The systems can accept up to 2,048 discrete analog and digital signals and switch them to any of 2,048 separate outputs. A system can consist of a single cage, or several cages can be linked to form a larger system. Cages can be separated and network audio through bi-directional fiber optic links or a single CAT-5 connection.

The classic method of feeding audio sources through distribution amplifiers and then running these feeds to every studio, rack room, production and news room in the building is labor-intensive and requires significant amounts of hardware. By using the router for audio interconnection we were able to substantially save costs and greatly reduce the time needed for installation.

The audio router offers many benefits. When our main T1 STL link to our transmitter failed, the backup ISDN codec tried to dial but was unsuccessful. I would have had to drive

Sources and destinations can be controlled through dedicated control panels such as this one, or through the communications port, allowing consoles and automation systems to make changes.

two hours to rearrange some equipment or create a temporary installation. Instead, the announcer routed the air studio program audio to an ISDN codec in another room, which got the station back on the air without any new rewiring.

The system also allowed us to maintain a completely digital audio chain. The station's music is ripped from a CD, played through the AES-3 output of the automation system and routed digitally until it becomes RF. The router even converted the analog sources, such as the Starguide receivers, into digital.

The system was fairly easy to install, too. With CAT-5 cable now being a common part of any businesses wiring, interconnecting the router to the consoles and the setup computer is a snap. The consoles connect to the router via RS-485. The Ethernet connection connects to a TCP/IP network to allow communication via the setup software on any computer on that network. This software shows a visual overview of the system routing and allows the user to make changes and restrict or permit specific routing. One example would be to restrict routing a device's output to its own input.

We ordered our system with a number of analog and digital inputs and outputs that can be upgraded when we need more. It came with the pigtail cable assemblies prewired. This allowed us to run the wires and punch them down to block without having to solder connectors.

Davis is chief engineer for Cumulus Broadcasting in Houston/Beaumont, TX.

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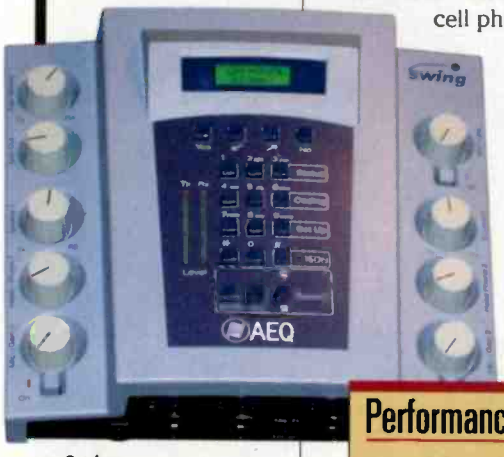
AEQ Eagle and Swing

By Steve Fluker

The past decade has seen a total evolution of how remote broadcasts are handled. With ISDN phone lines becoming commonplace just about anywhere in the world, broadcasters have come to rely on them to deliver high-quality audio from remote locations and events back to their studio. Radio stations are broadcasting live from locations that were once out of the reach of their RPU transmitters, not cost-effective for satellite broadcasting, and too important for the low audio quality of dial-up and cell phone audio.



Swing

As usage increases, so do the demands on the manufacturers of the audio codec interfaces for better audio, more bells and whistles and universal compatibility worldwide. AEQ has stepped up to the plate with its Eagle and Swing ISDN codecs. The Eagle is a rack-mountable studio version, while the Swing unit is a compact and portable package for remote locations.

Performance at a glance

- Compatible with most ISDN services
- G.711, G.722 and MPEG L2 codecs
- Audio and auxiliary data channel
- Adjustable data rate
- POTS interface with frequency extension
- Built-in mixer on portable unit
- AC adapter or battery operation

Universal compatibility

Both units have direct inputs for the U.S. ANSI standard or the European ETSI ISDN standards. Typically, there is no need for an external terminal adapter. However, one can be connected through a V35 port on the back of either unit should you find the need.

The AEQ units can talk to most other brands of ISDN codecs by incorporating many common coding algorithms including G.711, G.722 and MPEG LII modes. The LII mode offers 64kb/s and 128kb/s mono or dual-stereo. AEQ also offers its own algorithm when connecting with another AEQ unit, which offers high quality (15kHz bandwidth) with low delay. When connecting to another unit, the codec will detect the operating mode of the remote end and automatically adjust for proper sync.

These codecs can also come to the rescue on those occasions where a spur-of-the-moment broadcast doesn't allow enough time to order an ISDN line, or when you arrive and the line is not working or you were given the wrong SPIDs. In this event, you can connect and broadcast over a standard analog POTS line. While it's not designed to be a POTS codec, it does offer a built-in frequency extension to improve the low end frequency response and pass signals between 50Hz and 3,750Hz. It gets you on the air, makes the phone line sound better and saves the broadcast. Two and four wire POTS connections can be accommodated.

Data channels can also be passed through the codec along with the audio. Easy Port connections provide a quick way to interface RS-422 data. A standard 9-pin D connector also offers RS-232 compatibility. A typical setup would allow mono audio and 64kb/s data on the ISDN B channel. Data rates can also be customized for individual needs up to 115kb/s. Audio quality may be reduced as higher data rates are desired. A computer can be connected using AEQ software to customize the data channel rate, or to allow remote control of the codec.

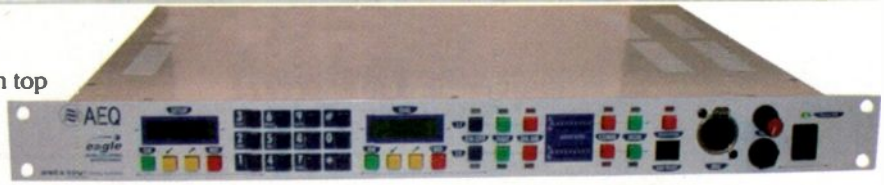
Both the studio and remote units can be customized for startup and user features. A built-in phone book allows storage of as many as 256 frequently called numbers, and can also be programmed to selectively accept incoming calls. Pre-programmed numbers can automatically connect, while other numbers can be programmed to ring only and be answered manually.

Portable features

The features of a remote unit can make or break a product. The company did its homework and designed the Swing to be compatible with just about anything anywhere in the world. A built-in mixer allows direct connections of as many as three microphones, or the third input can be selected for line level inputs. Neutrik connectors allow compatibility with XLR or ¼" audio cables. The mixer also provides connections for two headphones. The headphone outputs provide a mix of local audio with the mix-minus return audio from the studio. Each guest has his own level and mix adjustments. The Swing even includes a built-in compressor and limiter to keep the audio level consistent. VU meters are

easily visible for transmit and receive audio on top of the unit, and a digital display is used for setup and shows status and parameters. This display is small and can be difficult to read, though. A surprise feature was a built-in battery in the ac adapter. This can serve as a UPS to prevent disconnection when someone trips over the power cord or during a power failure. I was able to run the unit for two hours on a full charge.

AEQ has packed a lot of features into the single rack spaced, studio unit. Analog and AES digital inputs are available on the back panel, and an intercom IFB microphone can be connected on the front panel. The system is capable of accepting two calls from remote broadcast locations, and a front panel multiplex switch allows the receive audio from one line to be relayed on the send audio to the second location. Front panel swit-ches allow you to mute or activate the on-air audio for each channel. This feature can also be controlled through a computer by connecting to one of two data ports on the back.



Eagle

Through the paces

The AEQ Eagle and Swing ISDN codecs tested well. The compatibility to other brands worked well, as did the direct connection between the two units. Audio quality is good and a variety of algorithms allow a trade off between quality and low delay times. Another notable attribute is the variety of connection types from the different ISDN standards, and the ability to connect RS-422 or RS-232 data. Also impressive is the ability to adjust the auxiliary data bit rates for custom applications.

While the conservation of rack space is appreciated, the single rack unit chassis creates a busy appearance on the front panel. At first glance, there are a lot of colorful buttons, which appear to be confusing, however they are clearly labeled and easy to decipher in a very short period of time. As in the portable unit, though, the rack-mount version uses the same small displays, which can make it difficult to read for someone with poor vision.

Fluker is the director of engineering for Cox Radio, Orlando.

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Enco Systems DADpro32

By Christian Arnaut

When the decision was made for WJR, WDVD and WDRQ, Detroit, to move into new facilities in 2000, perhaps the single largest decision to be made was the choice of a digital delivery system. Our needs were unique; three stations, more than 40 workstations, linear-stereo storage for all stations, dual-touch screens in all control rooms and enough redundancy so that we would never go off the air. After much consideration and deliberation, the choice was made: Enco's DADpro32 platform.

The DADpro32 application is modular. These modules include record machines, basic playback machines and a collection of more advanced playback devices to help bridge the gap between live-assist and full automation. Because our three stations have individual needs and personalities, this allowed us to purchase only those features that would meet the specific needs of a specific location. In fact, each station's method of using the application is almost unrecognizable to the others.

The DAD application may not be the prettiest or flashiest on the screen, however, Enco Systems has more than made up for this in its performance, reliability and functionality. The on-screen functions are reminiscent of cart machines. The playback machine includes buttons for start, stop and pause. The large, easy-to-understand buttons facilitate the use of touch screens, and are self-explanatory. The DAD's array panels are even easier to use. The arrays are a grid of programmable buttons for manual playback. Using common drag-and-drop techniques, these panels are great for morning show drops and music beds.

While appearing plain to the eye, DAD's flexibility is large. This became evident during our extensive on-site training when the system was installed. We had to learn not to ask, "What can it do?" Rather, we had to have the jocks and operators provide the scenarios. Then the instructors would provide different ways the DAD could accomplish a task, and then let the operator choose which method worked best for him. Simply showing people everything DAD can do would be lengthy and confusing.

Advanced users, such as producers and engineers, will appreciate DAD performance the most. The DAD application includes features such as a CD-ripper, a timed record scheduler for recording network feeds, a two-track editor, voice tracking and serial communications for routing switchers.

DAD's performance and functionality would not be possible unless the software had a reliable hardware platform to run on. This is where the other half of Enco's attention to detail is demonstrated. While the DADpro32 application is available as software only, purchasing it in tandem with Enco's workstations or servers is highly recommended. At the time of installation, I was less than impressed with having two large Netware servers, because my knowledge was entirely WinNT. (Enco has since begun building servers on a Win2K platform.) I could not have been more wrong. Once installed and running, our servers ran for more than 495 days before the first reboot was necessary. It is now two and a half years later and my knowledge of Netware is still limited, simply because the servers are so reliable. Advanced Netware knowledge still is not necessary. The servers just run. This is too bad, really, considering the layers of redundancy that are incorporated into the design. In total we have two primary servers and 10 backups. All of these are RAID arrays, with the exception of a few of the

Performance at a glance

- High system reliability
- Flexible configuration options
- Telephone and e-mail customer support
- Interfaces with other audio systems
- Scalable design

backup machines. Through the inherent design of RAID arrays and the use of hot standby drives, drive replacement is a simple procedure without the risk of lost data. Not a common occurrence, but with nearly 70 SCSI drives on the network, premature drive failure does occur on a small scale.

After more than two years of hard use, we've found that there is almost nothing that the DAD can't do. This is no small compliment considering our facility. Our AM station is a 50kW news/talk station. It is one of the largest in the Midwest and the primary EAS station for southeast Michigan. At the time of installation, WJR was the flagship station for Tiger baseball, Red Wing hockey and University of Michigan football and basketball. Additionally, WJR produces a daily, nationally syndicated talk show. At times we were producing three live shows simultaneously, in addition to multiple workstations running in sports, news and production. All of this was occurring while our FM stations were running two full music formats and as many as four active production studios. Another testament to the server and workstation design is that the control rooms have six to nine individual stereo outputs and the ability to play multiple cuts from the same channel. Playing as many as eight to 10 cuts at the same time, while not commonplace, is certainly possible without worry.

It wasn't until we had begun installation that we realized just how versatile DAD could be when integrating it into an existing facility. Integrating with routing switchers, console logic, GPS master clocks and third-party applications such as Newsboss, Protools, Audicy, Cool Edit and SAW Plus were easily overcome. We have used three different traffic/continuity software platforms and RCS's Selector, all of which input logs into DAD. Through the use of custom input filters, the station has the ability to transform logs into playlists with the push of a button. We can even merge music and a commercial log into a single playlist, for non-attended operation, through one of Enco's external utilities. These utilities are many in number and address any possible situation you may be faced with. These range from importing audio files into the system or converting the audio format and sample rate of a file to a powerful application (Gateway) that can manage server backup operations to assure full redundancy.

Satisfying customer service

Few radio stations will install a system without needing to call technical support at least once in a while, whether for operational questions or to address a potential hardware issue. Enco's attention to support is among the best I have ever seen, from helping calibrate a touch screen over the phone, to calls that last well over an hour or two for catastrophic issues like a RAID controller failure. In addition to the phone support, the company offers a responsive e-mail support system. This list server, available to all DAD users, is an uncensored forum for users to share ideas and collectively help solve problems.

Because most DAD installations use the application in a way unique to their operation, this system is a constantly evolving platform that necessitates the need for

periodic revision releases. Not only do these revisions address the inevitable bug that comes up in software development, but they also provide the latest features as well. Many a time has an idea been discussed on the list-server only to see a few weeks later that idea has been developed into a new feature. In fact, of the dozen times I inquired about the possibility of a new feature, within reason they all have made their way into production.

The array panels can be set up with drag-and-drop mouse clicks.

In this world you get what you pay for. Yes, on the surface, Enco's product line may appear to be a little pricier than some of its competitors. However, those few extra dollars are earned back many times over when considering everything else that comes with it. From support to quality of construction to servers that run rock solid, I sleep well at night knowing that we have a DAD-pro32 platform back at the studios.

Arnaut is an engineer supporting broadcast IT operations for WJR, WDVD and WDRQ, Detriot.

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SWR Illumitron

by Dale Harry, CPBE

KXS-FM, Shingletown, CA, suffered from a problem shared by many small FM stations in rural America: the population in this northern California market is spread over a large area, and rough terrain presents serious obstacles to a Class A FM station. Shingletown is too small to support a station profitably, and most of the market's listeners live in Redding (27 miles away) or Red Bluff (47 miles away). For KKXS to compete with several Class C stations in the market, something had to be done to improve the KKXS signal. The station needed substantial improvement at an affordable price. It was not practical to increase power or to move closer to Redding.

Performance at a glance

Reduced side lobe and downward radiation
Reduced multipath effects throughout coverage area
Better field intensity variation specifications
Improved coverage area performance
Exceptional cost-per-performance ratio

When I discussed this problem with other broadcast engineers, I learned of an FM antenna that is making a reputation of improving coverage for small FM stations. I was skeptical at first, until I talked to engineers and station owners who are now using single-lobe or reduced-sidelobe antennas. Their reports were encouraging.

I was referred to SWR, which sent literature on the Illumitron FM antenna, and also referred me to a local engineer who could look at the coverage problems and evaluate how much improvement was possible with the Illumitron antenna. The consulting engineer's recommendation was instrumental in the station's decision to purchase a four-bay Illumitron, which was installed in January 2002. Much of the following month was devoted to checking the performance of the new antenna and comparing field intensity measurements.

While the signal is still weak compared to the Class C stations, there is a significant improvement in coverage. Many shadows and holes in the service area are gone. The signal is noticeably improved in buildings and behind obstructions.

Improving signal strength

Perhaps more significant, multipath and picket fence effects are much reduced. One listener said that "the station is more fun to listen to" with less noise and interference. Field intensity readings showed an average increase of almost 3dB with the new antenna, but the consulting engineer told me that this difference is most likely due to loss of signal from the old antenna, because of the way it was mounted on a tapered tower. The average field intensity is related to distance and effective radiated power (ERP), rather than the type of antenna in use.

The major difference in signal strength (or field intensity) for the Illumitron antenna is a remarkable stability. While most FM signals vary ±10dB or more over short distances, this antenna's signal remains almost constant. Variations of 1dB or 2dB are typical, except near overhead wires and other reflecting objects. For KKXS, the minimum signal strength was almost 5dB higher, and maximum signal strength was only 1.2dB higher. Receivers only care about minimum signal strength, and this explains why the Illumitron improves coverage and signal quality. The station had found subtle, but significant signal improvement.

KKXS' antenna has not been in use long enough to have an effect on ratings or revenue, but the station is encouraged by what it has heard from others using a similar antenna.

We are still a Class A FM station, but we don't feel quite so small anymore.

SWR

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Harry is proprieter of Sierra Broadcast Service, providing engineering services to Northern California-area broadcast stations.

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Contributor Pro-file

Meet the professionals who write for *Radio*.
This month: Field Report, page 66.

Dale Harry
Technical Director
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As proprietor of Sierra Broadcast Service for the past nine years, Harry provides technical design, installation and maintenance services for broadcast stations in the southwestern states. He specializes in the construction and maintenance of AM and FM transmitter sites and antenna arrays. Prior to developing his own engineering company, Harry worked for 25 years in engineering management positions with Group W Radio and NBC Radio.

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Shaping radio today and tomorrow

By Kari Taylor, associate editor

Do you remember?

In 1994, the Electronic Industries Association's DAR Subcommittee and the National Radio Systems Committee's Digital Audio Broadcast Subcommittee began testing seven DAR systems at the National Aeronautics and Space Administration's Lewis Research Center in Cleveland. Following the labs tests, the committee made its recommendations to the FCC. This was the first time that several DAR systems had been subjected to laboratory testing.

Testing addressed the issues of sound quality, immunity to interference, transmission problems and IBOC compatibility with existing services.

The seven systems tested were: AT&T (in-band, adjacent-channel), AT&T/Amati Communications (IBOC), Thomson Consumer Electronics for Eureka-147/DAB (new band), USA Digital Radio FM Implementation No. 1 (IBOC), USA Digital Radio FM Implementation No.2 (IBOC), USA Digital Radio AM (IBOC), and Voice of America/Jet Propulsion Lab (new band, direct broadcast satellite). Amati, Thomson/Eureka and VOA/JPS actually submitted two variants of their formats, so testing was administered on 10 systems.

In the end, the test results were inconclusive. USA Digital Radio, AT&T and the VOA filed protests with the EIA over the IBOC testing procedures because of the EIA's findings that IBOC showed poor performance. Due to these circumstances, follow-up field testing was conducted in San Francisco.

That was then

This photo was taken in 1931 in a wooden shack outside the house of Technical Editor John Battison. The transmitter had an oscillator, audio stage, RF stage and P.A. plate modulation. The tube filaments operated at 4Vdc with a B-plus supply of about 200V. The main supply was 230Vdc so no filament or power transformers could be used. The entire transmitter was 230V hot to ground. Battison, W8KUC and formerly G2AMC, built the transmitter himself, and operated it in the 180m band (160kHz).

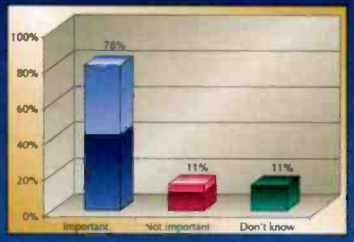
In those days, engineers metered every conceivable tube electrode. The antenna was horizontal and about 50-feet long, using ceramic crossover spacers in the transmission line and was attached to a telephone pole and Battison's house. Ten watts was the maximum power allowed in those days without special dispensation. It was not stable and frequently broke into self-oscillation on the slightest provocation.

Sample and Hold

A look at the state of radio today

Strong Consumer Support for Local Radio

Generally speaking, are you satisfied or unsatisfied in the job your local radio stations are doing in providing you news; information and entertainment programming?



How important a role would you say local radio stations play in providing news and information to your community?

Darker shading = stronger intensity

Source: NAB Poll, Dec. 17-19, 2002

Wheatstone Corporation

D-8000

Digital Radio Console

ADVANCED TECHNOLOGY! WHEATSTONE'S fourth generation digital console has what you need: dual-domain input modules that accept both analog and digital sources; built-in router integration with 8-character displays; a choice of features like auxiliary sends, equalization, dynamics control and event memory/recall—all without the aid of an external computer. *The D-8000 is an all-modular design with no active components mounted inside.* And best of all, it uses Wheatstone's exclusive VDIP® setup software, letting you easily configure individual console modules, logic modes and automatic functions. ***Contact Wheatstone—the digital audio people!***

sales@wheatstone.com
tel 252-638-7000

www.wheatstone.com

THINK *INSIDE* THE BOX

ONE INTERCONNECT DOES IT ALL!

THAT'S RIGHT— ONE DUPLEX FIBEROPTIC LINK OR A SINGLE CAT-5 WIRE = 64 channels of simultaneous bi-directional digital audio, intercage communication, logic signals, X-Y controller commands, plus auxiliary RS-232 data streams. *This single interconnect between your studio and central rackroom can save you thousands—if not TENS of thousands—of feet of wire in a typical installation!*

THE WHEATSTONE BRIDGE DIGITAL AUDIO NETWORK ROUTER can start small with a single cage and only a few cards, or fully populated units can be stacked to form larger systems. Wheatstone's STAR TOPOLOGY ARCHITECTURE lets you connect multiple locations to your central rack room, providing shared resources for all yet still permitting independently functioning studios, each with its own combination of plug-in modules specifically suited for a select set of gear.

SIGNALS ARE ROUTED entirely in the digital domain. All AES cards have sample rate converters on each input, freeing you from worry about varying sample rates throughout your facility. A family of plug-in connector modules makes installation easy, letting you mix varied signal technologies and standards all within the same cage. WHEATSTONE'S intuitive graphic based setup software handles system configuration, matrix selection and salvo presets. All systems interface directly with Wheatstone consoles for seamless source selection and display.

THE BRIDGE
DIGITAL AUDIO
NETWORK ROUTER

Wheatstone

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