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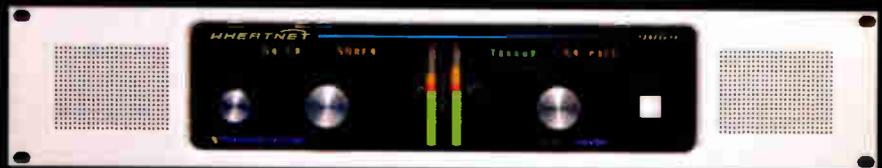


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ON THE COVER:

A flying remote vehicle made history in April with a Transatlantic broadcast. Radio magazine was there to witness the event.

Photo courtesy of Lufthansa.

Cover design by Michael J. Knust.





Remote Broadcasting over the Internet



The remote from Mexico was a spectacular success, in no small part thanks to the flawless sound which the Tieline G3 provided over the public Internet

**-Mike Rabey Chief Engineer
Entercom Indianapolis**



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Currents Online

Selected headlines from the past month.

Senate Confirms McDowell for FCC

Robert McDowell fills the third Republican seat on the Commission, filling the seat vacated by Kathleen Abernathy.



McDowell

Comrex Access Passes Inmarsat Service Tests

The test was completed from the Inmarsat headquarters in London using a Comrex Access and a Thrane Explorer 500 BGAN terminal.

ADC and Andrew to Merge

The combined company will be based at ADC's world headquarters in Minnesota. The companies expect the transaction to be completed by the end of the year.

DG Systems Completes Merger with Fastchannel

The new company is called DG Fastchannel.

Nautel Names Iannotti as GM of U.S. Operation

Edward Iannotti joins Nautel from Texas Instruments.

Heil Equipment Moves to Rock Hall

A display that opened on June 8 will highlight some equipment from Bob Heil's early work with the Who, the Grateful Dead and more.

Site Features

The Engineer's Notebook

One *Radio* magazine reader tells us about his recent find in the Engineer's Notebook in Reader Feedback. Take a look and see what other handy tools are available.

Buyers Guide Online

A printed version of the *Radio* magazine Buyers Guide is released in December, but you can access the most current info online right now.

Recognizing Innovation

December 2006 will mark the 100th anniversary of Fessenden's first radio voice transmission. We need your help to identify the top technical accomplishments for radio broadcasting, and we'll report on these accomplishments in the December issue.

NAB2006 Photo Blog

See the images from NAB2006 through the eyes of the *Radio* magazine staff and contributors in the NAB2006 Photo Blog.

E-mail Newsletters

The Currents Online weekly e-mail and Digital Radio Update bring you the latest news and information. Subscribe to both today.

Find the mic and win!

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



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PAW 120

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More to digital radio

When it comes to digital radio, the debate about various transmission systems rages on, but the real future of digital radio lies not in the transmission scheme, but in the basic definition of digital radio.

Is digital radio HD Radio? Yes, but it's also DRM, DRE, Cam-D and other digital transmission systems. Digital radio doesn't end with these terrestrial transmission systems either. Terrestrial broadcasters don't like to admit it, but satellite radio is digital radio, too. It is just based on a different business model. Is this the limit of the digital radio universe? No, there's still more. Internet streaming can be considered digital radio; so can podcasting.

We need to define the meaning of digital radio so that we can better understand what it covers, and better plan for its future.

The digital part is easy to define: an encoded bitstream. Digital also carries an inference to a future technology. Analog was yesterday. Digital is tomorrow. We see this everywhere with the consumer focus that digital anything must be better simply because it's digital.

What is radio? For our use we mean radio broadcasting, and that means delivering an audio program of entertainment or information to an audience. Classically, this has been done via a wireless transmission (the definition of the noun radio), but if we ignore the transmission medium for a moment, we can still consider many different types of audio streams as radio.

With this in mind, it's safe to say that digital radio is the digital delivery of an audio stream. This is not a difficult concept. However, terrestrial radio stations are having difficulty separating the content creation for a mass audience from the delivery mechanism.

Look around and you'll see that the media convergence is really

happening. You can now watch TV programs on an Ipod or a cell phone. You can watch movies on a portable game device or a PDA. You can download a radio program and listen to it during the day when you want on an Ipod, cell phone, PDA, PC and countless other devices. So why do so many broadcasters seem to think that digital radio ends with IBOC?

IBOC—and specifically HD Radio—is but one piece. To continue the quest to provide digital radio to the masses, stations must keep looking. Traditional terrestrial delivery—analogue or digital—is not the only future. Successful stations will be content providers with many delivery vehicles. Digital radio is just one part of the multimedia experience.

Broadcasters should continue investigating alternate forms of delivery. While many stations already stream their own signals, they must look farther afield. The giants of the online industry also provide streaming audio. These services tend to be super jukeboxes, so why not leverage their reach with the popularity of a radio personality? At the end of last year, Clear Channel was exploring this idea with Yahoo, Apple and Microsoft.

Everyone carries a cell phone today, and some companies are looking to use this installed base to sell more services, including radio. One example is the Motorola Iradio. Just like partnering with the online firms, similar deals can be made with the dominant cell providers.

These ideas require some deals to be made, but terrestrial stations can take the first step on their own. If you're not streaming already, begin doing so. Display the program service data that you prepared for RBDS or HD Radio and put it online. Taking this one step further, we can promote HD Radio through a variety of player skins for Windows Media, Winamp and the others. Perhaps the HD Digital Radio Alliance can provide these for stations, and include presets for the stations to link to their multicast streams.

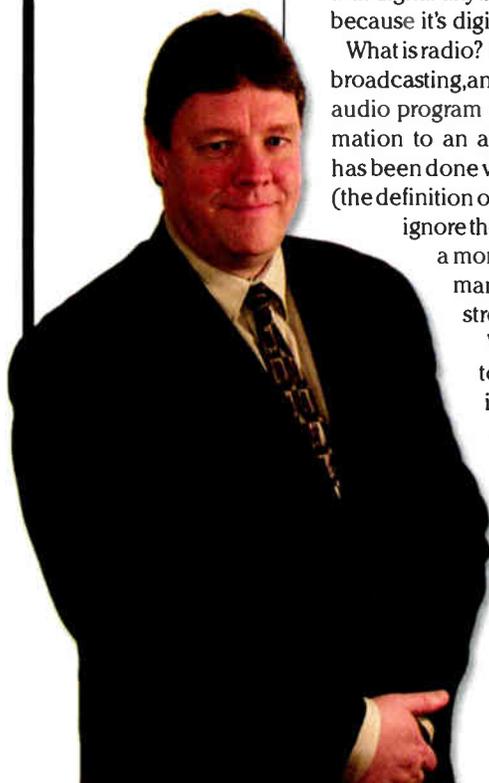
Stations can also begin offering podcasts of their programs. Many automation system manufacturers offer this capability, as do most of the logging systems.

This is all based on existing technology. The successful content provider will be ready to take advantage of them by embracing the systems that are available today.



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cscherer@prismb2b.com

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World Radio History



Identifying tower sites

By Kevin McNamara, CNE

If you have been in the business long, you have been, or will be, tasked with finding a new tower location. This happens for a number of reasons; one of the more common is that urban sprawl has caught up with your once remote site and the value of the property is worth significantly more money than your owners might see fit to pay. In real estate terms, this is called the "highest and best" use of the property and can be translated as "it will be easy to find an entity willing to pay too much for the property who will subsequently subdivide it and sell it for a huge profit to the general

I have been waiting for the one zoning hearing where I follow an attorney representing a broadcast group justifying to the board (and angry onlookers) how their 1,500' tower is in the best interests of the people. I can imagine that my request for a 125' monopole would go much easier than normal, assuming we can get the board to stop laughing about the previous request.

Where can we go?

You will typically start the process of finding a new tower site location armed with some form of area-to-locate study. This can be provided by a consulting engineer or can be created on the desktop with one of the available RF plotting programs. The purpose of this study is to overlay the relevant protection contours of the other stations on your frequency or adjacent frequencies. The specific criteria vary depending on the type (AM or FM) and class of service affected.

The end result is that you will be in possession of a topographic map depicting a suitable area where the station could be located and subsequently approved by the Commission. I want to caveat this by saying that these previous steps are good for the perfect world, but in practice will probably be much more difficult as a result of short spacings and grandfathered inference limits and other obstacles.

Identify potential sites

Once you have narrowed the search to a particular area, the next obvious problem is to find a specific parcel of land that might work. You will also have some idea of the minimum size of property needed to accommodate the project. The good news is that there is a wealth of free information on local government websites. Note that I use the term "jurisdictions" to define the local, county, state or federal entity that has control over the specific area in which you are working. This is significant because some areas might require approvals from some or all of the above and you need to know how many of these entities must approve this and their filing process. It is not unusual to spend the time and money to take a project successfully through the zoning process only to find out you will not be able to file for the building permits until you get additional approval(s) from other agencies.

In the majority of urban areas, finding land is easier said than done. Developers and investors have been aggressively buying large tracts of land outside of urban centers with the intention of developing or selling as the metro expands outward in the future. Your company should not enter into any purchase or lease agreements for a property without first having this information—the cheaper property could end up costing more to get approvals than a



Finding a suitable location for a new tower involves working with more than just zoning laws.

public." Another common reason is that the same sprawl has moved away from your previously dominant coverage footprint, or maybe the owners purchased an underperforming facility and want to move it. Whatever the reason, you, as the engineer, will be thrown into the middle of the project and, in addition to your other duties, will take on the responsibility of finding a suitable property that will accommodate the new tower. This wasn't a big deal 15 or 20 years ago when towers, and the issues surrounding them, weren't a part of our life; but thanks to the advent of mobile telephones and the multitude of towers required to support a wireless network, everyone is extremely aware of their presence and the impact they might pose.



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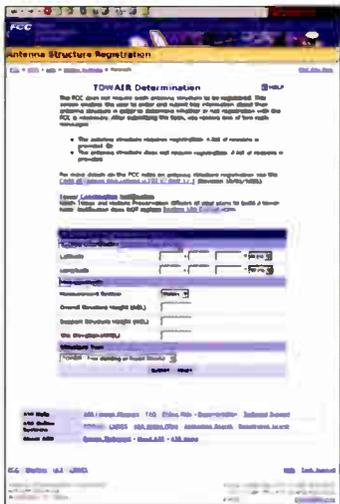
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Making Digital Radio Work.



The FCC's Towair program provides basic information about potential site issues that require further study.

costlier one.

1) *Jurisdiction(s) of the area.* Some parts of the area are unincorporated or fall in jurisdictions where tower ordinances are "silent."

2) *Zoning classification(s).* Is it residential, industrial, agricultural? Residential makes the chances of approval almost zero, and the costs associated with the attempt to get it approved go up dramatically. Zoning maps are readily available at town halls or on the Web. A call to the zoning department will provide the specific process and

possible timetable for hearings.

3) *Size of parcels available.* Some areas might seem rather rural when driving around, however there might already be

a subdivision plan approved or specified on the "master plan" of the jurisdiction.

4) *Areas of historical or archeological significance.* File for approvals from the designated state historical preservation office. Tip: If the proposed site is in view-shed of a national park, it will not be approved. You need to file and have approved an environmental impact report with the EPA prior to any tower construction.

5) *Local airports and heliports.* Run the FCC's online program called Towair (wireless2.fcc.gov/UlsApp/AsrSearch/towairSearch.jsp), which will provide cursory information as to any potential safety issues that require further study by a qualified airspace consultant prior to FAA approval to construct the tower.

6) *Environmental issues.* Flood plains, wetlands, soils problems and wildlife habitats are areas to avoid.

7) *Prior use of the property.* Have an environmental contractor provide a "Phase 1" report that will reveal possible problems based on limited soil sampling and historical records. The conclusion of the report will reveal that there is no problem or may recommend a more comprehensive "Phase 2" study.

McNamara is president of Applied Wireless, Cape Coral, FL.

More Online
Access this article online for more on zoning laws and ordinances.

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Public file maintenance

By Harry Martin

Although the last of this cycle's radio license renewal applications was filed on April 1, it is never too early to think about your next renewal. What you do now will determine if you receive any fines eight years from now, or have your renewal application put on deferred status while the FCC contemplates what fine to impose. At least, that is the message the FCC delivered in one recent license renewal case involving the FCC's public file requirements.

Licensees must certify that all documents required to be placed in the public inspection file have been placed in the file at the appropriate times. It is not enough that all required items happen to be in the public file by the time the license renewal is filed, the required documents must have been placed in the public file at the specific times required in the rules.

For example, the FCC requires that issues/programs lists be placed in the public inspection file within 10 days after the start of each calendar quarter (i.e., on Jan. 10, April 10, July 10, and Oct. 10 of each year). A station that misses any of these deadlines but places eight years of issues/programs lists in its public file the day before filing its license renewal, or puts such lists in its file one or twice a year over the eight-year license term, may have all required documents in its public file, but to that the FCC would say "so what"—because the important point would be that the licensee failed to place them there at the appropriate times.

Given the significant number of items that must be included in a station's public file over the course of an eight-year license renewal period, many licensees have complained that the FCC cannot possibly expect stations to certify to 100 percent compliance with the public file rules for all times during the renewal period. Unfortunately for such stations, that is exactly what the FCC expects.

The FCC recently emphasized this point in a letter ruling issued to a large group station owner. In the license renewal applications for its Ohio stations, the owner

responded "yes" to whether each station had placed all required materials in the public file at the appropriate times. In fact, however, three of the four stations had failed to file issues/programs lists for various periods between 1999 and 2001. These oversights were discovered in 2002 and the missing issues/programs lists were placed in the public files at that time.

When the license renewals were filed in 2004, the licensee answered the question regarding its public file in the affirmative, but then included an exhibit with the following caveat: "[Licensee] has answered Section III, Question 3 of this renewal application in the affirmative upon the belief that the station's public file currently contains all documents for which [Licensee] is responsible as the licensee."

Although the FCC concluded that the licensee did not intentionally attempt to deceive the FCC, it admonished the owner for answering yes when he knew that some of the station's issues/programs lists had not been filed on time. "A 'no' response is required to this question," the FCC warned, "when the licensee knows or has a reasonable belief that required materials had not been placed in the public file at the appropriate times(s)." The FCC fined the licensee \$12,000 for the late-filed issues/programs lists.

Stations will be held accountable not only for what items are not placed in the public file, but also for when items are placed in the public file. To avoid problems (and fines) at renewal time, every station should have a clear understanding of what must be placed in the public file, when it must be placed there.

Many, if not most, public file problems result from the departure of a staff member responsible for the public file without a clear set of directives to that staff member's replacement. Such lapses in 2006 or 2007 will likely cost thousands of dollars in 2014 or 2015.

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

Dateline:

July 10 is the date that quarterly issues/programs for the period April 1-June 30 must be placed in every station's public file. (This requirement doesn't apply to low power FM stations.)

Aug. 1 is the deadline for stations in Illinois and Wisconsin to file their biennial ownership reports. Aug. 1 is the date on which stations in North Carolina, South Carolina, Illinois, Wisconsin and California must place their annual EEO reports in their public files and post them on their websites.

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NAB

Under the



After nearly a week of seminars, exhibits and meetings, the activity of NAB2006 at the end of April seems like a blur to many, but based on accounts from attendees and exhibitors, the show was a success. Overall attendance this year was 105,046, compared to 104,427 for NAB2005.

The three topics that garnered the most attention were HD Radio, and multicasting and datacasting in particular, audio over IP, and the beginnings of several cooperative efforts between competitors. In our NAB review of products and technology, you'll see evidence of these activities in the products. Pick Hits and pictures from the convention.

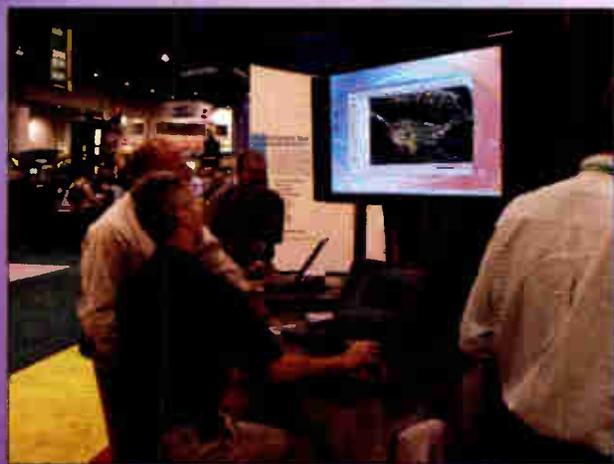
The March and April issues of *Radio* magazine had lots of information about products being unveiled, as did the NAB Insider e-mail newsletter, but they only scratched the surface. On the following pages you'll find details about some of the products that were kept secret until the convention doors opened. You'll also find the top picks of our Pick

Hits judges with the top new products at the convention. The *Radio* magazine Pick Hits are the oldest technology awards from the convention, and our panel of judges has excelled in its task to find the best of the best. You can see the list of the judges and the official rules as well.

Because of the scope of convention, it's impossible to include every new product introduction even in the pre- and post-show issues. Look for more great products in the New Products section of upcoming issues, as well as the annual Product Source accompanying the September issue.

—Chris Scherer, editor

2006 Spotlights



Recognizing Excellence The Pick Hits of NAB2006

Reported by Kari Taylor, senior associate editor



The Pick Awards are the original technology award presented at the NAB convention. First awarded in 1985, the awards recognize innovation in product development with an eye to meeting the practical needs for radio. The winners are selected by a panel of radio professionals who work independently and anonymously to find the top new products introduced at the convention. The panelists met on Wednesday

during the convention to make their final selections, which are limited in number. With so many new products introduced, this can be a difficult task.

While their identities are kept secret during the convention, we can tell you who they are now. See the list on page 24.

The Pick Hits judges also follow established guidelines to make their selections. See the rules on page 28.

NAB 2006

Master clock time code generator

ESE

ES-188: The ES-188 is a 1RU black anodized unit that displays nine

digits (day of year, hour, minute and second) of time as received via a user selected NTP server. Several types of time code, as well as a 1PPS signal are generated and output on the rear panel. These outputs allow the unit to interface with new or existing computers, automation systems and third-party clock systems. The clock features automatic correction for Daylight Saving Time and a four-hour battery backup. Options include ASCII NPR time code output, relay contact closure, 220Vac, 12 to 35Vdc power input and UL-approved power supply.

310-322-2136; fax 310-322-8127; www.e-se-web.com; ESE@e-se-web.com

Steve Church (left), president of Telos, makes the announcement that CBS Radio station WZLX Boston will offer all of its classic rock programming in surround and compatible stereo using the MPEG Surround system.

Harold Popp of Fraunhofer and Paul Donovan of CBS Radio look on.



2006 PICK HIT



Digital audio toolbox

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DA795: Analyze any stereo digital audio signal and generate low-noise digital test signals, all at up to 24-bit/96kHz sample rate resolution with this device. The unit offers two sets of AES/EBU and S/PDIF inputs, including Toslink and ADAT, plus word clock in. Digital outputs, including AES/EBU, S/PDIF, and Toslink/ADAT and word clock out are also available. A transparency test verifies that a device passes digital test waveforms without errors, using synchronous or asynchronous test. The bit stream analyzer analyzes digital stream characteristics to check actual word length and sample rate, bit activity, header information, flag errors and low voltage. Bitscope shows distortion, noise or jitter on an S/D or X-Y scope, and also applies the results to the internal speaker, headphones and line output.



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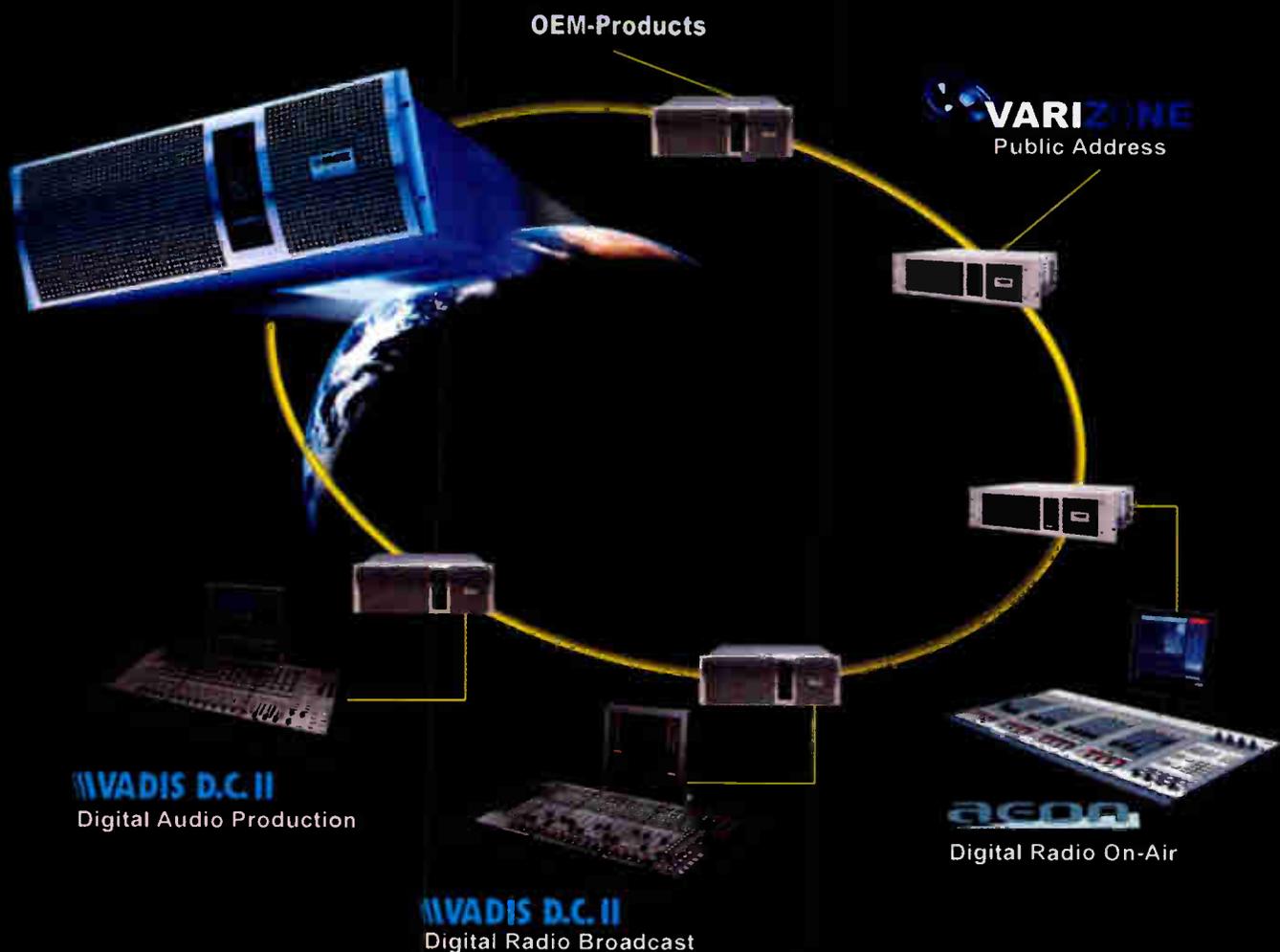
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- Any audio source – anywhere

For more information
visit www.klotzdigital.com
or call 678-966-9900

 **KLOTZ**
DIGITAL

Data collection system

Day Sequerra

Market Area Monitor: Designed for HD Radio, analog and Internet broadcasts, this data collection system offers radio broadcasters a

set of resources for local, regional and national HD Radio confidence monitoring and competitive analysis. The MAM system offers diagnostic measurements for any HD Radio station (AM or FM), whether an independent operation or part of a national multi-station group. Using 1RU of space, the MAM receiver records a complete snapshot of any station's HD Radio output including audio S/N ratio, level and time alignment as well as audio program samples, along with cataloging that station's full HD Radio data payload. The system also provides monitoring, cataloging and sampling of legacy analog AM and FM radio and Internet-streaming broadcasts.

856-719-9900; fax 856-719-9903; www.daysequerra.com; info@daysequerra.com

What the judges had to say:

I like being able to monitor all the AMs and FM's in my market.

Excellent logging features.



25 kW



50 kW

AM transmission just right for YOUR station.



15" XGA Graphical User Interface

The new 25 kW 4MX 25, like the award-winning 4MX 50, is designed to meet the demands of both analog and digital transmission. Based on BE's patent-pending 4M Modulation™ — they both boast unparalleled 88% typical efficiency into a small footprint with a price to match. Power amplifiers, each with their own power supply, can be removed and replaced while the transmitter remains on the air. Dual, low-voltage power supplies allow full operation with no loss of power or service even if one goes off line. Power levels down to 250 W meet all your power level needs, day and night.



Broadcast Electronics, Inc. • 4100 North 24th Street, Quincy, Illinois 62305-3606
Telephone: (217) 224-9600 • Fax: (217) 224-9607 • E-Mail: bdcast@bdcast.com
Broadcast Electronics and the BE logo are registered trademarks and 4MX and 4M Modulation are trademarks of Broadcast Electronics Inc.



John Battison received the SBE's Lifetime Achievement Award.

Photo by Angel Bates, SBE

Studio mic AKG

Perception 100, 200: These large diaphragm, side-address condenser mics are equipped with 1" capsules that deliver 20Hz to 20kHz frequency response, with a high-end peak that begins at 5kHz and rises to +4dB at 10kHz. The mics offer 135dB maximum SPL capability and self-noise of less than 16dB-A.

The 200 adds switchable 300Hz, 12dB-per-octave bass-cut filter and a 10dB pad for greater flexibility. Both mic's externally-biased capsules must be powered by 48V phantom power. The chassis are made of zinc/aluminum alloy and the grille screens are made of special spring steel that are dent resistant. Both mics have an impedance of 200Ω with a S/N of 78dB.



615-620-3800; fax 615-620-3875
www.akgusa.com; akgusa@harman.com

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**Xtreme
'SOFTWARE'**
powerful Windows PC software for live air, automation, scheduling, and production

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.



**Xtreme
'HARDWARE'**

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

No down payment

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Free Hardware upgrades

Free PC and Network setup

the XTREME 'Solutions' program

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 risk free automation system
XTREME~digilink



970-461-0730 www.arrakis-systems.com

Arrakis

IP audio codec software

Musicam USA

Audiostar: This is software for PCs that works over LAN, WAN, DSL, ADSL and the Internet. The system features an auto-detect algorithm built in, so when a user sends or receives content over an IP connection, the system can recognize the coding algorithm used in the transmission and automatically change the settings to match. A compact USB hardware key is required to run the software unrestricted. The software can be used on any computer equipped with a 10/100 LAN interface and a Direct Sound compatible sound card. It supports standard algorithms MPEG 1 and Layer 2, MPEG 2 and Layer 3 and G.722. It also supports MPEG 2 and 4 AAC, MPEG 4 AAC low delay and uncompressed PCM linear audio.



732-739-5600
 fax 732-739-1818
www.musicamusa.com
sales@musicamusa.com



Jon Young (left) answers questions about the Arrakis Digilink Xtreme.



IP audio distribution

Barix Technology

Instreamer, Exstreamer, Exstreamer Gold: With Instreamer, stations can distribute audio and deliver music and announcements via any IP path. The Exstreamer MP3 Player pulls digital audio from the network while converting it into music or voice. It communicates over a standard network connection (10/100 Mb/s Ethernet) with PCs, digital audio servers and Internet radio stations. It is controlled using a standard Web browser or IR remote control. The Exstreamer Gold is a MP3 player that can pull digital audio from the network while converting it to music or voice. This device includes its own built-in amplifier and speaker output. It communicates over a standard network connection with PCs, digital audio servers, Internet radio stations and analog audio sources using an Instreamer.



+41 43 43322 11; fax +41 44 2742849; www.barix.com; info@barix.com

What the judges had to say:

An inexpensive way to provide an IP stream.

I could use this for in-house monitor feeds.

innovation never gets old.



At Dielectric, you'll find the same spirit of innovation that inspired "Doc" Brown to build a better radio antenna in 1942 alive and well in our full range of broadcast solutions:
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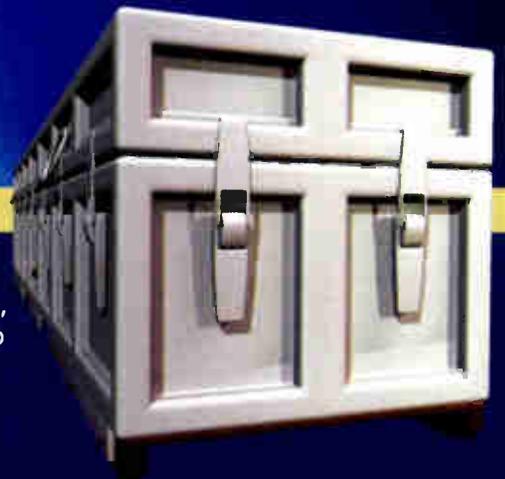


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USB-to-XLR codec

Henry Engineering

USB Matchbox: Replacing a computer sound card, this codec provides stereo line-level inputs and outputs at professional levels and eliminates the hum, buzz and other interface problems caused by in-PC audio cards. The Burr-Brown 8x ADC/DAC provides audiophile performance with the ease of USB interface to any PC. The unit features XLR connectors and monitor output with muting. The unit occupies 1/3 rack width and is 1RU tall.

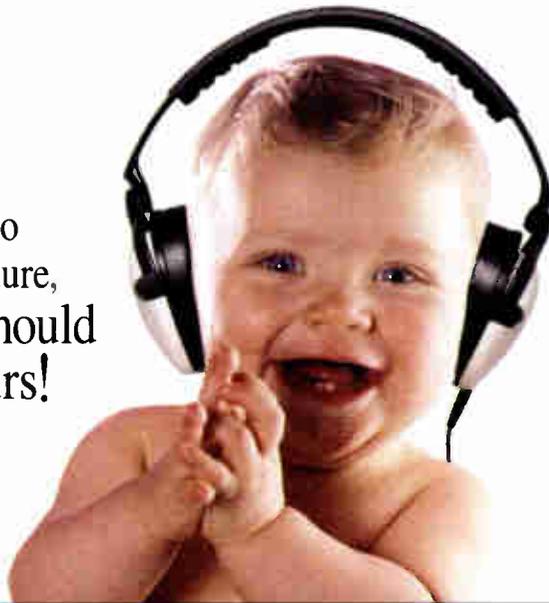
626-355-3656; fax 626-355-0077; www.henryeng.com; info@henryeng.com



What the judges had to say:

The audio-to-computer bridge is still an obstacle in many installations. • This is a perfect problem solver.

Digital Radio
Is In His Future,
Belden Should
Be In Yours!



Don't Trust Your Digital
Conversion to Anything
Other Than Belden —
The Proven Leader in Broadcast
And Data Cable Technology.

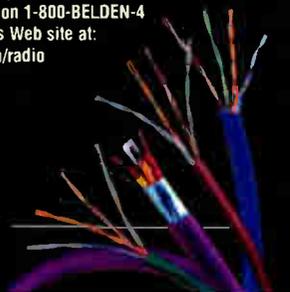
Belden is the leader in broadcast cable technology, offering the best quality and the broadest line of audio and video cables in the industry. In fact, Belden Brilliance® products are the important link in any number of radio broadcasts, network and cable TV broadcasts, and post-production recording and film studios. For radio, this includes hundreds of top-quality cables for instrumentation, microphone and line-level equipment applications — including AES/EBU-compliant digital cable designs.

Additionally Belden is the market leader in Unshielded Twisted Pair (UTP) data cable design, supplying extremely high quality cables for 10 Gigabit Ethernet performance, as well

as Category 6 and 5e. And, only Belden offers UTP cables with Bonded-Pairs. Belden Bonded-Pair cables ensure good attenuation characteristics over longer distance since the pair conductors are bonded together to maintain a consistent conductor-to-conductor spacing. Bonded-Pairs also mean Installable Performance® — that is, unlike other UTP designs, Bonded-Pair cables maintain their superior electrical performance even after the rigors of installation.

So, for a better link to the future, stay tuned to Belden.

For a FREE Digital Studio Cable Guide or a FREE cable sample, call: Belden CDT Electronics Division 1-800-BELDEN-4 Or, go to Belden's Web site at: www.belden.com/radio



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Pick Hits Judges

The Pick Hits Judges cover the entire convention floor and make their selections independently and anonymously. Only Radio magazine tells you who its award judges are.

Bud Aiello, CBNT

Director of Engineering Technology
NPR
Washington, DC

Gordon Carter, CPBE CBNT

Chief Engineer
WFMT-FM
Chicago

Bill Croghan, CPBE

Chief Engineer
Lotus Broadcasting
Las Vegas

Steve Fluker

Director of Engineering
Cox Radio
Orlando, FL

Gary Kline, CBNT

VP Corporate Engineering/IT
Cumulus Media
Atlanta

Kent Kramer, CBRE

Director of Engineering
Reach Media
Dallas

Marshall Rice

Engineering Director
Bonneville International
St. Louis

Barry Thomas, CPBE CBNT

Owner
Thomas Media
Bloomfield, NJ

ON THE AIR

SANITIZED FOR YOUR PROTECTION

SOME WORDS SHOULD BE OBSCENE AND NOT HEARD



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

Our new HD compatible BD600, 24-bit delay, comes standard with AES/EBU, and provides up to 80 seconds of memory — twice as much as other delays. There are fully adjustable Delay and Dump functions, and a Sneeze function which "edits" audio entering the delay, allowing the host to sneeze, cough, or make a short comment without being heard on air.

The BD600 offers two different methods of delay buildup and

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

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

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

Eventide®

HD COMPATIBLE

Eventide is a registered trademark and MicroPrecision Delay is a trademark of Eventide Inc. ©2005 Eventide Inc.

World Radio History

NAB 2006

Studio mic Neumann

TLM 49: The TLM 49 features the K47 capsule used in the M49 and U47 microphones. The capsule offers a linear frequency response up to the upper mid-range. Above 2kHz there is a gentle presence boost up to 3dB. The capsule is enclosed by a large, acoustically open head grille. The 34mm diaphragm cardioid capsule has a tendency toward supercardioid performance due to the special capsule construction. The mic operates at an SPL of up to 114dB without distortion and a dynamic range of 102dB (A-weighted).

860-434-5220; fax 860-434-3148

www.neumannusa.com; neumlit@neumannusa.com

The SBE provided the day-long Ennes Workshop on Saturday.



Transmitter remote control system Burk Technology

Arc Plus: Automatic functions are built in, and backward compatibility with the Arc-16

provides flexible roll-out options. The system is a next-generation transmitter remote control system for full-time, multi-site or dial-up operation. Taking advantage of the scalability of IP, the unit connects an unlimited number of sites, each with as many as 256 channels of metering, status and command. Access the entire system from the front panel of any unit, take control using a Web-browser or PC software or dial into the system over the phone. Advance facility management operation incrementally with this equipment, and protect the station's hardware investment.

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

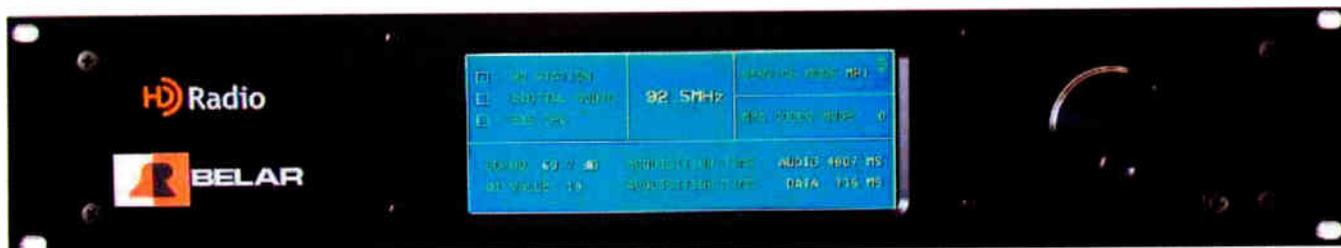
What the judges had to say:

It handles a tremendous number of sites.

Backward compatibility with the ARC-16 is a good evolution path.

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It Includes!

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- 2 High Quality Analog FM Composite Outputs
- 8 Analog Audio Outputs, 3 AES/EBU Outputs
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- RF Spectrum Analysis
- Time Alignment Analysis
- 4 Assignable Alarm Relays
- RJ-45 Ethernet Interface

www.belar.com

Designed, Developed, and Made in USA

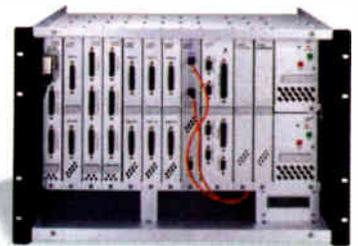
“The South has a lot of ‘favorites’ including barbeque, football and great hospitality. I’m adding Logitek to my list.”

“Logitek was the solution for our consolidation in Birmingham. We wanted a system that was flexible and reliable. The most flexible systems are based on router technology, and after looking at the choices, I picked Logitek. Logitek lets me makes changes fast and seamlessly. It manages my satellite feeds, ‘talks’ extensively to my Prophet system and lets me add sources and outputs without ever changing a wire connection. My operators love the ability to get any source anywhere, too.

“When we built this facility we had four FM’s and an AM. Suddenly, I had four additional HD streams to incorporate into the system. Logitek let me add the additional stations with a minimum of frustration.

“Logitek may not be as high on my list as great barbeque, but it gets my vote for a great audio platform.”

Bob Newberry
Market Engineering Manager
Clear Channel – Birmingham



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World Radio History

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www.audemat-aztec.com

Miami, FL USA - Tel: 305 249 3110

ussales@audemat-aztec.com

NAB 2006

Analog, digital translator

Armstrong Transmitter

TRX-HD series: Designed to transition a translator station from analog-only broadcasting to digital, this series receives an FM station's entire signal payload over the air, including its HD Radio digital component. The

signal content is transferred to the TRX-HD transmit side for retransmission on the translator frequency. The TRX-HD10 provides 10W in the hybrid digital mode, the TRX-HD50 provides 50W hybrid digital, and the TRX-HD100 is a 100W hybrid digital translator. Higher hybrid power levels are achieved by adding an Armstrong solid-state amplifier.

315-673-1269; fax 315-673-9972; www.armstrongbx.com; sales@armstrongbx.com



What the judges had to say:

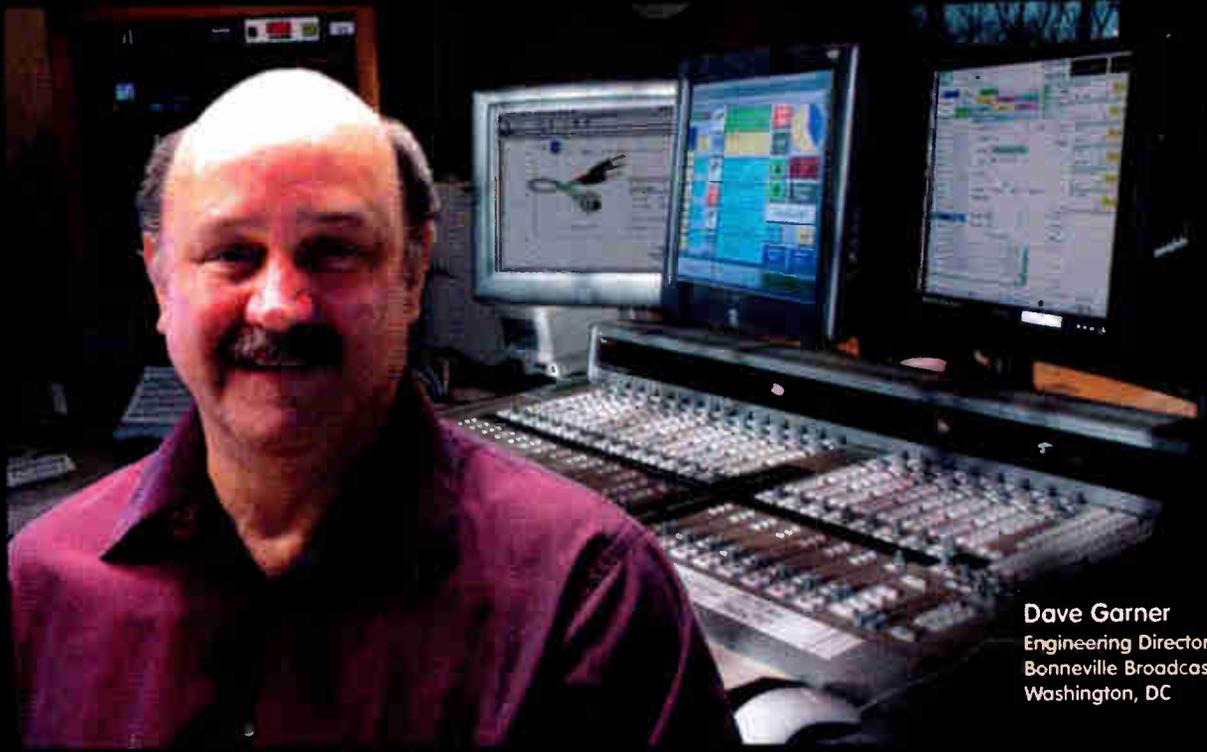
Stations with translators have been wondering how they will accommodate HD Radio. Now they know.

To have it all in one package makes it an elegant system.

Pick Hits Rules

Unlike some other convention awards, the *Radio* magazine Pick Hits are selected by following a set of established, published rules.

1. Products must be new and not shown at a previous NAB spring convention. In some cases, distinguishing a new product from a modified older one is difficult. For "Pick Hits" purposes, a new product is one with a new model number or designation.
2. Products must have some positive impact on the intended user's everyday work. Judges search for equipment intended for use on a regular basis. Products should provide new solutions to common problems.
3. Products must offer substantial improvement over previous technology. Unique circuit architecture need not be included, but some new approach or application must be involved in the product's design.
4. The price of the product must be within reach of its intended users. The judges seek products appropriate to a wide range of facilities.
5. The products must be available for purchase within the 2006 calendar year. Equipment must be on display on the show floor, currently (or imminently) in production, and some type of product literature must be available. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings do not qualify.
6. The Pick Hits Judges operate independently from one another and remain anonymous to everyone including other judges until the selection meeting. This ensures that the products chosen are truly representative of the industry, that the judges were not persuaded in any way, and that the entire selection process is as fair as possible. The judge's identities are published in the June 2006 issue.
7. The editorial staff of Radio magazine serves only as a moderator during the final selection process and has no influence or decision in determining the winners.



Dave Garner
Engineering Director,
Bonneville Broadcasting
Washington, DC

photo credit: Carol J Forman Photography

STUDIOHUB+ CASTING CALL

CONNECT EVERYTHING
THE CAT-5 STUDIO WIRING SOLUTION
StudioHub+

"I think that the standard today in broadcasting is CAT-5. We use it to interconnect our studios, wire our consoles to the equipment rooms, and it is a pretty universal system and philosophy. StudioHub has given us an interface that makes it very easy to make broadcast equipment work with IT equipment."

"StudioHub is very efficient. In our large studio is a 28 input console which to wire conventionally would probably have taken a couple of weeks. With StudioHub I think 3 of us came in here and basically got the consoles wired up in 2 or 3 days. That was quite a time savings."

"One nice thing from an engineer's standpoint is that Radio Systems has the ability to pre-make harness cables from our consoles to interface directly to the StudioHub chassis RJ45's. This made installation quite easy."

"We also use StudioHub to connect all of our studios to our equipment room. We've got about 24 CAT-5's from each studio back to the equipment room."

Join a cast of thousands who now count on StudioHub+, THE broadcast wiring solution.

StudioHub+ is the CAT-5 wiring system that lets you plug and play all your studio and rack-room equipment with an elegant system of pre-made cables and adapters.

StudioHub+ is the universal analog and digital approach to wiring all your broadcast gear.



See the Movie!

Log on to www.studiohub.com/themovie to view scenes of WTOP and hear the whole WTOP/StudioHub+ story from Dave Garner, Engineering Director and the sequel from 8 other StudioHub+ sites around the US.

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Phone: 856-467-8000 • Fax: 856-467-3044 • www.studiohub.com





Analog stereo matrix switcher Broadcast Tools

ADMS 44.22: The device is a four-input stereo AES and four-input stereo analog matrix switcher with two independent stereo analog and AES outputs in a 1RU profile. Each input is equipped with a three-band EQ, five types of filters and a leveler function. Any or all of the inputs may be mixed, faded or dimmed to either or both output pairs. Additional features include selectable stereo VU meters; head-phone amplifier; powered monitor output; 16x16 GPIO port and RS-232/USB port. The switcher is also equipped with an expansion port allowing a second unit to be added, increasing the inputs to 16.



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

What the judges had to say:

Switching analog and digital is something that I needed. • The extra features, such as EQ and remote control, are great.

Signal processor Vorsis

AP-1000: This multiband, dual-path FM plus HD Radio processor features an interactive user interface for remote monitoring and control. This 31-band processor features three-band preprocessing AGC, an AM/FM output limiter, an HD Radio output limiter, four-band full parametric EQ, variable high- and low-pass filters and Ethernet control. It provides HD Radio latency FM delay, FM stereo MPX generator, a 24-bit sample rate converter, de-esser, and accepts a 44.1kHz, 48kHz, 96kHz or 192kHz inputs.

252-638-7000; fax 252-635-4857; www.vorsis.com; sales@vorsis.com



What the judges had to say:

The user interface is incredible, and it sounds very clean. • The graphic representation of the settings is outstanding.



**WFDF Radio in Motown, USA
Eight Towers, 50KW, DA-2**

AM Radio DA Phasing System: The Way It Ought To Be.

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**Speaker cables
Belden**

Brilliance Low Cap OFHC: The cable's performance gains are achieved through the use of high-conductivity, oxygen-free copper conductors that are inherently free of impurities. The use of a low-capacitance polyolefin dielectric rather than traditional PVC ensures a high frequency response, even over extended distance cable runs. The new cables are available with 10, 12, 14 or 16 AWG bare copper conductors and feature round, brightly colored and satin-finished PVC jackets.

800-BELDEN1; fax 765-983-5294; www.belden.com; info@belden.com



FM/HD Radio mod monitor

Inovonics

Model 532:

The company's first product manufactured under license for Ibiquity's HD Radio digital transmission system, the monitor measures parameters of the analog FM and the digital HD Radio program channels, and includes a display of the occupied spectrum. It measures the injection of FM subcarriers and displays signal strength and multipath effects. Built-in spectrum analysis provides for incoming RF and FM baseband. Its tuning range is 87.9 to 108.1MHz in 200kHz steps. Other features include a sensitivity of 10dBf for 50dB mono quieting; RS-232 serial, USB and TCP/IP network ports; and power requirements of 95 to 250Vac, 50/60Hz, 50W.

800-733-0552; fax 831-458-0554; www.inovon.com; info@inovon.com



What the judges had to say:

The easy-to-read display is fantastic.

All the functions are built-in, including subcarriers and digital.



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- An ECS Studio is installed at the Whitman-Hanson Regional High School near Boston, MA.



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Safety system Will-Burt

D-Tec II: The built-in anti-collision system automatically stops mast extension, providing added protection from overhead hazards for the operator and equipment. The D-Tec II is equipped with the Emergency Bypass System, providing a safe means of bypassing the D-Tec II in the event a malfunction or false trip occurs preventing mast extension. System safety features include dual threshold ac alert, E-field (current) and H-field (magnetic); ac current and ac voltage sensing; audible alerts; and expanded self-testing features. The system offers an ac voltage detection range starting at 110Vac/60Hz.

330-682-7015; fax 330-684-1190; www.willburt.com; masttite@willburt.com



What the judges had to say:

Wonderful solution for mast safety.

E and H field sensing is a needed feature.

Podcasting, live streaming Orban

1020 FE: This encoding application for netcasting, file encoding, podcasting, audio content downloading and mobile 3GPP devices supports the MP4 family of codecs including AAC and HE-AAC/AAC Plus. It can produce podcasts that can be streamed live or played on demand, even when the file is still downloading. Also included are file hinting for streaming applications and 3GPP mobile phones. The system can tag and add graphics for album art and logos. Downloads comparable to high bit-rate MP3s and WMAs can be achieved in half the time, using half of the bandwidth.

510-351-3500; fax 510-351-0500; www.orban.com; custserv@orban.com



Comrex received lots of attention for its Access IP codec.



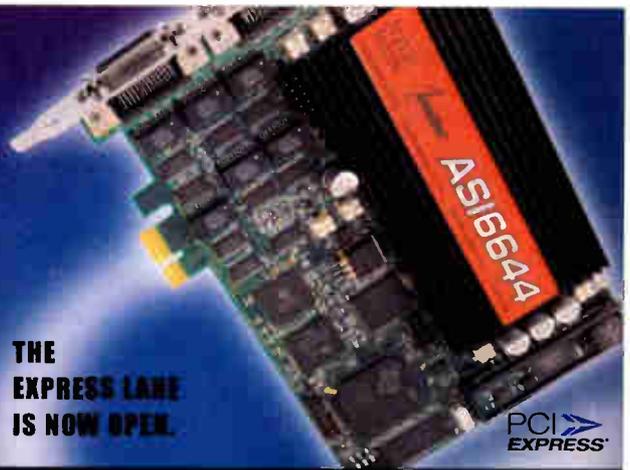
Your Best Move!

Make ERI part of your broadcast strategy.



ELECTRONICS RESEARCH, INC. **ERI**

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THE EXPRESS LANE IS NOW OPEN.

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AudioScience introduces the world's first PCI Express sound cards: the ASI6600 series. Not only do you get the advantage of speedy PCI Express data transfer, but our ASI6600 series sound cards are loaded with Built for Broadcast™ features. With PCI Express slots fast becoming the standard in new PCs, now is the time to get in the fast lane. Get ahead, and stay ahead, with AudioScience. Learn more by calling +1-302-324-5333 or visit www.audioscience.com.

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- +24dB analog levels
- 96kHz sample rates
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- MRX multi-rate mixing
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- TSX time scaling
- SoundGuard transient voltage protection
- Short 6.6" PCI card format
- Up to 4 cards in one system
- Windows 2000, XP and Linux drivers

(BUILT FOR BROADCAST)

AUDIOSCIENCE
Sound. Without Compromise.



**Eight channel remote control system
Broadcast Tools**



WVRC-8: This system comes equipped with a browser-based function program scheduler and alarm logger, while the user may select from four e-mail recipients or different sounds to play when an out-of-tolerance alarm is generated. The unit offers eight high-resolution telemetry channels, while each of the eight optically isolated status channels may be configured for five to 25Vdc wet or dry input monitoring. The eight control channels are equipped with independent SPST 1A relays for the raise/on and lower/off functions. Other features include stereo silence sensor audio and balanced caller/send telco audio; a jack for external fail power supply; 1/8" TRS jack for an optional external temperature sensor; a front-panel mic for remote aural monitoring; and a front/rear panel RJ-11 telephone jack for user voice response recording.

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

What the judges had to say:

Lots of control in a small space.

An excellent solution for smaller installations.



**Mini console
Sierra Automated System**



Rubi-T: This mini Rubicon broadcast console is 6" high and features any number of input modules, monitor modules and talkback modules. This console is useful for news booths, edit booths, voice booths, voice tracking and mini secondary effects mixer in on-air studios. Features include a full-length 100mm P&G fader, on and off, and four programmable source select or bus assignment buttons.

818-840-6749; fax 818-840-6751
www.sasaudio.com; sales@sasaudio.com

What the Judges had to say:

Lots of routing and mixing capability in a tiny space.

Great for voice tracking, news editing and talk-show host positions.

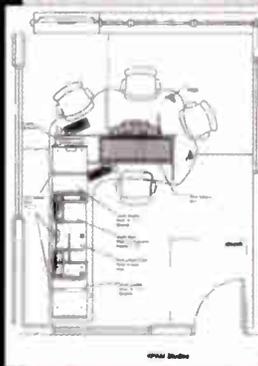
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Lucid Genx 192: Designed to fit in a variety of digital audio situations, this system provides a low-jitter master clock reference in several



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425-787-3222; fax 425-787-3211

www.symetrixaudio.com; sales@airtoolsaudio.com

What the judges had to say:

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www.broadcast.harris.com; broadcast@harris.com

What the judges had to say:

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HD-2-ready automation
Broadcast Electronics

Audiovault 9.5: Central to the new software version is the Flexscreen approach to the user interface, which gives broadcasters various profile options for personalized, on-screen layout of the functions used in their studios. Broadcasters can profile workspaces unique to each show or format, as well as for operational continuity throughout the studio environment. This version also integrates production tools into the air studio workflow. Segue Editor is one of several tools now embedded in AV Air utility to provide greater flexibility to voice track or create music fades and other transitions within the air studio.



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



The Audio-Technica booth provides an easy way to compare the company's arsenal of mics.



Digital recording mic
HHB

Flashmic DRM85: The Flashmic combines a Sennheiser omni-directional condenser capsule with 1 GB of flash recording memory to create a portable recording device with no cables and connectors. Either WAV linear or MPEG 1 Layer 2 encoded files can then be transferred at up to 90x real-time via USB. A date/time stamp is stored along with the file, with the internal real-time clock set and synchronized automatically by the host computer. The mic is powered for more than six hours by a pair of standard AA batteries. Customizable parameters include audio mode (six settings with a maximum record time of more than 18 hours), automatic gain control on/off, record level, pre-record buffer (zero to 10 seconds) and high-pass filter on/off. Operating at the industry-standard 48kHz/16-bit, the recordings can be played back under independent level control on headphones connected via a socket on the base of the unit.



860-434-9190; fax 860-434-1759; www.hhbusa.com; sales@hhbusa.com

What the judges had to say:

I like that the controls can be locked.

It's ideal for the quick reports that will return to the studio regularly.



Tower safety messaging

Towerswitch Collocom-2:

This system is useful at the base of a tower, the doorway leading out to the antenna rooftop or the side of the equipment housing. This audio-based safety device will automatically provide one or more verbal messages to all site visitors so that they may be properly informed of any safety hazards present. The Collocom Solar Datalogger is solar-powered; it will also run on ac, dc or a site's battery bank. The system features multiple messages and alternate language record and playback capability, as well as a 250-event non-volatile event logger. It's constructed in a NEMA 4 cabinet that is waterproof and a 1/4-turn twist lock with key.

561-482-7334; fax 954-428-0233

www.towerswitch.com; info@towerswitch.com



What the judges had to say:

This is a great idea with the recent attention to safety.

The switch for the tower ladder and the motion sensor ensure that the warning will be heard.

Subwoofers, monitors
Genelec

7200, 8200: These monitors and subwoofers accept all standard AES/EBU formats of digital audio. The 8200/7200 series will accept sampling rates ranging from 32kHz to 192kHz. The 8200 series will also accept traditional analog signals. The 8240A uses a 6.5" woofer and 3/4" tweeter set into Genelec's Advanced Directivity Controlled Waveguide. The free-field frequency response is 48Hz to 20kHz. Peak SPL per pair is 115dB driven by a pair of 90W amplifiers for each driver. The 7260A features a single 10" proprietary driver with a 120W power amplifier, frequency response of 19Hz to 85Hz and delivers an SPL of 108dB at 1 meter.

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There was lots of activity in the Teline Technology booth in opening hours of the convention.

On

the Air

By Kari Taylor,
senior associate editor

As soon as the lighted "fasten seatbelt" sign above everyone's head dimmed, Peter Greenberg's team quickly began preparing for his regular Saturday morning radio show, which was scheduled to begin in about an hour. But unlike most Saturdays, Greenberg, host of *Travel Today with Peter Greenberg*, was about to broadcast his show from a regularly scheduled flight of a Lufthansa Airbus 330 jet flying from Frankfurt, Germany to New York City. Flying at 35,000' at about 600mph, this would be the first live radio program from a commercial airliner. Until now, technology was not advanced enough to accommodate a radio broadcast such as this.

"I remember being in the cockpit of a Pan Am 747 in 1985, and we arranged for me to do a live radio report on the polar route from London to Los Angeles," said Greenberg. "It was a scratchy, weak signal, relayed through Stockholm radio to the station back in California. It lasted just four minutes until we lost the signal."

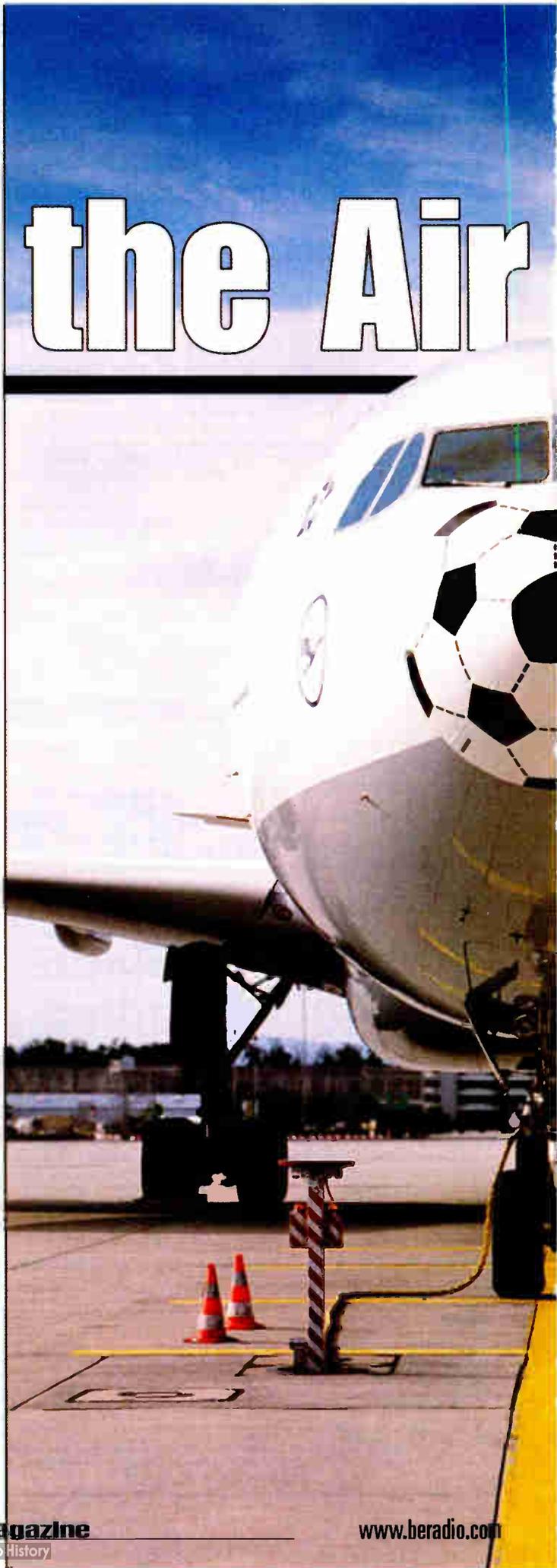
But 21 years later, on April 22, 2006, technology made it possible for Greenberg to broadcast for 2.5 hours discussing the travel industry, interviewing travel industry professionals and answering call-in questions from listeners.

This project was three years in the making. It began with Greenberg's engineer, Mike Worrall, calling about a half dozen technical departments of airlines, such as Singapore Airlines and Cathay Pacific, asking whether they had the ISDN technology to accommodate a broadcast from an airplane. Repeatedly the airlines would say that though many private business jets were equipped with ISDN capability—via services like Inmarsat Fleet 77—no commercial airlines were equipped with this equipment.

Sky high Wi-fi

In late 2005, Lufthansa contacted Greenberg about a new system from Boeing that was being installed in its long-range fleet that was Internet-based. Connexion by Boeing allows high-speed wireless Internet access on many airlines operating international flights. Users can log onto the Internet via their laptops during the flight and surf the Web, check e-mail, listen to streaming music and even tunnel through VPNs to work. It accommodates all three standards of Wi-fi: 802.11a, 802.11b and 802.11g. Lufthansa calls its Internet portal Flynet.

There is a data transceiver and router in the front of the plane. There is also a reflector antenna that is located on top of the airplane. The dish, about the size of a fist, turns and there is reflector that raises and lowers to maintain contact with the satellite, depending on where the aircraft is en route. There are currently five ground stations around the world to receive the signal. From Frankfurt, the airplane was using the station in Switzerland. Before Greenberg's show began, it switched to a ground station in Littleton, CO.





In the

Air

The other piece of equipment that previously wasn't available, but made this broadcast possible, was Comrex's Access audio codec. This codec is capable of providing voice and music quality service over IP connections using what Comrex has dubbed "BRIC technology." BRIC stands for Broadcast Reliable Internet Codec and enables broadcasters to use a variety of commonly available Internet access points to broadcast high quality, real-time audio. The Access is capable of using widely available wired circuits such as DSL, cable, POTS and frame relay as well as wireless circuits such as Wi-fi, 1XRTT, Edge and 3G data networks.

Comrex shipped Boeing an Access and Boeing facilitated some tests using its network simulator. At this point, the tests were not aircraft-based, but the tests indicated that the equipment would work together. The biggest concern seemed to be possible contention from other Internet users on board the plane.

"Boeing was convinced that we could get wired Ethernet and that the data path available for the whole plane would be 128kb/s, which is much more than the Access needed," said Tom Hartnett, vice president of engineering at Comrex.

Three weeks before the broadcast, Boeing informed Hartnett and Worrall that the Lufthansa fleet was not equipped with hard-wired Ethernet jacks at each seat, rather that their planes were "flying Wi-fi hotspots." Hartnett suggested waiting until the fall when Comrex would have a portable unit available with built-in Wi-fi and battery power, but it was too late to turn back or postpone the broadcast at that point. As soon as Greenberg heard that the initial tests were a success, he scheduled the Lufthansa broadcast. So, Hartnett and Worrall configured a standard laptop PC with Windows Connection Sharing providing the Access a path to the Internet via the laptop's built-in Wi-fi.

One week before the official broadcast, Worrall created a test broadcast on an outbound flight between Los Angeles and Frankfurt while on his way to South Africa, which was the site of Greenberg's broadcast the week prior to the official airplane broadcast. Worrall and a Boeing engineer were on the plane while the engineering team at Comrex was standing by to participate in the test.

About 20 minutes into the test the captain of the Lufthansa flight approached Worrall demanding that he turn off the equipment. Passengers were complaining that they couldn't get on the Internet. The captain assumed it was Worrall's equipment causing the problem. In reality, the flight crew had failed to clear the system's credit-card authorization cache following the plane's previous flight. Each time a plane lands the flight crew must push a button that clears everything in the queue that is Internet-related. The crew had failed to do that.

When Worrall and two other passengers logged on, they filled

On the Air In the Air

the bandwidth. Because of this, Worrall had to stop testing the system.

"The good thing was that what I heard during those 20 minutes of testing was very positive," Worrall said. "There was no break-up, it was very clean."

The group decided to try another test on the flight from South Africa back to Frankfurt. Unfortunately, they encountered another problem. Lufthansa explained that the Flynet system had no coverage over most of Africa. Because Worrall was flying

from southern Africa to Frankfurt, he would only get about two hours worth of testing time. And because he couldn't use the system during the last hour of the flight, because the crew would be busy preparing for landing and cleaning up, Worrall would only be allowed one hour of testing time.

The second test proved to be as solid as the first, even if it was only for an hour. Still, the path the audio would take from the airplane to New York during the live broadcast was complex.

Greenberg's show is syndicated from ABC Radio in New York and distributed via the ABC satellite system. Also, the studio that assembles all of the commercials, buffers and liners that are part of the show is at ABC in New York. But the weekend IT staff is limited. Had there been connection issues during Greenberg's broadcast, it might have meant dead air.

Because Worrall is the assistant chief engineer at ABC Radio in Los Angeles, he called on his colleagues to help. He installed the Comrex Access in Los Angeles instead of New York. The LA station had a dedicated T1 service with an analog, no delay path from ABC Radio LA to ABC Radio NY. He hooked the output of the Access to the T1, routed it to NY where they received the airplane audio. But then the signal had to be returned from NY to the plane. Because the path from LA to NY was only one way, Worrall had to find another way to get it back to LA. He used ISDN at G.722, which is a low delay algorithm. The quality didn't matter at that point, all Worrall wanted were the cues and caller audio; the low delay was most important. From the ISDN it was hooked back into the Access. From the Access, where it became Internet data again, it went to the satellite ground station in Littleton, CO, and went back to the plane. All of this took place in a little less than two seconds.

With the signal traveling all over the world, Worrall was concerned about possible single point of failure problems.

In terrestrial remotes using ISDN, the radio engineer can always fall back on the telephone line. On a plane there is no phone line. All Worrall had for a backup was a "best of" show on CD in New York. The board operator was instructed to use it if the signal from the plane was lost.

Luckily, it was not needed. Greenberg's live broadcast was a success. Everything went smoothly—even more so than expected.

During the broadcast Greenberg was using about 24kb of the available bandwidth, which is about 20 percent. Because he was primarily uploading, or sending, rather than downloading like the majority of passengers on the plane, there were no bandwidth problems, nor did Worrall need to block-out bandwidth from the other passengers on the plane.

VoIP takes off

During his broadcast, Greenberg received a



Technical Coordinator Mike Worrall on-board Lufthansa flight 406 with the Comrex Access for the *Travel Today* broadcast.

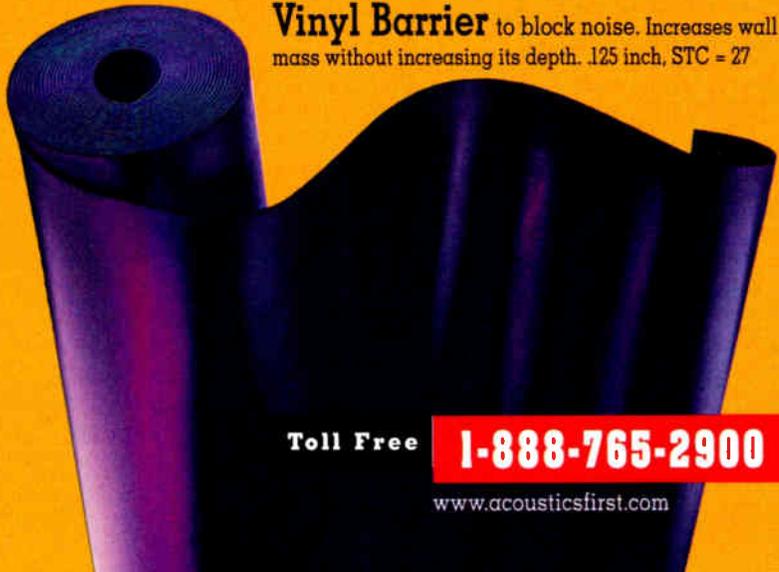


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Dell Latitude D610 laptop with on-board Wi-fi card
Mackie 1202 VLZ audio mixer
Comrex Access IP codec with BRIC
Sennheiser HMD 280 Pro headset

call from one of his film crew personnel who was on a flight from Frankfurt to LA. The film crew had been in South Africa with Greenberg the previous week and was heading home. With a laptop, the film crew logged on to the Internet using the Flynet/Connexion by Boeing access and listened to a live stream of the program. They were listening to the show on another airplane that was flying a completely different route, using the same technology that Worrall was using to broadcast Greenberg's program.

The film crew decided to call the show from the galley of the 747. They swiped a credit card, called the 800 phone number for Greenberg's program, talked to the board op in NY who told Greenberg in his headset "your video producer wants to talk to you from the airplane he's on going back to LA."

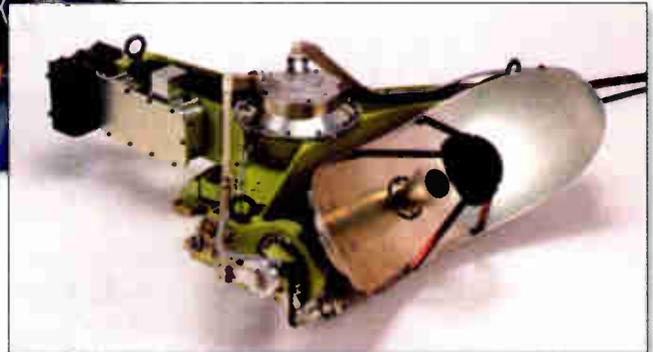
"Now this technology is growing exponentially by the minute,"



Travel Today Host Peter Greenberg with Worrall during the initial connection of the Comrex Access.

said Worrall. "Imagine talking to people on other planes. It's mind boggling."

As everyone fastened their seatbelts and the flight attendants prepared for landing, some people looked relieved, others looked exhausted, but everyone understood the importance of the remote broadcast and its effect on the future.



The transceiver and reflector antenna on top of the jet maintains contact with the satellite via a gyrostabilized mechanism.

Remote Replay

the technology behind Travel Today

Comrex Access

Access delivers mono or stereo audio over POTS, DSL, Cable, Wi-Fi, 3G cellular, satellite and some services you may not have even heard of. Given the challenges of the public Internet, it's no small boast to say that Access will perform in real-time over many available IP

connections including the most challenging ones.

BRIC (Broadcast Reliable Internet Codec) technology allows Access to achieve unprecedented flexibility and reliability in the IP environment. Access will work on a wide variety of wired and wireless data circuits, including:

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- Access is also a full-featured POTS codec. Use Access to make



a POTS-to-POTS connection. Dial up a Comrex POTS codec (including Matrix, Vector or BlueBox). You can deliver 15kHz stereo on a single POTS line when connecting to another Access.

BRIC technology can also deliver wideband audio over 3G cellular datanetworks like EV-DO and UMTS, as

well as the increasing number of publicly available of Wi-Fi hotspots. The forthcoming Portable Access has a built-in slot for easy connection to data cards supporting these services. Studio Access Rackmount can also be adapted to work over these services by using a special external adaptor.

When Peter Greenberg's producers looked to originate the broadcast from an in-flight jet via the Boeing Connexion service, the Comrex Access was the best solution for the job.

www.comrex.com
800-237-1776



ER EMERGENCY RADIO

Emergency text messaging fills gaps in disaster management

by Anders Madsen

The firefighter who enters a burning high-rise already has a dangerous job. Moving through smoke and darkness to a stairwell and, against traffic, upward toward the source of the fire, he can use all the information he can get to make his job safer. Even though police outside can see that the building is collapsing, they can't tell him. Police radios can't talk to fire radios.

A storm hits. Cell towers are down, and the same lack of communication exists among police, fire and rescue personnel. The management of the emergency is severely hampered because there is no way to coordinate activities. The first 72 hours, when it would be crucial to deliver information, are marked by a complete lack of effective communication.

As recent events along the Gulf Coast and elsewhere have shown, the job of creating effective emergency communications management systems is not yet done.

Critical information systems

The federal government is developing ways to overcome the shortcomings exposed by Hurricane Katrina, including the inability of interagency radio systems to interoperate. Equipment suppliers are anxious to provide hardware solutions to communications shortfalls, but proposed approaches offer advantages and disadvantages that complicate the decision-making process for local officials.

Most mature among these technologies, the familiar-to-all Emergency Alert System has served for decades to warn of threats including fires, floods and approaching storms. Using the existing broadcast infrastructure, EAS announcements come over the air to radios and TVs and are played by every active receiver in the service areas of the transmitters being used. By their nature, these one-way alerts are broad and nonspecific, and cannot be sent to a select audience.

Newer RBDS and satellite-based alerting systems offer the advantage of targeted messaging, optionally tailoring messages to specific individuals or groups. From a central command, pertinent information can be sent to rescuers, relief centers, police and fire, and, given the right equipment, to the general population. In the case of satellite systems, the receipt of the message can be acknowledged back to the control center, and a log kept of the time each message is seen. The advantages of targeted messaging are clear. As the disaster progresses, responses can be directed, and meetings can be arranged among critical personnel to share information and to determine how to adapt to changes on the ground.

The use of RBDS to send emergency text messages has been explored in Europe, where Radio Data Service first saw widespread use in consumer receivers. From Germany, a company called 2wcom has marketed an RBDS-based system that depends on supplying special FM radios to businesses and households in high-risk areas. A constantly searching RBDS receiver sounds an alarm or presents flashing lights when an emergency message of sufficient priority enters the system. The largest user of RBDS alert technology, the Swedish nuclear power industry, has issued receivers to residents of areas around power plants.

2wcom's U.S. subsidiary is Via Radio in Melbourne, FL. President Bill Marriott is rolling out the 2wcom system for local SBE chapters and displayed the system at NAB2006. The next generation 2wcom products will introduce addressability, with multiple priority



levels for messages, which allows low priority messages to be sent silently, or high priority messages that place the receiver to go into an alert mode, complete with sirens and lights, if desired. With the waking tabletop radio available today, Marriott sees the eventual incorporation of receiver chips in cell phones and TVs as "a great idea." But "the problem with something like that is that to get suitable market penetration may take many, many years."

Communication Laboratories (Comlabs), also of Melbourne, FL, offers a hybrid Internet/satellite-based system that connects tiers of hierarchy in federal, state, county and municipal governments and private industry. Depending on who knows first of the emergency, an initial EAS message

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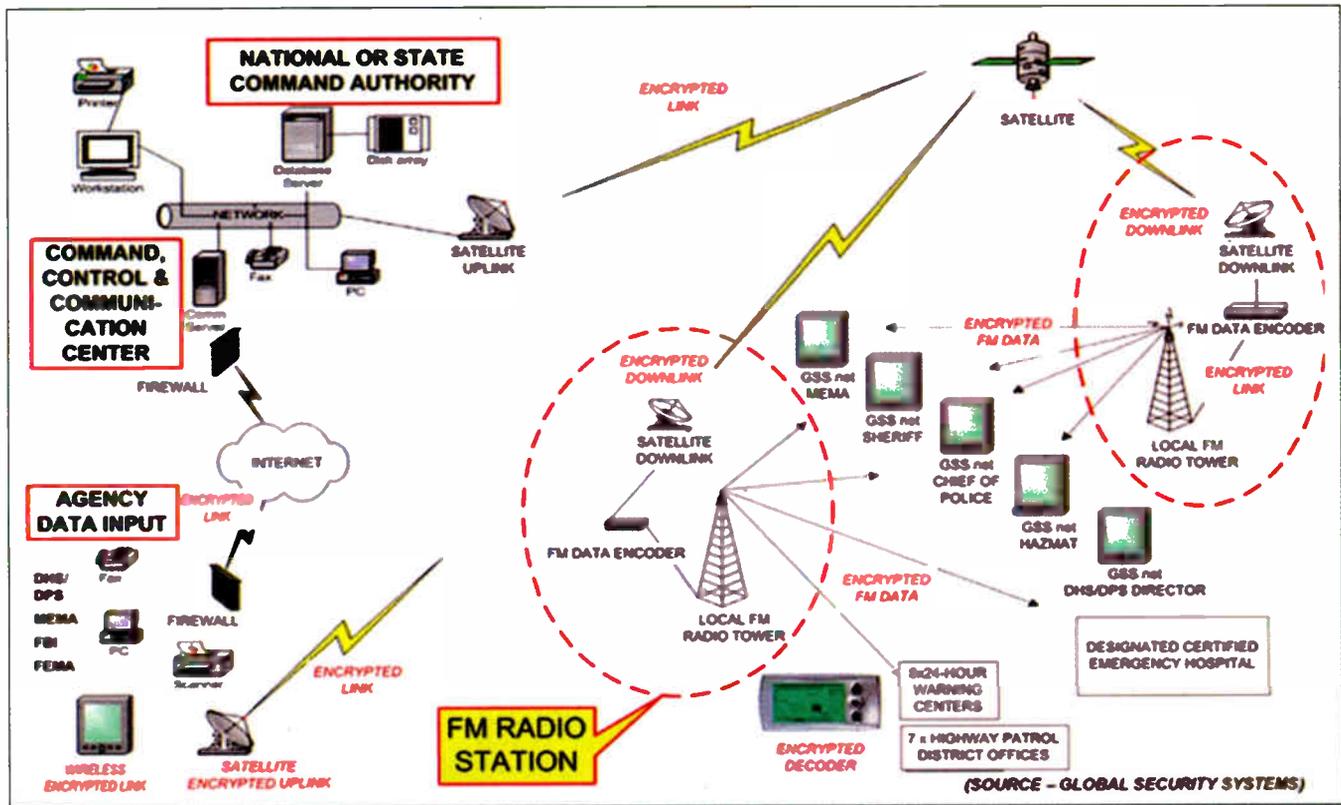
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can be issued via TCP/IP to its uplink and down using its product, Emnet (Emergency management net), to a command center, to targeted groups or to every Emnet user in the state. Broadcasters on the system can go to air with the news, and the delays and lack of participation associated with daisy-chain issues, common to EAS, can be alleviated. Acknowledging a lack of satellite reception inside buildings, the company uses satellite receiver cards built into the computers they manufacture to put the alert onto the client site's LAN and its computers. Delivery times are measured in seconds to as many as thousands of sites.

States weigh the options

Especially along the Gulf Coast, officials in the states hit hardest by Katrina are at the front of the line to assess these competing technologies. Mississippi, the first to adopt the new technology statewide, has selected RBDS-based equipment developed by Global Security Systems (GSS) of Jackson, MS. According to Vice President Matthew Straeb, GSS uses proprietary software to deliver text messages to receiver/display devices. These devices receive RBDS signals sent by FM stations, the assumption being

GSS offers several personal alert monitors.



that at least some FM towers will survive a natural or man-made disaster. The \$1.6 million contract was granted in early March after about six months of investigation and deliberation.

Regarding the selection of RBDS technology over satellite and over statewide integration of two-way radios, Mississippi's Program Review Administrator Todd Frier said, "Satellite phones are expensive. It's just not feasible to give every firefighter and all law enforcement personnel a satellite phone." The proposal to integrate radios is a \$200 million-plus idea, projected to take seven to eight years to complete. Right or wrong, Frier said, it's not a solution for today.

Mississippi Director of Homeland Security Ed Worthington describes his mission as that of building a backbone, a basic system that can be used in the near term, and can be expanded going forward. The first stage of implementation of the state's new RBDS system involves giving specialized receivers (supplied by GSS) to 100 people along the coast, in the lower six counties of the state. These critically chosen individuals will be able to receive text messages right away, and the plan allows for additional receivers to be purchased by local counties and municipalities as their budgets allow. Later, assuming that the technology is embraced, once the receiver chips are built into cell phones, all responders will have access to cell phone delivery of emergency text messages.

GPS allows directed reception

Because the capability of global positioning (GPS) is expected in any new system, messages can be sent not only to a select individual or group (through normal addressing), but also to all recipients in

a defined geographic area using GPS. In addition, the receiver crop could be grown in the future to include home appliances—microwave ovens with receiver chips inside could display alerts, as could smoke detectors or any other devices with digital displays. Given the development of a sizable installed base of receiving devices, each county's emergency operations managers could make the decision to buy message-generating equipment for about \$20,000—considered inexpensive for a capability of such magnitude.

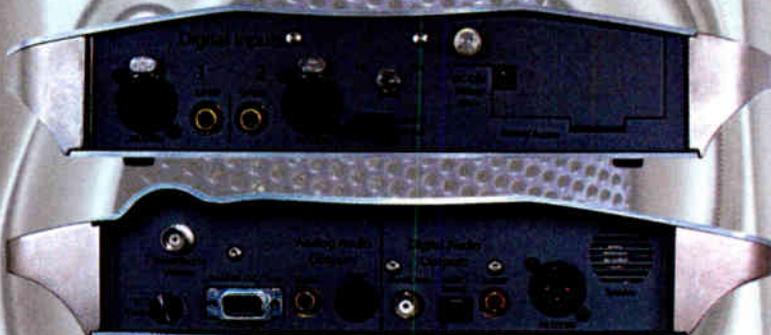
Two of the coastal counties in Mississippi are considering placing a receiver in every home, at a cost of less than \$20 each. Oncoming weather would trigger a message, tailored for the emergency, sent to all receivers in a designated area. As of this writing, Mississippi is reported to be the first state to pursue this objective to this well-defined point.

During Katrina, Mississippi suffered spotty or no communication for the first 48 to 72 hours post-

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landfall. "If we had had this capability then," said Worthington, "we would have been able to send a message day one, three hours after the storm had passed through, and ask the fire chiefs, police chiefs, sheriffs, to meet at a certain location at a certain time, and be able to provide us with whatever their needs might be. Right now we don't have that capability and didn't during Katrina. We will have that starting June 1."



A personal alert receiver from GSS.

Flying between the layers

Up to now, push-to-talk radio systems have allowed agencies to overcome a loss of cell towers, but although many local two-way systems maintained their integrity during Katrina, not all of them

interoperated with each other. Agencies often had some form of communication with their own people, but not with other agencies. The result seemed to make the crisis much worse than might have been the case had communication been more effective among police, fire and rescue personnel.

In Mississippi, the experience has guided Worthington's effort to design new communications methods. During the storm's aftermath, he saw that satellite radios continued to work "magnificently." Unfortunately, there was only one state law enforcement agency that had them, so a sergeant with the Mississippi Department of Wildlife and Fisheries, the lucky agency, was parked outside Worthington's Homeland Security office relaying messages for days.

"There is no one panacea for communications. It has to be a layered approach," said Worthington. "I'm also trying to make sure that that satellite radio capability is established in those lower six counties."

If Mississippi also finds the money to integrate a statewide two-way radio system, Worthington is determined that the RBDS-based GSS system will remain as one of the communication layers in the state. "It's one thing to be able to contact first responders; it's another thing to alert citizens. How do you alert your population? The potential here is to have this device in every home, so that they also will be protected." 

Madsen, a freelance author, is a marketing consultant to broadcast equipment manufacturers.

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Find the mic winner April issue

Congratulations to

Frank Meek

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His name was drawn from the correct entries for the April issue. He won a Heil Sound PR-20 from Transaudio Group.

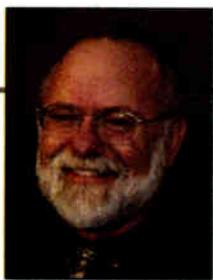


The mic icon was on the second CD player in the rack on the right.

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Sony PCM-D1

by Rich Parker

www.beradio.com

or the field recordist or reporter, finding a high quality recording device that is easy to use and carry is an ongoing quest. With the advent of flash memory-based recording there have been several new products available that are portable and have a reasonably long recording time and battery life. Unfortunately, some of these have audio quality specifications that are not up to snuff—the internal mic preamps were noisier than desired, battery life was less than optimal or there was some other small compromise. Most of these units also contain internal microphones, but with rare exceptions the quality was often not adequate for any but the most rudimentary recording tasks. With the introduction of the PCM-D1 solid-state recorder, we have an entirely new animal on the playing field: a portable flash recorder with extremely high quality microphones as an integral part of the package.

Weighing just over a pound (18.2 ounces with batteries), thinner and half again as long (2.5" x 6.75" x 1.3") as the venerable Sony TCD-8 portable DAT recorder many field recordists are accustomed to using, the PCM-D1 linear recorder is, at first glance, a work of engineering art. The unit is immediately visually appealing. Contained in the titanium case are two large and easy-to-read backlit VU meters placed prominently near the top of the unit; above the more commonplace LCD screen, which includes the various bits of information and meters. Below that are a set of easily accessible, human-sized buttons. At the top of the unit is the piece de resistance: a matched pair of X-Y electret/condenser cardioid microphones in a stainless steel cage in a swivel mount.

The controls are easy to read, and dials and adjustments that need protection have that protection built in. As a subtle example, the power switch can be switched on easily by dragging a finger or thumb up the side of the unit, but turning it off is another matter. There is a slight speed bump in the form of a bar molded into the case just above the switch that forces the user to consciously move his finger directly to the off switch to slide it down, preventing accidentally switching the unit off from careless handling. Even the wrist strap features a tab to allow the headphone cable to be inserted through it, which prevents it being jerked out accidentally. Granted, these are small details, but examples of the obvious care that went into the design of the case.

Additionally, there is a small mount on the back of the unit that takes any standard camera tripod mount.

I have always joked that any device that needed a user manual was poorly designed and the PCM-D1 does not disappoint in that regard. In only a few minutes after getting it out of the box, I was able to access and use virtually all of the functions of the unit without having to open the manual.

According to the manual, the permanently mounted X-Y microphones are a pair of carefully machined and matched units. From the supplied frequency response charts, they have fairly flat resolution from 400Hz to 10kHz, with some roll-off in the low end, a slight bump above 10kHz and a slight roll-off out to about 30kHz. (This is to be expected in a small-capsule microphone.)

Performance at a glance

4GB internal memory

Memory expandable to 4GB external

Uses standard AA batteries (alkaline or NiMH)

Electret/condenser mics with mount and guard

Easy to see interface, easy to use controls

Integrated threaded tripod mount

Manageable size and form factor

In addition to the permanent stainless steel mic guard, there is a foam windscreen that works quite well in windy environments. Because there are no moving parts there is no mechanical self-noise to affect the recording. The mic pre-amps are listed as Analog Devices AD797s and our listening tests confirmed that it is a quiet and accurate front end for such a small device.

In a rather radical departure for Sony, the unit records linear PCM WAV files that can be transferred from the unit via USB for immediate editing. In addition to the standard 22/44.1/48k at 16-bit sampling rate, recordings can be made at 24-bit/96kHz as well. The Sony Super Bitmap scheme also lives on in the unit as a selectable parameter for recording.

What is perhaps one of the more remarkable features of the device is the unique selectable limiter. In a truly innovative design,



a brief shadow recording is continuously made 20dB down from the normal input and stored in memory for a short time. If a transient peak clips the standard input, the lower level audio is normalized and inserted instead to prevent peak distortion. Of course, if the overload exceeds 20dB then all bets are off, but this is far easier than running two mics with a split track with one at 20dB down. We recommend this procedure to our VPR reporters for noisy and unpredictable environments.

Internal flash memory comes standard at 4GB, which yields anywhere from two to 12 hours depending on the sample rate and bit depth, with 24-bit/96kHz requiring the most real estate. In addition, there is an external slot for Sony Memory Stick Pro modules of up to 4GB. There is an external power supply, but the unit also can use alkaline (for two hours) or rechargeable nickel metal hydride (for four to five hours) AA batteries.

In the field

We held two significant field tests with the unit. The first was to place the unit next to a pair of modified Neumann U-87 microphones during a live concert broadcast. After the event, we A/B compared the recordings in the studio and our recording engineers and producers were impressed with the sonic clarity and quietness of the PCM-D1 recording. Although it clearly could not reproduce the low end as faithfully as the large capsule microphones, everyone was amazed at how well it held its own in that environment. Clearly, this would be the device to have for a back-up or safety recorder for an important event. Because the specs and curves for the built-in microphones are well documented, it would be easy to use a bit of low-end boost to save that special event. In many cases it would be adequate for recording on its own, particularly at live, outdoor venues. There is a line input and an external microphone input as well, so a small mixer can be connected.

The second test was somewhat accidental. I gave the unit to one of our reporters who forgot his own recorder, so he had to use the unit without any training whatsoever. He covered a Vermont Senate hearing. Placing the unit on the table and tipping the mics slightly up, he was able to record not only the witness, but also clearly hear all of the questioners around the table—something he'd never been able to do as well before in similar situations.

Overall, the PCM-D1 is an impressive piece of equipment for recording in various environments. One caveat, which Sony mentions in the manual, is that there is a fair amount of handling noise from the thin titanium case. In fact, it can be quite microphonic at times. In the case of our VPR reporter, he became aware of it quickly, and was able to compensate by holding the unit near the bottom and not rubbing his fingers on it, but I wouldn't guarantee that every reporter would be so motivated or careful. In fairness, the Sony rep at NAB2006 said that the unit wasn't specifically designed for hand held use—but I would venture that using a small pistol grip camera mount would probably solve that problem nicely. But set on a table or on a small tripod the unit would do quite nicely for ENG and high-level recording work. (In an unofficial test, I tried placing the unit on the balcony of our church to record a service. With the main action more than 85' away the unit performed well).

Some small quirks of the unit include the fact that it is not possible to seamlessly switch from the onboard memory to the external Memory Stick. It requires stopping, choosing which memory source to use, waiting for it to recognize the memory and then start recording. This is clearly not a change that can be done on the fly. Also, the WAV format has a built in limitation of 2GB for a file, so if you record longer than that, the file will be broken into pieces. Files did not appear to lose any audio when doing that, so a quick edit made everything right again. 🎙️

Parker is director of engineering for Vermont Public Radio.

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

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Reader Feedback

Catching up with the mail

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I read with interest John Battison's RF Engineering column, "Engineering Assistance" in the March 2006 issue of *Radio* magazine. He well covered most of the broadcast engineering/allocation software providers serving the industry. I would like to make you aware of Au Contraire Software, a software consulting service that provides access to more than 200 software titles and FCC databases of AM, FM, TV, broadcast auxiliary, land mobile, terrain, conductivity and population. We have provided these services for 15 years.

Cris Alexander, CSRE
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and right-together for a mono signal. I just didn't like doing it this way.

At the new studio, I installed a Symetrix 422 stereo AGC/leveler. Because the 422 doesn't have a mono out, I built the lattice combiner (found on the *Radio* magazine website) and mounted it on an XLR male connector. It works great, and it's so simple! Sometimes simple is best!

Scott Schmeling, chief engineer
Linder Radio Group
Mankato, MN

Glad it worked for you. The Lattice Combiner is one of the tips in the Engineers Notebook section of the *Radio* magazine website. We're always looking for more ideas and tips to include, so please send them to us. — CS

Combined thanks

I just wanted to send you a quick thank you. Earlier this year I was involved in building new studios for three radio stations and a satellite network in Minnesota. At the old studio, I was told to tie left and right + and left

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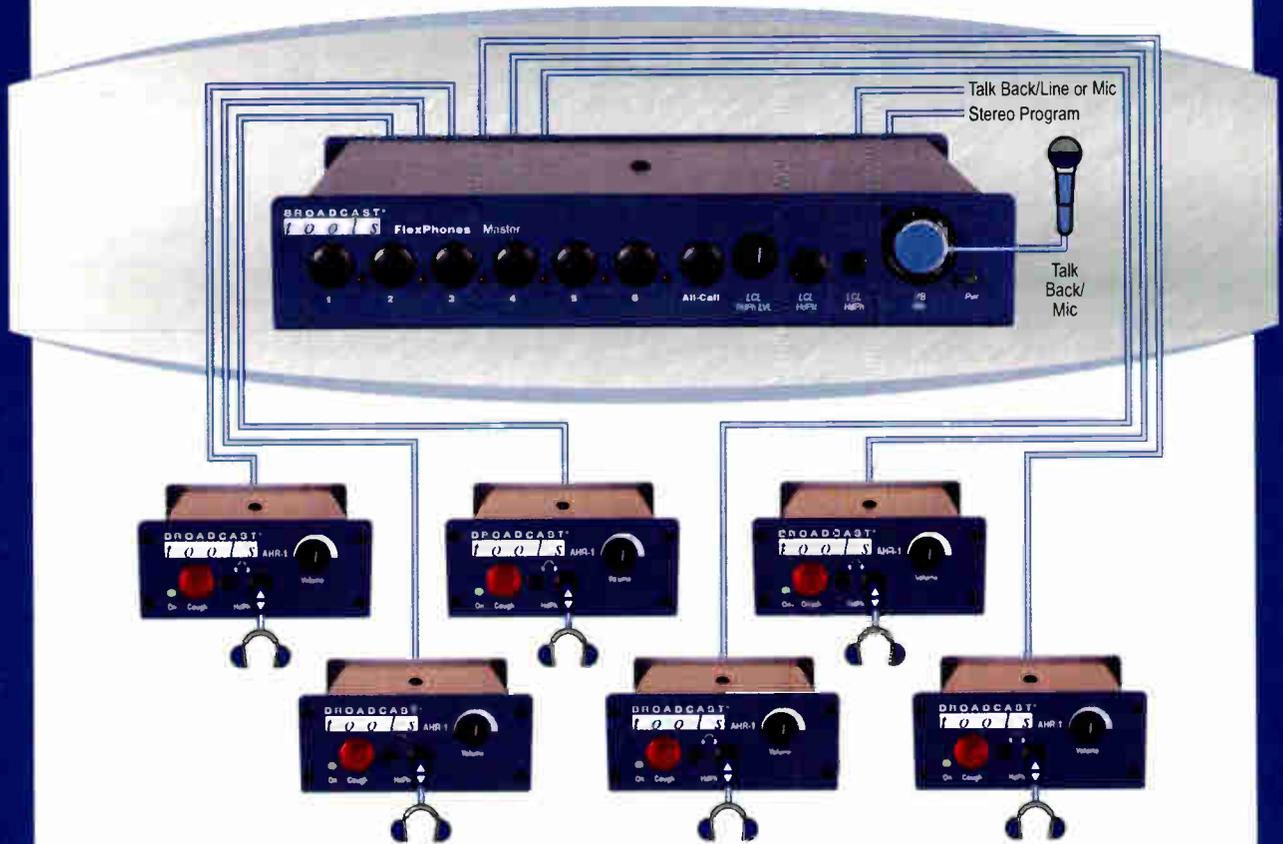
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The FlexPhones Master is equipped with inputs for stereo program and talkback audio. Rear panel program and talkback trimmers are provided to pre-set maximum input levels. The microphone/line level talkback input is available via a rear panel plug-in euroblock connector, while the front panel XLR connector facilitates the use of a user-provided gooseneck microphone or headset. The front panel is equipped with a level control for local headphones with both 1/4" and 1/8" stereo headphone jacks. The six front panel talkback switches allow the user to independently communicate with each AHR-1 listener and can be configured to insert talkback audio into only the left or both ears and dim either or both program channels. Any combination of switches may be pressed, while the "All-Call" interrupts all listeners. The Talkback function can be remotely controlled. Six RJ45 jacks are provided to distribute audio and power via CAT5 cable to the AHR-1's, which conform to the Studio Hub format. Low-Z balanced audio distribution is used to preclude audio degradation with long cable runs.

AHR-1 Active Headphone Remote

The Active Headphone Remote (AHR-1) contains a stereo amplifier designed to work with any combination of high-efficiency headphones with impedances between 24 and 600 ohms. The AHR-1 is equipped with 1/8" and 1/4" headphone jacks, level control, user-configured utility momentary pushbutton and LED indicator. Two rear panel RJ45 jacks are provided for connection via CAT5 cable to the FlexPhones Master. The AHR-1 may be desktop mounted, under counter or with the optional HR-1/MP or HR-1/MP-XLR mounting plates, which may be turret or counter-top mounted.



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7+ KW	2005	Harris Z16 HD
10 KW	1988	BE FM10A
10 KW	2001	Henry 10,000D-95
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20 KW	1978	Collins 831G2
20 KW	1985	Harris FM20K
25 KW	1980	CSI-T-25-FA (Amp Only)
25 KW	1982	Harris FM25K
30 KW	1986	BE FM30A
50 KW	1982	Harris Combiner w/auto exciter- transmitter switcher

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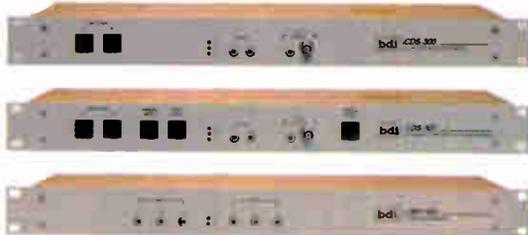
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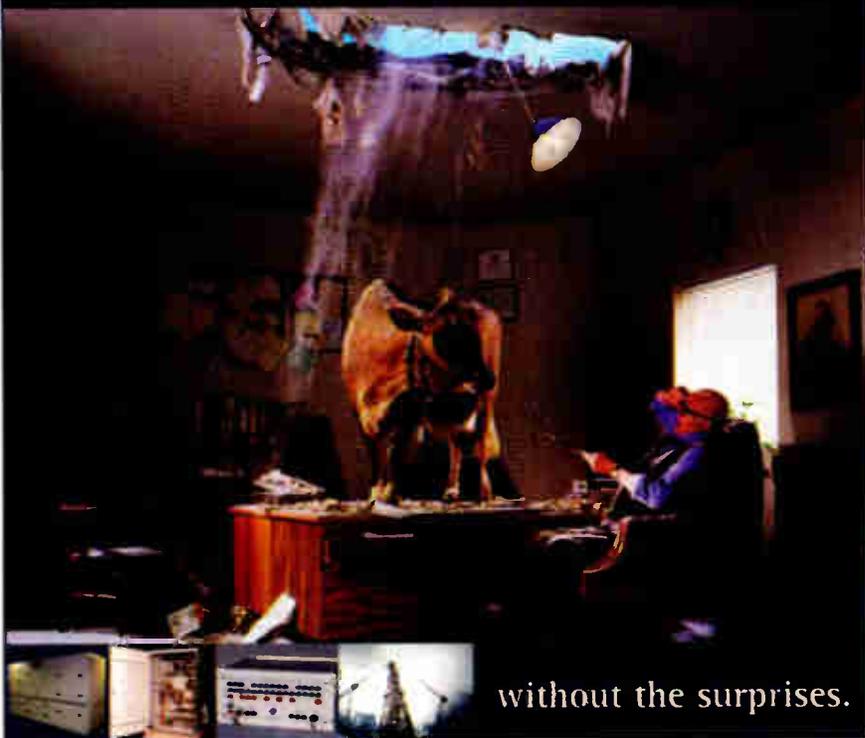


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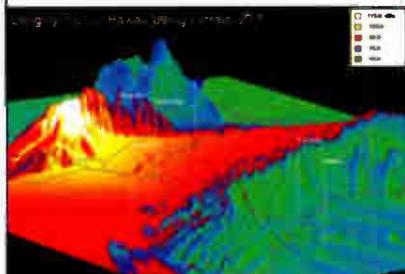


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This month: On Location, page 36.



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Radio magazine
Overland Park, KS

Taylor graduated from the University of Missouri-Columbia in 1998 with a bachelor of journalism degree. While in college, she interned at the local ABC-TV station in its marketing department.

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Written by radio professionals
Written for radio professionals

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Sign Off

By Kari Taylor, senior associate editor



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Do you remember?



About 18 years ago, Audio Precision was advertising its System One tape machine test equipment. System One provided response on stereo machines or multitracks up to 192 tracks, offered distortion across the entire spectrum and tested phase vs. frequency. For analog tapes, the System One tested VTRs, ATRs, reel-to-reel, cart and cassette formats using tapes the user made or standard reference tapes.

The system tested audio parameters including gain, frequency response, distortion, noise, frequency, phase and crosstalk. It was the first computerized test system and permitted measurements to be made in a fraction of the time previously required.

Sample and Hold The technology behind online consumer listening

Podcasting is popular for all

Age groups listening to podcasts

21%	12-17 year olds
12%	18-24 year olds
20%	25-34 year olds
21%	35-44 year olds
17%	45-54 year olds
7%	55-64 year olds
2%	65+ year olds

Source: Arbitron, *The Infinite Dial: Radio's Digital Platforms*, 2006.

That was then



With the recent attention on reception of HD Radio signals, a portable radio from the past caught our eye for its reception improvement.

In 1955, the Motorola Portables, a line of portable radio receivers, offered a handle that also acted as a rotating antenna. Users could turn the handle for a stronger, clearer reception. The ad touted the benefits: "Three times bigger than other portable antennas, the user could hear stations from farther distances than with other portables radios." The unit operated on ac, dc current or batteries.

The Citation portable radio came in charcoal, green, red or blue with a price tag of \$34.95. The Spectator portable radio, featuring a taupe case with brown trim, cost \$29.95. The Caribbean portable radio, with a "deluxe gold-trimmed design," cost \$39.95.

This Little Unit



Can Do BIG Things!

Our new AP-3 is the perfect HD Processor:



SETTING UP FOR HD RADIO?

The VORSIS AP-3 digital processor is the ideal tool to shape your sound exactly the way you want it —cleanly and efficiently.

Built around a multi-band compressor with complementary AGC, the AP-3 replaces a whole rack of dedicated units. VORSIS pre-conditions your signal (HPF, LPF, notch filter, de-esser, expander), then let's you apply 3-band AGC/compression and 4-band parametric EQ (signal chain reversible) before going through a final stage zero-overshoot peak limiter.

With real-time spectrum density readouts and full metering, our included PC graphic interface software makes operation of the AP-3 direct and easy, offering complete control of all audio parameters, presets, monitor functions, system settings and security—all through a single RJ-45 ethernet connection that lets you control one or many AP-3 units.

TAILOR THAT SOUND

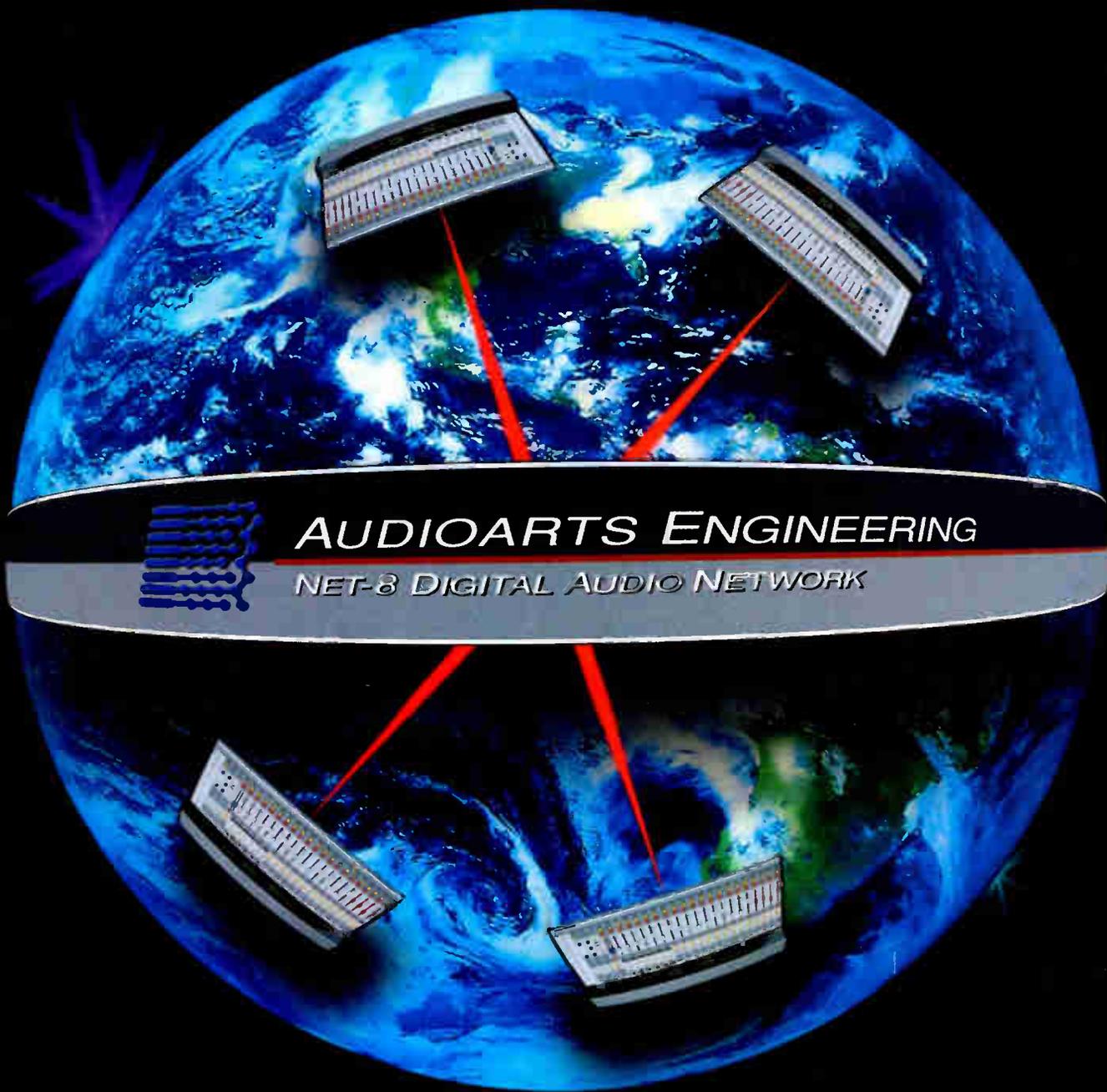
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