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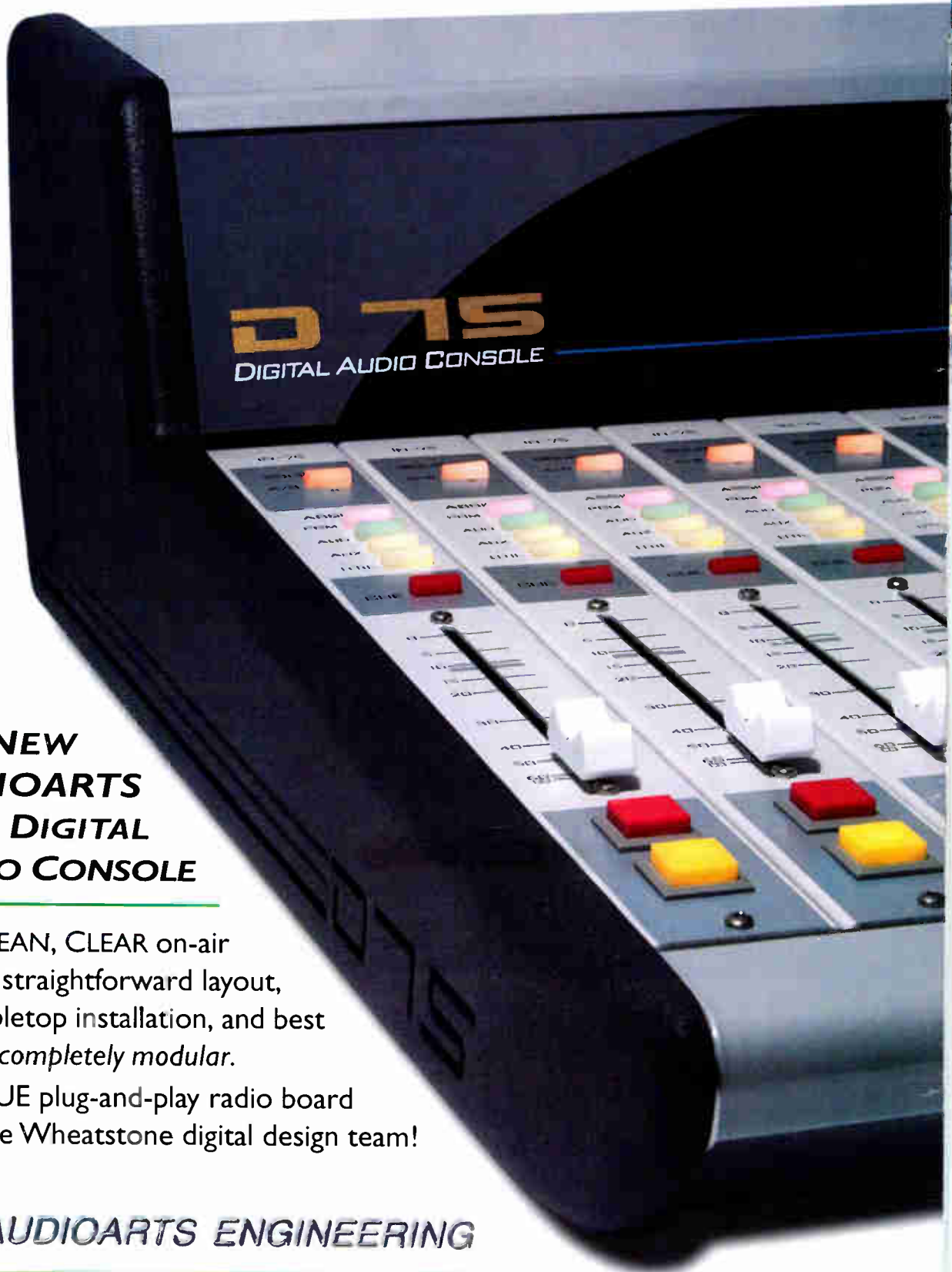
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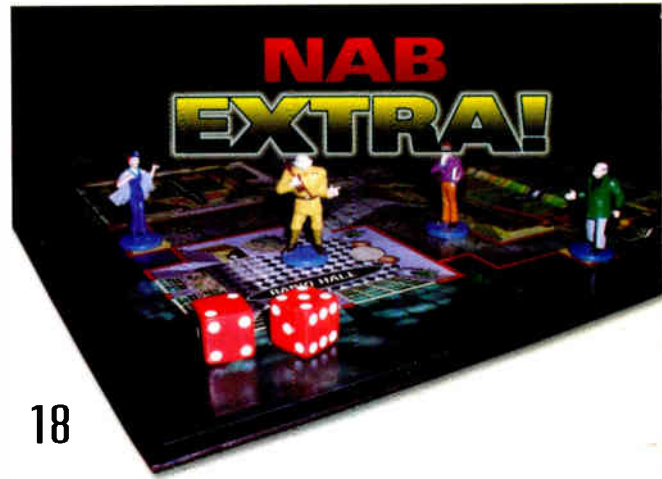
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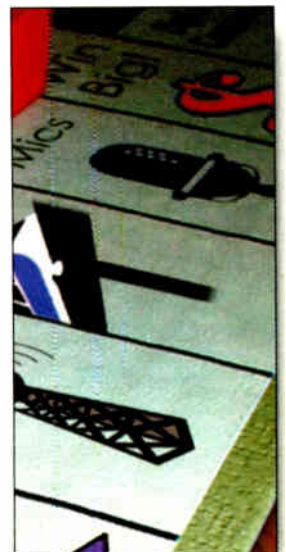
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Expanded-band changes afoot?



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Currents Online

Highlights of news items from beradio.com from the past month

NAB Announces 2005 Engineering Achievement Awards ▶

The awards, first established in 1959, recognize individuals for their contributions advancing the state of the art of broadcast engineering. This year's winners are Milford Smith for radio and Oded Bendov for TV.



Smith

McCain Introduces Broadcasting Reform Legislation

Following the release of survey data on broadcasters' coverage of the 2004 election cycle, Senator John McCain introduced legislation to increase localism and reduce a broadcast license term from eight years to three years.

Senators Introduce Local Community Radio Act of 2005

Senator McCain and other senators have introduced the Local Community Radio Act of 2005, a bill that would restore the LPFM specs to the original wording introduced in 2000.

Trask Promoted to DE of JP Atlanta

Scott Trask has been promoted to director of engineering of Jefferson-Pilot Atlanta radio stationsWSTR-FM, WQXI-FM/AM. He succeeds Tom Giglio, who will continue to oversee technical operations in all five JPCC radio markets as corporate VP of engineering.

Audemat-Aztec Collaborates with Clear Channel to Customize HD Radio Monitors

Clear Channel has placed an order for 49 Goldeneagle HD FM modulation monitors and 14 Goldeneagle HD AM modulation monitors. The Audemat-Aztec monitors were specifically designed and customized to meet the needs of Clear Channel.

Site Features

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Take the exhibitor directory with you when you head to the convention.



Reader Feedback

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Today in Radio History

Important dates in radio history from the 2005 Radio Industry Calendar are available online.

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IBOC Update E-newsletter

Stay up to date with our twice-monthly e-mail newsletter, *IBOC Update - Insight to HD Radio*. Mark Krieger covers HD Radio, DRM, Cam-D and other digital technologies. Subscribe today for the latest DAB news.

Find the mic every month!

Since 1998, *Radio* magazine has hidden our mic icon on each cover of *Radio* magazine. At the end of the year we have held a sweepstakes asking you to find all of them and enter to win prizes.

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An act of localism

It's been almost six months since the November elections, but there is a new-found debate making the rounds that is tied to the election. It's not a hanging chads or uncounted ballots this time, instead it's all about television coverage about candidates and issues.

Following the last election, the Norman Lear Center presented the findings of its ongoing study of media coverage of the elections. While it's easy to shrug this off as a problem for TV, there is a strong potential for radio to feel the effects of any resulting FCC or congressional action. The report finds that a viewer of local news sees less than three minutes of campaign coverage per half hour of evening news, on average, but just over four minutes of paid political advertising aired during the same half-hours.

While the data gathered is likely accurate, the conclusions being drawn by legislators are troublesome.

The most prominent action taken as a result of the survey is from Senator John McCain, who has introduced the Localism in Broadcasting Reform Act of 2005.

In a speech he delivered before introducing the bill, McCain cited his reasons for proposing the legislation. He noted the political ads to candidate news ratio.

His conclusion is that because the stations were not covering the candidates, the candidates were forced to spend more than \$1.6 billion on television ads in 2004.

I completely disagree with McCain. Regardless of the news coverage, candidates will buy commercials. In addition, the candidates are able to purchase the airtime at the lowest unit rate. That's usually a bargain.

The reality is that there is little to cover about the candidates in an election. Why should broad-

casters devote the air time to deliver the same information?

Broadcasters serve the public interest. If what is delivered is not of interest to the public, the listener or viewer will go elsewhere. The ratings will reflect this.

The Lear survey considered 11 markets and 44 TV stations. This survey sample is too small to form an accurate national trend because there are hundreds of markets in the country and more than a thousand TV stations.

McCain is also concerned about the content of the broadcasts devoting eight times the coverage to stories on accidental injuries that they did to the candidates. As McCain put it, "if a local candidate wants to be on television and cannot afford to advertise, his only hope may be to have a freak accident."

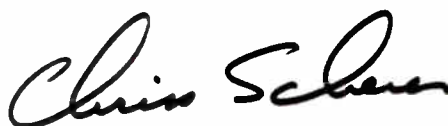
Don't give us any ideas, Senator.

The survey should have asked the viewers what they want to see. It's possible that the viewers didn't want to hear the repeated rhetoric from the candidates.

To add to this, FCC Commissioner Jonathan Adelstein voiced his support of McCain's ideas. Adelstein noted that voluntary measures are preferable, but the results of the survey prove that government intervention is required to ensure that "the public gets more back in exchange for the free use of their airwaves."

This is just what we need: more misguided government regulation of the airwaves.

McCain is now party to two bills that affect broadcasters. One on localism—spurred by the myopic USC study—and another on LPFM. Both deal with issues that politicians hope will be a rallying cry for public support: serve the public interest. The reality is that these efforts will serve the politicians as their own rallying cry in the next election: vote for me.



Chriss Scherer, editor
cscherer@primediabusiness.com

Follow-up:

In the January issue I discussed some of the various digital radio systems in development, including Kahn's Cam-D. To spread the word of his work, Kahn has launched WrathofKahn.org, which features information about the Cam-D installations.

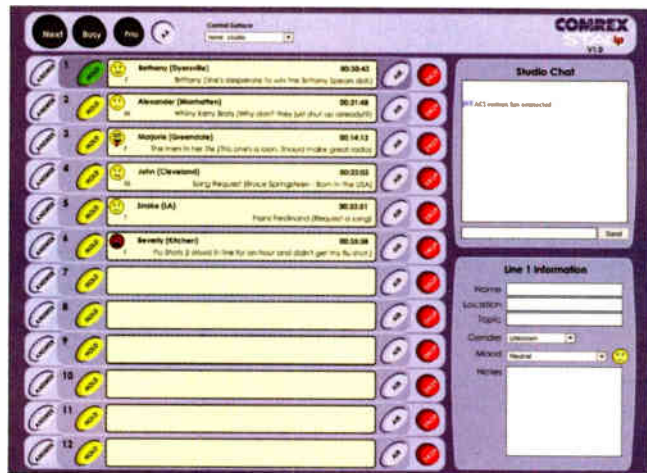


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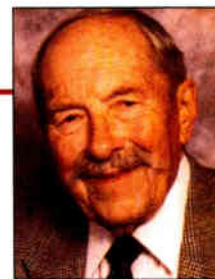
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FM IBOC site preparation

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

www.beradio.com

From time to time in every chief engineer's life it becomes necessary to prepare for the installation of a new transmitter or the major modification of an existing transmitter. This can be a harrowing experience or an exciting and rewarding experience if properly handled. The most important thing is to have an organized, scheduled timetable.

To keep a project on task, a PERT chart can be used to show every step that has to be taken and the order in which these steps must occur. PERT stands for program evaluation review technique. Probably

A fresh start

If a new transmitter facility is to be constructed the transmission system decision is fairly easy to make between split-level, high level and low-level combining. Multiple antenna operation should be avoided, especially in new systems unless there is some strong reason for using it.

As IBOC developed, low-level and high-level combining of the two signals kept pace with the systems development. High-level combining is a somewhat wasteful process in which as much as 90 percent of one signal is dissipated in heat. Therefore, it seemed that it would be more efficient to combine the signals at a low level. Unfortunately, like many options encountered in radio engineering there is a downside to the system. Its broadband antenna, less efficient linear amplifier and power limitation tend to restrict its usefulness.

Recently, Harris and Cox Orlando engineer Steve Fluker suggested and developed split-level combining. This appears

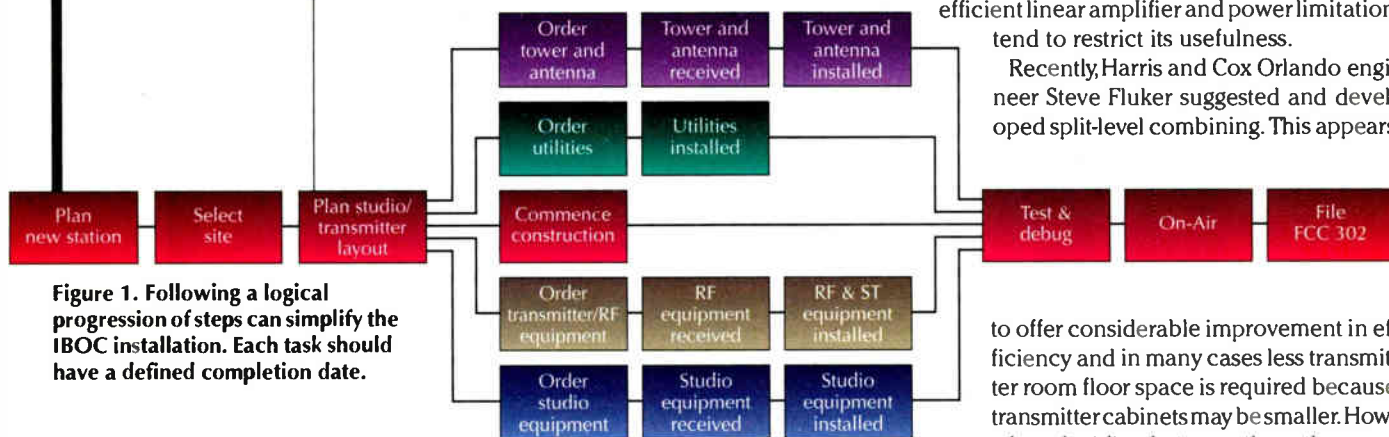


Figure 1. Following a logical progression of steps can simplify the IBOC installation. Each task should have a defined completion date.

most engineers prepare a written checklist of the steps to be taken and the equipment to be installed and have their own system of following through. I have always liked a modified PERT chart because you can then see the interrelated actions, the due dates and the steps that have to be taken to ensure that all required activities come together at the correct point.

When implementing digital IBOC transmission the most important decision to be made, apart from where to locate the transmitter, is which method of IBOC FM transmission will be used. Today we have a choice of four basic methods: high-level combining, low level combining, mixed level combining and split antennas in various configurations. Antenna space and tower load capacity will have considerable effect on the final decision.

to offer considerable improvement in efficiency and in many cases less transmitter room floor space is required because transmitter cabinets may be smaller. However, when deciding between these three systems of transmission prepare a kilowatt-per-cost comparison of the three systems, and make sure to include all the minor incidentals involved.

Seeing double

Using two antennas (multiple antenna operation)—one for the analog and one for the digital signal—is a possibility, but it calls for additional antennas and transmission lines and extra space and loading capability for towers. What might be called a double antenna obviates the need for two antennas, but this system calls for more tower space and load handling capability for the tower and there is the possibility of reception problems due to the varying radiation fields of the two signals producing possible distortion and fading.

Space is also a pertinent consideration in the transmitter room because depending on the IBOC transmission system chosen space has to be allocated for the necessary combiners as well as the transmitter and ancillary equipment.

If the studio and production facilities are not collocated with the transmitter building, an STL will need to cover the distance. A path survey between the sites, STL frequency



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World Radio History

allocation coordination and application and additional equipment will help determine the best choice. Remember that new audio techniques and changed STL equipment requirements and older STL equipment may no longer be the best choice for digital transmission.

The digital nature of IBOC may allow shortcomings in the audio path to become noticeable. Also, depending on the station's engineering plan, separate analog and digital audio paths and a data path may be needed.

Another important consideration in transmitter site selection is the availability of suitable ac power. This means that not only will the local power company provide power at a reasonable charge but it will also be clean power. When considering the primary power supply, ascertain the quality in terms of harmonics and power fluctuations of the proposed source as well as the frequency of occurrence of lightning strikes and voltage surges.

If an existing site is to be used together

with some existing buildings the obvious requirements of suitable space, HVAC and acoustic adequacy must be carefully examined. Sometimes a proposed building is pleasing aesthetically and the temptation is to select it without considering all the pros and cons.

Time to look up

If the height matches the requirements of your CP, the major question then becomes is the tower capable of supporting the antenna(s) for your new station? Be sure that the tower as it stands, or as adequately and safely modified, can support the antenna and transmission line installation required for this project. This antenna survey must be performed by a qualified professional structural engineer. If an STL is to be used then the STL antenna and transmission line loading must be included in these calculations.

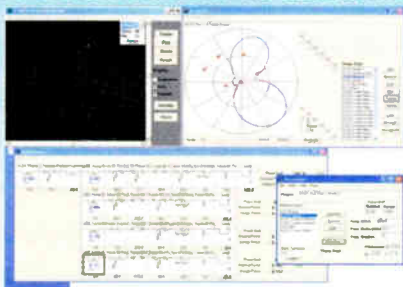
New construction that includes studio and transmitter installations for a new FM IBOC station will naturally follow AES standards and audio cabling designed for digital transmission. The usual precautions should be taken to ensure that no audio problems will arise through impaired digital signal flow caused by incorrect digital cable selection and installation.

E-mail Battison at batcom@bright.net.

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Possible changes to expanded-band rules

By Harry Martin

The FCC has been asked to consider liberalizing its current rules governing use of the expanded AM band (1,605 to 1,705kHz) by allowing increased power and the use of directional antennas.

Broadcast historians will recall the FCC's years-long effort to clean up the AM band by making available virgin spectrum beyond the original upper limit of the AM band to licensees who were willing to migrate their stations up to that new spectrum. The idea was to reduce congestion—and its natural by-product, interference—in the lower portion of the band. When the dust finally settled after years of rule makings and re-location efforts, the results were somewhat limited: only 65 stations made the move (or committed to make the move).


In setting up the expanded-band opportunity, the Commission sought to avoid the shoehorn approach which complicated AM allocations for the better part of a century. Rather than permit expanded-band stations to use directional arrays and a range of powers to snuggle themselves into tight locations between or among adjacent stations, the Commission opted for a more FM-like approach based on distance spacings, omni-directional operation, and uniform 10kW (day), 1kW (night) power limits.

Service upgrade

Now three expanded-band pioneers have filed a petition for rulemaking asking the FCC to amend its rules and afford Class B status for stations operating in the AM expanded band. In particular, the petitioners have asked for the elimination of the limitations on power and the prohibition against directional antennas. According to the petitioners, those revisions would “enable expanded band stations to respond to market forces,” which presumably means that the changes would make it easier for such stations to go after listeners they can't presently reach. According to the petition-

ers, the changes would also help alleviate the second-class status of expanded band operators. That status, they say, arises at least in part from the fact that ground conductivity—a key factor in determining the reach of an AM signal—tends to be worse for higher AM frequencies than for lower ones. While expanded-band licensees could theoretically already seek waivers of the existing power and directionalization limits, the petitioners claim that eliminating those provisions would relieve the FCC's staff of the “burdensome task of evaluating multiple waiver requests.”

Of course, any such relief would presumably be offset, at least partially, by the added burden of processing modification applications that would likely require essentially the same staff analysis as would waiver requests, so that potential benefit may not be that great administratively. Moreover, to the extent that reliance on power increases and directional antennas might result in increased potential for interference to other stations, such reliance might also trigger more petitions to deny or other objections, thus imposing an even greater burden on the Commission's staff.

For the time being, the Commission has taken no action on the proposal. But the Commission has gone so far as to issue a public notice alerting the public to the fact that the petition was filed. The issuance of such a notice is often the first step toward a rule making proceeding, so the petitioners have apparently succeeded in getting the ball rolling. It is not surprising that the FCC is interested in the proposal given the lack of success of its expanded-band program to date. Anyone with more than a passing interest in AM technical standards—and particularly anyone with an expanded-band license or with a station near the expanded portion of the band—should probably keep an eye out for further developments on this proposal. 

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

Dateline:

April 1 is the deadline for radio stations in Texas to file their renewal applications, biennial ownership reports and EEO public file reports. Also on April 1, stations in Michigan and Ohio must begin broadcasting their pre-filing announcements in anticipation of the June 1 renewal filing date for stations in those states.

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NAB 2005 PREVIEW



Welcome to the *Radio* magazine NAB2005 Preview. The NAB convention is the largest broadcasting event of the year, and this year's convention is expected to be another record-attendance event. Digital technologies are maturing, radio ad sales are up and the economy continues to show signs of recovery. There should be a general feeling of positive thoughts at the convention.

Our convention preview has many elements to help you prepare for the show. The exhibit hall is the center of activity and overflows with new product introductions. This issue of *Radio* magazine is packed with useful information to help you navigate the floor.

The *Radio* magazine NAB Extra! gives you a sneak peak of some of the new products you will find. To help you plot your course, use our pull-out map of the Radio Hall, which includes an alphabetical exhibitor list. The FASTtrack—a *Radio* magazine exclusive—organizes the exhibitors into product categories, and then sorts them according to booth number. This is done so that you can plot the shortest course—the fastest track—between exhibitors showing the products you seek.

The convention is not just products on the exhibit floor, and you can gain some insight into the radio sessions of the Broadcast Engineering Conference with our session preview.

Be sure to take this issue with you when you go to Las Vegas. We'll have copies of the March and April issues at the show as well if you need an extra map.

And be sure to take the FASTtrack with you on your PDA. Download the *Radio* magazine FASTtrack, Exhibitor Directory and BEC Session Guide to your Palm or Pocket PC today. The files are on the *Radio* magazine website. Look for the FASTtrack for PDA link.

See you in Las Vegas.

Chris Scherer, editor

The routing switcher gets a new twist.

(About five twists per inch, actually.)

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

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

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

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



Are you still using PC sound cards?

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

Livewire



<...> 100/1000

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



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

Put your preamps where your mics are.

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



Put your snake on a diet.

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



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



Axia is already working with some great companies. Like Enco Systems, Scott Studios, Radio Systems, Balys Technology Group, and of course Teles and Omnia. Check AxiaAudio.com/partners/ to find out who's next.

With a little help from our friends.

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



Would you like some control with that?

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



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

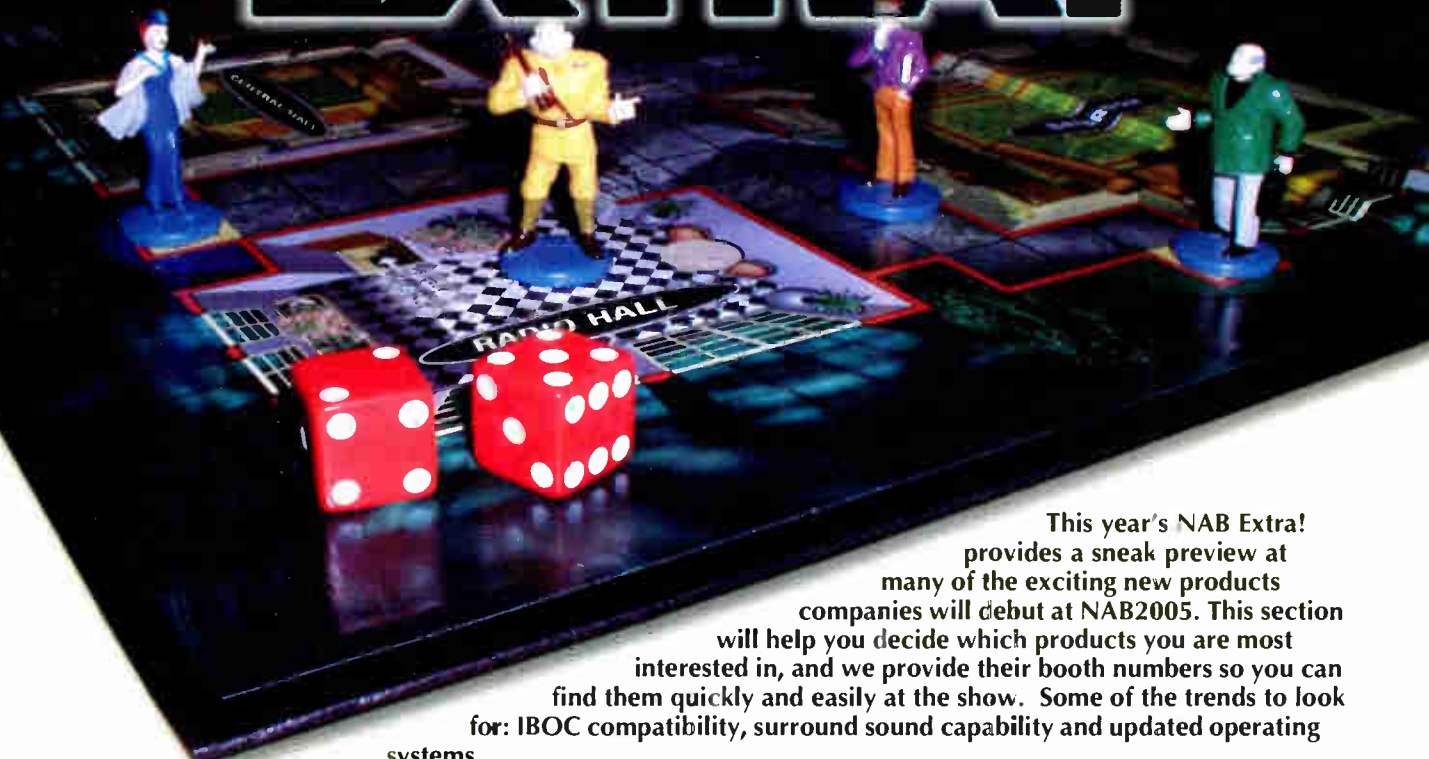


"This sounds expensive." Just the opposite, really. Axia saves money by eliminating distribution amps, line selectors, sound cards, patch bays, multi-pair cables, and tons of discrete wiring — not to mention the installation and maintenance time you'll recover. And those are just side benefits: our hardware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



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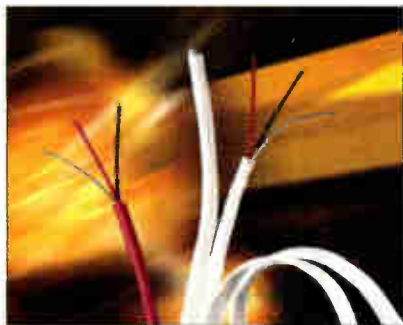


This year's NAB Extra! provides a sneak preview at many of the exciting new products companies will debut at NAB2005. This section will help you decide which products you are most interested in, and we provide their booth numbers so you can find them quickly and easily at the show. Some of the trends to look for: IBOC compatibility, surround sound capability and updated operating systems.

Analog audio cable

Belden

Booth #C2257



Brilliance 9451P, 9451DP: These cables are plenum versions of Belden's 9451 and 9451D analog audio cables and are designed for line-level audio connections, audio distribution equipment and studio wiring with room-to-room plenum. The

cables include a single-pair construction, the 9451P, and a Siamese construction, the 9451DP. The cables can be easily installed because the Beldfoil bonded-foil shield is bonded to the cable jacket and can be stripped for termination using conventional cable stripping tools. Color-coding provides easy channel identification for stereo applications.

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

Booth numbers from the NAB are current as of March 1.

Audio analyzer Rohde & Schwarz

Booth #C2633

UPV: A compact instrument for audio measurements of analog and digital interfaces, the unit offers dual-channel signal processing and generation, as well as a sampling rate up to 192kHz. Other features include recording and replaying of audio signals, comprehensive FFT analysis and user-programmable filters for analyzers and generators.

410-910-7800; fax 410-910-7801; www.rohde-schwarz.com; info@rsa.rohde-schwarz.com



Audio alignment Dorough Electronics

Booth #C1833

Program Alignment Generator Model 10: The Audio Alignment Generator features a tone burst that makes it possible to confirm that a channel has sufficient headroom to pass the peak of the program material.

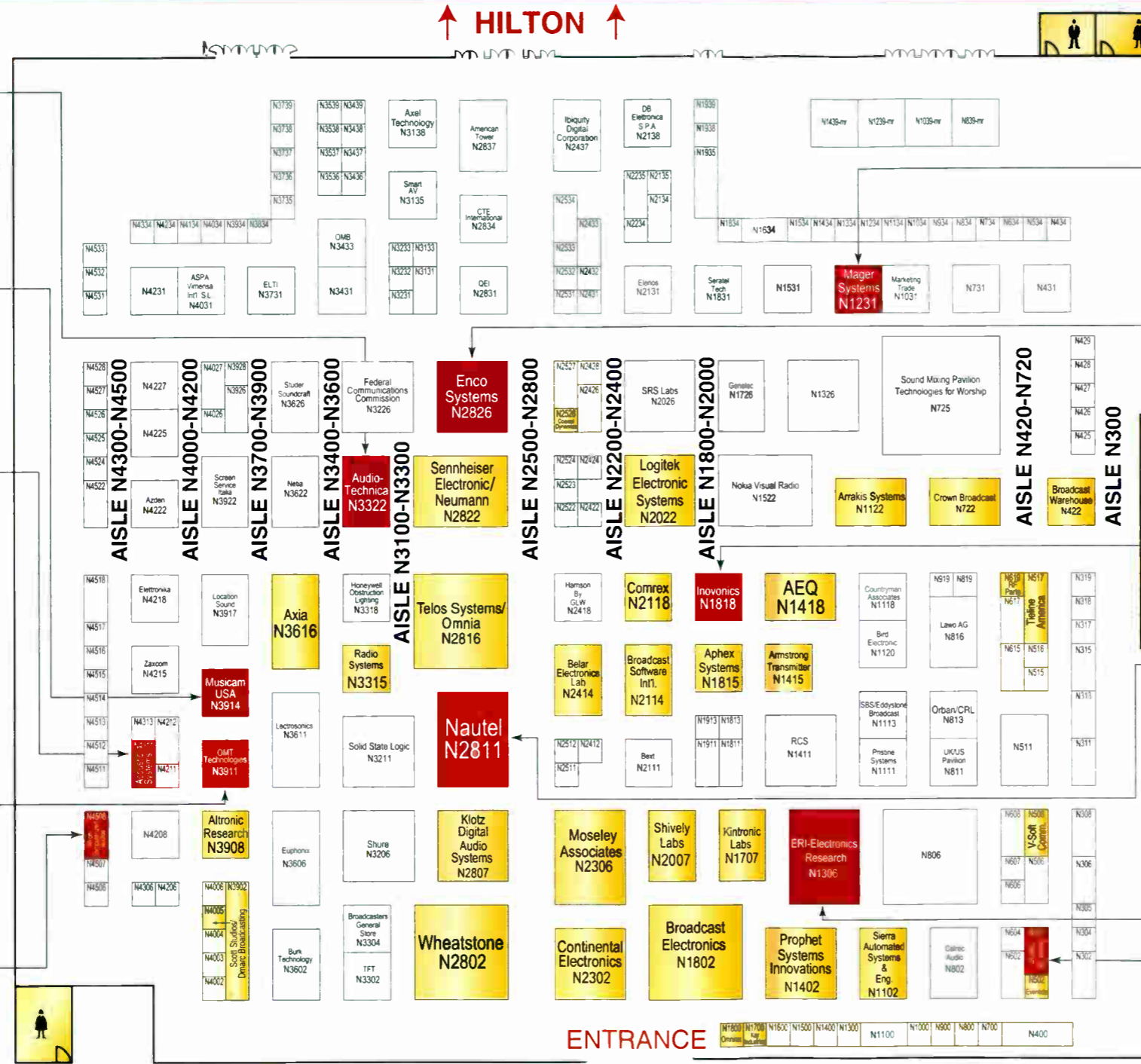
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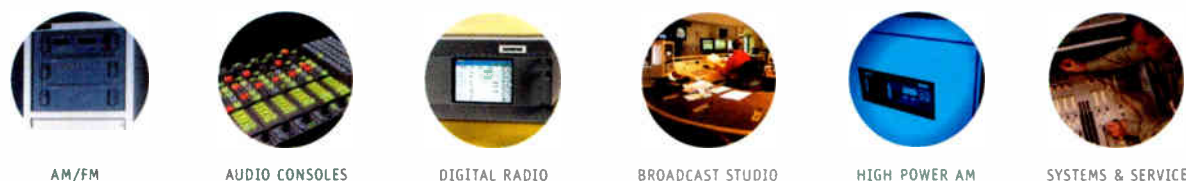
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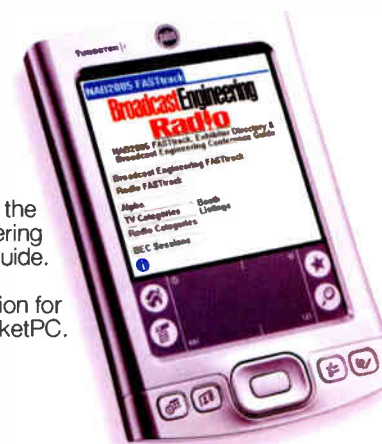
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Digital control surface

Wheatstone

Booth #N2802

Generation-6: The console provides seamless integration with the Bridge digital audio router and allows system-wide access to a station's on-air and off-air audio resources via interlinked CAT5 or fiberoptic cable. In addition to its standard features, such as Ethernet protocol, VDIP configuration, X-Y controllers and eight-character controller displays, the console offers an expanded number of AUX sends and increased Preset options to boost save-recall capability.



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

Audio processor

Broadcast Warehouse

Booth #N322

DSP Extra: This audio processor features a six-band limiter with advanced distortion control, multiband AGC adopted from Translancech Sound's Ariane digital audio leveler and split processing architecture that makes it suitable for simultaneous FM and digital radio services such as IBOC and Internet streaming. The unit also provides TCP/IP and serial control, multiple factory and user-defined presets and front panel metering and a control system.

+44 208 5409992; fax +44 208 5409994

www.broadcastwarehouse.com; info@broadcastwarehouse.com

Coax cable

Gepco International

Booth #C9341

VDM260: An ultra-miniature high definition coax cable, this product achieves low weight and small size without losing the electrical and



mechanical properties required for reliable transmission in broadcast applications. This cable features an ultra-thin profile, is low weight, is easy to terminate and has a broadband foil and braid shield that offers better RF/EMI protection and greater structural integrity. It also provides 75Ω impedance and low structural return loss up to 3GHz.

800-966-0069; fax 847-795-8770; www.gepco.com; gepco@gepco.com

EXTRA!



IBOC monitor

Audemat-Aztec

Booth # N2235

Goldeneagle HD: This equipment monitors the quality and continuity of HD Radio and FM signals as well as PAD and RBDS data. An embedded spectrum analyzer is available as an option to monitor power of the sidebands and other parameters.



The monitor features an embedded Web server and SMTP server for alarm notification as well as a touch pad on the front panel. Installed at the transmitter, it can also be used as a remote control unit by adding 16 digital inputs, 16 metering channels and 16 relay outputs.

305-249-3110; fax 305-249-3113

www.audemat-aztec.com; contact@audemat-aztec.com

Sound card

Audio Science

Booth #N503

ASI6416: Using Peak Audio's Cobranet technology for streaming audio over Ethernet, the sound card provides eight stereo or 16 mono inputs and outputs. It can be connected to any Cobranet-compliant device. MRX technology allows 16 streams of formats and sample rates to be played, recorded and mixed over Cobranet. A choice of 16-bit PCM, MP3 or MPEG Layer 2 compression is available on all streams. Other features of this device include eight stereo/16 mono inputs and outputs on Ethernet operating at 48kHz or 96kHz and 16-, 20- or 24-bit PCM; its low-profile PCI card allows use in 2RU computers; MRX technology supports recording, playing and mixing of multiple stream formats and sample rates; and TSX time scaling allows compression/expansion of play streams by as much as ±20 percent with no pitch shift.



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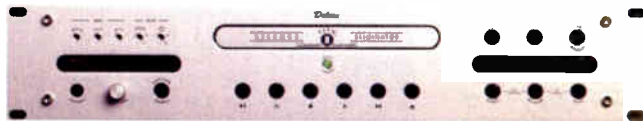
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FM antenna Propagation Systems



Booth #C9229

Low-power FM antenna: An omni-directional circularly polarized FM antenna for low-power broadcaster, this antenna also serve the FM broadcasters implementing IBOC with a separate antenna approach. Manufactured with stainless steel, the PSI-FL antenna exhibits low weight and wind load. Pressurization is not required. Multiple versions are available that allow inputs from 500W to 2kW, at full or halfwave spacing. Radomes are available.

814-472-5540; fax 814-472-5676
www.psibroadcast.com; psiba@surfshop.net

Headphone amp Broadcast Tools

Booth #N1400

HPA-4: This amp provides cue signals for as many as four sets of headphones. Each output is supplied with a stereo amplifier and may be configured to accept cue audio on the left headphone with a simple contact closure to ground. Front and rear-panel TRS jacks are provided with each output, along with a front-panel level control. The stereo balanced input is adjustable with the front-panel master level control. The balanced cue input is equipped with a rear-panel trimmer. The amp is powered by a surge protected internal bipolar 15Vdc power supply. The half-rack profile allows the unit to be set on a desktop, mounted on a wall or as part of the new RA-1, Rack-Able mounting shelf.

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Clock, time code generator ESE

Booth #C2639

ES-185U: The ES-185U is an upgrade to the ES-185A/12 GPS master clock/time code generator. Upgrades include IRIG AM or TTL time code, SMPTE time code selection (drop frame, NDF, EBU and real time) through supplied software and USB connection for configuring set-up features. Features include a nine-digit yellow LED display, rack mount enclosure with black front panel, four-hour battery back-up, indoor/outdoor antenna, one PPS output and five time code outputs (SMPTE/EBU, ASCII, IRIG-B, ESE-TC89 and ESE-TC90). Other options available include 10MHz/1kHz frequency outputs, relay contact closure, 220Vac, 12-35Vdc power input and a UL-approved power supply.

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



Software for MSD600M++

DK Technologies

Booth #C2757

Graphical Leq: Designed for the company's flagship audio meter, the MSD600M++, this software is aimed at users working with surround sound. The software package allows users to mix to the highest score on the Leq loudness standard. SMPTE time code input brings automated start/stop points and provides a direct readout of where the sound material can be optimized for louder mixes. There is also new Windows-based software for internal matrix setting, and a USB interface utility module.



+45 4485 0255; fax +45 4485 0250

www.dk-technologies.com; info@dk-technologies.com

XLR cable

Neutrik

Booth #C5137

NC**XX series: Similar in style to the NP**X series of quarter-inch phone plugs, the NC**XX series is available in configurations of three to seven poles. The compact, die-cast shell



has internal threads that mate with the external threads on the boot to eliminate damage sometimes found on exposed threads. Additional features include a female cage type contact that increases conductivity and reduces wear of the male contacts and a new ground contact that provides better integrity between the chassis and cable connectors.

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

1200 series

...radio consoles

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- mix minus bus for telephone
- Penny & Giles slide faders

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1200-10s
ten channel



Arrakis

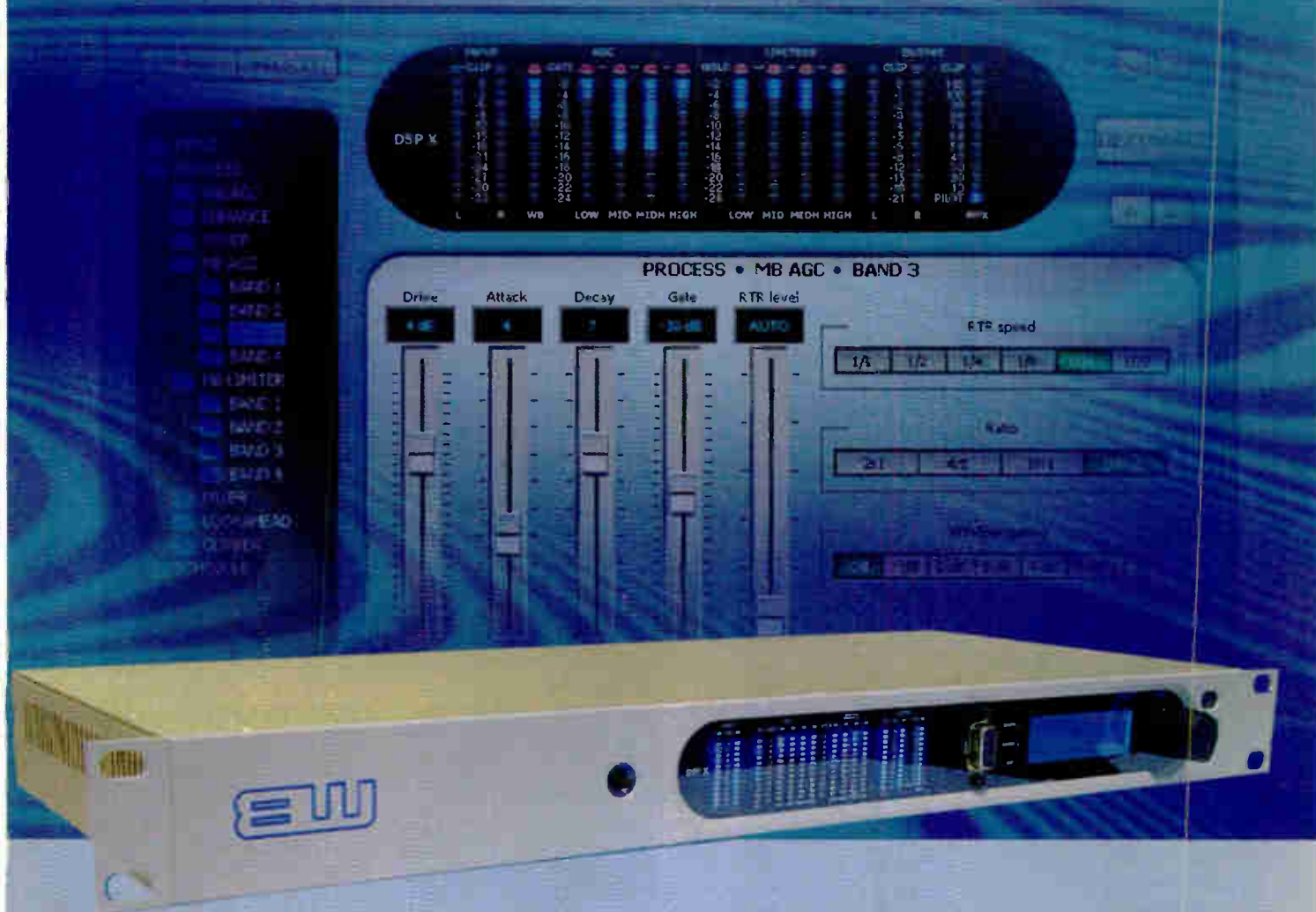
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Tascam
Booth #SL1516

VL-X5: These powered speakers feature 5 1/4" woofers, silk-dome tweeters and a 60+30W bi-amplified active power amp. The monitors feature low- and high-frequency controls and an Acoustic Space Control to optimize their performance for room placement or listener preference. The monitors are shielded to prevent magnetic damage to CRTs. The deep cabinet and ported design produce a large amount of bass for the size of the monitors.

323-726-0303; fax 323-727-7635; www.tascam.com; tascamlit@tascam.com



Broadcast console
Sierra Automated Systems
Booth #N806

Rubicon SL: A radio broadcast console control surface for the smaller market station or smaller studio, the SL offers complete integration with the SAS 32KD and the SAS Connected Digital Network, as well as stand-alone operation with the new upgraded Riolink mixer and router.

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



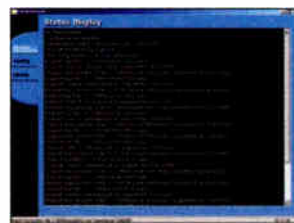
Digital transmitter
Nautel
Booth #N2811

XR12: As the forth generation of Nautel 12kW AM transmitters, this modular HD Radio/DRM digital transmitter features reserve power for aggressive signal processing and 155 percent positive peak program modulation at 10kW to produce more sideband energy and a stronger signal. With two power modules and one standby module, full power will automatically be maintained even under fault conditions. Power modules are hot-pluggable and can be removed and replaced without an interruption in transmission. For even greater redundancy, the transmitter comes with a complete standby DDS exciter section including a modulation encoder with automatic changeover.

207-947-8200; fax 207-947-3693; www.nautel.com; info@nautel.com

Content importer

OMT Technologies
Booth #N3911



Imediaimport Module: The Imediamport Module automatically imports station content from a variety of sources including but not limited to: third party multi-track editors, newsroom applications, FTP sites, network folders and NPR Content Depot. Using the Cart Chunk and ID3 tagging systems, users of this system can have any content automatically placed and titled into an Imediatouch system.

888-665-0501; fax 204-783-5805; www.omt.net; omt@omt.net

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NAB EXTRA!

Digital console surface

Logitek

Booth # N2022



Mosaic: Mosaic consoles use a series of drop-in modules that permit users to purchase console configurations that meet their needs. These consoles are router-based, acting as control surfaces for the Logitek Audio Engine. Features include multiple frame sizes, allowing configuration of consoles ranging from four to 24 faders and multiple, full-color LCD screens, which provides at least one screen on each module, giving users meters, clocks, timers, delay information, text from the Audio Engine and downloaded bitmaps. There are more controls available than there were in previous consoles, giving users single-button access to multiple functions.

800-231-5870; fax 713-664-4479; www.logitekaudio.com; info@logitekaudio.com



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Home/main page - www.scmsinc.com
Broadcast section - www.scmsinc.com/SCMSbroadcast.htm
Used Equipment - www.scmsinc.com/SCMSused.htm
Contacts, personnel - www.scmsinc.com/SCMScontacts.htm
Manufacturers - www.scmsinc.com/SCMSmanufacturers.htm

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 Voice: 877-391-2650

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

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

Mid-West Sales:
Mary Schnelle
 Sales: 513-899-3036

South-Atlantic Sales:
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www.scmsinc.com

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Booth #N3304

Raillight: This rack mount light can be extended 9" and rotated 180 degrees to light areas in a rack that conventional pull-style lamps can't. The ergonomic extruded aluminum exterior houses 12 long-life LEDs and includes a rocker power switch that is always lit so it can be easily located, even in a dark room. The unit comes complete with a UL-approved 24V power supply.

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

www.cbtsystems.tv; julie@cbtsystems.tv

Data importer, exporter Harris

Booth #C3612A, C1907

Flexstar HDI-100 and HDE-100: The Flexstar HDI-100 data importer and HDE-100 program exporter can broadcast supplemental audio and implement data services, maximizing available bandwidth within the transmission chain. The HDI-100 importer accepts all advanced application services, including supplemental audio program streams, allowing broadcasters to better serve the community and generate additional revenue. The HDE-100 exporter multiplexes the data leaving the importer with a station main program channel and feeds all the data as one bandwidth-efficient bit stream to an HD exciter. Both units are compatible with Harris' Dexstar HD Radio exciter. A demonstration at NAB will simulate an end-to-end HD Radio platform for enabling advanced services such as supplementary audio and data.

800-622-0022; fax 513-459-3890

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

On-air radio console Audioarts Engineering

Booth #N2802

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



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

Software update Burk Technology

Booth #N3602

Autopilot 3: Autopilot 3 introduces custom views, which provide broadcasters with a new level of flexibility in viewing and managing an unlimited number of Arc-16 sites. Users can select individual channels to display on the PC interface, and they can draw from as many sites as needed to create a drill-down approach to fault resolution, a map-based geographic view for multiple sites, or a customized interface designed for operation-specific work flows or procedures. The software offers an e-mail alarm notification utility that provides selective, customizable reporting so that each alarm message can be sent to a different e-mail addresses or distribution groups, adding efficiency and making workgroup communication more effective.

800-255-8090; fax 978-486-0081

www.burk.com; sales@burk.com

Logger Prophet Systems

Booth #N1402



Digilogger: This audio logging and digital archiving program can retain as much of the station's audio as needed using compressed or non-compressed audio formats. The logger is expandable, recording from one to 16 sources simultaneously (mono or stereo) when used with the ASI8702 tuner-card. Multiple bit-rate storage per recording channel is possible. Recording lengths and times are user-configurable and the unit can be configured to work with most analog or digital audio sources, including automation systems, satellite receivers and switchers. VU metering allows the user to monitor the current status of the recording.

800-658-4403; fax 308-284-4181

www.prophetsys.com; sales@prophetsys.com

IBOC combiner Dielectric

Booth #C7807

HDR Dibrid: The Dibrid facilitates in-band on-channel radio broadcasts that combine analog and dual sideband digital signals. Because the combiner does not use switches, it permits hot switching that keeps broadcasters on the air as functions are changed while also extending the operating life of transmitter components. The combiner is a stand-alone unit with two inputs and two outputs. Depending on the function, one transmitter or a combination of the two can be connected to the combiner's inputs, while one output is attached to an antenna and the other to a station dummy load. Transmission modes can be created to direct the analog transmitter, digital transmitter or a combination of both in several ratios to the antenna, with the residual power directed to the station load.

800-341-9678; fax 207-655-7120

www.dielectric.com; dcsales@dielectric.com

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Navigating the four halls and outdoor exhibits of the convention can be confusing. You don't have time to wander all the exhibits in hopes that you'll stumble across the right products. We have the solution. The exclusive *Radio* magazine FASTtrack is your ticket to plotting an easy course through the show floor.

We have sorted the exhibitors that are relevant to radio into convenient categories. Within these categories, exhibitors are arranged by booth order. This makes it easier to locate exhibitors in a specific product area.

For an alphabetical exhibitor listing, use the condensed list on the pullout Radio Hall map on page 19 in this issue.

Associations, Societies & Agencies

ARRL	Lobby 9
Society of Broadcast Engineers ..	Lobby 17
National Religious Broadcasters ..	N 425
Radio Music Licensing Committee ..	N3133
FCC	N3226
SMPTE	South Lobby 29

Audio Accessories, Headphones & Speakers

Richardson Electronics	C 1824
Dorough Electronics	C 1833
Ward-Beck	C 1924
Techflex	C 2041
DK Technologies	C 2757
Sonifex Ltd	C 3526
TC Electronic	C 3612G
Panasonic	C 3617
Neutrik	C 5137
Prime Image	C 5614
Wohler	C 6221
Telex Communications	C 6821
Electro-Voice	C 6821
Beyerdynamic	C10421
Riedel Funk- and Intercomtechnik ..	C11107

KLZ Innovations	N 317
DB Elettronica	N 500
Eventide	N 502
Audio Science	N 503
DPA Microphones	N 506
Prime LED	N 604
Danagger Audio Works	N 722
SBS/Eddystone Broadcast	N1113
Arrakis	N1122
Henry Engineering	N1300
Broadcast Tools	N1400
Prophet Systems	N1402
AEQ	N1418
Genelec	N1726
Aphex Systems	N1815
Inovonics	N1818
Logitek	N2022
Broadcast Software International ...	N2114
DB Elettronica	N2138
Audemat-Aztec	N2235
25-Seven	N2432
ATI	N2523
Industrial Acoustics	N2524
Yamaha	N2531
RDL (Radio Design Labs)	N2534
Wheatstone	N2802
Sennheiser Electronics	N2822



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World Radio History

HHB	N2822A
Enco Systems	N2826
TFT	N3302
Heil Sound	N3304
Circuitwerkes	N3304
Radio Systems	N3315
Audio-Technica	N3322
Euphonix	N3606
Lectrosonics	N3611
Crown Audio	N3626
AKG	N3626
JBL Professional	N3626
Studer	N3626
Electro-Voice	N3834
Mediatouch	N3911
Symetrix	N4006
Lucid Technology	N4006
Sound Devices	N4212
Acoustic Systems	N4311
Independent Audio/Sonifex	N4522
Sonifex	N4522
Mackie	SL 254
Microsoft	SL 332
Gefen	SL 501
Kramer Electronics	SL 856
Genelec	SL1143
Tascam	SL1516
Whisper Room	SL3712
RealNetworks	SL4906
Sony	SU 6406
Leitch	SU 7805
Leitch	SU 8100
Leitch	SU 8709
Acoustical Solutions	SU10714

Audio Mixers-On Air

Harris	C 1907
Ward-Beck	C 1924
Lawo AG	N 816

Sierra Automated Systems	N1102
Arrakis	N1122
Henry Engineering	N1300
AEQ	N1418
Omnirax	N1800
Logitek	N2022
Audioarts Engineering	N2802
Wheatstone	N2802
Klotz Digital	N2807
Radio Systems	N3315
AEV	N3437
Axia Audio	N3616
Studer	N3626
Otari	N4511

Audio Mixers-Portable

Denon Electronics	N 313
KLZ Innovations	N 317
Nicom LLC	N 325
Calrec Audio	N 802
Henry Engineering	N1300
Broadcast Tools	N1400
ATI	N2523
RDL (Radio Design Labs)	N2534
Klotz Digital	N2807
Shure	N3206
AEV	N3437
Studer	N3626
AKG	N3626
JK Audio	N3926
Sound Devices	N4212
Zaxcom	N4215
Professional Sound	N4518
Audio Developments	N4522
ATA Audio	N4524
Mackie	SL 254
Tascam	SL1516

Audio Mixers-Studio, Recording

Harris	C 1907
Ward-Beck	C 1924
TC Electronic	C 3612G
Panasonic	C 3617
Telex Communications	C 6821
KLZ Innovations	N 317
Calrec Audio	N 802
Arrakis	N1122
AEQ	N1418
Logitek	N2022
Harrison by GLW	N2418
Yamaha	N2531
Dan Dugan Sound Design	N2532
Wheatstone	N2802
Audioarts Engineering	N2802
Klotz Digital	N2807
Sennheiser Electronics	N2822
Shure	N3206
Audio-Technica	N3322
Euphonix	N3606
Studer	N3626
Symetrix	N4006
Sound Devices	N4212
Zaxcom	N4215
Audio Developments	N4522
Mackie	SL 254
Tascam	SL1516
Sony	SU 6406

Audio Processing & Encoding

Dorrough Electronics	C 1833
Harris	C 1907
Ward-Beck	C 1924
Leader Instruments	C 3150
TC Electronic	C 3612G

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World Radio History

NAB FASTtrack

ADC/Nvision	C 4515
Prime Image	C 5614
Wohler	C 6221
Neural Audio	C1907
Nicom	N 325
Broadcast Warehouse	N 422
Eventide	N 502
Audio Processing Technology (APT)	N 811
Circuit Research Labs	N 813
Orban	N 813
Junger Audio Studioteknik	N 919
SBS/Eddystone Broadcast	N1113
RCS	N1411
Aphex Systems	N1815
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Audemat-Aztec	N2235
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AEV	N3437
DBX Professional Products	N3626
Lexicon	N3626

Symetrix	N4006
Otari	N4511
Phoenix Audio	N4522
Independent Audio/Sonifex	N4522
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Gefen	SL 501
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Scott Studios/Dmarc Broadcasting ...	C 1828
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Lexicon	N3626
Studer	N3626
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Scott Studios/Dmarc Broadcasting ..	N4005
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Zaxcom	N4215
Otari	N4511
Independent Audio	N4522
Sonifex	N4522
Mackie	SL 254
Tascam	SL1516
Microboards Technology	SL2753
Sonic Solutions	SL308
Disc Makers	SL3616
Primera Technology	SL4267
Sony	SU 6406
360 Systems	SU11011

Audio Routing & Distribution

AVP Manufacturing & Supply	C 1857
Harris	C 1907
Ward-Beck	C 1924
Switchcraft	C 2339
Wegener Communications	C 2624
DK Technologies	C 2757
Clark Wire & Cable	C 3331
Sonifex	C 3526
Audio Accessories	C 3651
Neutrik	C 5137
Wohler	C 6221
DG Systems	C11436
Fast Channel Network	C12014
DB Elettronica	N 500
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Lawo	N 816
Sierra Automated Systems	N1102
SBS/Eddystone Broadcast	N1113
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Broadcast Tools	N1400
AEQ	N1418
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Aphex Systems	N1815
Logitek	N2022
SRS Labs	N2026
DB Elettronica	N2138
Prism Sound	N2412
Digigram	N2428

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	Comrex Matrix	Tieline Commander	Zephyr Xport
Audio Bandwidth @ 24 kbps @ 19 kbps	14 kHz 11.2 kHz	15 kHz 9 kHz	15 kHz 15 kHz
Direct Internet Software Updates	No	No	Yes, via Ethernet port
Digital PC Audio Input	No	No	Yes, via Ethernet port and supplied driver
Audio Metering (XMIT/RCV)	Transmit only	One-at-a-time	Simultaneous
Audio Processing	None	Simple AGC	Digital multi-band AGC with look-ahead limiter by Omnia
Remote Control	No	RS-232 and dedicated computer	Ethernet via Web browser
Auto Dial Storage	19 Numbers	50 Numbers	100 Numbers
Frequently-Used Settings Storage	none	none	30
Standards-based POTS Codec	No - Proprietary	No - Proprietary	Yes - aacPlus (MPEG HEAAC)
Transmit-Receive Quality Display	No	Yes	Yes
Contact Closures	2	2	3
Display Resolution	120x32 LCD	120x32 LCD	128x64 LCD
Analog Cell Phone Interface	Optional	Standard	Standard
Mixer Inputs	1 mic, 1 mic / line	2 mic / line	1 mic, 1 line
Phantom Power	No	No	Yes - 12 volt
Automatic Voice-Grade Backup	No	No	Yes
Power Supply	External	External	Internal auto-switching
Local Mix Audio Outputs			
Headphone	Yes	Yes	Yes
Line Level	Yes	No	Yes
Direct Receive Audio Output	No	Yes	Yes
Uses ISDN at the Studio Side for More Reliable Connections	No	No	Yes - your Zephyr Xstream becomes universal POTS and ISDN codec.
Available ISDN Option	\$850.00 (adds MPEG L3 & G.722)	\$850.00 (adds G.722)	\$495.00 (adds G.722 & state-of- the-art AAC-LD for high fidelity and low delay)
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Wheatstone	N2802
Klotz Digital	N2807
Shure	N3206
Radio Systems	N3315
Burk Technology	N3602
Euphonix	N3606
Axia Audio	N3616
Crown Audio	N3626
Studer	N3626
JK Audio	N3926
Lucid Technology	N4006
Symetrix	N4006
Otari	N4511
Signex/Independent Audio	N4522
Sonifex	N4522
DG Systems	N4522
Independent Audio/Sonifex	N4522
Hosa Technology	SL 256
Kramer Electronics	SL 856
Avid	SL1210
Dalet Digital Media	SL1953
Mohawk	SU11839

Automation Systems & Content Management

Scott Studios/Dmarc Broadcasting ...	C 1828
Harris	C 1907
KLZ Innovations	N 317
Wireready	N 700
Pristine Systems	N1111
Arrakis	N1122
Prophet Systems	N1402
RCS	N1411
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Broadcast Electronics	N1802

Broadcast Software International ... N2114
 Audemat-Aztec



Netia Digital Audio	N3622
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OMT Technologies	N3911
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Winradio Software	N4211
Dalet Digital Media	SL1953
SMART Technologies	SL4423
On-Air Systems	SL5710
Sony	SU 6406
IBM	SU 7049
Siemens Business Services Media ...	SU 8541

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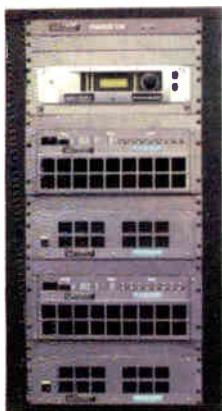
Microwave Service Corporation ...	C 1539
Richardson Electronics	C 1824
Harris	C 1907
Joseph Electronics	C 6248
RF Parts	N 619
Broadcasters General Store	N3304
Lightner Electronics	N3911
Herman Electronics	SU 9814

Digital Audio Workstations

TC Electronic	C 3612G
Audio Processing Technology (APT)N	811
Orban	N 813
Pristine Systems	N1111
Arrakis	N1122
Prophet Systems	N1402
Broadcast Electronics	N1802
Broadcast Software International ...	N2114
Digigram	N2428
Yamaha	N2531
Enco Systems	N2826
Audion Laboratories	N3304
Netia Digital Audio	N3622
Studer	N3626
Mediatouch	N3911
Otari	N4511
Mackie	SL 254
Avid	SL1210
Tascam	SL1516
Dalet Digital Media	SL1953
Sonic Solutions	SL308
Adobe Systems	SL313
Sony	SU 6406
360 Systems	SU11011

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 Beyerdynamic C10421
 Riedel Funk- and Intercomtechnik .. C11107
Sierra Automated Systems N1102
 Broadcast Tools N1400
Comrex N2118
 Anchor Audio Comm./Portaco N3200
 JK Audio N3926

Internet, Computers, Peripherals & Data

Masterclock C 1430
Scott Studios/Dmarc Broadcasting ... C 1828
 Switchcraft C 2339
 Panasonic C 3617
 JVC C 4526
 Tektronix C 6231
Telex Communications C 6821
 Fluke Networks C11814
 Denon Electronics N 313
Audio Science N 503
 Audio Processing Technology (APT) ... N 811
 Orban N 813
Mager Systems N1231
 Broadcast Tools N1400
 RCS N1411
Broadcast Electronics N1802
 Audemat-Aztec N2235
 Digigram N2428
 Yamaha N2531
Enco Systems N2826
 Netia Digital Audio N3622
 Lexicon N3626
Scott Studios/Dmarc Broadcasting .. N3902
OMT Technologies N3911
Musica USA N3914
Scott Studios/Dmarc Broadcasting .. N4005
 Lucid Technology N4006
 Mackie SL 254
 Gefen Inc SL 501
 Avid SL1210
 Anystream SL12100
 Tascam SL1516
 Apple Computer SL1902
 Apple Computer SL1914
 Dalet Digital Media SL1953
 ATTO SL2265
 Anystream SL3316
 Studio Network Solutions SL3331
 Primera Technology SL4267
 IBM SU 7049

Microphones, Accessories

Harris C 1907
 Hollywood Edge/Soundelux Mic .. C 2346
 Sonifex C 3526
 TC Electronic C 3612G
Telex Communications C 6821
Electro-Voice C 6821
 Beyerdynamic C10421
 DPA Microphones N 506
 Sanken Microphones N 617
 Junger Audio Studiotechnik N 919
 SBS/Eddystone Broadcast N1113
 Countryman Associates N1118
Aphex Systems N1815
 Digigram N2428
 ATI N2523
 RDL (Radio Design Labs) N2534
Omnia Audio N2816
Neumann N2822
 Sennheiser Electronics N2822
 Shure N3206
 Schoeps/Posthorn Recordings N3231
 Rycote Microphone Windshields .. N3232
Circuitwerkes N3304
 Heil Sound N3304
Audio-Technica N3322

Letrosonics N3611
 AKG N3626
 DBX Professional Products N3626
Electro-Voice N3834
 Symetrix N4006
 Sound Devices N4212
 Azden N4222
 Sonifex N4522
 Flea N4522
 Phoenix Audio N4522
 Pearl Microphone Labs N4522
 Independent Audio/Sonifex N4522
 Coles N4522
 Mackie SL 254
 Marshall Electronics SL 913
 Sony SU 6406

Microwave, Fiber Optic & Telco Equipment

Superior Broadcast C 1218
 Microwave Service Corporation ... C 1539
Harris C 1907
 Harris C 1907
 Microwave Radio Comms C 3007
 DMT USA C 3016
 Sonifex C 3526
 ADC/Nvision C 4515
 Tektronix C 6231
 Kathrein, Scala Division C 8538
 KLZ Innovations N 317
 Nicom N 325
 DB Elettronica N 500
Tieline America N 517
 Audio Processing Technology (APT) ... N 811
 Orban N 813
 SBS/Eddystone Broadcast N1113
 Henry Engineering N1300
 Broadcast Tools N1400
 RCS N1411
Armstrong Transmitter N1415
AEQ N1418
 Marti Electronics N1802
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Radio Systems N3315
 OMB America N3433
 AEV N3437
Musica USA N3914
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 Otari N4511
 Sonifex N4522
 Independent Audio N4522
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Power Products, Batteries, Generators, UPS

LEA International C 1563
 Dorough Electronics C 1833
 Belden C 2257
 Active Power C 2659
 Mole-Richardson C 3021
 Neutrik C 5137
Telex Communications C 6821
 Lightning Eliminators & Consultants ... C 7834
 MGE UPS Systems C10521
 Cummins Power Generation C11343
 Superior Electric N 608
 Henry Engineering N1300
ERI-Electronics Research N1306
Kay Industries N1700
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Recording Media & Accessories

JVC C 4526
Wireworks C 4541
 Maxell C 8530
 American Recordable Media C11812
 Denon Electronics N 313
 HHB N2822A
 TDK Electronics SU 9636
 Brother SU11819

RF Feedline, Components, Towers & Services

Coast to Coast Tower Services C 1211
 Myat C 1407
 SWR C 1820
 Jampro Antennas C 2316
 CPI Eimac C 2616
 Richland Towers C 2627
 Radian C 3028
 RFS Broadcast C 3031
 Neutrik C 5137
 Micro Communications (MCI) C 7736
Dielectric C 7807
 Coast to Coast Tower Services C11914
 Phasetek N 602
 Allied Tower N 615
 EMR Corporation N1000
 Bird Electronic N1116
ERI-Electronics Research N1306
Kintronics Labs N1707
 Econco N1811
Shively Labs N2007
 TWR Lighting N2431
 Unimar N2512
Coaxial Dynamics N2526
 American Tower N2837
 Honeywell Obstruction Lighting ... N3318
Altron Research N3908
 Dialight N3928

Satellite Equipment & Services

Wegener Communications C 2624
 Patriot Antenna Systems C 5843



Norsat International C 7848
 Dawnco C 8141
 Clear Channel Satellite Services .. C10049
 DH Satellite C12329
 Patriot Antenna Systems MM 4
 Broadcast Tools N1400
 Scientific Atlanta SU 7848

Software - Business, Traffic, Scheduling, Inventory

Xytech Systems C 2260
 Wireready N 700
 RCS N1411
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 Encoda Systems SU10048
 TM Century SU10367

Sound/music/image libraries

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 Omnimusical C 2953
 Megatrx Production Music C 2957
 Firstcom Music C 3024
 Groove Addicts C 3053
 5 Alarm Music C 3163
 615 Music Library C 3256
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 Denon Electronics N 313
V-Soft Communications N 508
 Towerline Software N 516
 Prime LED N 604
 Comet North America N 607
 Superior Electric N 608

RF Parts N 619
 Circuit Research Labs N 813
Arrakis N1122
Mager Systems N1231
 Broadcast Tools N1400
Omnirax N1800
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 Dataworld N2422
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Wheatstone N2802
Telos Systems N2816
Radio Systems N3315
 Studio Technology N3315
Efron Computerized Studios N4508
 Hardigg SL 357
 Penny & Giles SL 365
 APW Enclosures SL1567
 NKK Switches SL2454
 SKB SL2868
 Middle Atlantic Products SL3606
 Noren Products SL3618
 WhisperRoom SL3712
 MilesTek SL4647
 TBC Consoles SU 6831
Forecast Consoles SU 7131
 Paladin Tools SU11826

System Integrators, Installers, Consultants & Services

Richardson Electronics C 1824
 Non-Stop Music Library C 1850
Harris C 1907
 Comsearch C 4645
 Wolf Coach C 4845
 A.F. Associates C 5434A
 International Datacasting C 6637
 E-N-G Mobile Systems C 8548
 FastChannel Network C12014
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 RCS N1411
Broadcast Electronics N1802
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Lightner Electronics
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Good Mood Productions N4522
 Non-Stop Music Library RT 719
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 Ward-Beck C 1924
 ESE C 2639
 Leader Instruments C 3150
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 Sencore Electronics C 7331
Dielectric C 7807
 Fluke Networks C11814
 Pomona Electronics C11814
 Denon Electronics N 313
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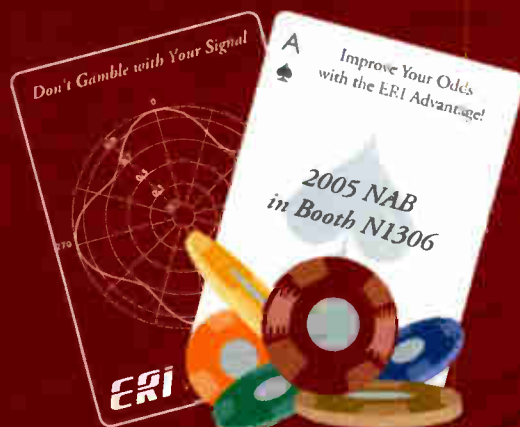
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ATI	N2523
Coaxial Dynamics	N2526
RDL (Radio Design Labs)	N2534
QEI	N2831
Circuitwerkes	N3304
Altronic Research	N3908
Symetrix	N4006
Sencore Electronics	SU10006
Trompeter Electronics	SU10323

Transmitters, Antennas, Remote Controls, SCA & Tuners

Superior Broadcast	C 1218
Modulation Sciences	C 1223
SWR	C 1820
Harris	C 1907
Jampro Antennas	C 2316
DMT USA	C 3016
RFS Broadcast	C 3031
Larcant	C 5620

Dielectric Booth C7807

Kathrein, Scala Division	C 8538
Propagation Systems	C 9229
Statmon Technologies	C11404
Valcom	N 319
Nicom	N 325
DB Elettronica	N 500
Crown Broadcast	N 722
EMR Corporation	N1000
Davicom/Comlab Telecomm	N1100
R.V.R.	N1102
SBS/Eddystone Broadcast	N1113
ERI-Electronics Research	N1306
Broadcast Tools	N1400
Armstrong Transmitter	N1415
Nokia Visual Radio	N1522
Kintronic Labs	N1707
Marti Electronics	N1802
Broadcast Electronics	N1802
Inovonics	N1818
Shively Labs	N2007
Bext	N2111
DB Elettronica	N2138
Audemat-Aztec	N2235
DRS Broadcast Technology	N2302
Moseley Associates	N2306
Energy-Onix	N2527
Nautek	N2811
QEI	N2831
TFT	N3302
Circuitwerkes	N3304
OMB America	N3433
AEV	N3437
Burk Technology	N3602

Delta RF Technology	N4206
Broadcast Technology	SU 9317

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Techflex	C 2041
Belden	C 2257
Switchcraft	C 2339
BTX	C 2657
Clark Wire & Cable	C 3331
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Canare	C 5134
Neutrik	C 5137
Kings Electronics	C 8131
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Amphenol	C11448
Hannay Reels	C11714
Pomona Electronics	C11814
AEQ	N1418
Heil Sound	N3304
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- Multiple frame sizes allow configuration of systems ranging from 2 to 24 faders
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NAB2005

The Technical

SESSIONS

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Between the convention floor and the session halls, you will find plenty to do to fill your day. Produced in partnership with the Society of Broadcast Engineers, the Broadcast Engineering Conference enters its 59th year by presenting topics that cover the entire range of radio broadcast engineering.

A timetable of the BEC and other key events is on page 52. This is not a complete timetable, but includes the sessions and events that are most likely of the greatest interest to you, the *Radio* magazine reader.

A full week

The activities begin on Saturday, April 16 with the Ennes Workshop, which is arranged by the SBE. Fred Baumgartner, CPBE CBNT, and Lewis Zager arranged the agenda. The topic of the workshop is Building the Next Generation Master Control, and it will be held in room N110 of the Las Vegas Convention Center (LVCC). The session will include opening remarks from John Poray, executive director of the SBE. Three portions of the workshop have direct radio themes: *Calculating Reliability*, Fred Baumgartner, Leitch; *Quality Master Control Room Audio Monitoring*, Frank Foti, Omnia Audio; and *Radio Master Control Design and Implementation*, Steve Davis, Clear Channel Radio.

Sunday's sessions all relate to radio's future, with an emphasis on IBOC. The day's events begin with the Broadcast Engineering Conference Keynote by Lynn Claudy, senior vice president of science and technology for the NAB. The keynote will be held in room N112. The radio portion then moves to

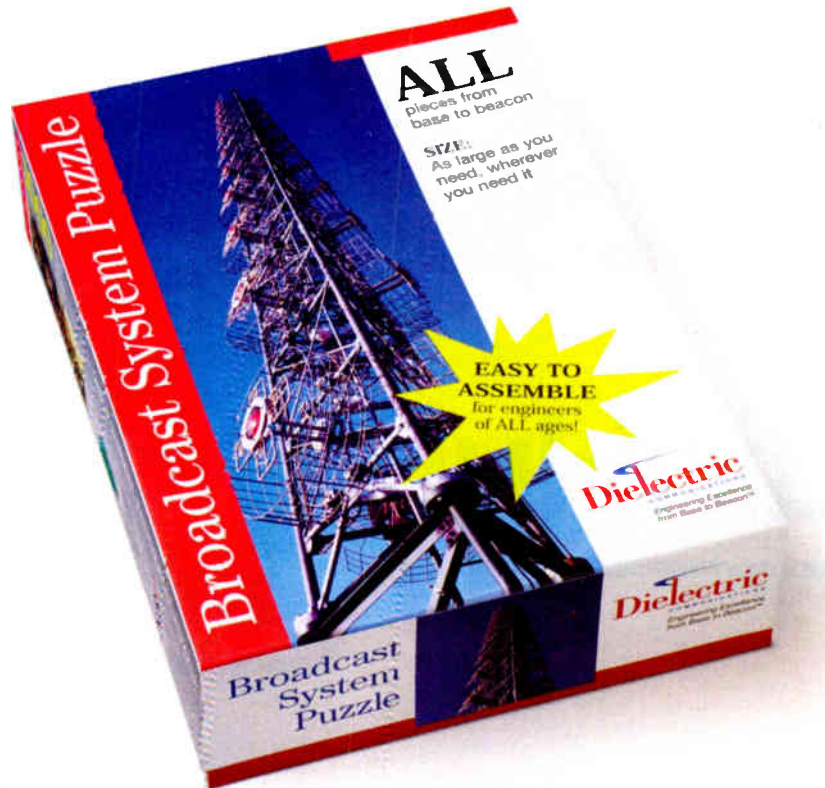
room N110 for an update on the latest activity of the NRSC from Charles Morgan, senior vice president of Susquehanna Radio and active member of the NRSC.

The remainder of the morning sessions cover the various aspects of surround sound for IBOC. The session, titled *Surround Sound - A New Frontier for Radio* includes presentations from Frank Foti of Omnia Audio, David Frerichs of Coding Technologies, Robert Reams of Neural Audio and Shigeru Aoki of the Japan FM Network.

After lunch, H. Donald Messer of the International Broadcasting Bureau will provide an update on International radio with a presentation called *The DRM Digital Modulation System in the Mediumwave (AM) Band*.

The Sunday afternoon sessions are all about IBOC. The session chairmen are Norm Philips of Susquehanna and Chriss Scherer, editor of *Radio* magazine. The scheduled presentations include *Hitless Space Diversity STL Enables IP and Audio in Narrow STL Bands* by Sunil Naik of Moseley Associates, *Linearizing HD Radio Transmitters* by Anders Mattsson of Harris, *IBOC Considerations for Multichannel FM Installations* by Henry Downs of Dielectric Communications, *Split Level Combining Systems For HD Radio* by Steve Fluker of Cox Radio Orlando, *4M Modulation and its Benefits on Digital Radio* by Jerry Westberg of Broadcast Electronics, *HD Radio Installation - Two Case Studies* by Erick Steinberg of Susquehanna San Francisco and Max Turner of Susquehanna Indianapolis, *HD Radio at Greater Media Boston* by Paul Shulins of Greater Media, *Improving Transmitter Linearity in FM HD Radio Using Digital*

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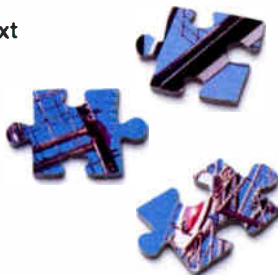


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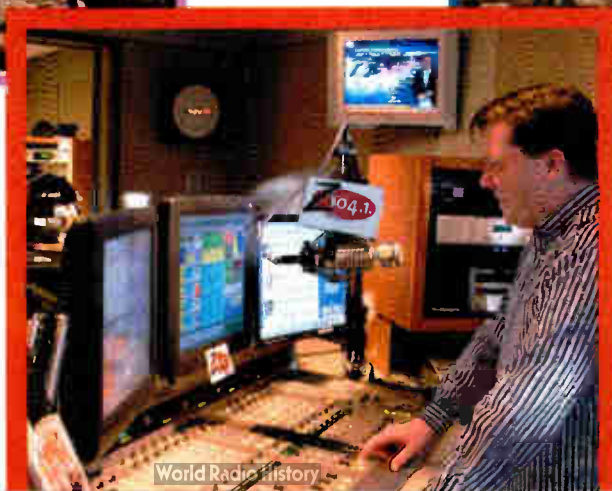


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Rick Ganley, WPMH-FM, Franklin NH



File	Name	Length	Date/Artist	Intro	EOM	Type
18 00 00	Legal ID 5	11.5			01.0	General Audio
18 00 10						
@ 18 11 29	11 474 I NEED TO KNOW	3:12.6	MARC ANTHONY	17	00.3	Musical
XX						
18 14 38	6850 4-SEC Prod Rotation File	00.0			00.0	Rotation
@ 18 14 19	0320 1 04 Produced	04.7			00.7	General Audio
15 18 10	0000 Jock Slab Master Rotation	00.0			00.0	Rotation
18 18 10	0000 1 Jock 6 Slab Rotation	00.0			00.0	Rotation
18 18 10	0054 1 Jock 6 Slab #5	04.3	TFN		00.8	General Audio
@ 18 10 43	11 388 TAKE IT ON THE RUN	3:33.4	REO SPEEDWAGON	1	03.0	Musical
18 21 44	0360 24/7 365	08.0			00.8	General Audio
18 21 52	15718 WHITE FLAG	3:36.0	DIDO	11	02.5	Musical
18 25 25	0950 Pre-local Master Rotation	00.0			00.6	Rotation
18 25 25	15103 OH GIRL	3:21.6	PAUL YOUNG	14	03.3	Musical
18 28 27	0000 Jock Slab Master Rotation	00.0			00.0	Rotation

**"...I'm very impressed with the entire process
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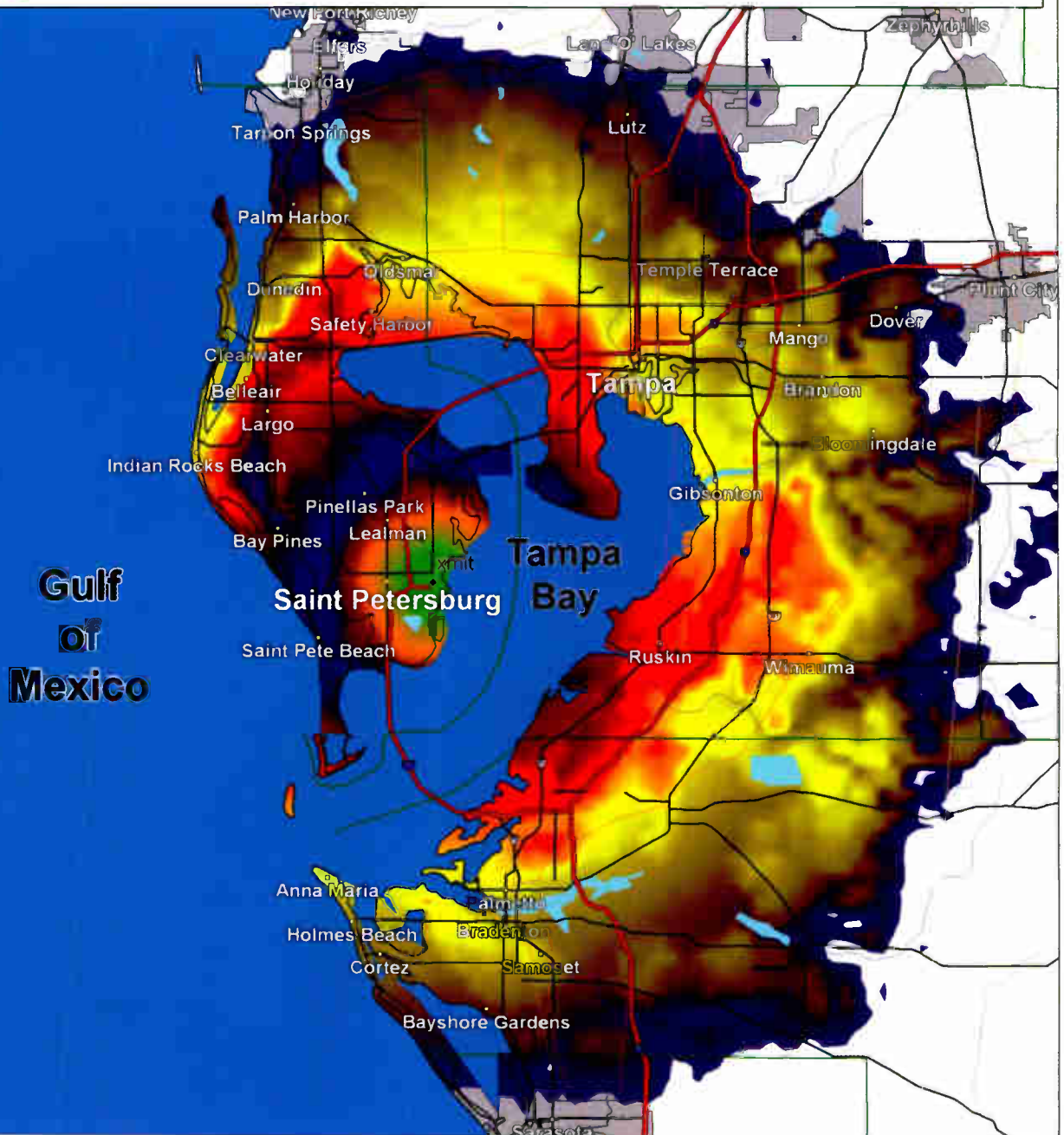
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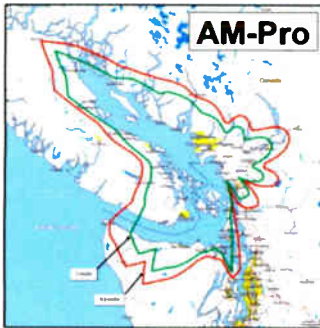
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This Longley-Rice coverage map was created with Probe 3, the complete package for predicting radio propagation anywhere in the world in the 20 to 20,000 MHz frequency range. Probe 3 creates stunning "real-world" color maps from standard size to large page format. The program performs coverage and interference analysis using Longley-Rice, FCC, Okumura-Cost-Hata, PTP2 and other models. Land cover databases are fully integrated using TSB-88 standards. Street-level mapping and year 2000 U.S. census databases are included. Probe 3 has many useful tools including a new drawing tool that calculates population within user defined areas or shapes, an FCC contour overlap tool and a terrain profiler. The program features backdrops including land use, towers, terrain and census scattergram. Probe 3 is an intuitive, wizard based program made for accuracy, ease of use and excellence in presentation. Look at the back of this insert for more R.F. software engineering programs.

See: www.v-soft.com/probe

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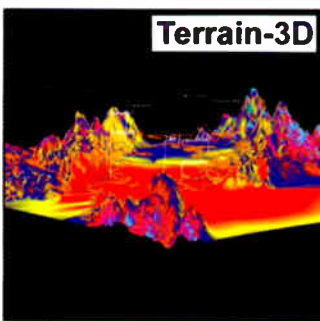
AM-Pro is a grouping of enormously powerful routines in one integrated program designed to calculate and map AM standard band broadcast coverage and perform allocation studies. The program uses M3 or R2 ground conductivity curves for daytime studies and the skywave formulas for nighttime analysis. AM-Pro's use of polygon feature mapping skillfully blends shape and dimension producing "atlas quality" maps. For nighttime allocation studies AM-Pro quickly determines interference free coverage using RSS calculations. Calculate population within coverage contours, determine the upgrade potential of existing AM stations and find new frequencies using AM-Pro.

See: www.v-soft.com/am



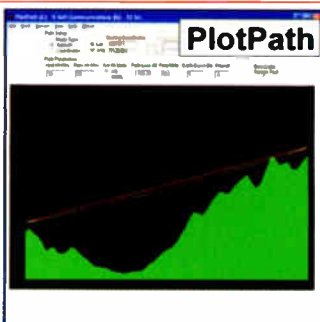
FMCommander is our most comprehensive FM frequency search program to date. The program provides quick, accurate information for both minimum spacings studies and contour-to-contour studies. The results of the studies can be seen in the tabular format, and visualized with high-quality, atlas-like maps including area-to-locate, contour-to-contour and coverage mapping. The program can be used to search for full service stations, translators and LPFM. A powerful pattern editor that automatically designs a pattern to prevent overlap is also included. FMCommander's intuitive tools are perfect for searching for move-in opportunities, new channels or upgrading existing stations.

See: www.v-soft.com/FMCommander



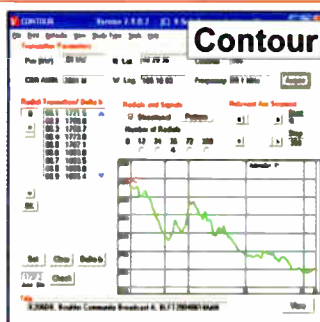
Terrain-3D uses Microsoft's OpenGL graphics technology to model RF signals over true-to-life 3D terrain anywhere in the world. The use of 3D visualization integrates the appearance of real life terrain with signal propagation, giving you the vivid experience of being there. Use your mouse to rotate or tilt the view or use the terrain animate feature to watch the terrain come to life as it rotates. Plot Longley-Rice and FCC coverage or point-to-point microwave radio paths over 3D terrain. Use Terrain-3D's system wizard to evaluate link budgets and fade margins for the entire radio system. Terrain-3D also plots census density using 2000 U.S. census information and towers using the FCC tower database.

See: www.v-soft.com/Terrain3D



PlotPath calculates the path loss, signal and fade margin of a given radio path at the user's frequency and instantly plots the path using Earth curvature over a distance versus terrain elevation graph. The program has a range of frequencies from 22 MHz to 35 GHz and it automatically calculates path loss as antenna height is changed. Points can be selected along the path to change the elevation to accommodate for any known obstructions such as buildings or trees. It also provides interactive system loss/gain analysis. PlotPath is ideal for modeling communications microwave links, and paths for FM, TV, MMDS, and cellular.

See: www.v-soft.com/PlotPath



Contour specializes in the creation of FM and TV distance to contour tables for submission to the Federal Communications Commission. The program creates tables for one contour or multiple contours and outputs them to any printer or to a word processor. Contour computes terrain roughness (Delta h), calculates FCC and PTP distance to contour tables, truncates radials, prints profile graphs, and calculates depression angles, electrical and mechanical beam tilt. Contour graphically shows the terrain along a specific azimuth and distance when using the terrain roughness or truncate function of the program.

See: www.v-soft.com/Contour



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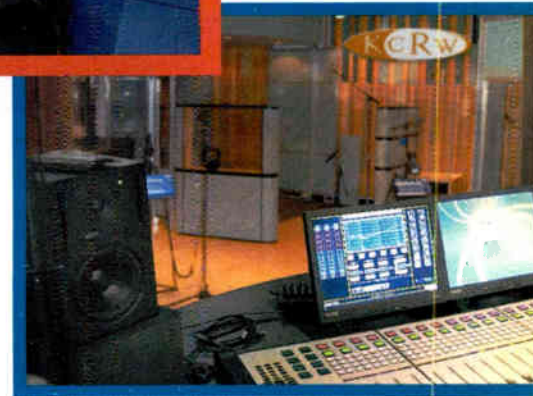
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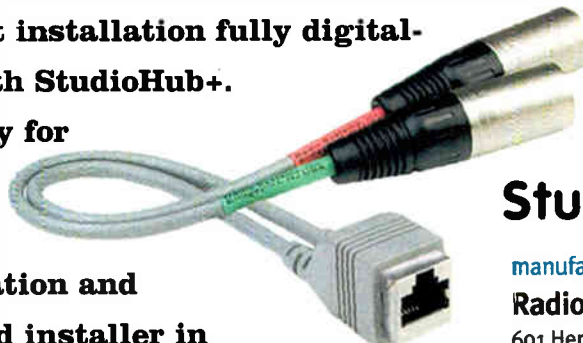
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SESSIONS

Time	Friday April 15	Saturday April 16	Sunday April 17	Monday April 18	Tuesday April 19	Wednesday April 20
7:30						
8:00				Congressional Breakfast	FCC Breakfast	
8:30						
9:00						
9:30			BEC Kenanote NRSC Update	Opening Ceremony		
10:00						
10:10			Surround Sound - A New Frontier for Radio	Test, Measurement and Quality Control for a Digital Radio Plant	Radio Broadcast Facilities	Disaster Prep and Recovery
11:00						
11:30				Nautel Boers Group		
12:00						
12:30	Public Radio Engineering Conference	Public Radio Engineering Conference				
1:00		Ennes Workshop				
1:30					Radio Luncheon	Technology Luncheon
2:00						
2:30						
3:00				IT in the Radio Broadcast Facility	Broadcast Technical Regulators Issues	
3:30					IEEE Workshop on Digital Broadcasting	IEEE Material
4:00						
4:30						
5:00						
5:30					BRE Technology	SBE Membership Meeting
6:00						
6:30					Tuesday Night Party	Amateur Radio Recreation
7:00						

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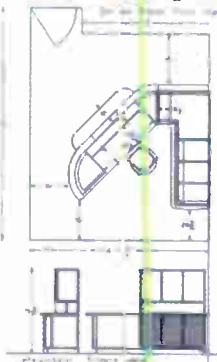
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SESSIONS

Adaptive Pre-Correction by Tim Hardy of Nautel, and *A New Approach To Digital Radio Broadcasting in The FM-Band* by Derek Kumar of Digital Radio Express.

During the convention

Monday morning turns the attention to the tools required to evaluate digital systems. In room N110, *Test, Measurement and Quality Control for a Digital Radio Plant* includes *IBOC Instrumentation Utilizing Novel Software Defined Radio Architecture* by Eric Eckstein of QEI, *Performance Measurements of Hybrid IBOC Signals* by David Maxson of Broadcast Signal Lab, *Practical Considerations in the Measurement of Power and VSWR in Broadcast Transmission Systems* by Tim Holt of Bird Electronic, and *Examples of AM Antenna Bandwidth from Over 50 Typical Cases* by Ben Dawson of Hatfield and Dawson.

On Monday afternoon, the session *IT in the Radio*

Broadcast Facility focuses on the trend of viewing all radio operations as a data transport system. Bill Gould of Moseley Associates presents *New STL/TSL Solutions for LAN/WAN Extension to Transmitter Sites*. Steve Church of Telos Systems discusses *Studio Structures for Surround Broadcasting*. William Eldridge of U-Turn Media covers *IT Service Management Applied to Broadcast Facilities*. Al Salci of Sierra Automated Systems and Engineering presents *Data Transport for Audio*. Tom Hallowell of Radio Free Asia delves into *Information Lifecycle Management for Broadcasters*. Ray Miklius of Broadcast Electronics describes *Broadcast Infrastructure Engineering of the Future*. Phil Owens of Wheatstone talks about *Data Transport for Audio*. Frederick Gleason of Salem Radio Labs provides tips on *Empowering Your Audience: Creating Rich Online Archives for Talk Radio*, and Ted Staros of Harris looks into *Distributed Intelligence Applied to Routing of Audio and Control in a Radio Broadcast Environment*.

Tuesday's morning presentations look at practical installations in the session *Radio Broadcast Facilities*. Topics include discussion of AM feeder design, a look at the Clear Channel LA consolidation project, challenging remote broadcasts, building the WOR facility and construction of the 4 Times Square New York tower site.

The session *Leading Edge Technologies* covers mostly TV topics, but there is one hidden radio gem called *BRIC Technology - Responding to the Changing Telecom Industry with Reliable, Real-Time, Broadcast Audio Delivery on the Public Internet*. Tom Harnett of Comrex provides the details.

The session *Broadcast Technical Regulatory Issues* on Tuesday afternoon leans toward TV in its scope, but the presentation

Amateur Radio Reception

April 20, 6 p.m. to 8 p.m.

Las Vegas Hilton Ballroom

Always a popular event at the convention, the reception draws attendees from all areas and interests. The event includes food and refreshments. A number of door prizes will be awarded as well. The event is sponsored by Heil Sound.

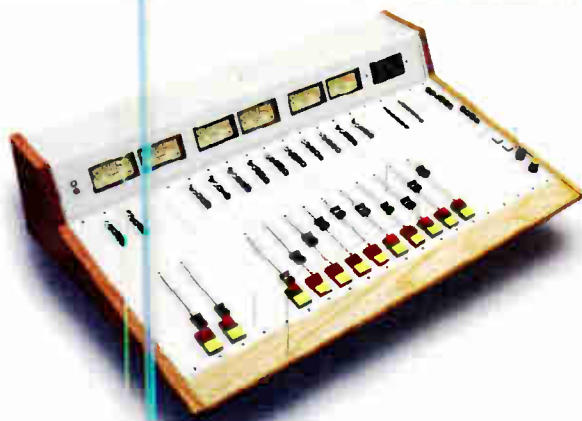
12,000 series

...radio consoles

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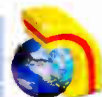
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of modular analog consoles for on air & production Radio applications are feature laden and reliable. DC control of audio means there is no audio on faders or on/off switches for maximum life & reduced RF interference. Use of P&G slide faders, 10 million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



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SESSIONS

Broadcast Auxiliary Service - A Frequency Coordination Primer by Tim Hardy of Comsearch and *Wireless Device Interference to UHF Television* by Bill Ruck should carry some radio relevance.

While the BEC continues through Thursday, the last radio presentations are on Wednesday morning during the *Disaster Prep and Recovery* session. The hurricanes of 2004 are a part of half the sessions including *Hurricane Preparedness in a City Below Sea Level* by Joseph Pollet of Entercom New Orleans, *Disaster Survival and EAS* by Roz Clark of Cox Tampa, and *Disaster Recovery—Tales from the Damaged Side* by Michael Patton of Michael Patton and Associates. In addition, *Disaster Prep* by Larry Gispert of the Hillsborough County Emergency Management office, and *Disaster Preparation and Recovery: Designed into all Systems from the Start* by James Kutzner of PBS should be interesting.

Outside the BEC

There are two sessions during the Broadcast Management conference that have technical relations. On Monday, April 18, the FCC Roundtable provides just over an hour to hear an FCC Commissioner field questions relating to the tough issues that broadcasters face.

On Tuesday, the session *HD Radio: You Ain't Heard Nothing Yet* will discuss the next steps that broadcasters and manufacturers should take in making HD Radio a viable transmission system for listeners.

SBE Events at NAB2005

The Society of Broadcast Engineers has several events and meetings planned during the convention. SBE members are welcome to attend any of these functions, especially the membership meeting.



April 17 SBE Board of Directors Meeting

7:30 a.m. to noon
Grand/Royal Salon, LV Hilton

April 18 SBE EAS Meeting

2 p.m. to 4 p.m.
N-36 LVCC

April 19 SBE Membership Meeting

5 p.m. to 6 p.m.
N109 and N110, LVCC

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Find the missing link Studio to transmitter links

By Doug Irwin

In the old days, radio broadcasting meant AM radio and transmitter sites were manned. The studio may have been co-located with the transmitter, or maybe located downtown, so at most there would only be the need to communicate in one direction with one program channel. Even new FM services were commonly located in such a fashion as to share to program source of a sister AM station, with the FM antenna located atop one of the AM towers.

continued on page 60

Resource Guide

A sampling of STL systems



Big Pipe

A new method of creating point-to-point links, the **Broadcast Electronics** Big Pipe provides a bi-directional link with up to 45Mb/s of data throughput depending on the model. Modular interfaces allow carriage of analog and digital audio, HD Radio data, RBDS data, Ethernet, serial data, video and telephony. Audio can be encoded at 44.1kHz or 48kHz sampling rates. License-free systems operate at 5.3GHz UNII band or the 5.8GHz ISM band. Using 16QAM, 12 radios can be located without interference.

www.bdcast.com
217-224-9600



Worldnet Oslo

The APT Worldnet Oslo is a 3RU modular frame system that can transmit five stereo channels of audio via a T-1 or E1 line. A failsafe option allows the unit to use ISDN as a back-up connection. It also supports X.21 and Ethernet data interfaces. Audio is encoded with Apt-x at 24-bit resolution and 48kHz sampling frequency. Audio latency through the system is less than 5ms. Each audio channel includes an RS-232 data path. Dual power supplies can be fitted for redundancy. The unit can be controlled via IP or RS-232. A smaller, 1RU version, the Baby Oslo, is also available.

www.aptx.com
323-463-2963



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Bill Gould 978 373 6303

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Find the missing link

MDO UK offers hardware and software systems to transport audio over IP networks. The Audio TX STL-IP is a 1RU interface to deliver 24-bit, 96kHz audio over existing private networks, such as a LAN, WAN, telco network, T1/E1, wireless networks, satellite and the Internet. The system can accept an external wordclock signal or sync to an external digital signal. It also provides ancillary serial data and contact closures. Each unit can simultaneously transmit audio to six connections and receive audio from one location.

Audio TX Communicator is a software-based audio transport system via an IP or ISDN connection. The software runs on Windows 98/NT/2000/XP/ME. A single stream can be received by multiple users.

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Two things happened in the late 60s and early 70s. First, the FCC approved the use of remote control systems. Second, FM radio just started to come in to its own, and FM transmitters were moved to hilltops, mountaintops or other tall structures so they could be heard by bigger audiences. These changes necessitated several improvements in broadcast technology—specifically communications pathways that could carry stereo program material (in the case of FM) and remote control information for AM and FM.

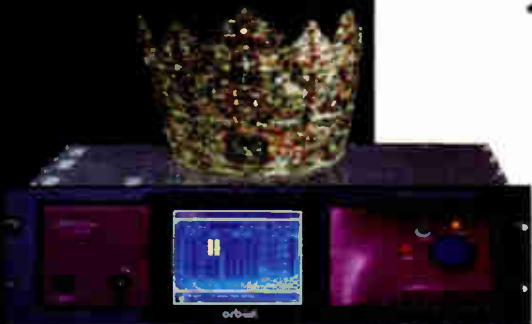
The FCC allocated spectrum in the 950MHz band for communications for AM and FM radio stations, and several manufacturers responded with various radio links that could carry monaural programs or composite audio. The same radio links could be used to carry information to the transmitter site for the remote control. The telephone company also provided a means by which transmitters could be remotely located. In the old days, the telephone company would provide a continuous copper connection, often called a loop, from the studio to the transmitter site. With proper equalization it could be used for audio or remote control by the way of its dc continuity.

Not surprisingly, technology changes in the telecom industry—probably been the biggest engine of technological advancement since the beginning of the 20th century—affected the offerings to broadcasters long before changes were seen in broadcast radio STLs. The telephone company converted to digital communications links between facilities long before “digital” became a buzz word. Continuous copper loops became a thing of the past, as did remote controls that used dc continuity. They had to be replaced with slow-speed modems and four-wire data circuits. Audio links left the building as analog, but went from central office to central office via T-carriers.

The first duplex links

I worked in San Francisco during the late 80s when the local telephone company (then known as Pacific Telephone) first

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offered full T-1 circuits to the end users, thus eliminating the analog last mile. We used a T-1 for KSAN for the first time in 1990.

It was a radical change for several reasons. The first, and most noticeable to ourselves and we hoped our listeners, was that we made use of our own digital audio encoder—a Graham-Patten Systems VAMP 3—and we weren't tied to what the telephone company provided. The second important change was that we could now return audio directly from the transmitter site. Because we didn't have a line-of-sight path, we made use of this link to return an air monitor.

Other broadcasters saw the advantages of having a full T-1 to their transmitter sites and it wasn't long before several manufacturers offered equipment to take advantage of the new telco offering. Graham-Patten Systems (which was a great sounding system, but not modular), QEI, Intraplex and CCS/Musicam USA all became known names for link connectivity. Telos also got in to the game by way of the Zephyr.

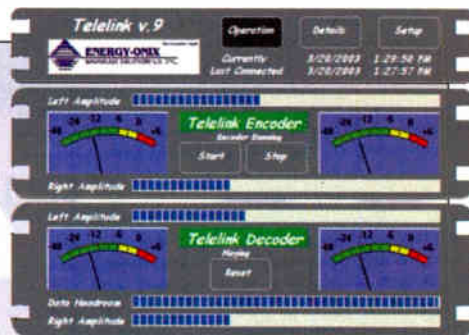
Radio links go digital

Radio link manufacturers needed to catch up with the quality provided by digital encoders running

The Energy Onix Tele-Link is a full-duplex, 22kHz stereo transmission system for IP or Internet delivery. One stereo source can feed multiple destinations. The software is loaded on a computer to provide an encoder and decoder at each end of the path.

A minimum 128kb/s path is required for operation. If audio is lost, the software can be configured to automatically play recorded audio from the receiver computer. An option is available to provide eight relay and five metering channels. A spread spectrum version is available to encode audio at 16-bit MPEG4 rates from 32kb/s to 96kb/s, 24-bit MPEG4 rates from 128kb/s to 384kb/s and a non-compressed rate. Systems operate at 2.4GHz or 5.8GHz. As many as four stereo channels can be transmitted through the system.

www.energy-onix.com
518-758-1690



Tele-Link

over T-1s and they started to do so in the mid 90s. The first digital radio STLs were the existing composite radios that had been in use, except instead of analog, composite audio the radio was fed the output of a high-speed modem that digitally encoded the two program audio channels. Moseley and TFT were two of the early

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providers of this equipment. About the same time, Dolby appeared with its own entry in the market, a digital radio STL known as DSTL.

There have been rapid advances in the technology of radio systems such as this, and in the last 10 years they have gone from the original analog/digital hybrid to the latest digital radios, some of which can carry three AES data streams without any data compression.

The state of the art

When FM exciter with AES inputs became readily available, there was a new impetus to deliver a station's program audio to the transmitter site in that manner. It has become a trend not only in FM, but AM as well, because newer audio processors can accept AES audio input signals. Now 950MHz radios that can deliver AES audio are commonplace, and in that sense they have caught up with their wire-line brethren.

With the consolidation that has occurred in the industry, it is common for one studio to communicate with multiple transmitters at a given transmitter site, and for that reason radio links that can carry multiple AES data streams have become useful. Whereas their analog ancestors used mux channels



LD

Bext offers three STL systems. All are frequency-agile systems, and the operating frequency can be set from the front panel. Other common features include direct FM to frequency modulation, mono and composite audio inputs and SCA/RBDS inputs and telemetry/remote control connections. The LC series has three SCA inputs and occupies 3RU. Metering displays modulation in peak and peak hold, forward and reflected power and LED status indication for all functions. The unit can operate directly from a 12Vdc supply.

The LD series includes three SCA inputs and occupies 2RU. Metering is provided on an LCD screen for operating frequency, modulation, forward and reflected power, voltage, current, operating temperature, and alarms and status info.

The LJ series features two SCA inputs and occupies 2RU. Metering of modulation as peak or peak hold, forward and reflected power is provided, as are LED status indicators for all functions.

The LD and LJ have an optional stereo generator/encoder module. The CDX encoder/decoder provides two or four channels of digital audio via a composite STL link.

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Find the missing link

to pass control information for the transmitter site remote control, it is now standard for digital radios to have a relatively slow serial data connection for what is essentially the same purpose.

Even with ever increasing types of STL systems, the 950MHz band is often crowded in the larger markets; frequencies are often shared twice and three times. In a market such as Seattle every fraction of the 950MHz band is in use, even though many of the stations are using high-speed data circuits for STLs. Many stations use wireline STLs for the main path and radio links as backups. Prior coordination notice is now required before an application for use of a 950MHz band channel will be accepted by the commission; and so, in many cases, the informal nature of frequency coordination in a given market has gone by the wayside.

Wireline STLs

Products made as wireline STLs have evolved during the last 10 years. Intraplex has been in the market for some time, having originally made equipment that was sold to the telephone companies. Its form factor has been that of a shelf that accepts plug-in modules that accomplish various functions. QEI also made a modular device called



STL-20M

Marti manufactures the STL-20 in a mono (STL-20M) and composite (STL-20C) version. Both are capable of transmitting 20W and are frequency-agile. The front panel features a power switch, power adjustment and a test meter switch. The test meter can display forward and reflected power, PA current, subcarrier level and the power supply. A peak hold bar graph meter shows the modulation level. A 15-pin DB connector provides remote control and remote power metering. Modulation is by direct FM synthesis.

www.martielelectronics.com
217-224-9600

the Catlink, which had an interesting feature: a composite signal could be connected directly to its input and a composite signal would come out on the other end. In addition, it could be configured with other modules that provided lower bandwidth audio. There were other manufacturers that made codecs as stand-alone boxes; CCS (Musicam USA) and Telos come to mind. Later generations of these systems still are in production today,

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Starlink 9003QT1

Long-time STL manufacturer Moseley offers several options for STL connections. The PCL6000 series is a frequency-agile, analog 950MHz system for discrete or composite operation. The series includes the PCL6010 transmitter and PCL 6020 and PCL6030 receivers.

One of the earliest offerings for a digital STL link was the DSP6000, which provides a digital path on an analog composite link. Using Layer II or ADPCM encoding, audio channels and a data channel can be sent via an analog composite STL system. The V.35/RS-422 interface allows it to be used with digital circuits as well.

The Starlink is the digital platform for several digital STL configurations for 950MHz or T-1/E1 use. It transmits linear encoded audio via QAM. The SL9003Q accepts a stereo analog composite input or six discrete audio inputs. The SL9003 Composite provides a direct digital replacement for analog composite STL systems. The Starlink SL9003T1 can be configured using a variety of plug-in modules to transmit audio, RS-422, Ethernet and E&M signals.

The Lanlink 900 is a long-range, high-speed wireless IP/Ethernet/IP facility controller that can use an existing 950MHz STL antenna infrastructure for LAN and RS-232 connectivity. It uses 902MHz to 928MHz FHSS spectrum to provide a 512kb/s data rate.

www.moseleysb.com
805-968-9621

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Adobe Audition 1.5 will be shown at the NAB convention in Adobe's booth #SL313.

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and probably the most common change is the ability to use the full T-1, a fraction of a T-1 or ISDN (in a backup, lower-data rate mode). The coming of IBOC has made the capacity to handle 20kHz of audio bandwidth sampled at 44.1kHz more and more critical. The ability to extend a LAN to the transmitter site has become a hot feature as well.

With many stations operating as part of larger organizations, it is not uncommon for a station to be connected to a WAN, and thus an ever-present data pipeline exists for TCP/IP communications between two or more locations. Depending on the traffic load, some of the data capacity can be used by audio codecs that are connected via Ethernet. This is a relatively new development for wireline STL products. The ubiquity of the Internet has driven their development as well; Internet connections at two or more locations can be loaded with such devices for applications that are not necessarily mission-critical.

Other bands and full-duplex

A relatively recent development now becoming common in radio broadcasting is that of uncensored radio spectrum. This spectrum is widely

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TSL 910 and RSL 900

Nicom offers the TSL 910 and RSL 900 950MHz system. At 1RU for each unit, this system offers 12W of transmitter power, remote control via RS-232, frequency agility in 25kHz steps, three SCA inputs, an RF monitor jack on the transmitter front panel and an IF monitor on the receiver front panel. All functions are accessed via the LCD screen, and access is password protected. The system includes monitoring software. The unit can be run from a 15Vdc supply.

www.nicomusa.com
619-477-6298

The MT/MR Platinum STL from OMB features a frequency-agile, microprocessor-controlled transmitter. An LCD shows operating parameters such as frequency, forward and reflected power, modulation level and pilot signal. The system accepts balanced mono and composite audio and three SCA inputs. It includes SWR fold back protection. The operating frequency is adjustable in 10kHz increments. The unit can be remotely controlled via an RS-232 port for remote control of frequency and power.

www.omb.com
305-477-0973

shared by different types of services. There are three industrial, scientific and medical (ISM) bands in use by broadcast equipment manufacturers; the 900MHz band, the 2.4GHz band and the 5.8GHz band. The Unlicensed National Information Infrastructure (UNII) band is around 5.3GHz. These combine the idea of free radio spectrum and thus no bills from the telephone company with the functionality of a full-duplex system that was heretofore only available from telephone providers.

There is a major drawback: with more users on the ISM bands, the systems become more likely to be interfered with at some point in time. Fortunately, the use of the spread-spectrum modulation scheme and highly directional antennas diminishes the likelihood of interference. There are also real distance limitations on radio links such as these, and power is limited. See 47 C.F.R. 15.247 for details.

The Superior Broadcast SBP1200M is for 950MHz use. The transmitter and receiver each occupy 3RU. A selectable multimeter displays all operating parameters of the 10W system.

www.superiorbroadcast.com
800-279-3326

Where are we going with this?

With Ethernet being so common around radio station facilities, it is no surprise that broadcast engineers are taking pains to extend such networks to the transmitter sites themselves. Over the years I have seen many SCA systems that used some sort of computer at the transmitter. That was in the old days though, and most of those

communicated via a slow, old modem. Now they can be connected directly with a LAN extension operating over a T-1 or a radio link. Having a computer at the transmitter site is handy for picking up e-mail and looking at manuals on-line.

More importantly, though, we need to be concerned with the ability of an STL system to deliver multiple data streams over and above what we consider to be the station's program audio to the transmitter site. These data streams could be anything from station-specific SCA data, such as now playing info sent over RBDS, to other more specific SCA data and even additional audio channels for NPR's Tomorrow Radio project.

Irwin is director of engineering for Clear Channel Radio in Seattle.

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Xlink

The Xlink is **Armstrong's** new generation of STL systems. This microprocessor-controlled system is frequency agile and requires no tuning across the entire STL band. It has improved sensitivity and better selectivity than previous units from the company. The front-panel LCD display provides control and monitoring of system parameters, plus the Xlink is remote-control ready. It includes composite and mono inputs.

The DTX and DRX make a digital encoder/decoder system for use with a composite STL. The system provides a two-channel 15kHz path and an RS-232 path. Audio is sampled at 32kHz and encoded with sub-band ADPCM at 256kb/s. Each unit occupies 1RU.

www.armstrongtx.com
315-673-1269



Intraplex STL HD

Harris offers two STL systems. Using a 950MHz path, the CD Link is a digital STL that can deliver a 16-bit, AES-3 signal and two RS-232 signals. As an option, it can support an additional two 6kHz audio channels or one 12kHz audio channel. The self-contained unit does not require an external modem or interfaces.

The Intraplex STL HD is a T-1 multiplexer that offers a bidirectional connection via various types of T-1 circuits, including private, public leased, microwave, spread spectrum radio and T-1 subcarrier over video microwave. Audio can be sampled at 32kHz, 44.1kHz or 48kHz. Various modules can be installed to provide several types of audio paths with variable quality, telephone signaling, Ethernet and data connections. Harris also offers the Aurora spread spectrum radio for wireless T-1 links.

For IP applications, the IntraLink IP connects via IP networks.

www.broadcast.harris.com
800-622-0022



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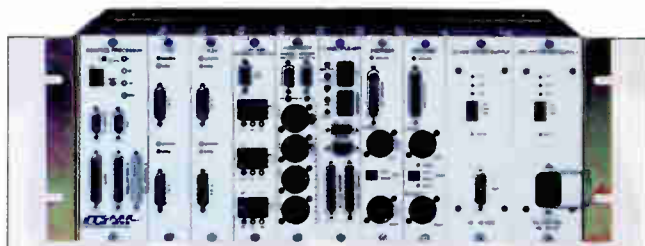
460/467

The TFT 460/467 offers six uncompressed program channels and a data channel. The transmitter provides a 2W output and accepts audio at sample rates of 32-, 44.1- and 48kHz. The RF system is frequency agile and set by software in the transmitter and receiver. The transmitter and receiver can be remotely controlled over an Internet or LAN connection. The receiver offers a threshold sensitivity of 84dBm for 256 QAM.

The 9100 series and 9200 series STL systems are similar in form. The 9100 is a composite system, while the 9200 is a mono system. Both are frequency-agile systems. The transmitters and receivers feature a multifunction test meter to verify proper operation. An optional SCA/MUX encoder or decoder can be installed into the system. An automatic switchover is built-in to the 9107 receiver.

The DMM92 is used to transmit digital audio via a composite STL. It is available in two versions: the DMM92-75 and the DMM92-100, which can transmit two or four audio channels respectively. Both can accept an optional capability to support a 32kb/s data channel.

www.tftinc.com
408-943-9323



Team

Musicam USA provides two units for wired connections. The Team is a T-1 or E1 audio multiplex unit that features a modular frame to support several modules. Each unit has a control processor with Ethernet port and an ac power supply. An optional 60V dc power supply or second ac supply may also be installed to provide redundancy for the primary power supply. The seven user slots can accept stereo codec, stereo encoder, stereo decoder, X.21, V.35 or ISDN modules to customize each system.

The Superlink can connect via LAN, WAN, DSL, ATM, ISDN, T-1 or E1. Interchangeable junction modules support many applications, while user configurable hardware and software control the DSP-based audio codec that supports all the popular compression algorithms. The 2RU unit accepts three of the same modules that are used in the Team.

www.musicamusa.com
732-739-5600



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A small market



Inside Renda Radio in Indiana, PA

A few years ago while contracting at WCCS-AM in Indiana, PA, the manager announced that Renda Broadcasting was purchasing the station. I immediately wondered why Renda Broadcasting would buy an AM station in Indiana, PA. Indiana is a small, unrated market that is best known as the Christmas tree capital of the world, the birthplace of Jimmy Stewart and the home of Indiana University of Pennsylvania. Renda owns stations in Pittsburgh; Oklahoma City; Tulsa, OK; Jacksonville, FL; Ft Myers, FL and Naples, FL; which are all much larger than Indiana, PA. As time went on, Renda purchased WLCY-FM in Blairsville, PA, and WDAD-AM and WQMU-FM in Indiana, PA. I later learned that Anthony Renda grew up in Indiana, PA, listening to WDAD. In fact, his first job in radio was with WDAD, where he worked as a part time announcer.

In January of 2004, plans were announced to consolidate all the stations into a facility in downtown Indiana. Renda wanted to bring back an old time feeling to the stations by having large impressive studios surrounded by glass so everyone could see them as they walked or drove on busy Philadelphia Street. Renda purchased the former Gati Pharmacy building that is across the street from the world-famous Jimmy Stewart Museum.

The general manager of the stations, Mark Bertig, suggested that Renda hire my company, Lightner

Electronics, as the technical designer, system integrator and project manager of the technical facility of the project, based on the company's past facility projects in small and large markets.

We started to work with Renda's staff to select the equipment and create a budget. We quoted the design and project management part of the project, the security and card access system and the broadcast equipment. We began work in late March 2004 to manage the build-out and supply the equipment.

Local help

Renda worked with local architect Tom Harley, who designed the layout of the building. After the initial design was finished the CAD files were sent to Lightner so we could begin our design process. While the design of the offices and studios were impressive, we saw some major red flags. The first was the satellite dish. Where would we put a 3.8m dish? The site had no visibility to AMC-8. The second major challenge was the STL path. Across the street was a five-story courthouse blocking the view of the transmitter site.

To tackle the satellite dish problem, we immediately called the architect and informed him we needed one and maybe two 3.8m dishes on the roof, as well as poles to mount the STL dishes and other antennas. We provided the specifications and wind loading information on everything. We chose a Patriot Systems dish because we had installed them before and have had excellent results with them.

With the necessary information in hand, the architect consulted a structural engineer for the solution, which involved a large crane, eight cubic yards of concrete, four 35' steel beams with cross members and metal poles. It was enough to keep a welding crew



with big ideas

By Matt Lightner

busy for days. The large 35' x 15' pad had to be attached to the structure of the building to support the weight of the dish and itself.

The next challenge was the STL path that looked directly at the large courthouse across the street. The courthouse is more than two stories higher than the studio building, and it completely blocks the view of the transmitter site. Would a 950MHz STL work through the building? Possibly, but we could not afford to guess with signals for two FMs and two AMs. I needed multiple 950MHz STLs or a T-1.

The telephone company quote for monthly service on a T-1 was more than \$2,000 per month. That was out of the question, so wireless T-1s seemed like a good choice. I worked with a tower crew who had experience in cellular work, who told me that most of the cell sites are upgrading their 2.4 and 5.8GHz T-1 links to different radios or fiber for more bandwidth and to resolve interference issues. He suggested that I look for reconditioned 5.8GHz Western Multiplex Lynx radios.

While I was looking for the radios, I had the general manager of the radio station trying to find a building that we could use as a hop site. He was able to find a building only three blocks away that had a direct view to the transmitter site and studio.

I then purchased a dual 5.8GHz T-1 radio to transmit to the hop site. At the hop site I used a single 5.8GHz T1 radio and a 2.4GHz T-1 radio to transmit to the transmitter. I was not worried about interference on the 5.8GHz path from the studio to the hop site because it was only three blocks, but the transmitter site had multiple 5.8GHz antennas on the tower next to us. For this reason

The three air studios for WLCY-FM, WQMU-FM and WCCS-AM (left to right). Wheatstone or Raxxess furniture was used in each studio, depending on its typical use.

I installed the 2.4GHz radio in case there was any interference with the 5.8GHz unit. After installation I had no data errors on any of the links. The 5.8GHz path is used for program audio, and the 2.4GHz path is used for a data link to back up the Mediatouch system file server to the transmitter site.

Now that the T-1 radios were in place and working I needed a way to encode the audio into the T-1 channel. I chose the Moseley Starlink SL9003T1 configured for three stereo channels to the transmitter site using MPEG at 384kb/s. We also have an uncompressed dual mono channel to return both RPU's from the transmitter site. When the Starlink units arrived I plugged them in and within 10 seconds they locked and I had audio.

With all the problems out of the way it was time to move on with the project. While I was working on the STL and satellite dish problems, my crew installed the security system, the data cabling and the CAT5 interconnect wiring between studios. We chose shielded CAT5 cable and Krone blocks for



Production One, the main production studio, has a look and feel similar to the main air studios. It also has Wheatstone furniture because of its regular and sometimes heavy use.

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Sony MDS-E10 rackmount minidisk recorder/player
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Wheatstone mic risers with talent panels
Wheatstone Eclipse furniture



Production Two sees lighter regular use. The modular furniture will allow Renda to easily reconfigure this studio later if the need arises.

their multipurpose capabilities and resistance to RF interference. At this point most of the sources were analog, but we wanted to make sure we had the wiring in place to handle more digital sources in the future. We also worked with the electrical contractor to install all of the cable trays into the studios, and the 7KVA UPS system to back up the on-air equipment.

The rack room

Once the construction work was done on the building, it was time to build the rack room. We installed six Atlas Sound 44-space racks to house all of the equipment. The first order of business was to start loading the rack where the CAT5 cable terminated to patch bays for the office network, Mediatouch network and phone system. With the flexibility of all the patch



Like any facility, the rack room houses computers and computer network, and other equipment.

panels in one rack we can easily move any port in the building, and make it a phone jack or data jack.

Next was the audio distribution rack. The heart of this facility is the Audioarts ADR-32 router, which provides 32 stereo inputs and 32 stereo outputs, or 64 x 64 mono. The mono capability allowed us to feed mono sources and mix them to a stereo output. This is invaluable when you only need the left or right channel of a satellite receiver to feed the studios.

We connected all of the satellites, remote equipment and program outputs from the studios into the ADR's inputs. The ADR's outputs feed the studios so all of the studios could pull up any source equipment using the X-Point routing software. The other ADR outputs were connected to the audio processing chain through the LEI custom

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- accessory package for RFC-1/B



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Renda Radio

Emergency Bypass System. This allows any studio or any source to feed any of the stations. It makes life easy when you need to troubleshoot a problem with the studio. A touch of a button and you can route the Mediatouch mix output for that station directly to the transmitter.

It sounds like this puts all our eggs in one basket if the router should fail, but we compensate for this by running all the program outputs through the LEI Bypass System. If silence is detected or if audio is manually switched, the Bypass routes the program outputs of the studios directly to the audio processors bypassing the router.

The studios

As crews worked on the rack room the studios were also built. Renda wanted cherry wood trimmed furniture in the on-air and main production studios. Wheatstone was able to accommodate this request. The metal frame design of the furniture made for fast assembly. I chose Audioarts R90 consoles. I like the R90s because of their reliability and ease of use for the operator. Because the studios were completely designed in CAD, we were able to create a complete pre-wire of the consoles to Krone blocks ahead of the on-site work. We also had the cut-out templates designed for the countertops so we could cut all the



Looking down studio row while standing in the lobby. This creates a showcase of the studios for visitors.

Indecency Processor



No, this product doesn't remove naughty words, but if you do run a profanity delay or simply have a buildup of digital latency, talent can't listen to the processed air signal. Instead, their feed is probably direct from the console. Compared to the air sound, this can seem weak, dull and lifeless.

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holes for the turret, the monitor arms, microphone risers and wires in one shot. This saved a great deal of time. Out of all the gadgets in the on-air studios, the station management loves the Wheatstone cherry microphone risers, and the O.C. White black microphone arms with the gold springs.

The remaining production room and voice track studios use Raxxess studio furniture, which is modular and easily configurable. It is perfect for the smaller sit down studios.

I saw the sign

Now that all the stations are on the air, we saved the fun project for last: a 1' x 40' scrolling sign that wraps around the building. It took a little convincing to get a permit for the sign; residents thought it might cause traffic accidents. But the good news is that the sign has been ordered from Daktronics and should be installed by the end of March.

The sign will scroll local and national news, along with a scroll of what song or program is playing on each station. An LEI employee is familiar with Mediatouch and knows Visual C programming, so it shouldn't be too great of a challenge. I just can not wait to play with a 40' scrolling sign.

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What is the Facility Focus?



The Facility Focus provides an up-close look at the technology in use at the facilities featured in *Radio* magazine Facility Showcase articles. The highlighted manufacturers are leaders in the industry, and the Facility Focus allows them to showcase their products and services.

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Adobe Systems Audition 1.5

By Jim Cook

As the largest operator of radiostations in the United States, Clear Channel Radio prides itself on the quality of its programming. In addition to the reach of our own 1,200 stations, Clear Channel's Premiere Radio Network syndicates more than 100 programs to more than 7,800 radio stations total. Premiere reaches 180 million listeners a week with its network.

To enhance our content, we have a network of top producers across the country creating imaging elements, such as station IDs and promotional spots. We strive to bring out the best in our producers and spur their creativity by equipping them

with the best possible audio-editing tools and making it easy for them to share samples of their work and production tips.

Over the years, we've tried various strategies and tools for radio production. We are constantly learning new ways to

level mandates telling them what they should use. The decision depends on individual needs and preferences, market size and budget.

Because of our wide span of coverage and the size of our network of stations, Clear Channel must place the best audio editing tools it can afford across its network of stations. At the same time, we must keep a close eye on budgets like most radio operators. It's also important to be sure that the audio-editing systems are easy enough for less technical producers, yet have enough features to satisfy technically savvy users.

In 2003, Clear Channel Radio made a strategic decision to purchase several hundred copies of Adobe Audition, a software-only audio editing program, for its network of stations. As budgets have shifted in the radio industry, expensive stand-alone, proprietary hardware and software workstations have become somewhat less attractive, and many stations and networks like Clear Channel Radio have moved toward software-only solutions.

We selected this program because it is intuitive, precise and inexpensive. It has allowed Clear Channel to place digital audio multitrack workstations economically in stations where we could not afford to install them in the past. The software gives producers many of the functions and features of systems costing many times more. In some instances, it is replacing analog, tape-based systems or augmenting other combined hardware and software systems.



Performance at a glance

- Multitrack mixing
- Built-in audio effects and DSP tools
- Waveform editing
- Royalty-free music loops
- Includes audio analysis tools
- Supports VST and Direct-x plug-ins
- Integrated CD burning

make production more engaging and fun, and I believe it comes through in the quality of our broadcasts.

Cost-effective tools

Across Clear Channel, we use a mix of digital audio workstation (DAW) systems. Creative producers and imaging specialists in Clear Channel's markets are free to make their own decisions in selecting audio-editing tools—there are no national-

From basic to long-form

We use Adobe Audition for everything from song parodies to sound design. In addition to its rich feature set and relatively inexpensive price, we also like it for its compatibility with the Prophet Nexgen digital audio storage system, which is used at many Clear Channel stations. Data from Audition is entered into the Prophet system without the need for time-consuming file translation. Because we purchased the software, it has become the standard in a number of facilities for basic production and in some stations is also used for long-form programming. It is a mainstay in our smaller markets, as well as our top 10 Clear Channel stations.

Creative Director Dave Savage, for example, produces imaging elements for two Clear Channel stations in Atlanta: oldies station WLCL and news talk radio WGST. Especially for the news talk station, he is constantly on deadline. When a hot news story breaks, he must quickly obtain sound bytes from the news networks and the local news department to create other audio elements that serve as lead-ins for announcers covering the story. Audition helps him record and edit quickly. He does not have to constantly set up new sessions, which is a major time savings. Also, the

software doesn't mix down MP3 and WAV files in real-time like other DAWs. In other words, if he's creating a four-minute piece, he does not have to wait four minutes to get the completed project to the newsroom. Instead, it can be completed in a matter of seconds. This real-time processing feature is crucial for our producers, because of the deadline-driven nature of their jobs.

Steve Sykes at KSLZ in St. Louis uses the software to produce all of the station's imaging elements. He also does sound design for Premiere Radio Networks. A self-proclaimed audio geek, Sykes also takes advantage of real-time processing to speed production of promos and imaging. Because the software is intuitive, it is accessible to less technical producers, but also has the features and capabilities to satisfy technically oriented producers who use numerous real-time effects and compressors on a daily basis.

Morgan Mason, radio personality for WYYD in Roanoke and Lynchburg, VA, and imaging director for KYKS in Lufkin, TX, uses the system for everything from commercials to daily production of audio content such as jingles and station IDs. To streamline production, she recommends setting up shortcuts for common audio editing tasks such as dynamics processing and normalization. To create fun sound effects for both stations, she also matches up a variety of filters with various delay effects such as the bottom of the barrel reverb.

Sharing knowledge

In addition to providing everyone with digital-audio editing software, Clear Channel also helps producers share their work and leverage each other's knowledge. We've set up a production forum on our intranet that allows all of our producers to share ideas. Producers can post questions, ask for feedback and share knowledge with each other online.

They can also submit samples of their work such as contests, holiday promos and imaging elements to a website that other stations around the country can leverage or use to spur their own creative ideas. Called the Cook

Imaging Site, this website helps producers by making station promos and imaging materials available in stages. We provide the fully produced element, followed by a stripped-down version, and finally its parts and pieces. Producers can share the finest work by the best producers and everyone can see how it went together.

At Clear Channel, we are proud of the programming we produce and the community of top-notch producers we've been able to attract. We've made strategic purchases of key tools and made these tools available to everyone across Clear Channel Radio. And we've made it easy for producers to share their expertise and work. For Clear Channel, these strategies have resulted in higher quality programming, at a cost-effective price point. 🎤

Cook is senior vice president of creative services, Clear Channel Radio.

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Edirol R-1

By Steve Fluker

As technology advances, new inventions have made almost every part of the radio station more efficient and less expensive to operate. While the industry has seen so many improvements, one area seems to have been almost overlooked: the portable field recorder. This device is commonly used by promotions departments at concerts to get audio drops from artists, or by

the news department for recording interviews or press conferences. Many radio stations are still using portable cassette recorders because of too few economical options. Portable DAT machines are hard to find and can be a maintenance nightmare. The small Minidisc recorder is also fading fast. So where do we turn now for these machines?

There are a few high-cost devices out there, but for the average radio station that uses these recorders only on occasion, the price is an issue. One of the reasons we've been able

records via a microphone or line input. Most are set up for audio file transfers from a computer, which means they don't really record at all. There are a few models with built-in microphones, but these typically are used for low quality dictation, and are not broadcast quality audio.

I have searched for a solution for some time and have finally found one. Edirol has introduced the R-1 digital audio recorder, which is about half the cost of competing models. The recorder is a 24-bit or 16-bit WAV, or MP3 digital recorder that is loaded with some amazing features for such a small package. Measuring 3.75" W x 5" H x 1" D, the recorder operates on two AA batteries or with the included ac power adapter. The recorder comes with a 64MB Compact Flash card, and can be used straight out of the box for recording with the built-in stereo microphone. I found the quality and sensitivity of the mic to be good, but for more versatility the unit has a stereo external line input and a stereo/mono microphone input with a switch to select a dynamic or condenser mic. These are unbalanced 1/8" mini jack inputs. It is these external inputs that are absent from so many of the consumer models. Audio levels can be adjusted manually with an input level pot on the side. A display selection button on the front can select a VU input meter or can show the recording time remaining on the memory card.

No moving parts

The memory card used is a standard Compact Flash card, which is available at most stores. The cost is relatively low. On-the-shelf memory cards typically range in capacity from 32MB up to 2GB. Larger cards can be specially ordered. One big plus of using memory cards like this is that the recorder has no moving or mechanical parts like cassette, DAT, CD or MD recorders. This means no heads or optics to replace, and no parts to align. It will also be more resistant to damage from rough use or being thrown on the floor of a car.

The recorder has several recording quality settings, including seven MP3 settings from 64kb/s to 320kb/s, and a 44.1kHz WAV in 16- or 24-bits. With the included 64MB memory card set at MP3 192kb/s, the unit can record 43 minutes of audio. Larger memory cards and lower quality settings can provide 70 hours of recording time. For news gathering, I found the audio to be acceptable down to 96kb/s, but would suggest 128kb/s or higher. I was really impressed with the audio quality at and above 196kb/s.

Feature rich

The recorder has so many features that when I first turned it on, I thought it might be difficult to use, but this was not the case. Turn it on, press record, press play and it's recording. Each of the main functions—play/pause, record, stop,



Performance at a glance

- Records to Compact Flash
- MP3 and linear WAV recording modes
- Built-in EQ, reverb, effects and noise filters
- Built-in stereo microphone
- External line and mic inputs
- Operates on batteries or included ac adapter

to find inexpensive recorders in the past is because we could use consumer models, which were available in most electronics and department stores. Today, consumers have turned away from recording music from the radio and have moved to downloading MP3 files from the Internet to their new portable storage devices. There are plenty of low-cost MP3 players on the market, but it's difficult to find one that

previous and next track selection, A-B repeat and 1/2 speed playback—has its own dedicated buttons for basic usage.

Included in the audio effects menu are features such as an Easy EQ mode with 11 presets for various types of music. Customize the audio using the built-in 10-band equalizer that offers ±12dB range of control. Next is an adjustable reverb for different types of room or hall effects, followed by a set of fun voice-altering effects. This is called the voice perform mode, which provides pitch shift, a springy or a spacy effect.

The center channel cancel effect is adjustable and can be used for vocal elimination. To help improve the audio quality there is a noise reducer and a hum noise cut filter. For the musician, there is a built in tuner and tone generator selectable to different musical notes. Once the instrument is tuned, the built-in metronome can be used to stay on beat.

The track splitting mode automatically begins a new track number every time the unit detects three or more seconds of silence. Finally, there's a sleep mode that will turn off the unit at a preset interval from one to 60 minutes, or it can be defeated.

There are a few ways to retrieve the audio from the unit. First is the headphone output jack, which can be connected to a console to feed audio real time. Second, the recorder is equipped with a USB port that will interface with a PC and allow direct file transfers to the computer for editing and playback faster than real time. Of course the memory card can always be ejected and plugged into a computer card reader for file transfers as well.

In the field

I sent the unit into the field with one of our news reporters to get a true test of the equipment's abilities. As I suspected, the reporter did not get too deep into the effects built in, but had no problems figuring out how to use the recorder. It interfaces nicely with press conference multi-feed boxes and can accommodate mic or line output levels. While the feeds that we received during the test were clean, it's not uncommon for us to get hum from these audio sources. In cases where the noise is out of our control, the hum filter would be useful. After recording, the files can be transferred to a laptop computer with editing software to produce the final copy of the news story.

While the recorder performed well, the news reporter and I made some observations. First, to see the input level VU meter, the unit must be in the record mode, and then the display button must be pressed. The default display reads Record Standby. I would like to have the option to have this level meter be the default screen because the REC button lights and flashes when in the standby mode, and is lit steady when recording. Also, while actually recording

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you can't access the menu options. I can understand why some features should be locked out, but it might be nice to select the auto limiter while recording should you see a wide ranges of dynamics. The only other issue pointed out by our news reporter was that he would like to see a push button to allow track splitting on the fly while recording. During a press conference, it can be useful to split a track when different speakers talk, or when different subjects are addressed. The auto track splitting mode is fine for quiet recordings, but when you are on location, there is always enough background noise to prevent the detection of silence. The only other way to do this with the Edirol is to press the stop button, then go back into the record mode, which takes about four seconds for the cycle.

Typically, I would keep the record mode set to the MP3 mode to give more recording time, but it is nice to have the ability to record in a linear WAV mode to get an uncompromised quality recording.

These items are minor in comparison to what the device is capable of doing. Overall, I was quite impressed with the unit and am happy to see the price barrier finally broken on these Compact Flash recorders.

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



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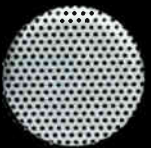
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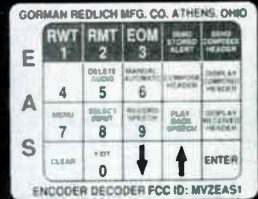
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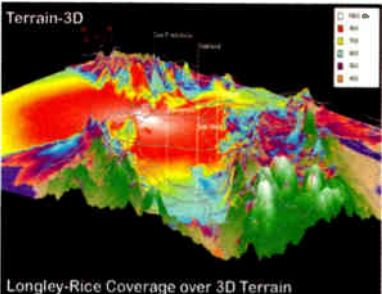
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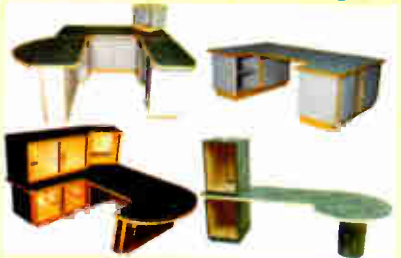
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Contributor Pro-file

Meet the professionals who write for *Radio* magazine.

This month: Trends in Technology, page 58.



Doug Irwin
Director of
Engineering
Clear Channel
Seattle

Irwin's involvement with radio began when he received his Novice Class license on his 14th birthday. By 16 he obtained his

Amateur Extra Class license and First Class Radiotelephone license. He became the director of engineering services for the Clear Channel station (KKSF, KIOI and KYLD) in 2000. In 2004 he relocated to Seattle to oversee the Clear Channel stations there.



Written by radio professionals
Written for radio professionals

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Sign Off

By Kari Taylor, associate editor



That was then



Take a look at WTIC-AM's first special events remote broadcast vehicle. The vehicle was an ordinary truck equipped with the necessary broadcast equipment. Located in Hartford, CT, this picture shows Chief Engineer J. Clayton Randall (right) and was taken sometime in the 1920s. The truck was parked in an alley next to the Hotel Bond. Lines from the hotel dining room were coupled with telephone terminals to bring listeners the music of The Emil Heimberger Trio performing inside. This was WTIC's first remote broadcast.

Source: *WTIC: Radio to remember.*

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- #2 Live Theater, Opera, Music, Dance
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Source: Media Monitors: Product Categories "Year In Review" of 2004.

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