

# Radio <sup>TM</sup>

THE RADIO TECHNOLOGY LEADER

## Because the sound matters

Points to ponder in an audio processor



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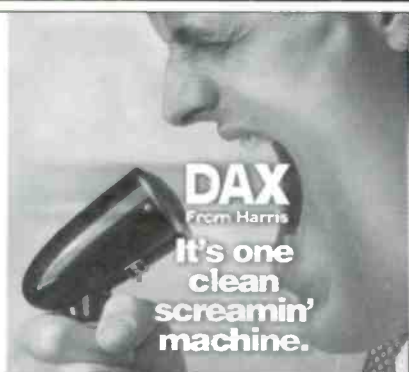
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Once configured, the system operates entirely independently of external computers. Configuration itself is intuitive and carried out onsite by means of user-friendly graphic interfaces provided by Wheatstone desktop software. We have gone to great lengths to make these setups easy for your field engineers, allowing expansions and changes to be achieved painlessly. Naturally, the Generation 9 system also takes full advantage of Wheatstone's exclusive VDIP® configuration

software as well, so that studio functions (like mutes, fader and timer starts, tallies, etc.) are easily accomplished right at your desktop. Once set-up is completed the desktop is disconnected; all settings are retained in nonvolatile storage and the entire system runs standalone. Ethernet protocol is built in, providing interface with automation, scheduling, and hardware controllers as you require.

Whether you're planning a small, centrally located studio network or a large, multiple format build-out, the Generation 9 Digital Control Surface can form the basis for a fully integrated, reliable and user-friendly broadcast system that will handle your most demanding requirements and be able to change with your varying needs as they arise.

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## Shaping radio today and tomorrow

By Heidi Hueseman



### Do you remember

In June of 1993, the FCC issued a Notice of Inquiry (NOI) into the rules regarding AM directional antenna performance and specifications. This NOI was meant to provide guidance in the new world of computer-operated systems and, in many cases, non-human supervised systems of the time.

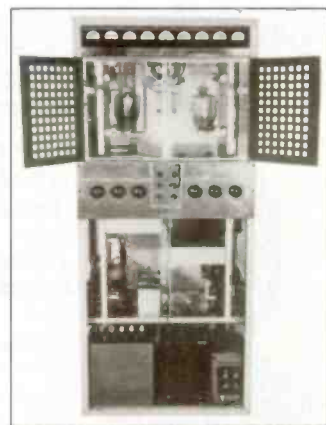
The original rules and the long-gone *Standards of Good Engineering Practice* (that are now incorporated into the FCC's rules) were products of the 1930s, and the rules concerning directional antenna systems had been written mostly in 1939. Many of the DAs designed and installed from 1939 through 1965 were located in wide-open spaces, far from towns and other developed areas. This posed a problem for engineers. This resulted in rules that worked, but failed to provide the technical guidance and regulation that was required.

Therefore, in the early 1990s, the FCC adopted sweeping changes in the AM rules. These were designed to facilitate the introduction of the extra 100kHz at the top of the broadcast band (the so-called expanded

band), and to reduce co-channel and adjacent-channel interference. The new rule changes reduced the amount of interference allowed. At the time, almost every RF engineer knew of at least one case where a directional pattern was designed to provide interference-free service, but that satisfactory operation was hard to obtain. The new NPRM was expected to seek a method of anticipating some of these problems, and also trying to find better ways of calculating directional patterns.

### That was then

In the early 1940s, Gates introduced the model 1D broadcast transmitter, which a promotional flyer touted as "a moderately priced, high-quality transmitting piece of equipment." It featured two doors near the top of the front panel that exposed practically every component in the top part of the transmitter.



The full-size door provided easy access to the back.

Frequency control for the 1D was obtained from the 25-A Frequency Control Unit, which included the oscillator and two buffer stages and power supply with provision for operating two crystals, one being connected for heating only.

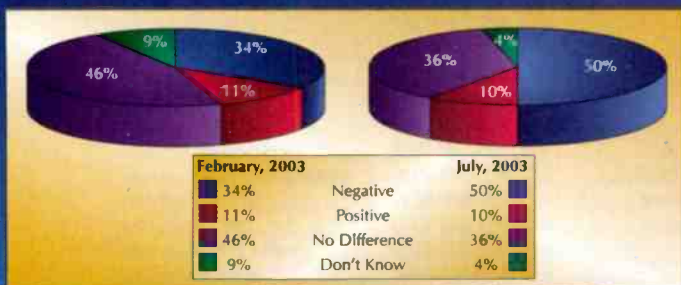
The 1D produced 1,000W, but could be reduced to 500W or 250W for nighttime operations. The transmitter consumed about 5.5kW of power and responded to frequency within 1½dB from 30Hz to 10kHz. The 1D had less than 3 percent distortion at 95 percent modulation.

It was designed to operate with a 60 to 300Ω load and "coupled into concentric or unbalanced low impedance transmission lines and into most standard antennae with external matching units."

## Sample and Hold

Report on the future of radio

What will be the likely impact of the new ownership rules on the USA?



Source: Pew Research Center, July 2003 Media Update Survey

### The oldest transmitter

Last year, *Radio* magazine asked you to help us find the oldest transmitter that was in working condition. We located a Western Electric transmitter in Sharon, PA, that was installed in 1940. That transmitter is still used as a backup transmitter today. Now we want to find the oldest transmitter in use as a main transmitter; that is, a transmitter that is used everyday. Do you have it? Send a note to [radio@primediabusiness.com](mailto:radio@primediabusiness.com) and let us know. We'll share the entries in our December issue.

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## Contributor Pro-file

Meet the professionals who write for *Radio*.  
This month: Field Report, page 30.



**Carl E. Gluck**  
VP Technical  
Research  
Salem  
Communications  
Camarillo, CA

Gluck heads Salem's Technical Research Department, which performs acquisition and allocation studies for Salem including the evaluation of potential acquisitions as well as upgrade potential among the stations Salem presently owns.

He began his career in radio in 1965 as a volunteer board operator at a noncommercial station in Sacramento, CA. Gluck joined Salem in 1991, transferring to Camarillo in 1994.

He holds a lifetime FCC First Class Radiotelephone Broadcast License, CPBE certification from the SBE and an Extra Class Amateur Radio license (KE0GP).

**Radio**  
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Written by radio professionals  
Written for radio professionals

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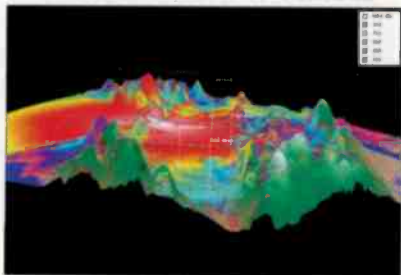
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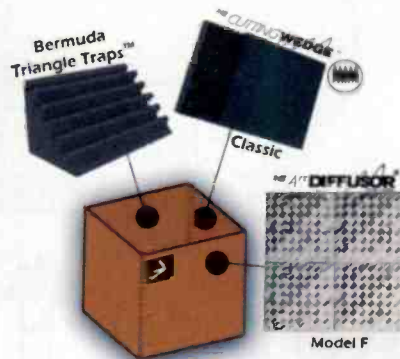
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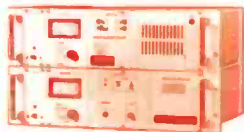


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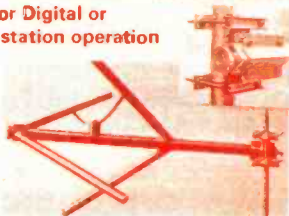
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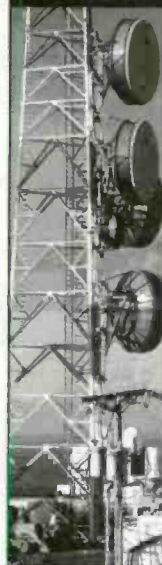
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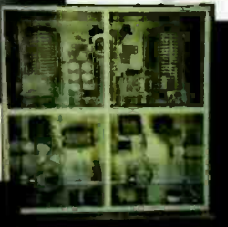
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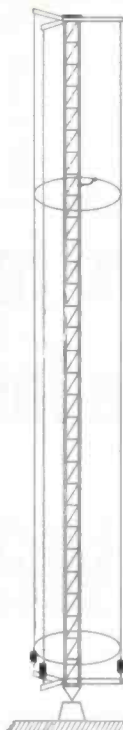
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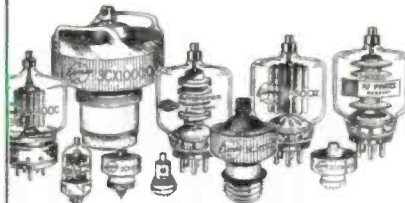
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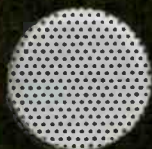
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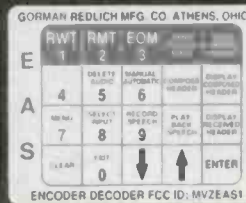
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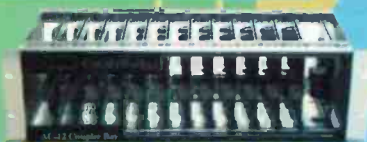
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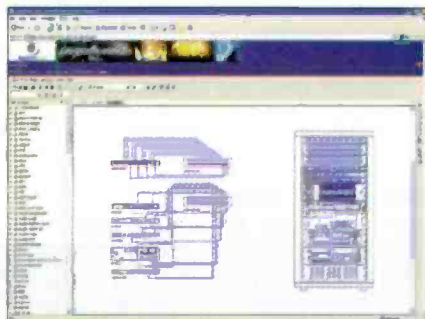
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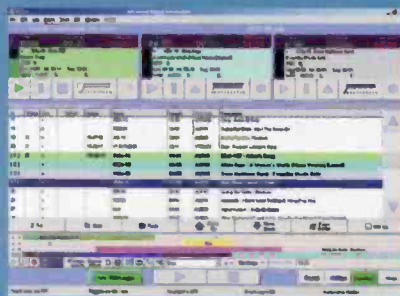


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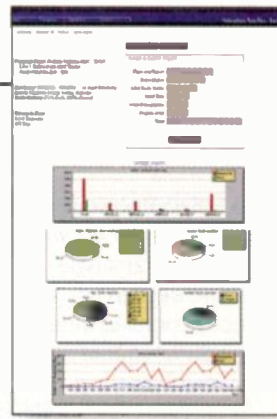
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## RBDS data manager Stratosaudio

**Web Management Reporting Software:** This software provides real-time reporting tools that give broadcasters the ability to provide data mining services to content owners, advertisers and other interested parties to study listener response and sales behavior to on-air content. SAW MRS collects and stores the real-time data feed from the Stratosaudio Broadcast Management Software (SABMS). Third-party reporting services may enlist the use of the real-time data to increase the accuracy of their offering and broaden the scope of their reporting services.

866-289-0770; fax 626-289-0405

www.stratosaudio.com; info@stratosaudio.com



## Remote transmitter Marti Electronics



**SRPT-30:** This wide-band, dual-frequency RPU transmitter can cover several VHF bands. The unit uses an RF synthesizer design that allows frequency pairs to be as much as 50MHz apart. This design allows greater flexibility in a station's RPU system and precludes the need for multiple transmitters for spread frequencies. The SRPT-30 replaces the RPT-30 remote transmitter and provides a 20W to 30W output.

817-735-8134; fax 817-735-9340

www.martielelectronics.com; sales@martielelectronics.com

## AM/FM tuner Rolls Corporation

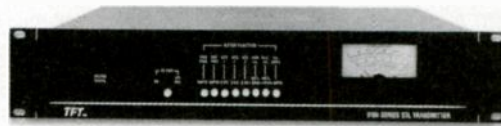


**TU78:** The TU78 features 75ohm FM and 300ohm AM antenna inputs, stereo line-level RCA outputs, a variable tuning control and an AM, FM stereo, and FM mono band select switch. An LED indicates when a station is locked, another indicates a stereo signal is present at the outputs. The unit operates on a 12Vdc power supply. The compact size makes it ideal for remotes, house PA or EAS decoder feeds.

801-263-9053; fax 801-263-9068

www.rollscorp.com; rollsrft@rollscorp.com

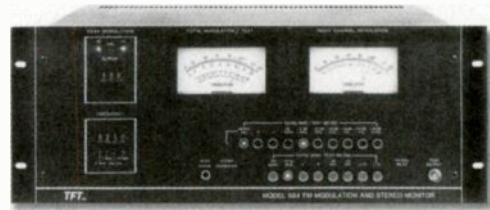
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## Upgrades and Updates

### Adobe releases replacement

Adobe Audition is multitrack recording software for Windows-based PCs. Previously named Cool Edit Pro 2.1, this product was acquired from Syntrillium Software in May 2003. Adobe Audition is available as a stand-alone product or in the new Adobe Video Collection. Registered users of Cool Edit Pro 2.x can obtain a free upgrade to Adobe Audition. Previous version register users including Cool Edit 2000 can upgrade for \$99.

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

### Burk Technology ships Lynx 4.2

Version 4.2 of the Lynx software for the GSC3000 and VRC2500 transmitter remote control systems is now available. The new version features automatic report printing and custom user privileges, along with more flexibility in how users manage multiple connection settings.

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

### Netia develops for Pocket PC

Netia has entered the wireless world by completing its range of digital Radio-Assist software with a first product for Pocket PC. The new version of Insider is called Insider Pocket PC. This intranet-based lookup program is designed to give quick access to any multimedia item in a database.

[www.netia.net](http://www.netia.net)

### Audioscience releases software

The Hardware Programming Interface (HPI) audio adapter driver software is available as source code under the General Public License (GPL) open source license. The HPI allows application developers to exploit the advanced digital processing features that Audioscience cards feature. The source code is available on the company's website under the download section.

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

### Eventide ships Reverb 2016

The sound of Eventide's SP2016 reverb has been recreated in the Reverb 2016, manufactured by Princeton Digital. The reverb features dedicated controls and menu-tree operation in a 1RU, roadworthy chassis. The unit recreates the original reverb algorithms of the Eventide SP2016-stereo room, room reverb and high density plate, as well as new enhanced versions of each algorithm.

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

### V-Soft adds ZIP Code search tool

The ZIP Code-signal look-up tool can find the signal strength of AM and FM stations at ZIP Code centers anywhere in the United States. The feature is a free V-Soft Communications' website service.

[www.v-soft.com/ZipSignal](http://www.v-soft.com/ZipSignal)

## Truthful



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## Digital audio router Z-Systems

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www.z-sys.com; z-sys@z-sys.com



## Safety system Will-Burt



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# New Products

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## USB audio/MIDI interface Tascam/Teac Professional

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also offers 16 channels of MIDI I/O for use with synthesizers and other MIDI equipment.

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www.tascam.com

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## USB audio interface Creative Labs



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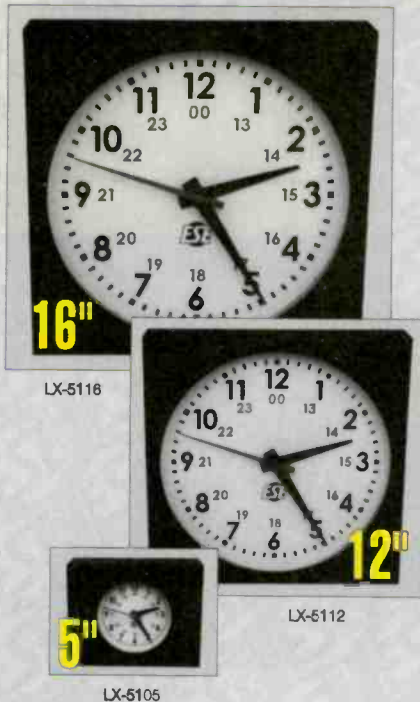


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## New Products

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### Modular audio console Sierra Automated Systems

Indigo: Built in a partnership with Ward-Beck, this analog console can be tightly integrated with SAS routers. The console can be equipped with individual router input select directly on the input module. Based on the Ward-Beck R2K series, which was first introduced in 1998, the console will be marketed in the United States exclusively through SAS and its dealer network.

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MP3-5	5	3,000 W	\$2,250
MP3-6	6	3,000 W	\$2,700

## FM Low Power Circular Polarization Antennas

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GP-2	2	3,000 W	\$1,350
GP-3	3	4,500 W	\$1,800
GP-4	4	6,000 W	\$2,500
GP-5	5	6,000 W	\$2,900
GP-6	6	8,000 W	\$3,500

## FM Medium Power Circular Polarization Antennas

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SGP-2	2	6,000 W	\$2,450
SGP-3	3	8,000 W	\$3,500
SGP-4	4	8,000 W	\$4,300
SGP-5	5	8,000 W	\$5,100
SGP-6	6	8,000 W	\$5,900
SGP-6R	6	15,000 W	\$6,500

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example, you can read a signal's frequency at the A input while writing its value into an Excel spreadsheet. This powerful system can be applied to an endless range of manufacturing, research and studio support applications.

The dScope products continue to evolve. Recently, PrismSound announced 192kHz sample rate support, and all dScope III units in the field will receive free updates. The company also introduced a multi-channel router that mates with the dScope to facilitate multichannel measurements.

The dScope Series III is a powerful audio

test and measurement system, with high performance and full automation capability, in a compact, roadworthy package. Offering a combination of analog and digital source and input capability (especially with the ability to perturb the digital output carrier and examine the results), the dScope matches the capabilities of all but the top-of-the-line competitive products.

Hall is a technology consultant in San Francisco.

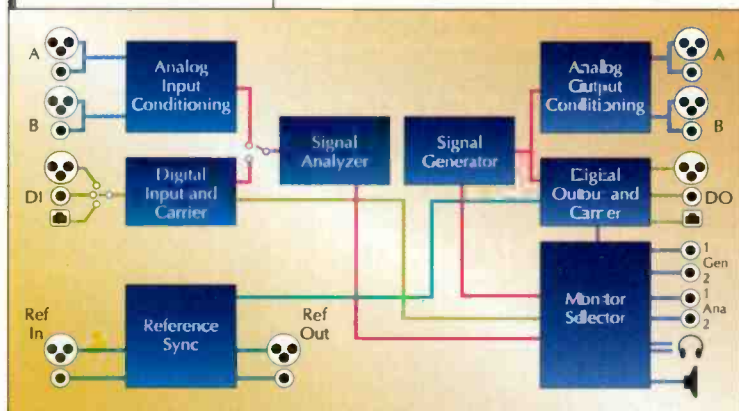
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The dScope III architecture, showing the system's overall flow.



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pattern, which indicates the basic integrity of digital audio data transmission. This display is vital to evaluate digital audio routing and distribution components. The jitter component also can be demodulated and routed to the analyzer input, showing the exact amplitude and spectrum of sample-clock jitter.

The application's full capability for signal sweeps, across amplitude and frequency, allows the user to quickly profile a device across the full-range signals. Results can be viewed graphically, printed or recorded as tabular data.

For device qualification, such as D/A converters and digital mixers that receive digital audio information, the system's digital-output controls provide for controlled degradation of the carrier signal, applying defined percentages of jitter (with various spectral characteristics), as well as differential or common-mode interference. These capabilities are essential to characterize the robustness of a digital audio component or system.

The system provides such a wealth of information that finding an optimal Windows configuration onscreen can be challenging. Fortunately, the software's multiple pages allow various panels to be distributed sensibly, with alternate views of information. Configurations of screen displays can be saved along with full system setup information.


### Scripting features


The dScope provides an entire bench of audio test equipment in a single, portable system. But the whole point of connecting a set of audio instrumentation to a computer is to hook it to a computer. This product's primary customers are manufacturers, researchers and large station and network facilities that need to measure the performance of large amounts of audio equipment, as efficiently as possible, and collect the results into reports and statistics.

The system includes a detailed scripting environment that is based on Windows Visual Basic Script (VBScript) and OLE. Every setting and reading the unit is capable of is accessible via a comprehensive set of VBScript methods and properties. Scripts can be executed by an operator or in response to any system event defined in an Event Manager window. Because most major Windows applications support the VBScript and OLE interfaces, marrying dScope to computer and network systems becomes quite simple.

Of course, with hundreds of application-specific calls available, it is easy to get mired in documentation. Luckily, dScope's Script Editing window lets you drag-and-drop individual methods and properties into a shell from a well-organized hierarchy. For

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### RADIO SYSTEMS' StudioHub+

Wiring Solution is used exclusively throughout MRN's new remote broadcast facility.

This impressive, new 53' double slide-out/double deck remote vehicle is equipped with 3 digital studios, ISDN, POTS and Data Links and multiple track-side broadcaster pick-ups. The mobile facility will begin service this May, providing live race coverage to MRN's 700+ affiliate network.

Jim Moody, Chief Engineer of MRN, selected StudioHub+ for the vehicle wiring because of its analog and digital compatibility and easy re-wiring ability.



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## PrismSound dScope Series III

By Gary S. Hall

Perhaps better known for its Dream Series of no-compromise A/D and D/A converters and Maselec high-performance analog processors, PrismSound started developing the dScope Series of test instruments a few years ago, initially for its own in-house needs. PrismSound recognized that manufacturers, researchers and studios could use a cost-effective, high-resolution audio test system with automation capabilities, and so dScope was born.

After intensive beta testing, the latest version—dScopeSeriesIII—is now ready for full release.

### Description

This test system interfaces to a Windows PC via a single USB connection. The hardware provides stereo test signals in analog and digital formats, analog and digital stereo inputs for return of the tested device, digital-reference sync input and output, and monitor outputs for its signal

audio test system.

A basic system signal flow chart is shown in Figure 1. The stereo analog generator provides parallel-output XLR and BNC connectors; the digital generator outputs are on XLR, BNC and Toslink optical ports. Analog and digital returns from the tested unit are provided in the same connection formats, while sync-reference inputs are only offered on XLR and BNC. Monitor outputs are via BNCs, and as an additional benefit for mobile applications, the system's headphone output and internal speaker offer a quick check of what the unit is doing. A front grounding post is provided. The rear panel has a reference-sync output on BNC and XLR and the USB connection to the host computer. Also on the rear is a DSNet connector to network multiple systems under a common host, with a four-wide DIP switch to set unit addresses in DSNet.

### Up and running

Because the system requires a hardware unit, PrismSound was able to forego copy protection. Simply connect the USB port on the hardware unit to a PC running Windows 98 or 2000, install the application from CD and start it. The hardware unit is immediately recognized, and the dScope workspace and toolbars appear on the screen.

On startup, the user sees an empty workspace with a set of menu selections and buttons. Most of these open tileable, non-modal dialog boxes to set I/O parameters, generator signal characteristics and display analysis results. With these, any desired test, including sweeps and measurements of AES-3 signal quality, jitter and rise/fall times can be quickly set. For example, to test a stereo A/D converter, plug the analog outs (XLR or BNC) to the ADC's input and connect a digital out (XLR, BNC or optical) to dScope's digital input. For system validation, the signal generator outputs can be looped back to analyzer inputs using internal relays or external cabling.

In the software application, open the dialogs for signal generator, digital inputs, signal analyzer and continuous time detector. This setup allows the user to control test signals, determine the digital return's integrity, and read level and noise/distortion in the converted signal. Basic audio test bench operations also can be performed.

On the next level, a user can enable the Trace window, which overlays display of the raw waveform with residual noise and distortion signals with contrasting color traces. More powerful, this offers the option of an FFT frequency analysis to view the spectrum of the raw signal or of the distortion analyzer's residual output. The residual also can be routed to audio monitoring, allowing quick analysis by ear of even the lowest-level distortion components.

Other windows provide detailed views of the AES/EBU signal with a clear indication of signal jitter and the eye



### Performance at a glance

- Small, portable design
- No hardware calibration needed
- Wide range of test functions
- Compatible with other Windows programs
- Stereo I/O

generator and analyzer functions. The dScope Series III application (currently at version 0.99) provides the system's control and read back. Without the controlling computer and software, effective audio testing cannot take place.

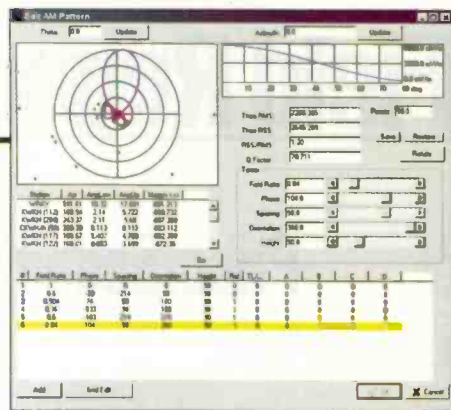
While the dScope can be rackmounted with the appropriate hardware, its approximate 12" x 9" footprint makes for a good fit with a host laptop computer, thereby creating a portable, no-compromise

stations and a table that provides direct access to the FCC database information for each station. In addition to changing the database information in your study, you can also pull up a pattern editor for any station and change its parameters to immediately see the pattern changes on the screen. The Nighttime Allocation Study modules do all of this in addition to providing skywave evaluation calculations. Once executed, the nighttime modules quickly bring up a table of all pertinent AM station database records for the U.S. and International stations. The user can select, adjust, add or delete any records to the study as desired. Both the daytime and nighttime study modules provide tables with radiation limits.

One of the best features of AM-Pro is its Nighttime Study module's pattern evaluation routine. After doing a nighttime study the user can push a button marked "pattern" and instantly pull up a circular plot with marks showing all of the protected station limits around the pattern. The marks are green if the existing pattern toward the protected station has a radiation value less than the limit, and red if the radiation exceeds the limit (the user can adjust or manipulate things like augmented pattern data and measured conductivity data).

Gluck is the vice president of technical research for Salem Communications, Camarillo, CA.

The Nighttime module's pattern evaluation routine allows users to study protected station limits.



## V-Soft

**P** 800-743-3684  
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**E** jbyers@v-soft.com

**Editor's note:** Field Reports are an exclusive Radio magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.

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

It is the responsibility of Radio magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by Radio magazine.

# The Dorrrough Loudness Monitor

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## V-Soft AM-Pro

By Carl E. Gluck, CPBE

The Technical Research Department at Salem Communications has been providing research on potential station acquisitions to the company's leadership since 1994. Although there are many software options for evaluating FM stations, there are few software packages to evaluate AM stations. AM-Pro is perhaps the newest package available, and it is proving to be one of the best.

Introduced about a year ago, AM-Pro is a broadcast coverage and allocation software tool offered by V-Soft Communications.

Evaluating an AM station's existing coverage and allocation constraints requires an understanding of FCC rules, agreements, treaties, policies and procedural exceptions. With that understanding, engineers need a powerful tool to quickly cut through the mathematics and propagation predictions. AM-Pro is such a tool.

### What it does

AM-Pro is a multifunction module that guides the user through AM station cover-

### Performance at a glance

- Performs all AM studies
- Applies M3 or R2 data as needed
- Creates atlas-style maps
- Plots ground-wave and sky-wave contours
- Performs RSS studies
- Analyzes sky-wave coverage
- User-selectable control

age and allocation evaluations for any AM station in the United States.

Like all of V-Soft's software, AM-Pro automatically integrates records out of the FCC database (actually the FCC data is crunched

into a file AM-Pro uses, which may be downloaded periodically from the V-Soft website). It also obtains data from an M3 conductivity database, the U.S. Census database and the USGS Polygon and Tiger Map databases to create accurate coverage plots and potential audience population data.

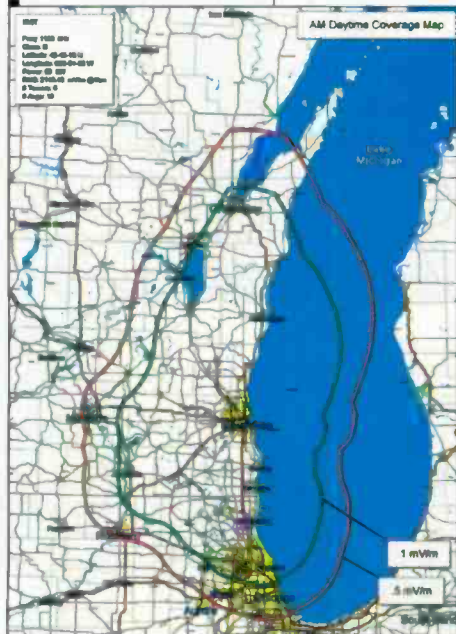
### How it works

The program begins by providing the user with five options: AM Coverage Study; AM Daytime Allocation Study; Single Station RSS Study; AM Night Allocation Study (sky-wave/RSS); and AM Night Allocation (groundwave - using daytime rules).

To create an AM station coverage map, select the station record using the software's menus. A detailed, atlas-style map pops up, showing the station's transmitter site. From there select any contour value desired (groundwave or skywave) and have it plotted on the map. A distance to contour file (.DTC file) can also be produced that may be used in other software modules. The user may literally produce a coverage map showing a daytime and a nighttime coverage contour for a particular station in less than a minute.

Unlike FM coverage plots, where you can use the same contours 24 hours a day to show coverage, AM coverage plots vary between the daytime and the nighttime hours, often dramatically. The single biggest handicap many brokers, owners and station engineers face in making a nighttime coverage map is defining nighttime interference free (NIF) contour value. It is a different value for each AM station. The FCC defines this value through a root sum square calculation that can be confusing. With AM-Pro, a Single Station RSS Study can also be done quickly. Simply pull up the nighttime record for the station under study, make sure the study defaults are set up (e.g., FCC 1992 Skywave Rules, 10 percent or 50 percent time, and whether or not you want first-adjacent stations considered), and hit OK. On my computer it takes less than 1 second to get a nice table screen full of data, including the 50 percent IFRSS NIF contour value. Because this value can vary from as little as 2mV/m or 3mV/m to as much as 40mV/m or 50mV/m, knowing the value is important before trying to predict a particular station's night coverage area. Note that accuracy depends on the user's understanding of FCC procedures and of how to properly cull out the potential interfering database records.

AM-Pro lets the user determine how a study will be done. Users can clip contours at the ocean, include every Class A regardless of distance, select the number of points per contour, automatically remove pending applications, and remove U.S. stations with a blank domestic status. The Daytime Allocation study quickly brings up a map showing co- and adjacent-channel protected/interfering



An Atlas-style coverage map with labeled contours and pop counts.

# Harris Broadcast – A Decade of Growth and Innovation

1993: DIGIT, the world's first all-digital FM exciter introduced

1994: Radio magazine begins publishing  
World's first all-digital radio RF air chain demonstrated

1995: World's first 1000 kilowatt Harris all-solid  
state MW transmitter on the air

1997: Bruce Allan named President and General Manager  
Acquisition of ITIS, Rennes, France

1998: Harris and PBS launched DTV Express  
DigitalDog debuted at NAB1998  
Inraplex Products acquired

1999: Grand Opening of Mason, Ohio Headquarters  
Acquisition of PR&E

2000: Louth Automation, acquired

2001: Hirschmann MCN, acquired  
Harris is first manufacturer to  
receive a license from iEquity  
to develop IBOC products

2002: Dexstar AM/FM HD Radio Exciter  
introduced at NAB2002

radio and television transmission systems (U.S. and European standards) and digital cable systems;

• Studio Products and Systems offering radio and television studio products including the *BMXdigital™* and *Legacy™* On-Air Digital Consoles and the recently introduced *VistaMax™* Audio Management Hub, digital audio preconditioning technology, which enables 5.1 surround sound and supplemental audio applications, digital network access solutions, a new approach to network-wide audio management, scaleable broadcast management systems for centralized operations, pre-wired systems, and custom-designed and integrated studios, facilities and networks;

• Harris Automation Solutions developing ingest-to-plaintext workflow management solutions that automate

labor-intensive processes, eliminate duplication, originate live productions outside of Master Control, and share media seamlessly throughout a media enterprise.

Each unit is backed by the best service, training and support in the industry.

## Future Forward Thinking

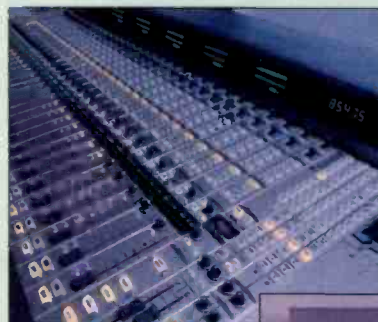
Looking forward to radio's digital future, Harris is deeply immersed in defining and developing digital broadcast technology for the 21<sup>st</sup> century. At NAB 2003, radio broadcasters got a glimpse of this

technology with the unveiling of Harris' remote control products that feature computer access capabilities from literally anywhere in the world via the Internet. If you imagined that your transmitter could talk to you via page or e-mail when problems arise, then Harris' remote control products, Re-

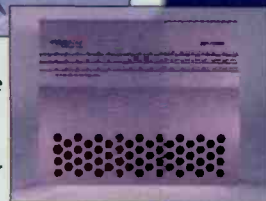
Con™ and eCDi™, have realized that vision today. And for the future, Harris engineers promise even more connectivity and synergy in the digital air



A recently installed studio at Maricopa Community College, Phoenix, Arizona.



*BMXdigital™* on-air console (above) with the *VistaMax™* (right) delivers state-of-the-art networking capabilities.



chain as IT wireless and RF merge.

This is an exciting time for all of us in the broadcast industry as we explore exciting new broadcast formats and opportunities. In many ways, we are like those early broadcast pioneers who had to literally invent the radio/television business as we re-invent this mass media, all over again. ■

# Harris Broadcast Congratulates Radio Magazine for Ten Years of Broadcast History

*After a Decade, Harris Continues to Lead the Way in Radio Broadcast Technology*

Harris Broadcast Communications, founded in 1922 as Gates Radio, has always blazed the way in developing cutting-edge broadcast technology. From its humble beginnings in a rented apartment in Quincy, IL, Harris has rapidly grown to become a global digital technology powerhouse providing products, systems and services to customers in more than 125 countries.

During its 80+ year history, Harris Broadcast Communications has introduced well over 70 major technological breakthroughs—important “firsts” including many

world standards that have literally changed the way our world sees and hears itself.

## Innovation Leader

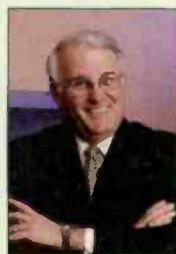
In radio alone, Harris has pioneered such inventions as the condenser microphone and remote amplifier, radio automation system, solid-state AM transmitter and MW exciter, digital FM exciter and all-digital FM air-chain, and the world's first uncompressed digital 950MHz Studio-to-Transmitter Link (STL). Harris also has developed the AM modulation standards used by virtually every transmitter manufacturer, including Pulse Duration Modulation (PDM), Polyphase PDM, Pulse Step Modulation, Digital Amplitude Modulation and Digital Adaptive Modulation.

As over-the-air radio broadcasters in the United States begin their transition from analog to the digital broadcasting – HD Radio, Harris is setting the pace with the development of core technologies that will provide a smooth, safe and cost-effective migration path. The sky is quite literally

the limit when it comes to the possibilities and opportunities that HD Radio offers with datacasting over a wider broadcast “pipeline”. Broadcasters will be able to scroll text information for songs, news, scores and weather information. A growing number of new cars offer or will offer a Global Positioning System (GPS) unit that will eventually enable broadcasters to tailor their text messages with personalized and localized information.

As radio's digital leader, Harris is the only manufacturer with solutions for all digital standards and has the largest installed base of HD Radio- and DRM-capable transmitters and DAB systems. Harris also offers an utterly flexible family of STLs and network access solutions including the Intraplex line and the world's first 950MHz uncompressed

The new 165,000 square foot corporate headquarters centralized Harris' three broadcast business units with key design and engineering resources, and features state-of-the-art laboratories for technical development, a high-power transmitter test laboratory, warehousing shipping and support services for the thousands of products that Harris distributes, and a systems assembly area for building newsgathering and production trucks and staging radio and television systems projects.



**Bruce M. Allan,**  
president and  
general  
manager, Harris  
Broadcast

During dedication ceremonies at the new headquarters, Bruce M. Allan, president and general manager of Harris' Broadcast Communications Division, noted, “The digitization of broadcasting is rapidly blurring the lines between television and radio,” Mr. Allan said. “Today's technical innovations in one area very often will have significant applications in another area. We are already seeing the benefits

of a single strategic location in terms of efficiency and operational effectiveness.”

## End-to-End Digital Solutions

Today Harris is focused on providing the most responsive end-to-end digital solutions in hardware, software, systems integration and services for the delivery, automation and management of digital audio, video and data with its three business units:

- Transmission Systems designing, engineering and manufacturing the world's #1 line of analog and digital



**The 165,000 sq. ft. Harris Broadcast Headquarters houses Harris' Advanced Digital Engineering Center.**

digital STL, a full range of PR&E consoles from full-featured yet cost-effective standalone models to full networking platforms, and complete end-to-end systems.

## Harris Opens Advanced Digital Engineering Center

A milestone mid-way through *Radio* magazine's first decade for Harris was the grand opening of the Broadcast Communications Division's new corporate headquarters and Advanced Digital Engineering Center in Deerfield Township, northeast of Cincinnati, OH, in 1999.



# The Best 10 Years of *Radio* magazine



## Time Line

### 1996

- The EIA RBDS rollout continues in markets 11 through 25 in an effort to bolster the acceptance of the technology.
- The FCC streamlines antenna registration procedures for sites that require special FAA clearance.
- Radio ownership rules are relaxed, removing the total station cap. Station facility consolidation begins to grow two years after duopoly rules are adopted.
- Telecom Act enacts that stations that are silent for 12 months forfeit their license.
- More stations look to computer-based audio storage.
- In June, the NRSC begins a series of lab tests on high-speed FM subcarriers.
- FCC tower registration rules go into effect in July.
- Stations learn how to best deal with unattended operation rules.
- The EIA DAB field tests begin in San Francisco. USADR does not participate.
- As part of the 1997 budget, the U.S. Government revenue expectations for S-band satellite radio spectrum auctions are approved.

### 1997

- The EAS rules go into full effect.
- ISDN use reaches commonplace status.
- Uncompressed digital STLs are introduced.
- The NRSC completes the laboratory phase of its FM subcarrier high-speed data tests. Field tests are scheduled for WGAR-FM, Cleveland and WKSU-FM, Kent, OH.
- The IP Multicast protocol is discussed as the next step in Internet broadcasting.
- Expanded AM band allocation plans begin.
- The FCC auctions two satellite radio licenses.
- USA Digital Radio and Lucent announce plans to work together on a single IBOC system.
- Senator John McCain introduces legislation to remove the TV/newspaper cross-ownership ban.
- The United States and Canada amend their agreement to allow an increase in power for FM translators to 250W and Class A stations to 6kW.
- FCC Chairman Reed Hundt announces plans to resign. William Kennard is appointed to the FCC in October and is named chairman in November.

### More online

See the Pick Hits from 1996 and 1997 and a gallery of past covers. Click on the 10 Year logo at [www.beradio.com](http://www.beradio.com).

Continuing our retrospective of the past 10 years of *Radio* magazine, we look at the years 1996 and 1997. Since our first issue in January 1994, the radio industry has changed in many ways. Through these installments we will recall the changes in technology, FCC rules and our industry in general. These changes have made radio what it is today, and *Radio* magazine has been there all along—and will continue to be there.

## You read it in *Radio* magazine

### Computer-based radio



In March 1996, we investigated the new role that computers were playing with audio storage, data storage and file retrieval for radio. Cart machine replacement, audio editing and paperless logs all relied on the emerging use of PCs.

"Today, the most important piece of computer-based gear—and thus the one that should be chosen most carefully—is the digital audio on-air delivery system. Especially for an on-air studio,

thoughtful consideration should be given to the interface that the DJ/operator must use."

In the September 1996 issue, we took this a step further and detailed the terms and concepts of computers to specific uses for audio; a practice that is second nature today.

"The major computer-industry issue of how to store and retrieve data faster and more reliably is being addressed in a multitude of ways today, and most of those will affect broadcasters soon."

### Advances in remote broadcasting

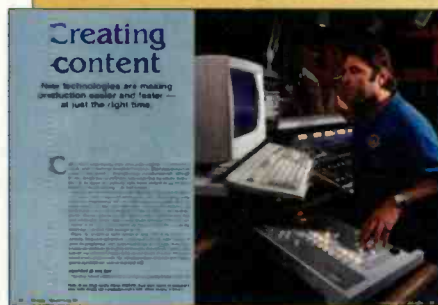
The July 1996 issue discussed the new technology behind remote broadcasts. ISDN codecs were proving their value, frequency extenders were still holding or as POTS codecs began making a mark, and RPU was feeling the squeeze of frequency congestion. We also discussed portable mixers, microphones and the importance of mix-minus.

"The maturing of Integrated Services Digital Network (ISDN) service across the country and around the world is making it the service of choice for moving audio in real-time from point to point."

"For those interested in feeding live stereo music from remote locations, invers multiplexing systems are available that can combine up to three BRI ISDN lines."



### Production productivity



Computer-based audio systems grew in popularity by January 1997, most likely due to increased processor speeds (the Pentium processor was introduced in 1993) and reduced costs for memory and hard drive space.

"DAWs are available in three basic types, defined by the computer upon which they run: the Apple Macintosh, the IBM PC or a non-standard ('proprietary' or 'dedicated') computer."

"The gravity of platform choice has grown recently as the issue of networking emerges. The days of the single, stand-alone DAW are fast receding, with the sneakernet method of audio transfer (via removable media) being replaced by local area network interconnections."



**Translantech Sound**  
**Ariane**



The Ariane Stereo Audio Leveler design premise is to control levels while preserving dynamic quality. Placed at the beginning

of a station's audio chain, this product analyzes the variation of RMS energy of the audio, and then dynamically adjusts as needed to bring the program audio to the user-specified target dynamic range. If needed, the unit will adjust levels with its multiband stereo matrix control system. The XLR I/O can then feed an all-in-one or peak processor. The four audio bands can be controlled through the front-panel trimpots. This product is distributed in the United States by Broadcasters General Store.

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

**On-air**  
*processing*

**Omnia**  
**Omnia A/X**



This software processor runs on a Windows 98, 2000, NT or XP operating system and can run on a streaming audio server simultaneously. It can be used as a processor for Windows Media, Real, MP3 and other streaming formats. Omnia A/X looks like a sound card to the host computer, so it's compatible with most applications that use the wave in/out driver interface. Using about 20 percent of the resources of a 700MHz Pentium III, multiple copies of the program can be run. Features include an adjustable wideband AGC and a three-band compressor/limiter, an HF EQ and low-pass filter and a look-ahead limiter.

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

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**IDT Impact**  
**Developpement**  
**DBP7+4 in DVP**



This processor combines IDT's FFT technology with multiband processing. It features three stages: a seven-band compressor, a four-band limiter and final limiter. The design takes advantage of both processing approaches. The unit can accept several IDT plug-ins, including a stereo enhancer, RBDS encoder and Dorrough metering. System latency is 6ms. The unit can store as many as 60 presets and includes a scheduler to change presets. The front-panel control can be supplemented with a software interface, modem interface or optional TCIP/IP interface. It includes stereo analog and digital I/O, a BNC wordclock sync in/out, a 19kHz pilot output, two subcarrier inputs and two composite outputs.

[www.idt-fr.com](http://www.idt-fr.com)

**Omnia Audio**  
**Omnia-4.5 and Omnia-3**



Both families of processors are available on AM, FM and Internet configurations and feature a 96kHz/24-bit sampling rate. The 4.5 offers stereo and bass enhancement features, a five-band limiter and a two-band AGC. The 3 has a three-band peak limiter, digital audio I/O and advanced bass management. Both series include a complement of presets and a PC card interface for software upgrades. The 4.5 can be controlled through the on-board Ethernet port. An Ethernet port is optional on the 3. The 4.5 includes a color matrix display. The 3 has a two-color display.

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

**Orban**  
**Optimod 8400HD FM**



This processor can provide two independent peak limiting chains; one for an analog FM transmission and one for any non-pre-emphasized digital transmission. It takes into account the differences in analog and digital transmission processing needs. The processor includes a stereo enhancer, two-band AGC and selectable five-band or two-band compression/limiting for analog and digital transmission paths. The analog transmission path then adds the necessary pre-emphasis and stereo generation. The digital output offers a look-ahead limiter. The digital processing chain allows users to insert a high frequency shelving equalizer before or after the look-ahead limiter.

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

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

**IDT Impact Development**  
**Digital Band Processor 4**

This four-band processor provides processing power for medium-market applications. It



includes a stereo encoder and several plug-ins. The unit features a wide-band AGC, two or four bands of compression and two or four bands of limiting. The crossover frequencies are adjustable. It operates on a 96kHz sampling rate with a 40-bit floating internal processor. The IDT Advanced Peak Control optimizes the clipping point to prevent overshoots and distortion. Various presets are available. The Compact Flash port allows the user to store and load presets. It includes analog and digital I/O. Models are available for AM, FM and Internet use.

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# On-air processing

## Orban Optimod-PC 1100



The 1100 is a PCI-card application of an Optimod processor suitable for live streaming and on-demand programming. It offers features such as two digital inputs with mixing of asynchronous sources, and sound card emulation that allows Optimod-PC to talk through the operating system to applications running on the host. Multiple cards can be installed in a single computer. The processing includes a two-band AGC, a shelving bass equalizer, a two-band parametric equalizer, a five-band compressor and a look-ahead limiter plus an internal mixer. I/O includes an analog input, two digital inputs, analog output, PCI-bus audio output and a digital audio output.

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

## TC Electronic

### DB Max

The DB Max is a level maximizer and audio enhancement processor for FM and Internet applications. It does not include a stereo generator. Features include a five-band compressor, automatic gain control, dynamic and static stereo enhancement and dynamic and static equalization. Balanced analog and balanced and unbalanced digital I/O is standard. Sample rate conversion can be invoked when using digital inputs. The DB Max can be remotely controlled via GPI, RS-485 or MIDI. Presets can be saved and loaded to PC cards. The D3Max comes loaded with 60 presets.



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

## Broadcast Warehouse

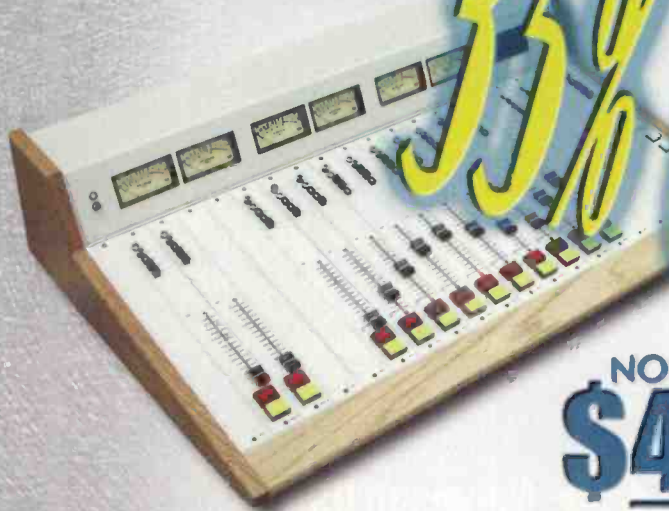
### DSP X

This 1RU multi-band digital audio processor uses an eight-bit RISC micro-controller for the analog and digital circuitry, which includes 24-bit A/D and D/A converters and a range of DSP. The unit includes an Ethernet module and code to provide a Web-based interface. Control is also available through an RS-232 port and external closures. Status is indicated on LED meters and an LCD display. The unit offers wideband AGC with gating, multiband AGC with gating, multiband limiting with defeatable look ahead limiting and a distortion-controlled over sampled clipper. Equalization and composite processing are in development for a later release.



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

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**Orban**  
**Optimod-FM 8300**



The Optimod-FM 8300 is a mid-priced processor providing many of the features of the company's 8400. Adjustments can be made with a one-knob adjustment to customize any factory preset, or with full control to completely customize the parameters. Experienced users can also use advanced control. It features a stereo enhancer, a two-band AGC, selectable two-band or five-band compression and limiting, a look-ahead limiter and a stereo generator. It includes stereo analog and digital I/O and can be controlled through a GPI interface, RS-232, Ethernet or through the external software. Settings can be saved and uploaded and scheduled.

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

**Omnia Audio**  
**Omnia-6FM,**  
**Omnia-6HDFM**



Featuring 96kHz processing and advanced DSP algorithms to eliminate intermodulation distortion, the Omnia-6FM displays settings on dual active matrix color displays. It includes a selectable, four-frequency high pass filter and phase rotator, an adjustable five-band AGC plus wideband AGC, a Space-EFX adjustable stereo enhancement algorithm, a five-band adjustable crossover network, bass management low frequency enhancement, an over-sampled six-band limiter and a 10/100baseT Ethernet port and software presets stored on PCMCIA card. Output section includes dual adjustable composite and balanced analog outputs, dual AES3 output selectable for 32kHz, 44.1kHz, 48kHz or 96kHz. Inputs include analog and AES3 synchronizing input. This processor adds a dual output for digital and analog audio chains. The look-ahead final limiter conditions audio for the bit-reduced encoders used in IBOC systems.

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


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

**IDT Impact Development**  
**Digital Virtual Processor**

The Digital Virtual Processor uses IDT's fast Fourier transform (FFT) algorithms, which eliminates the multiband processing approach. Audio is sampled at 96kHz. The unit uses a 40-bit floating processor. Version 2 of this processor updates the AGC, FFT engine and limiter. Basic control is available via the front panel. A software interface is accessible through Windows 95, 98, NT and 2000 with IE version 5.0 and above or through a serial modem. TCP/IP control is available as an option. It includes stereo analog and digital I/O, a BNC wordclock sync in/out, a 19kHz pilot output, two subcarrier inputs and two composite outputs.



[www.idt-fr.com](http://www.idt-fr.com)



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# On-air

By Chriss Scherer, editor

## processing It's all in the sound

**T**he role of an on-air processor is two-fold. From a functional standpoint, the processor provides the necessary limiting and pre-emphasis to comply with FCC modulation requirements. This important step is often an afterthought today, and subsequently the operational aspects that a processor can provide to a station in creating a sonic identity are given prime attention.

The functional characteristics, for the most part, are easy to address. If nothing else, a brick-wall limiter can ensure that a station does not overmodulate. It may not be the best sounding approach, but it works.


The operational function has become an art of its own. For some, the ability to reduce an audio signal's dynamic range to a few decibels while maintaining the perception of an open, airy sound is the holy grail of audio processing. This pursuit of the ultimate in heavy processing that sounds unprocessed has led to great advances in audio processing methods.

When analog processors were the only choice, engineers would experiment with various aspects of a device to push its

operation to the maximum limit of its ability. Changing capacitor and resistor values to vary time constants were the norm. When multiband processing became popular, many engineers formed their own secret recipes to change crossovers and other parameters.

Now that digitally controlled processors have become the leading standard, there is no need to open a device and manipulate the components. Most processors provide full access to every parameter with a menu. With this level of control there is no reason a user should not be able to find that perfect sound by navigating a menu. The added advantage is not needing a box of precision resistors or a soldering iron.

Digital control also offers repeatability. Settings can be stored and recalled at will. Favorite settings can be shared or loaded into other processors at sister stations. Many processors include daypart scheduling, so the presets can change as needed.

The state of technology in audio processing is as high as it has ever been. Whether your need is aggressive compression or an open, natural sound, finding the right settings should be easy. 

### Resource Guide

A sample of available on-air audio processors

#### Inovonics Omega\_FM



This 2RU digital processor combines a straightforward design and simple operation with a high degree of control. Despite the use of DSP, the unit introduces less than 10ms of latency to the audio signal and boots in a matter of seconds. The front panel controls do not use a menu structure, but instead rely on front-panel buttons and a series of LED bargraph meters to indicate status and levels. Twelve factory presets can be recalled and modified through the front panel or through the RS-232 interface. Connections include analog and digital audio I/O and a BNC composite output.

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

#### Aphex Model 2020 MkIII

This is the third generation of this audio processor. Housed in a 2RU chassis, the 2020 does not use multiband clipping or composite clipping. The digitally controlled analog processor maintains an analog path throughout the system. A digital input and output interface is available with an adjustable sampling rate of 32kHz to 48kHz and 20-bit resolution. 75µs and 50µs pre-emphasis settings are available. Analog audio I/O and optional digital audio I/O are available, as well as a BNC composite output. Adjustments are made through the front panel menu with multiple LED bargraph meters to indicate levels.



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



#### Harris Neustar

Created in a partnership with Neural Audio, this 1RU processor addresses the needs of processing audio for data-reduced delivery, such as IBOC and Internet radio, where traditional compression and clipping methods can introduce unwanted artifacts into the encoded audio. The modular design allows users to select the necessary processing power for each application. These modules include spectral image management, spectral image mapping, loudness management, peak management, noise reduction, hum removal, low-frequency extension and watermarking. The spectral image mapping module has the ability to mimic processing settings from existing sources.

[www.broadcast.harris.com](http://www.broadcast.harris.com)

# Focus

## The technology behind the Rock Hall

### Henry Engineering PatchBox



This Stereo Output Multiplier "splits" the output of a mixer (or any audio source) to feed peripheral equipment. In many applications, PatchBox can be used instead of a distribution amplifier or patchbay. From a

low-impedance balanced stereo audio source, PatchBox provides 11 stereo outputs. Five outputs, on XLR and TRS connectors, are balanced at professional level. Six outputs, on gold-plated RCA connectors, are unbalanced at consumer level. All 11 outputs can be used to simultaneously feed recorders, effects loops, PA systems, etc. Patchbox is passive, needs no batteries or power, and introduces absolutely no noise or distortion into the signal.

[www.henryeng.com](http://www.henryeng.com)  
626-355-3656

### Comrex Matrix



The Matrix is the heart of the Comrex Remote Broadcast System. With the Matrix, a POTS/ISDN/wireless codec, remote broad-

casters can send high-quality audio to their station from the Rock Hall or virtually anywhere. The Matrix is compatible with the full line of Comrex POTS codecs, including the BlueBox and Vector, offering up to 15kHz frequency response on a plain telephone line.

Designed for maximum versatility, the Matrix is also compatible with ISDN and GSM wireless service with optional modules. The Matrix ISDN module supports most standard protocols, plus the low-delay, 15kHz Turbo. The GSM module, coming in Fall 2003, achieves 7kHz response over an embedded GSM wireless phone and external antenna.

If your station is planning a remote from the Rock Hall, Comrex can help—please call to arrange a loaner Matrix.

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

### CBT Systems On-air Light



When mics are live in the Alan Freed Studio the CBT Systems On-air Light lets everyone know in a classic style. The feel of the Rock Hall's history is carried through to this modern warning light. The cast aluminum housing is polished to a bright finish and includes a multilayered Plexiglas lens. Standard legends include On-air, Recording, Standby, Silence and Applause. Custom legends are available. The entire unit installs onto a standard two-gang J-box or on the wall and operates on 120Vac, 24Vac/dc or 12Vac/dc. An optional flasher module with variable flash rate can also be added. It measures 14 $\frac{1}{4}$ " l x 2 $\frac{3}{8}$ " w x 4" h. The unit is UL listed.

[www.cbt-net.com](http://www.cbt-net.com)  
858-536-2927

### Sound Broadcast Services Match-IT



The Match-IT allows inexpensive source equipment to be applied to the professional installation with no compromise in sound quality. Like all sbs products it comes with

a five-year warranty.

It is just one of the sbs products of its Solutions audio range that has been engineered to provide reliable, high performance and professional answers to the interfacing and signal processing problems encountered while creating a smooth running audio system.

The audio products are just a small part of the sbs portfolio. The main product range comprises FM transmission equipment. Amplifiers, exciters, stereo encoders, limiters and automatic changeover units are just some of the types of products that are offered. Additionally there are the STL/OB high performance link transmitters and receivers operating between 48MHz and 1GHz.

[www.sbsfm.com](http://www.sbsfm.com)  
+441424445588

# Hello Cleveland!

determine pin-outs and cable lengths to produce prewired cables. This created significant time saving for the project because the engineers were able to take the cables out of the boxes, attach them and within a matter of hours have the entire facility wired and running.

Gepeco supplied 100-feet of cable, including the 5596M digital audio microphone cable; D61301EZ dual pair analog audio cable; GA61804GFC 4-pair, 22-gage, analog audio multi pair cable; and RGBSC260TS-5 conductor plenum coax.

Neutrik contributed a variety of cable connectors, phone plugs and receptacles, including its models NC3FP1B, NC3FXB, NC3MXB, NP2C and NP3C.

One of the objectives was that visiting stations or artists would never have to open a rack to accommodate a broadcast, because the studio would be populated with any type of equipment that could be needed.

The studio is in the process of creating an I/O panel that will be installed near the console to accommodate any special needs, such as an MP3 player or keyboard. There is also a wireless microphone system and a microphone outside the studio's glass wall, so the on-air teams and spectators can talk back and forth. There's also Shure



The fully-equipped studio now provides the versatility to handle any on-air need.

wireless equipment for the announcers so they can go outside the studio and walk around the museum, and they can use a wireless IFB to hear what's going on in the studio.

The new Alan Freed Radio Studio at Cleveland's Rock and Roll Hall of Fame and Museum provides a showcase facility for visiting stations that not only looks good, but provides exceptional flexibility for the needs of the various visiting stations.

*Grayson is corporate donor relations manager for the Rock and Roll Hall of Fame and Museum.*

# Facility

## AKG K240 M



The Alan Freed Radio Studio at the Rock and Roll Hall of Fame has hosted hundreds of radio personalities who have created many memorable shows. The Alan Freed Radio Studio utilizes AKG K 240 Studio headphones, the newest version of the popular professional monitoring headphone. The K 240 Studio has AKG's patented gimbal-suspended semi-open ear cups and leather headband for automatic, comfortable fit on any user's head. AKG's advanced Varimotion XXL transducer technology ensures that the sound is pure and uncolored. The K 240 Studio also has a detachable cable for easy servicing and its 55-ohm impedance makes it easy to drive from any output device. Made in Vienna, Austria, and backed by a two-year warranty, the AKG K 240 Studio will please any discriminating professional.

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

615-620-3800

## Neutrik Connectors

The Neutrik X series of three-pole male and female cable connectors is available with gold or silver contacts in a black metal or nickel housing. Ease of use is one of the main features of these connectors as assembly requires no special tools and there are no little screws to handle. The Neutrik NP\*C series of quarter-inch professional phone plugs is available in mono (TS) or stereo (TRS) and features an all-metal, no-rivet design with nickel plug finger in a black or nickel shell. The Neutrik "bug" and name on each housing ensures original Neutrik connectors, not a copy. The original makes the difference, which is why Neutrik is a leading manufacturer of audio connectors and the connector of choice on projects such as the Alan Freed Radio Studio.



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

732-901-9488



Photo by Cam Eicher, Logitek

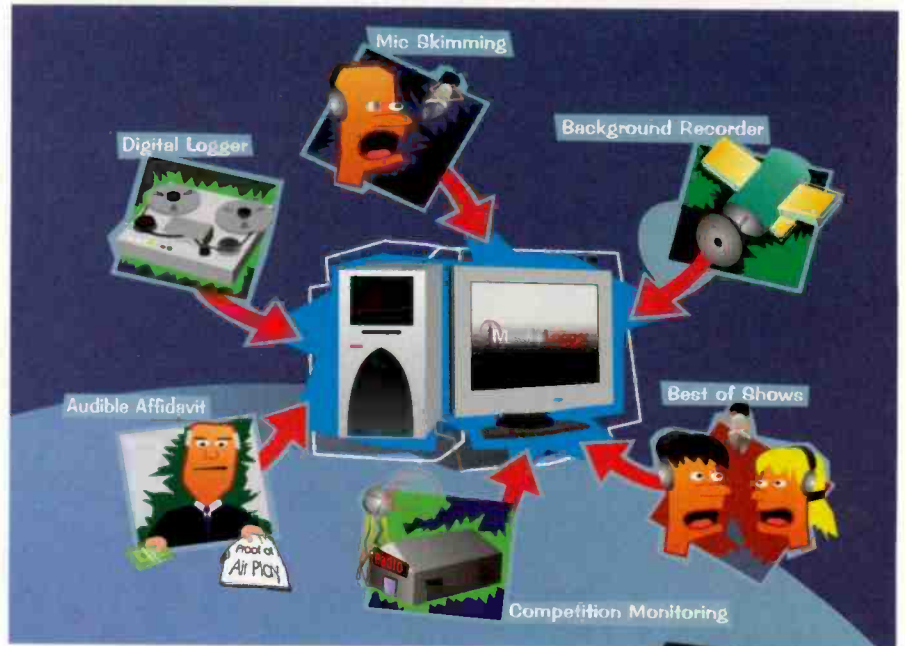
Welcome to the Alan Freed Radio Studio.

## Equipment List

Broadcasters General Store - dealer, organizer  
 AKG 240M headphones  
 Auralex Acoustic treatment  
 CBT on-air light  
 Comrex Matrix codec  
 Denon DN-C635 CD/MP3  
 Dorrough 40-A2  
 Enco Systems DADpro2  
 Eventide BD500-010  
 Gepco cable (5596M, D61801EZ, GA61804GFC, RGBSC260TS-5)  
 Hafler P3000 and P10C0  
 Henry Patchbox, Superelay  
 JBL Control 1  
 Liebert GxT2-1500RT120 UPS  
 Logitek Audio Numix  
 LPB Silent Mic Boom  
 Mackie 1604  
 Marantz PMD510 cassette  
 Middle Atlantic drawers and panels  
 Neutrik NC3FP1B, NC3FXB, NC3FXB, NP2C, and NP3C  
 Omnimount 30.0WB speaker mount  
 Radio Systems CT2002 clock, pushbutton panels  
 Rane HC6 headphone amp  
 Rane VP12 voice processor  
 RDL STPH1 phono preamp  
 SBS MatchIt interface  
 Shure SM7b mic  
 Shure U2/Beta87 wireless mic  
 Shure P7T/P7R in-ear monitors  
 SKB rack  
 Studio Technology furniture  
 Tannoy System 800  
 Tascam CD-RW2000  
 Tascam MD-301MKII  
 Technics SL1200MKII turntable  
 Telos desktop director  
 Telos Zephyr Xstream  
 Telos Twox12  
 Ward-Beck POD6B headphone amp  
 Whirlwind mic cable

exhibit, which adds value to their visit.

These are all benefits of the new studio's design, and the changes are evident from the smallest detail, starting with the furniture and layout of the room. Many stations will bring listeners or contest winners with them for a remote, and while there's no audience section in the studio, there are five guest positions opposite the console. The studio can comfortably hold 10 people.



## iMediaLogger

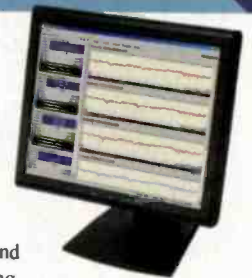
(i-mē'dē-d-ə lō'gēr) definition: The most complete, affordable, and easy-to-use automated audio recording solution available.

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To learn more about iMediaLogger, visit [www.omt.net](http://www.omt.net) or call 1-888-665-0501



# Hello Cleveland!

The original studio was built in the early 90s, which was a fairly dubious period to be buying radio equipment, because at the time digital standards were just coming to the forefront. Also, because there had never before been a Rock Hall, the original designers weren't quite sure how the radio studio was supposed to function. In one sense, it was almost as if someone had selected equipment at random from a catalog to build the room. As a result, the original studio was less than functional.

Photo by John Grayson.



Looking into the radio studio from the fifth floor landing.

## Product Showcase



### Model DAI-2 Dialup Audio Interface

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In the ensuing years, as the Rock Hall staff learned more about the hardware and the technology necessary to effectively carry out live radio programming, the radio studio evolved into its present form: a remote location capable of meeting the needs of any visiting radio station or artist.

The redesign was a cooperative effort between the technical staff at the Rock Hall and Broadcasters General Store, which specified and installed the equipment, all donated from manufacturers throughout the broadcast industry.

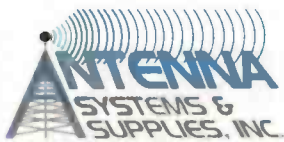
The design goals for the new studio included upgrading the technology to current-day standards; equipping the studio with appropriate recording, edit, storage and playback equipment that it didn't have in the past; and equipping it with a sufficient quantity of appropriate microphones and mixing equipment to support visiting remotes as well as impromptu live performances.

### A temporary home

Some tourist attractions will invite a radio station to broadcast live from the venue and then provide a folding table somewhere near the front door with a telephone jack.

At the Rock Hall, the goal is to put the visiting stations in an environment in which they're comfortable. What's more, the fifth-floor radio studio is also actually a working exhibit. Located behind a double-glass wall, visitors can look in, see what's going on and, on occasion, listen to the broadcasts. The Alan Freed Radio Studio is made available at no charge to visiting broadcasters from around the world that want to come to the Rock Hall and broadcast live.

Not only do visiting stations benefit from the panache of originating a distinctive remote broadcast from the Rock Hall, they also feel as though they are a part of the



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- 55G090D300: 300', 90 MPH, Guyed Tower . . . . \$11,420.00
- SSV190D090: 190' Self Supporting Tower . . . . \$13,850.00



## QUICKSET Pan & Tilts

- QPT 90: 24VDC, 435° Range, PN# 7-59005-2 . . . . . \$2489.00
- QPT 90: 12VDC, 435° Range, PN# 7-59120 . . . . . \$3160.00
- Gibraltar Tripod: 85" 94 Max Height, 200# capacity . . \$2085.00



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*Hear It*

...Processing doesn't get any-better than this.

# Hello Cleveland!

By John Grayson

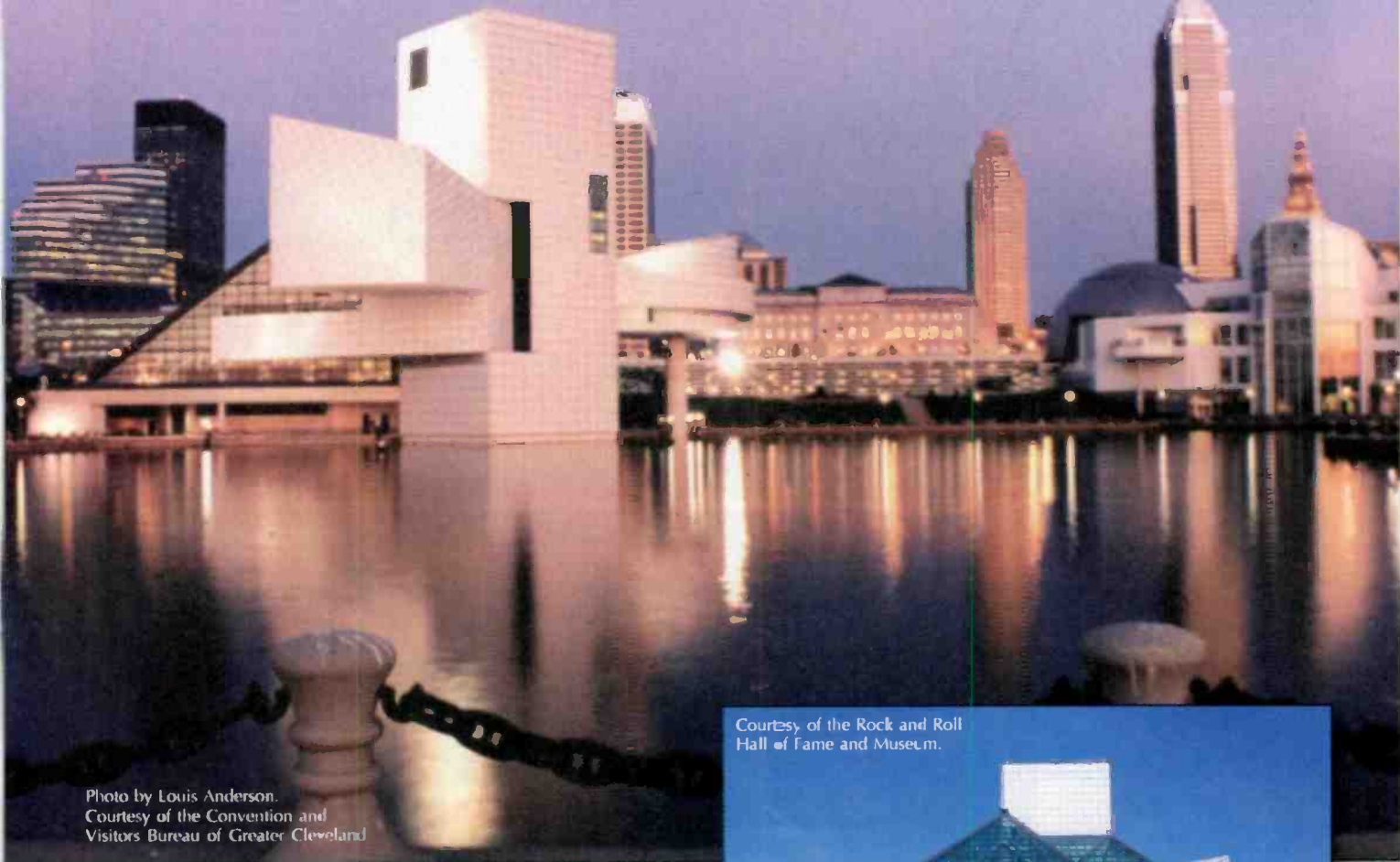
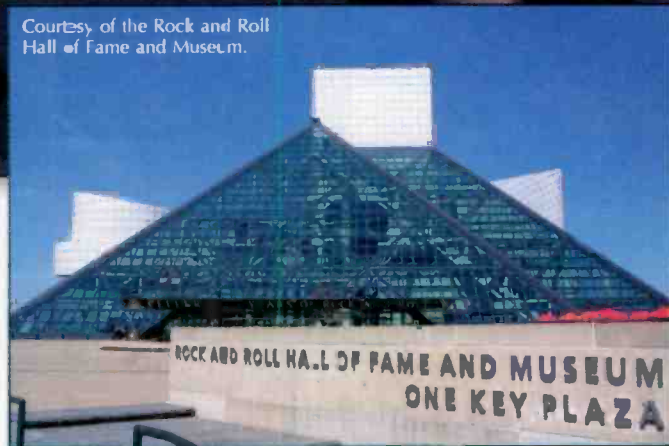


Photo by Louis Anderson.  
Courtesy of the Convention and  
Visitors Bureau of Greater Cleveland

Courtesy of the Rock and Roll  
Hall of Fame and Museum.



## The Rock Hall's redesigned radio studio allows more remote broadcast flexibility

Since opening its doors in 1995, radio stations around the world have been drawn to the Rock and Roll Hall of Fame and Museum's radio studio as a location for originating remote broadcasts. It's hard not to feel the excitement of the Rock Hall when you're physically there, but for the visiting stations, delivering that intensity to their listeners was always somewhat challenging, due in large part to the original studio's design.

That has all changed, however, with the recently completed redesign of the newly named Alan Freed Radio Studio, allowing visiting stations to broadcast while feeling a part of the Rock Hall and conveying a "you are there" experience.

Alan Freed was a pioneering disk jockey who began his notoriety in the Cleveland area. He is often credited with coining the term "rock and roll."

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The upgraded SS 2.1/TERM III & BNC III switcher/routers are improved with new front panel switches. They may be used as a desktop device, and are equipped with mounting holes for wall mount installation or may be installed on the new RA-1 "Rack-Able" 1RU mounting shelf.

The new "Rack-Able" SS 4.1 III switcher replaces the popular SS 3.1 while adding a fourth stereo input channel and front panel control. We've kept the best of the SS 3.1 features and added a few more.

The new Silence Monitor III improves on the features of the original SSM, with front-panel control, removable screw terminals, "Plug & Play" installation, built-in program switcher, restore timing delay, aural alarm and relays for most remote functions. Now rackable!

The new SS 8.1 II switcher replaces the popular 6x1 with the addition of two more stereo input channels and GPI, while keeping the price the same! The SS 8.1 II may be desktop, wall mounted or installed on the new "Rack-Able" mounting shelf.

The new RA-1 (1-RU rack shelf) provides mounting for three tri-rack or two half-rack "Rack-Able" configured products. The RA-1 is pre-drilled for flush and recessed product mounting. The RA-1 is furnished with filler panels and mounting hardware.

Look for additional  
"Rack-Able" products soon.



SS 2.1 III

SS 4.1 III

SILENCE MONITOR III



SS 8.1 II

RA-1 with FP-II Filler Panel

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## New multiple ownership rules adopted

By Harry Martin

**T**wenty months and 500,000 comments later, the FCC, by a 3-2 vote along party lines, adopted its new media ownership rules on June 2, 2003. The Commission acted in response to court decisions and biennial reviews of all such rules mandated by Congress.

The Commission modified its Local Radio Multiple Ownership rule to adopt a new method for determining the relevant "radio market" based on Arbitron's market definitions. Under the current rule, the Commission includes all stations whose city-grade signal contours overlap with the city-grade signal contours of stations that are to be commonly owned. Since 1997, parties have complained that this contour-based rule leads to anomalous results permitting one party to control most, if not all, of the stations in a local market.

The Commission will now consider a radio station to be in a particular market if it is (a) licensed to a community in the Arbitron "home" market or (b) considered "home" to the market, even if licensed to a community in some other market. The Commission will include noncommercial stations in the calculation of how many stations are in any particular market.

For those markets not rated by Arbitron, the FCC will define markets by means comparable to Arbitron markets. In the meantime, for cases involving such non-Arbitron-rated markets, the FCC will apply a modified contour overlap method. Under the modified method, the FCC will exclude from the market any radio station whose transmitter site is more than 92 kilometers (58 miles) from the perimeter of the mutual overlap area.

The Commission also eliminated the Radio-Television and the Broadcast-Newspaper Cross-Ownership Rules for markets with more than nine TV stations. In markets with between four and eight TV stations, combinations are limited to one of the following:

- A daily newspaper; one TV station; and up to half of the radio station limit for that market (*i.e.*, if the radio limit in the market

is six, the company can own no more than three) or

- A daily newspaper; and up to the radio station limit for that market; (*i.e.* no TV stations) or
- Two TV stations (if permissible under local TV ownership rule) and up to the radio station limit for that market (*i.e.* no daily newspapers).

For those markets with three or fewer TV stations, no cross-ownership is permitted among TV, radio and newspapers. The Commission will consider a waiver request if the parties can demonstrate that the TV station does not serve the area served by the proposed acquisition (*i.e.*, the radio station or the newspaper).

The Commission will permit the assignment of commonly-owned radio stations in violation of the new rules if the proposed acquiring party is a "small business," *i.e.*, one having \$6 million or less in annual revenues.

Already, efforts are being made on Capitol Hill to pass legislation that would reverse or substantially cut back on the new rules, although the new market definition is more regulatory than deregulatory—and, of course, there is also the prospect of possible judicial reversal at some point down the line, once the new rules are appealed. The new rules discriminate against mid-sized radio station consolidators, and some larger ones, who now will be prevented from reaching the same station ownership levels in local markets that their competitors already have. And the large incumbents' holdings that exceed the new rules are grandfathered.

### Reg fee post-card audits

The Commission recently completed its postcard data correction program for 2003 broadcast regulatory fees. The postcards, sent to licensees or their representatives in May through June, are designed to make sure that the FCC's records for the station are correct so that the Commission can accurately assess regulatory fees.

If the information included is correct, the licensee need not take any further action. If any item is incorrect, the licensee should send a letter with the corrections by fax to Rob Fream, FCC, Washington, DC, at 202-418-0521.

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

### Dateline:

Stations in Alaska, Florida, Hawaii, Iowa, Missouri, Oregon, the Pacific Islands, Puerto Rico, the Virgin Islands and Washington must file their biennial ownership reports by Oct. 1, 2003, and, also by Oct. 1, place their annual EEO reports in their public files and on their websites.

phone users—imagine, advertiser supported phone calls.

### A possible killer app?

The one-way nature of terrestrial digital radio broadcasting, with or without the benefit of IBOC, will create a disadvantage over other wireless services. Assuming the FCC permitted operation that would allow two-way operation on the current allocated frequencies, or perhaps opening up some additional spectrum that might permit a degree of asymmetrical two-way communication. To efficiently process the upstream, (remote-to-base) a series of receive points (cells) would need to be established within the service area of the station. The actual amount of cells would be determined by the amount of predicted traffic, similar to that of a traditional mobile network. Under this scenario, it may be possible to operate a modified IBOC audio transmission along with a higher-speed data broadcast method. IP-enabled radios would provide the receive subsystem for listening to the broadcast, as well as contain a system that provides data receive and transmit functions. The radio may also contain a video screen and perhaps a data port that could connect a laptop to the network.

This may not be the most efficient wireless two-way data network, but it would permit a unique level of connectivity and interactivity to listeners which, if used creatively, might spark a new level of listener interaction, particularly for formats that program talk, news or sports formats.

Is something like this achievable? Yes, with the right level of government and financial support. There is a good supply of smaller towers in most areas, thanks to the growth of wireless mobile services, and it probably wouldn't be difficult to deploy and build radio data networks that would serve one or more stations within a market.

These cells could serve a single station or the entire market; after all, the data will be riding on an IP-based network and routing that data to the appropriate station is a simple task. Once again, under this scenario each station would be broadcasting its unique IP address to all listeners; that IP address could automatically redirect a listener's radio to send data upstream to the appropriate station.

Having a data path from each listener to the station may also allow a station to compile real-time listener patterns, as well as determine a true number of listeners and the amount of time those listeners spend with the station.

That is one possible killer application for IBOC and FM broadcasting in general. One thing is certain—the FCC will need to make drastic changes in part 73 to support the next generation of radio broadcasting.

*McNamara is president of Applied Wireless, New Market, MD.*

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## The killer app for IBOC

By Kevin McNamara, CNE

In terms of new technologies, what could we do with a couple of hundred kilohertz of spectrum? What if we could only use that spectrum to broadcast in a single direction? Trying to imagine the killer application for a service with these limitations is challenging at best. To be fair, the term killer application may be asking too much. In my world, for an application to reach true killer status, it must fill a void, address a need and most importantly, create an environment where people can work more precisely and efficiently. The last real killer application was Supercalc, the original spreadsheet program that was ultimately replaced by the more advanced Lotus and Excel. While not an application, the evolution of the Internet globally also had a similar effect.



The long road to IBOC still has no clear future on the horizon.

With the FM implementation of IBOC, standard broadcast stations will need to deal with a number of technical problems related to making IBOC work with RF propagation issues. Let's immediately eliminate the obvious—streaming of continuous text enlightening us with the latest news, weather, sports, traffic, deer sightings, the current song, bible verses, joke of the minute, important messages and advertisements. We should have a good feel by now from radio's last killer app, RBDS, that nobody really needs or cares about this. If someone really wants this information, it is readily

available and customizable on a variety of data-enhanced pagers, cell phones, PDAs and, of course, computers. Besides, it is difficult to drive while reading textual information located somewhere in the center of your dashboard.

### We like interactivity

We have been conditioned to receive a response when we type something or press a button. Media such as the Internet, digital cable, two-way paging devices and those little wireless consoles now available at many bars and restaurants (that let us prove how smart we are by answering those trivia questions) give us the interactivity we crave.

The traditional TV broadcast networks have figured this out and now we have shows where viewers can vote for something or someone in real-time and watch the results, which of course, are not shown until after the last commercial break. Where does IBOC fit into this? The problem may not lay exclusively with IBOC. While IBOC currently doesn't permit a listener to be interactive, the real problem is that Part 73 simply doesn't allow anyone other than the licensee to use the frequencies.

### Bandwidth is essential

Whether data is traveling over the air or through a wire, the speed of data transmission has a relation to the amount of available bandwidth for a particular medium or wireless service. Creative compression techniques allow additional data to be sent within each packet, but there still will be a physical limit to the ultimate amount of data sent over a given medium. We are well aware that data transmissions over optical fiber and particularly copper mediums have limitations due to its composition and length.

Wireless services also are limited by the amount of allocated spectrum. Let's consider the FM band to which the FCC has allocated a 20MHz segment of bandwidth that is divided into 100 channels (actually 99 in areas that have a channel 6 TV allocation) about 200kHz each. Assuming a channel was dedicated exclusively to the delivery of data, what is the maximum amount of throughput that could be expected? With a well-designed compression algorithm that provides a good degree of error correction, maybe 300kHz?

Current 2.5G PCS mobile networks can deliver average data speeds (bursts) of 19.2kb/s in two directions. While this may not seem too impressive, remember that this is while the vehicle is in motion. When stationary, some carriers claim data burst speeds of up to 128kb/s are possible. Next generation 3G and 4G wireless mobile networks may achieve data throughput in excess of 2Mb/s. Who actually needs 2Mb/s data speeds while driving or walking around town? It is funny that one of the primary benefits touted for the 3 and 4G wireless mobile networks by the wireless carriers will be their ability to broadcast video advertisements to mobile

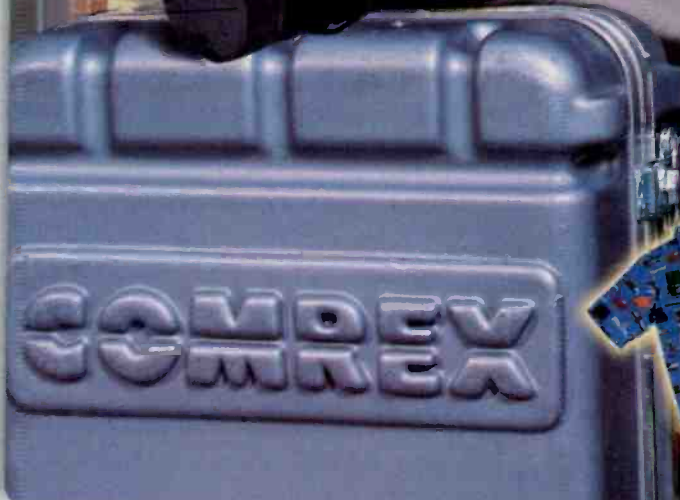
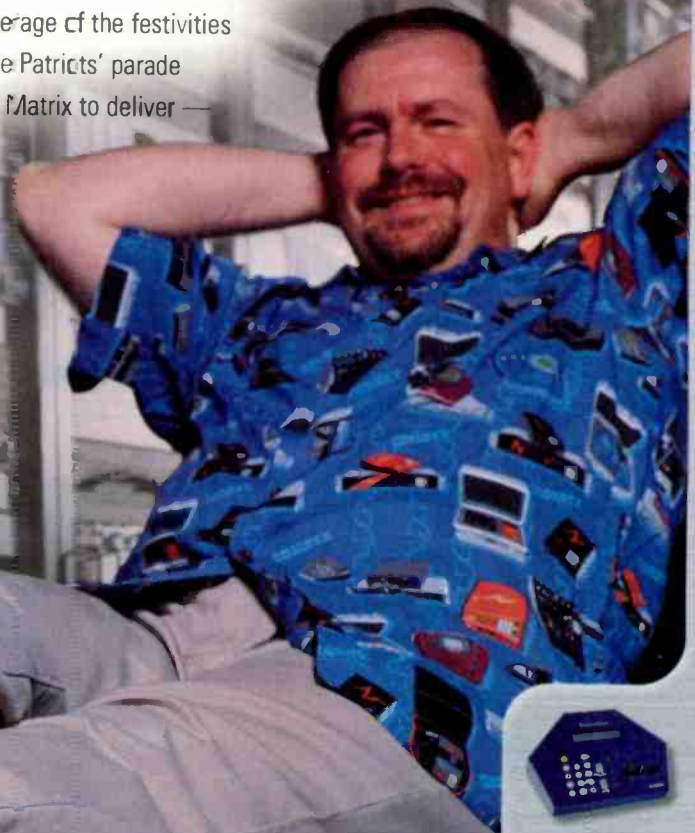
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## Uncommon knowledge

# W

Think back to Dec. 21, 2000. On that day, President Clinton signed into law an appropriations bill containing a requirement that the FCC conduct an experimental program to determine whether low-power FM (LPFM) radio stations would cause harmful interference to listeners of existing full-power FM (FPFM) radio stations or FM translator stations operating on third-adjacent channels. That's a mouthful to say, but it raised some serious issues that should have shaped the plans for former FCC Chairman William Kennard's great experiment to bring a radio voice to the masses in the form of LPFM. Obviously, Kennard didn't wait for the results. The study has finally been completed, and the results were publicly announced in mid-July.

The saga of LPFM is old news to broadcasters today, but to LPFM supporters, the struggle for a widespread LPFM service continues.

From the original bill, the program directed the FCC to select an independent group to conduct field tests in various markets. The field tests were to include an opportunity for the public to comment on interference, as well as independent audience listening tests to determine what is objectionable and harmful interference to the average radio listener. These tests were to be conducted in more than nine FM radio markets by waiving the minimum distance separations for third-adjacent channels for the stations. The goal was to evaluate whether minimum distance separations for third-adjacent channels are needed for FM translator and FPFM stations.

The MITRE Corporation was selected by the FCC to provide technical leadership and management by establishing and monitoring the experimental program. MITRE contracted Comsearch to conduct the field measurement and public comment data collection portions of the experiment. The FCC will present the data in the

final report to Congress.

So what did the report say? It took 203 pages, but the short answer is that the amount of interference that a listener may experience depends on the type of radio he uses. It took three years to determine what most broadcasters already know. The measured results indicate the receiver least susceptible to LPFM interference was the in-vehicle receiver. Next was the home receiver, followed by the clock radio. The boombox and Walkman were the worst performers. For the most part, the less expensive the receiver, the more susceptible it is to third-adjacent channel interference.

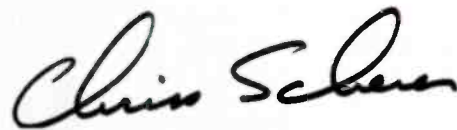
This sounds like a win for the FPFM stations, but the details of the report state that interference to the FPFM occurred when the receiver was close to the LPFM transmitter. How close? Try 50 feet.

The question remains as to what this study proves. The answer is that it really proves nothing. The third-adjacent channel protection of a full-power station from a low-power station is not really an issue. In most cases, the FPFM signal will easily overcome the potential LPFM interference.

I tried reading some of the respondent surveys to get a better understanding of what the listeners heard. I'm not convinced that these responses add anything to the study. Most of the comments describe interference from multipath, terrain and electro-magnetic sources. I don't think most of the listeners could have identified the supposed source of the interference without being prompted in some way. Some respondents reported interference even when the LPFM transmitter was not in operation.

Third-adjacent protection of FPFM stations from LPFM stations is not an issue. To be honest, second-adjacent interference is probably not much of an issue either. Who will win in the end? We all know that laws and FCC rules have nothing to do with science and hard data. In the end the loudest lobbyist will prevail.

The FCC seeks public comments on the report. Comments are due by Sept. 12.



Chris Scherer, editor  
cscherer@primediabusiness.com

Read the entire MITRE report online through the FCC website at this link:  
[http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native\\_or\\_pdf=pdf&id\\_document=6514285088](http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6514285088)

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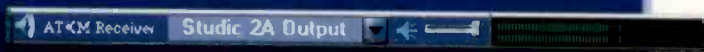
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## Currents Online

Highlights of news items from the past month

### New Address for Tieline Technology

The POTS and ISDN codec manufacturer has a new address and phone number.

### Safety Cast STA Dismissed

The FCC has dismissed the application for an AM/FM blanketing announcement system.

### Logitek Adds Grundstein to Sales Staff

Frank Grundstein has joined Logitek as the company's North American sales manager.

### Ibiquity Cuts Three Managers

Glynn Walden, Rick Martinson and Gerald Marcovsky are out.

### Orban MBL Tour Dates Announced

The mobile facility, unveiled at NAB2003, will make nearly 20 coast-to-coast stops including NAB Radio.

## Site Features

### Engineer's Notebook

Several new features have been added to our online resource, including a resistor color-code guide, a DTMF reference and a java-enabled formula conversion utility.

### 10 Years of Radio

The online companion to our series looking back on *Radio* magazine's past 10 years features a gallery of past covers and a complete list of all the Pick Hits award recipients.

### Online Classifieds

This is the place to find a new job, sell some equipment or find useful services.



### Eye on IBOC

We're tracking the transition to digital with a running list of the stations that have made the conversion to IBOC operation.

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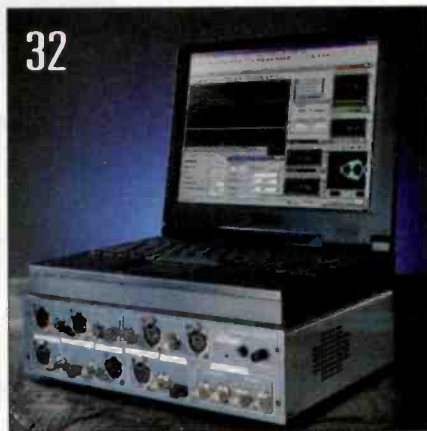
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Creating the expanded band and a classic transmitter



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