

BERadio®

December 2001
A PRIMEDIA Publication
www.beradio.com

The Radio Technology Leader

Is IBOC Sound? What the NRSC evaluated

Also:
Buy the right transmitter
Technology for the bottom line
Speedy Ethernet



#BXNDTJL *****AUTO** 3-DIGIT 161
#01532571# 0000 A 10 BER Q 140
CHARLES RING C E
MPIC/WYFH
2030 PINE HOLLOW BLVD
HERMITAGE PA 16148-2520



AUDITRONICS SERIES 2600

IT'S NEW — IT'S A BARGAIN — AND IT'S MODULAR, giving you any combination of mic, line or accessory modules. It's also INSTALLER FRIENDLY, with a hinged meterbridge that opens wide for direct access to connectors, trimmers and logic switches. Onboard cue and headphone amps keep you in budget. BEST OF ALL, you can have this AUDITRONICS tough-as-steel quality for **\$3995!**



- FULLY modular
- All electronic switching
- Separate mic & line inputs
- Eight or twelve input channels
- Two stereo Program busses
- Two Mono/Mix-minus busses
- Full-featured monitoring
- Twin VU meter pairs (PGM & switched)
- Opto-isolated control logic
- Built-in cue and headphone amps

AUDITRONICS

tel 252-638-7000/fax 252-635-4857/sales@auditronics.com

visit www.auditronics.com
Circle (101) on Free Info Card or go to www.beradio.com.

© 2001 by
C Corporation

Power Can Be Beautiful

BMX*digital*



Sure, it's the best looking broadcast console you've ever seen. But, beneath the sleek, elegant exterior beats the heart of a true warrior!

Pacific BMX*digital* has everything you need to win the digital revolution. Whether it's the number of output buses, mix-minuses, off-line mixes, stereo sends, direct IFB's, monitor inputs and outputs, inter-communication paths or logic interface, BMX*digital* offers more.

Incredible Flexibility including all input modules accommodate analog and digital signals without reconfiguring, swapping, or even removal from the mainframe.

Amazing Adaptability with easy storage, recall and reconfiguration of set-ups for various day parts, and built in connectivity to routing switchers, digital storage systems and other networked sources.

Low Cost of Ownership by design, Pacific BMX*digital's* true cost of installation, operation and maintenance is markedly lower than other consoles.

Legendary BMX Reliability is what you expect in a Pacific BMX from Harris. The table pounding of your resident shock jock won't faze this beauty.

Pacific BMX*digital*.
Beauty that's a lot more than skin deep.



next level solutions

SERVICE

SYSTEMS

AUTOMATION

TRANSMISSION

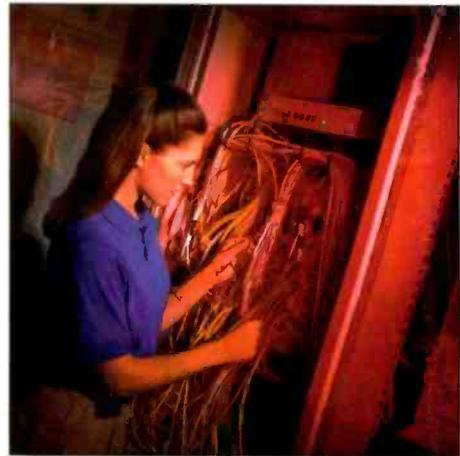
Circle (104) on Free Info Card or
go to www.beradio.com.

www.broadcast.harris.com

HARRIS

FEATURES

- 22 Testing IBOC**
by Doug Irwin
A look at the NRSC evaluation of IBOC
- 30 Trends in Technology: Transmitters**
by Hal Kneller
Solid-state or tube? This should help you decide.
- 35 Special Supplement: Classic Transmitter Sites**
by Steve Walker
Tales from the trenches
- 53 Facility Showcase: Westwood One**
by Conrad Trautmann
Directing traffic around the beltway



16

COLUMNS

- 08 Viewpoint**
by Chriss Scherer
Celebrating an anniversary
- 10 Managing Technology**
by John Caracciolo
Engineering can add to the bottom line.
- 12 RF Engineering**
by John Battison
Top loading, part 2
- 16 Networks**
by Kevin McNamara
Lightning-fast Ethernet
- 20 FCC Update**
by Harry C. Martin
FM in a class by itself
- 86 The Last Byte**
by Skip Pizzi
Industry trends and predictions



51



53

DEPARTMENTS

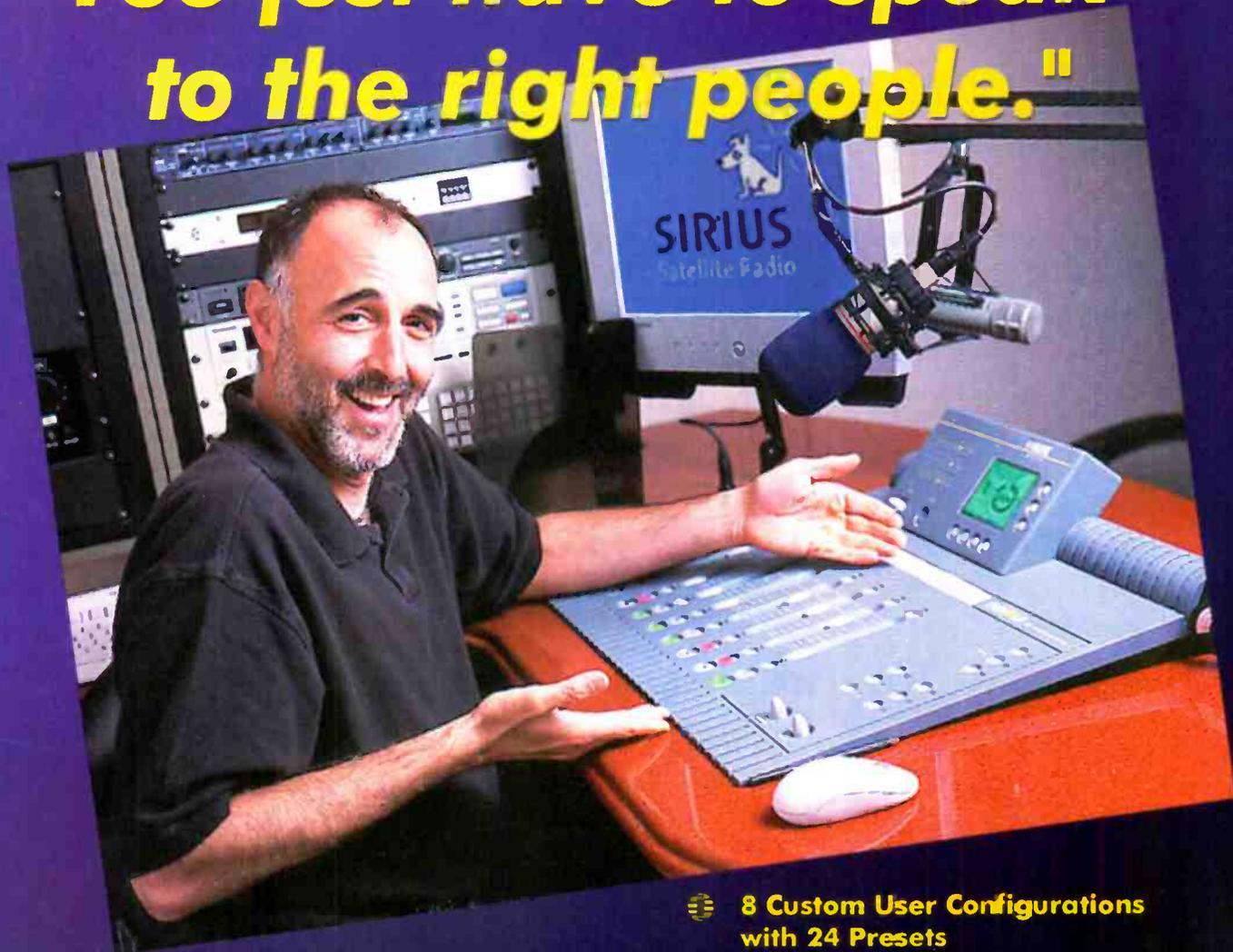
- 06 Online at www.beradio.com**
- 51 Field Report: Computer Concepts Epicenter**
by Steve Fluker
- 58 New Products**
- 83 Classifieds**



58

ON THE COVER: The process to establishing an IBOC standard for the United States continues with the NRSC evaluation. Photo by Jim Hawkins. Cover design by Michael J. Knust.

"You just have to speak to the right people."



Instant "Production to Air" Change-Over

Custom Voice Processing, Dynamics, and EQ

8 Custom User Configurations with 24 Presets

Protected, Intuitive Menu Structure

Intercom Auto-Sense I/O and Signal Loss Notification

"This board is an 11! Even though the faders only go to 10..." *Lenny Bloch, Program Manager, Sirius Satellite Radio*

KLOTZ DIGITAL's Paradigm sets the new digital audio standard for radio on-air consoles. Easily integrated into your existing control room/facility, this compact and durable 24 input console boasts more features than any other in its price range! Expandable to 48 inputs, the Paradigm digital console provides operators with a standard and intuitive control surface and offers the ultimate in flexibility and digital audio quality. That's why the most sophisticated and technologically advanced facilities throughout the world choose KLOTZ DIGITAL.

**KLOTZ**

DIGITAL

5875 Peachtree Industrial Blvd.

Bldg. 340

Norcross, GA 30092

Phone: 678-966-9900

Fax: 678-966-9903

www.klotzdigital.com



Your online source

for current radio broadcast news

Research & Tools Subscribe to BE Radio Daily Headlines



Browse Back Issues

November 2001

Site Features

Currents Online
Radio News updated daily

Currents Webcast
Listen to the headlines in a daily webcast

Weekly E-mail
Receive the headlines by e-mail

Engineer's Notebook
Tips, tricks and hints

Demo Room
Online equipment demonstrations

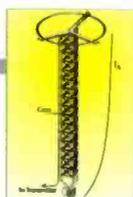
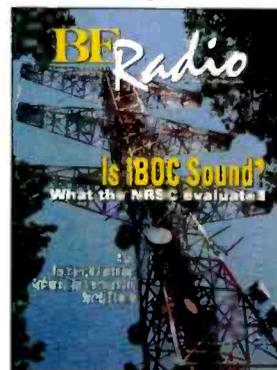
Stolen Equipment
List it here to find it faster

Contents

Currents

- [GM Produces XM-Equipped Cadillacs](#)
- [CRL/Orban Promotes Endara](#)
- [VXpocket Goes with SoundCheck](#)
- [CCI Installs Antex SC-22](#)
- [Harris Restructures Carlsbad Office](#)
- [Onan Joins Technet Systems Group](#)
- [FCC Appoints Shafran to MMB](#)
- [SBE Plans for its Future](#)
- [Sirius Names New CEO](#)
- [BSI Names Simian Beta Team](#)
- [SiteShell Transforms to Licensing](#)
- [Gentner to Become ClearOne Comm.](#)
- [RTNDA Moves to New Offices](#)
- [SAW Manufacturer Shuts Down](#)
- [Adelstein Recommended for FCC Seat](#)
- [Klotz Moves Deutsche Welle](#)
- [FCC Examines Multiple Ownership Rules](#)
- [SBE Relief Fund Disburses Funds](#)
- [Engineers Test APT Technology](#)

December in BE Radio: Testing IBOC



Currents Online Headlines Mailed Weekly

Receive the latest radio technology news and information every week via e-mail. Stay on top of what is happening in the radio industry with the Currents Online weekly headlines. Go to www.beradio.com and follow the link to subscribe.



Rhapsody in Blue.

**Digital Core
Routing System**

**Scalable Up to
4,096 Channels**

**Digital & Analog
24 Bit I/O**

**Mix Multiple
Inputs to
Any Output**

**IFB-Talk to
Remotes**

**Integrated
Intercom
Functions**

Introducing the new 32KD Digital Audio Network from Sierra Automated Systems.

This modular, digital-core routing system processes more audio, routes more signals, and provides more user control than any other system in its class.

Routing, mixing, signal processing, IFB, mix-minus, and more, run simultaneously without conflict. All this functionality is readily accessible via PC, mixing boards, or dedicated control panels. And the performance? Like music to your ears.



32KD

For more details about the impressive capabilities of the 32KD, give us a call or visit our web site.

SAS. Doing more for radio. Again.



**SIERRA
AUTOMATED
SYSTEMS**

818-840-6749
sasaudio.com

Something to celebrate

At this time of year it is customary to look back at the events of the past and look ahead to the possible future. Like most industries, radio has had its share of setbacks and successes, from a near stifling of Internet radio (thanks to the DMCA and the RIAA and AFTRA actions) to the inspiration of renewed spirit with IBOC and satellite radio. As we look to what is ahead, we need to stop and look at where this all started.

Radio today is a result of the early wireless tests of the late 19th Century. Originally intended solely as a messaging system, radio quickly gained acceptance as a means to broadcast information and entertainment to a wide

audience. The development and eventual invention of radio is the result of the work of many people, including Michael Faraday for his work in magnetism, James Clerk Maxwell for his work in electromagnetic mathematics, and Heinrich Hertz for his application of Maxwell's theories to create *Hertzian* vibrations. But when we think of one person to bestow with the title of the Father of Radio, that person is Guglielmo Marconi. This month marks a special anniversary for radio and the work of Marconi.

Marconi first began experimenting with radio wave transmissions in 1894 in Bologna, Italy. His early tests were over a range of about two miles and consisted of transmitting the Morse Code for the letter "S." In 1896 Marconi moved to London, where he filed a patent for his work. In July 1897, the Wireless Telegraph Trading Signal Company was formed, with its first factory started in 1898.

By the end of 1901, Marconi erected a transmitting station at Poldhu in Cornwall, on a peninsula in the Atlantic Ocean. His first North American receiving station was built in Cape Cod. This receiving station was damaged during a storm, and a newer station was built at Signal Hill in St. John's, Newfoundland. This is when Marconi began testing reception of signals across the Atlantic Ocean by experimenting with various antennas, all of which were suspended from kites.

The daily transmission tests were conducted from 1:00am to 3:00am and from noon to 1:00pm. Again, the Morse Code letter "S" was used for the test. The transmitter operator was John Ambrose Fleming, who, in 1904, would invent the thermionic diode tube.

A triumph came on December 12, 1901, just after 12:00pm, when the signal was received across the

distance of more than 2,000 miles. Marconi showed that radio waves could be used to cover great distances by receiving a signal transmitted across the Atlantic Ocean. Previously, most transmissions were made over short ranges of a few miles at most. This test set the path for radio to be accepted as a viable means of communication over great distances, and the event spurred a great interest in the further development of radio's capabilities.

These early radio efforts led to significant advances, including the work of such pioneers as DeForest, Sarnoff, Armstrong and others. Radio continues to grow and develop today, and while some changes are more dramatic than others, the work of radio's modern pioneers continues the spirit of innovation and ingenuity that was seen 100 years ago in radio's infancy.

Take a moment and consider how far radio has advanced from the spark-gap transmitters to the enhanced version of terrestrial, Internet and satellite radio we have today. When you celebrate the New Year, toast the innovators, like Marconi, who made our industry possible. Since technology advances on a curved scale, who knows what radio will be like in the next 100 years. Undoubtedly, it will change and adapt to serve the needs of the listeners.



Chriss Scherer

Chriss Scherer, editor
cscherer@primediabusiness.com



Matrix—

QUITE POSSIBLY THE LAST CODEC YOU'LL EVER BUY.



THE CODEC FOR THE FUTURE

Your remote equipment toolbox may already include ISDN and POTS codecs plus a slew of other stuff. Now they are talking about high speed GSM digital wireless — and coming soon...3G.

The Matrix's modular approach is designed with this future in mind. The core of the Matrix's flexibility revolves around full access to its powerful coding engine through easily inserted modules and upgradeable flash memory. Whatever may be coming down the communications pipeline, the Matrix is ready.

THE CODEC FOR TODAY

WIRELESS

- 5 kHz real-time, full duplex audio on GSM wireless phones
- Up to 10 kHz real-time, full duplex audio on HSCSD GSM
- 15 kHz real-time, full duplex audio on portable Inmarsat terminals (with optional ISDN module)
- 15 kHz nonreal-time, "Store and-Forward" feature may be used on many mobile circuits
- Optional battery kit delivers power for up to 7 hours



ISDN*

- Layer III for 15 kHz at 64 kb/s
- G.722 for wide compatibility with other codecs
- Turbo-G.722 for 15 kHz with only 6 mS of delay
- Layer III transmit with G.722 return to reduce delay
- 1200 baud ancillary data available
- Fully international terminal adapter works worldwide

* ISDN module required

POTS

- 15 kHz full-duplex audio on a standard telephone line
- Available in portable or rackmount versions
- Modular design enables use on future circuits
- Will work at data rates as low as 9600 baud
- "Store and Forward" allows 15 kHz, nonreal-time audio transmission at any data rate

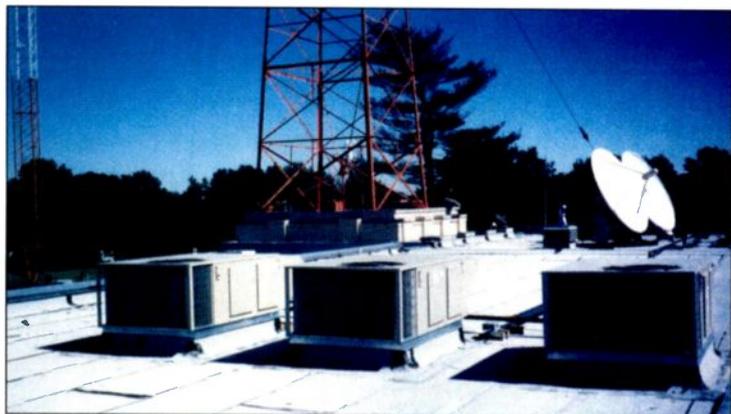


Open for business

By John Caracciolo

Since the Telecommunications act of 1996, groups all over the country started staking out dominant market shares. Multiples of 20 times cash flow was typical when pricing a station for a potential buyer. In 2000, when the buying leveled off and owners started operating their new facilities, times were good. The NASDAQ was over 4,000, consumer confidence was high and radio groups were experiencing a strong advertising market. Owners and managers were making money and servicing their debt load in a strong economy. What a difference in a year.

We don't need any more evidence that the economy is in a slowdown. The consumer price index fell 0.3% in the month of October. That is the largest one-month decline for the consumer price index in more than 15 years. Radio



Vertical real estate, particularly on the studio rooftop, can be a source of new-found revenue.

groups around the country are cutting paychecks across the board to eliminate layoffs in the continuing soft ad market. A recent survey of top companies found that a quarter of the employers surveyed had either denied or delayed salary increases, but a few had actually cut salaries or were considering such a move.

By many accounts, radio groups that will remain successful during these times will be judged by how well they adapt to the economy. A new style of thinking must be incorporated into the broadcast environment. The new way of thinking says every department must produce. Every employee must contribute to the bottom line success of the company. Typically sales, promotions, and marketing were the moneymakers, and programming and engineering were the liabilities. As a chief engineer turned GM, it is my first priority to turn the old image of the chief engineer that always spent money, into the profit center engineering department that found untraditional revenue under every

stone. There are many opportunities for the Engineering Department to make money for the company.

Every employee must work as a team to produce a large bottom line for the company. The first priority for an increased bottom-line profit, is to get every employee on the same page. Have one objective, one goal and one mission. Include every department in the planning and strategizing. Let's look at some immediate revenue the engineering department can bring to the table.

SCA rentals

The best place to solicit potential SCA customers is in the world of brokered time and foreign language radio. Start by contacting local hosts and shows that buy multiple hours on local stations. At WLIR, we took it to a different level this year. We re-invested in our own medium. We advertised the availability of our SCA on a local AM brokered time radio station. The response was overwhelming.

Other great sources for SCA rental are local high schools and colleges that do not have an FM frequency. Most schools that offer communication courses in highly populated areas are shut out when it comes to educational or commercial FM frequencies. An SCA is a wonderful opportunity for schools to have an over-the-air FM signal capable of being received on and off campus without the RF equipment costs that are associated with start up FMs.

Both of these plans can be lucrative for your station. Our SCA income will be more than \$60,000 for 2001.

Rent the roof

Tower space is at a premium. The rental income from a broadcast tower should be lucrative, but if the radio station does not own a tower, there is still a way to make money.

Our station owns the small office building in which we are based. Most new PCS, Nextel, and cell services look to install on RF friendly sites with an average AGL of 100 feet to 150 feet. Use strategically placed advertising to sell your facility to them. We placed advertising in two national trade magazines and got great results. The ads were simple classified listings, but spoke the engineers' language.

Today's broadcasting environment is full of innovation and constant change. Every department in the radio station must keep an eye on raising revenue and lowering costs. A chief engineer in today's station must have the business skill, the technical experience and the in-depth knowledge of how to win and succeed for the team.

John Caracciolo is vice president and general manager of Jarad Broadcasting Company, Garden City, NY.

CAM-1

CAM-2

CAM-3

CAM-4



PROGRAM

SAT6



AIR

Strike one, you're out.

A single bolt of lightning can throw you off the air for hours — even days.

Even if your grounding exceeds minimum requirements, you could be in for some major league problems. One New England TV station lost \$140,000 in equipment costs, plus untold amounts in revenue, from lightning damage. A midwestern FM station was tossed off the air for several weeks, costing them thousands of dollars. And lightning doesn't affect just commercial stations. Virtually every transmission tower — whether for police and fire stations, 911 call centers or telecommunications — is at risk. The only way to play it safe is to upgrade

your grounding system to 1-5 ohm resistance, as recommended by IEEE. At a fraction of what it would cost to repair and replace damaged equipment, you can get a correctly sized, properly installed copper-based grounding system. It's what these two stations did. And lightning hasn't been a problem since.

Learn how to protect your station from striking out — get our Power Quality CD-ROM and case histories today. Call CDA at 888-480-4276. Or visit us at <http://powerquality.copper.org>.



 **Copper Development Association Inc.**
260 Madison Avenue • New York, NY 10016

Circle (108) on Free Info Card or go to www.beradilo.com.

Top loading, part 2

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

Part One described the events leading to the development of top loading of broadcast AM antennas. This part continues with details of the types of top loading and discusses the use of the FCC's Rules in planning a top-loaded antenna system.

Figure 1 shows one method of driving a top-hatted quarter-wave AM antenna. The top hat is insulated from the top of the tower and connected via a small network designed to provide the proper impedance match to the end of the coaxial cable, which is insulated from the tower.

The current distribution for this construction is also shown dotted in Figure 1. The top hat is not designed to raise the impedance but to raise the horizontal field intensity and reduce the high angle radiation that comes with a shorter tower.

The top hat performs as an elevated ground system, or as a counterpoise. Maximum current occurs

at the bottom of the tower, across the base insulator, there will be an infinite impedance because the tower and the outer coaxial conductor form a quarter-wave stub with a short circuit at its upper end. The transmission line is insulated from the tower and connected to it where the top hat is mounted. No current flows on the outer coaxial conductor.

I have rarely heard of this type of antenna system being used commercially. The high voltage at the base is probably

a deterrent for broadcasters. Consulting engineer Tim Cutforth, P.E., has done much work on elevated ground systems and other exotic antennas. This inverted antenna was included to illustrate the many uses of a quarter-wave stub in antenna work and as another method of top loading.

Loading inductances placed in the vertical radiator are a natural consideration. There are three possible locations for such additional lumped inductance: at the base, in the center and at the top. Most readers have either experimented as hams, or seen such devices on a ham's automobiles. While these loading coils work well for the amateur, they do not fit easily into a large broadcast tower.

A base lumped inductance requires special mounting methods, either across the base insulator or inserted into the tower. The center coil requires an insulated break in the center. The top mount is easiest but still requires some engineering to do it satisfactorily. In all cases, the coil must be large and is subject to possible weather damage.

Only the top-mounted coil would give much improvement. Effective radiation requires high current through as much of the radiator as possible. In this case, the current would pass through all of the tower below the coil. Center loading provides the highest current in the lower portion of the tower, which would result in the least effective radiation.

Make a difference

For effective straight top loading use the top portions of the guy wires as the loading device. It is simple, inexpensive and usually very successful. If necessary, a folded unipole can be used in addition.

Figure 2 shows a typical top-loaded tower. Adding the length needed to make the overall length a quarter-wave seems to work well. The temptation to make the guy radiators too long can be strong. If the loading wires go down too far, they will shield the vertical radiator and reduce efficiency. A ring wire should go around

the lower ends of the loading guys, joining them together. It is essential to ensure that all guy top ends are cleanly and securely connected to the top of the tower and that the ring wire is similarly well connected to the lower ends. Figure 3 shows a variation on top loading.

It has been my experience that the Commission will accept an application specifying a top-guy loaded antenna with dimensions that are reasonable and specifying a radiation figure that meets the applicable Rule.

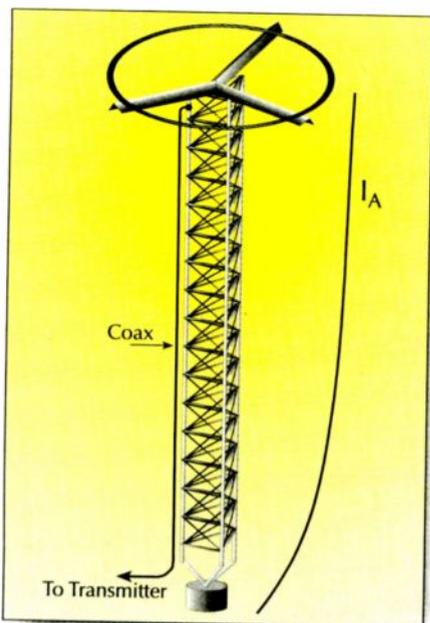


Figure 1. An inverted feed for top-hat loading. The current in the top does not contribute much to vertical radiation.

at the top of the tower not at the overall height point. Current in the top hat flows radially and does not contribute to the total radiation from the antenna. The additional height of the top hat does not act as part of the radiator.

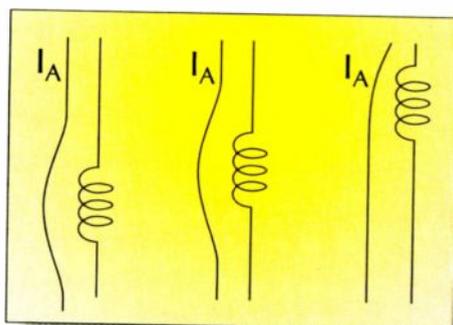


Figure 2. Various inductive loading positions. The location of the loading inductance controls the antenna current position.

Which Transmitter Control System is Right for You?

- Front Panel Display
- Site-to-Site Control
- 16 - 64 Channels
- Studio Control with Flexible Communications

- 85 Sites
- 8 - 256 Channels / Site
- Built-in Macros

- Single Site Solution
- 16 Channels
- Built-in Macros

ARC-16



GSC3000



VRC2500



Burk is proud to add the GSC3000 & VRC2500 to our product line, giving you more choices with our continued high level of support.

BURK
TECHNOLOGY

Phone: 1-800-255-8C90

Email: sales@burk.ccm

www.burk.com

Circle (109) on Free Info Card or go to www.beradio.com



Register Data Systems

800-521-5222

www.registerdata.com

Traffic & Billing Software Systems

Reliable

Dependable

Stable format

Affordable for any station

Software you can own

Maximum Efficiency

Maximum Productivity

Maximum Service

Circle (110) on Free Info Card or go to www.beradio.com

World Class FM transmitters

We at Armstrong constantly strive to bring you the best RF products, the best 24/7 support and the best prices ...because you deserve nothing less!

In our "T" series, we combined the best of both worlds: Stability and simplicity of grounded-grid PA design with the high efficiency of a tetrode. The result is a state-of-the-art FM transmitter line with world-class performance.

"T" Series with the *grounded-grid tetrode*. Available *only* from Armstrong at 20, 25 and 30kW power levels.



Marcellus, NY Tel 315-673-1269 Fax 315-673-9972
e-mail: sales@armstrongtx.com



Circle (111) on Free Info Card or go to www.beradio.com

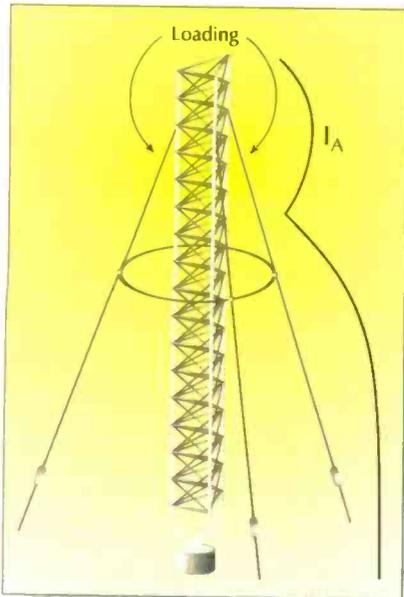


Figure 3. Top loading can also be accomplished by using the upper portion of the guy wires. Notice the effect on the antenna current.

The objective of top loading is to increase the antenna's electrical length to as close as possible a minimum of 90°. How it is done depends on the engineer and the desired effect. A combination of top-guy loading and use of a folded unipole antenna may present the best choice. This combination should give greater ease of adjustment, a desirable base operating resistance, lower Q, a grounded tower and a broader bandwidth. Many stations prefer using folded unipole antennas to using only top-guy loading.

I feel that the folded unipole is a form of top loading because it produces the similar effect of increased operating resistance and usually improves bandwidth.

For many years, the FCC's Rules had no formal provision in Form 301 for the use of top loading, and applications were accepted based on consulting engineer experience and engineering showing. Today's Form 301 provides

spaces for loading and sectional antenna data and simplifies the application.

Frequently, when issued, the CP contained provisions for proof of performance measurements to be conducted on non-directional stations after construction to show that the required efficiency was obtained. This requirement was not confined to rooftop stations, but also applied to stations built on *terra firma* whose antenna systems might not meet the Commission's efficiency figures.

The Commission's Rules in Section 73.160 provide a guide to calculations for the vertical radiation characteristics involving the use of top-loaded and sectionalized towers. However, these calculations are not necessary if the station is non-directional and a daytimer. This value is referred to as $f(\theta)$ where θ is the vertical angle of radiation. In a daytimer, unless it has to observe critical hour protection, only ground level radiation (horizontal) is used in the application.

Non-DA and daytime stations are not concerned with vertical plane radiation and use only the horizontal radiation at ground level $f(0)$. However, $f(\theta)$ enters into most directional antenna studies. Section (b)(2) of 73.160 provides the equation for calculating $f(\theta)$ if any reader needs it.

When filing an application specifying any type of antenna, other than a standard vertical of sufficient height to meet the radiation Rules, the Commission will require sufficient engineering data to convince them that the proposed antenna will meet their standards.

E-mail John at batcom@bright.net.

We've changed light bulbs so you don't have to.



LED Based Dual High Intensity System including LEDGuard L-864 LED Based Beacon

By using LED technology Honeywell has created a system that will change the way people see obstruction lighting. It's the only LED system that has been approved by the FAA, it uses 90% less energy than comparable incandescent systems, and is guaranteed to last for at least 5 years. So you save time and money. Isn't it time you changed your obstruction light bulbs? For more information, call 1-805-581-5591.



Honeywell

THE UNLIMITED PARTNERSHIP

www.oblighting.com

Circle (112) on Free Info Card or go to www.beradio.com

Encore!

The Telos Zephyr is one tough act to follow. It revolutionized point-to-point audio by combining ISDN with MPEG coding, and quickly became the #1 selling codec worldwide — perhaps the most successful digital broadcast product ever. So what will we do for an encore?

Presenting Zephyr Xstream, with innovations like AAC (Advanced Audio Coding) for superior fidelity, a special low-delay mode, and an Ethernet port for IP audio streaming, remote control and easy software updates. There's also a rugged portable version with full-featured digital mixing.

And of course Zephyr Xstream includes everything else you'd expect from a Zephyr, like Layer-II and Layer-III coding, SDN connectivity, a simple, friendly user interface, and bulletproof reliability.

Zephyr Xstream. Sometimes the sequel is even better than the original.

Telos
www.zephyr.com



Gigabit Ethernet

By Kevin McNamara, CNE

In 1998, the IEEE adopted the standard defining one Gigabit (1Gb) Ethernet over fiber optic cabling. In June of 1999, the standard defining 1 Gigabit Ethernet, or 1000BaseT, over copper pairs was ratified.

The Gigabit Ethernet standard for operation over CAT-5 cabling, also known as IEEE 802.3ab, provides a seamless upgrade path from earlier versions of copper-based Ethernet. It supports such features as full and half duplex operations, the 802.3 Ethernet frame format and the CSMA/CD access method. The specification adopted for Gigabit Ethernet over fiber cabling is called 802.3z or 1000BaseX.

How is it possible to get the Gigabit rate over CAT-5 cabling? You may recall that 100BaseT Ethernet achieved higher throughput by using three-level binary encoded

symbols sent at a rate of 125Mbaud across the cable. In addition, signals used separate pairs for transmit and receive, permitting full-duplex transmission capabilities. Gigabit Ethernet was developed as an extension to 100BaseT and uses the same 125Mbaud symbol rate; however, it uses five-level binary symbols operating over all four pairs of cabling. Each pair is also capable of transmitting and receiving simultaneously.

Network equipment supporting 1 Gigabit Ethernet, copper and fiber, is becoming available off the shelf. Fortunately, the network equipment designed to handle Gigabit Ethernet will also support earlier standards, such as 100BaseT and 10BaseT, so for a few extra dollars it is a wise investment to begin purchasing network hardware that will support the new standard, even if there are no current plans to upgrade the network infrastructure. Such an upgrade may make sense for several additional reasons.

- Higher-speed/more efficient networks can be built using existing cabling.
- There is no need for additional training of technical staff.
- Minimal disruption to the existing network is required.
- Copper cabling is the lowest cost method to deliver Gigabit Ethernet.

Why upgrade?

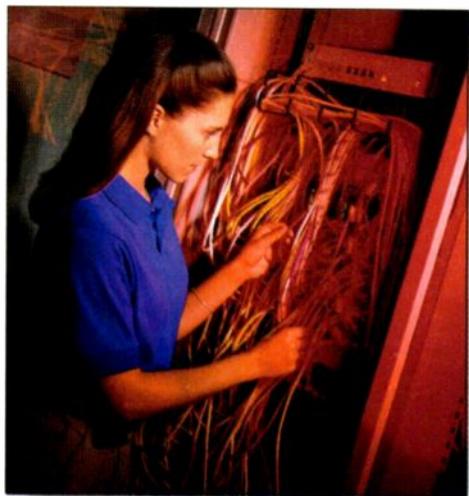
The answer to this question depends on the needs and objectives of the organization. The underlying theory is that the primary backbone provides a large pipeline to which data flows to/from one location to another. The size of this pipeline must be large enough to allow the unrestricted flow of data from the maximum amount of simultaneous users. In the classic client-server computing model, the network provided an efficient means to transfer files, share resources and access the Internet, but the actual processing of information took place on the desktop. Trends such as real-time multimedia content, storage area networking and remote application servers are placing demands on networks. In that same client-server model, workstations are connected to hubs, which are, in turn, connected to other hubs (or switches), etc. At some point, all of the data from these points will appear on the network backbone. Maintaining the proper bandwidth of this backbone and other portions of the network infrastructure is necessary for efficient operation. Gigabit Ethernet provides a means to increase the overall data throughput capabilities of a network at minimal cost.

Whether you plan to upgrade to Gigabit Ethernet now or in the future, there are some issues of which to be aware.

Cabling

One of the best features of the Gigabit Ethernet standard is that it will operate over existing CAT-5 cabling, assuming that the cabling and installation practices meet or exceed the standard defined in TIA/EIA-568A. In practice, this shouldn't be a problem if the cabling was installed within the past six years and tested in accordance with 568A, adopted in 1995. Most cabling systems, currently operating properly at the 100BaseT rate should pass Gigabit Ethernet; however, the higher demands placed on the cabling operating at the gigabit rate may show problems that were passable at 100BaseT. Each existing cable span should be tested using a cable analyzer suitable to certify operation for the new Gigabit standard. In particular, each cable span should be tested for return loss and *Equal Level Far End Crosstalk (ELFEXT)* (see September 2001 Networks) based on the 1000BaseT specification. Most current cable analysis tools can be upgraded to conform to the latest specifications through a software download or by purchasing a hardware module.

If plans call for the installation of new cabling, consider using the new generation of cable that conforms to the new CAT-5e specification. The specification for CAT-5e



Gigabit Ethernet offers a bigger pipe for data distribution.

"The best choice"

Ron and Beth Fruit of WRCO wrote us a letter about BSI's digital automation

October 9, 2001

Dear BSI,

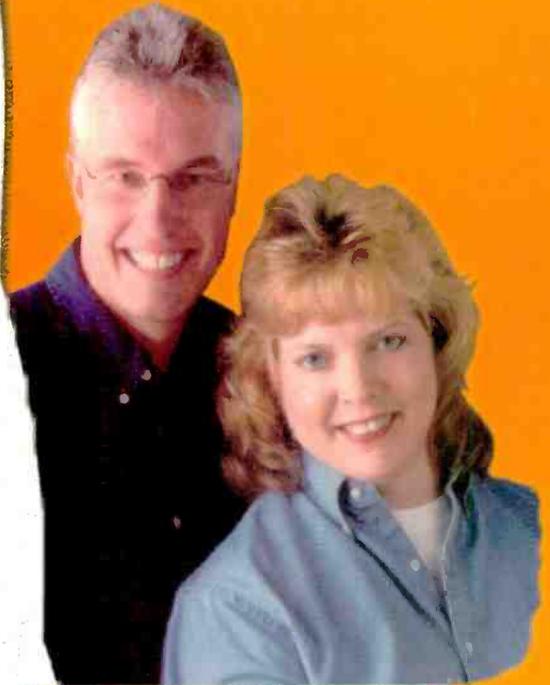
When WRCO Radio made the decision to go digital, our choice was BSI. I was really impressed and still am with your "try it before you buy it" philosophy. I became familiar with the software in the demonstration mode and was convinced it was the best choice for us before I ever wrote the check. After purchase, we were up and running in no time at all. I think it is clear that the BSI team has a strong grasp on what broadcasters want and need. I also appreciate the BSI philosophy that allows so much flexibility in hardware, although I have learned that following BSI recommendations is a very very good idea!

When we announced the change to digital at WRCO, several staff members were skeptical. Today, the comment often is, "how did we ever get along before?" or "I sure wish we would have done this even sooner."

We really appreciate the flexibility of BSI digital automation products. Our FM is live assist while the AM carries a satellite format. BSI products handle both tasks very well. When our farm network started offering mp3 downloads, we were able to route the material across our network and take full advantage of the opportunity in every studio, thanks to BSI. Similarly, as we have implemented change here at WRCO, BSI products have easily made the change with us. With BSI, I feel like I control the station and the software, not the other way around.

From the production studio to the control room, I can't imagine why we would ever want anything but BSI. It's reliable, user friendly software with the flexibility and power to make it a great investment.

Ron and Beth Fruit
WRCO AM & FM Radio
Richland Center, Wisconsin



Only \$1499

Including technical support and upgrades

Price, Power and Performance

More than 5000 broadcasters use our software in more than 50 nations around the world. Our \$1499 Simian includes one year of 365/24/7 tech support and software upgrades. Simian has amazing features, such as streaming spot substitution, automated online requests and touchscreen compatibility. Runs on Windows 98, NT, 2000, ME and XP.



Test and try before you buy.

www.bsiusa.com

888-bsiusa1

**Broadcast
Software
International**

Networks

cabling is similar to that of CAT-5, except that it is required to meet more stringent performance requirements for return loss and ELFEXT. Several manufacturers also offer cabling meeting the more enhanced CAT-6 and -7 pre-standard cabling products, which permit transmission of data at speeds in excess of 600MHz.

In all cases, maximum length of cabling per segment is at 100 meters, as specified in the TIA/EIA-568-A standard.

Upgrade paths

Network upgrades should be performed at the top-most levels of the infrastructure, typically the level that handles the largest amount

of aggregated data traffic, such as switch-to-switch or switch-to-router. Some possible scenarios follow.

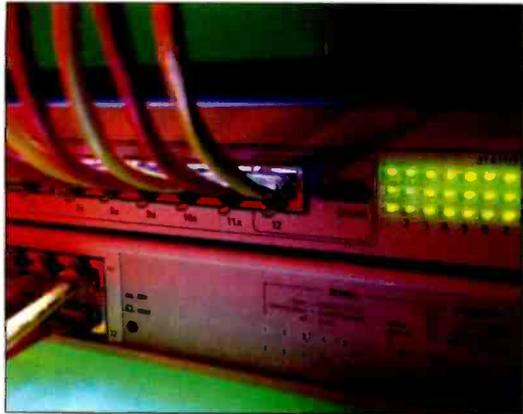
Switch-to-switch. Upgrading from 100BaseT to Gigabit Ethernet switches would permit more switched and shared segments. This is beneficial for networks that carry large amounts of multimedia or streaming content.

Switch-to-server. Facilities that maintain high performance and multiple servers that provide multimedia content, high availability to users, and complex database, graphical and scientific function, would benefit from an upgrade to Gigabit Ethernet from the servers to the network switch.

Switch-to-hubs/routers. In a switched network environment, upgrading hubs (or workgroup switches) and routers to Gigabit Ethernet would increase the overall bandwidth, number of available segments and the total amount of nodes per segment.

User-to-hub (switch). An upgrade would permit increased speed between high-performance workstations and Gigabit network infrastructure.

Backbone. Buildings and campuses are typically interconnected via high-speed backbone using fiber (or wireless) media. Backbones using fiber, or FDDI, can be upgraded either through replacement of existing FDDI hubs to Gigabit Ethernet switches or through the addition of an FDDI switch that can be interfaced directly into Gigabit Ethernet infrastructures.



Since Gigabit Ethernet will pass slower signals, it is best to install the fastest hardware you can to be future ready.

Kevin McNamara, BE Radio's consultant on computer technology, is president of Applied Wireless Inc., New Market, MD.

All of the Networks articles have been approved by the SBE Certification Committee as suitable study material that may assist your preparation for the SBE Certified Broadcast Networking Technologist exam. Contact the SBE at (317) 846-9000 or go to www.sbe.org for more information on SBE Certification.

RADIO HARD DISK LIVE ON AIR Production & Automation SYSTEM

DL4-MAX

- DUAL STUDIO SYSTEMS - AIR & PRODUCTION
- LIVE, SATELLITE & AUTOMATION
- VOICE TRACKING, SEGUES, PHONERS & MORE
- TRIPLE PLAY & RECORD

The DL4 is ideal for a two studio radio station with On Air & Production Studios. With simultaneous triple play & record, the On Air Studio has dual overlapping play while the production studio has both Play & Record.

The DL4 is a broadcast quality hard disk player and recorder. It is not a PC computer with audio on it, but is a hard disk audio appliance that is controlled by PC computers. If the PC fails the DL4 continues playing. The DL4 even has a cart machine like front panel for manual control.

The DigiLink Family of Hard Disk products is the #1 Satellite Automation system with 1000's sold around the world.



Arrakis Systems inc. Phone: (970) 224-2248 Web: arrakis-systems.com



Circle (115) on Free Info Card or go to www.beradio.com

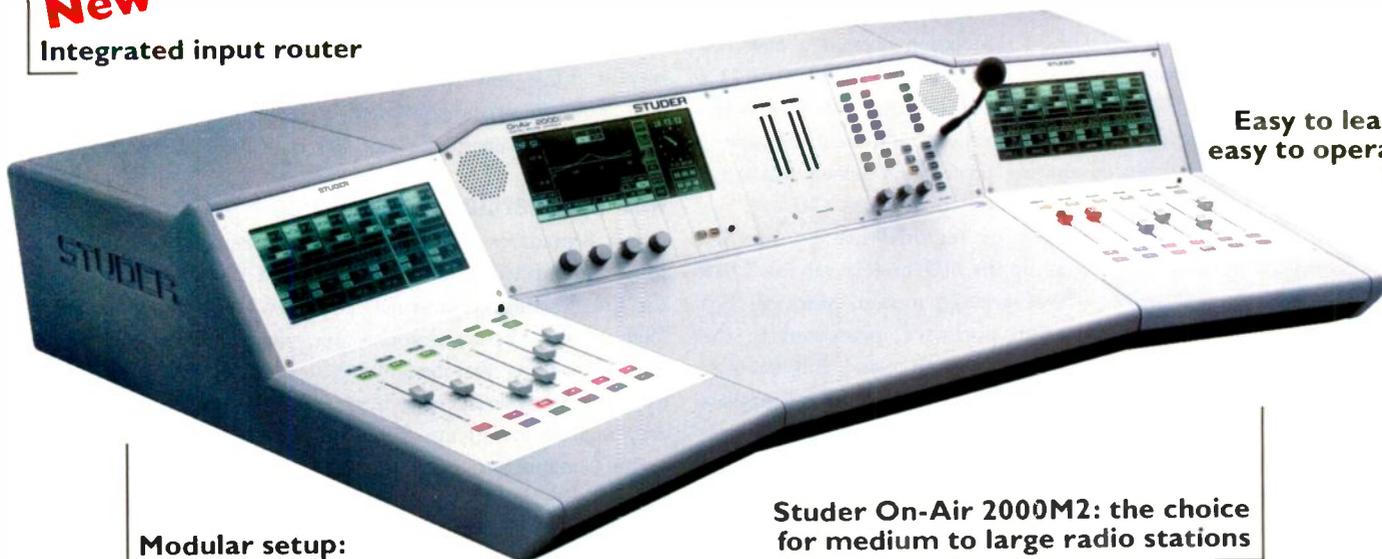
STUDER

Includes seamless integration with
radio automation systems

New

Integrated input router

Easy to learn,
easy to operate



Modular setup:
6, 12, 18, 24 faders

Studer On-Air 2000M2: the choice
for medium to large radio stations

The New Studer On-Air 2000M2 - now with Input Router



High flexibility, proven quality

Studer's new On-Air 2000M2 offers the freedom to route any input signal to any fader on the console surface. The modular unit can have up to 64 input signals, regardless of the number of faders installed (6, 12, 18 or 24). The system integrates seamlessly with radio automation systems (CAB) to comply with self-op mode or as part of a complete facility. For existing On-Air 2000 users, Studer offers the additional functionality in a retrofittable upgrade package.

Studer's On-Air 2000 delivers proven quality and reliability. It is the choice for nearly 500 broadcast installations worldwide!

Over the last 50 years, Studer's name has become synonymous with reliability.

Thousands of radio broadcasters all over the world put their trust and their professional reputation in our hands.

Because our technology will not let them down. Because it is by Studer.

Studer North America

Main Office:
Toronto, Ontario M3B 2M3
Phone +1 416 510-1347
Toll Free 866 269-0000
Fax +1 416 510-1294
eMail studer@mail.studer.ca

www.studer.ch



Studer On-Air 1000 - High quality for every budget

Class C-0 FM implementation

By Harry Martin

In November 2000 the Commission created a new FM channel classification to join Classes A, B, B1, C, C1, C2 and C3. Use of the new class—Class C-0 (C-Zero)—permits upgrades of existing stations and new allocations based on the reduced spacing protections, which will apply when Class C stations are converted to Class C-0.

FM Class C is designed for regional use by stations operating with 100kW at up to 600 meters (about 2,000 feet) antenna height above average terrain. Since all FM channels are, for allocation purposes, protected to the maximum potential facilities for their class, full Class C channels are treated for interference-protection purposes as if they are being used (or, in the case of vacant channels, will be used) at 100kW/600m.

However, few Class C stations operate with such maximum facilities. Thus, Class C stations have been able to operate at as little as 300 meters and still lay claim to full Class C protection. The Commission decided to recover the resulting unused FM spectrum by creating the intermediate Class C-0.

The creation of the new class has multiple potential effects on existing licensees. Stations operating on full Class C channels with antenna heights of 450 meters or less are subject to downgrading if another station files a channel allotment proposal that would necessitate the downgrading of the existing full Class C station to C-0 status.

Such downgrading is not automatic. The proponent of the downgrading must certify that no alternate channel is available to permit the service it is proposing. The Commission then issues a *show cause* order directed to the affected Class C licensee, giving it 30 days in which to express, in writing, its intention to seek an upgrade of its facilities to preserve its Class C status. The affected licensee then has 180 days to file an application to increase its height above 450 meters. After approval, the licensee has three years in which to construct its full Class C facilities. The affected licensee could also argue that the initial downgrading proposal does not conform to the rules, or that another channel could be used to achieve the desired result.

The new class may be useful to licensees who see the possibility of improving their facilities or adding a new channel into a desired community. However, a recalcitrant full Class C licensee would likely be able to stall such an effort for several years by availing itself of the procedural rights described above.

Two notes: First, vacant Class C allotments are preserved against reclassification, but pending applications for full Class C allotments that propose antenna heights of 450

meters or less, are being downgraded to Class C-0 status; second, while new rulemaking proposals may invoke Class C-0, counter-proposals filed in response to notices of proposed rulemaking may not rely on Class C-0 possibilities.

NCE commercialization issues

In a September decision by the Enforcement Bureau, the FCC admonished a noncommercial FM station in Alabama for broadcasting commercial matter in violation of Section 399B of the Communications Act, which prohibits the use of underwriting announcements to promote the contributor's products, services or business. Acknowledgments may only include identifying information about the contributor.

The Commission found that language that stated that the sponsor's dealers "usually deal only with America's largest importers" constituted a promotion because it distinguished the underwriter from competitors. Similarly, references to an underwriter's inventory of "name-brand" musical instruments were deemed promotional because the reference casts the product in a favorable light.

Also found to be prohibitively promotional were a reference to an underwriter's having "kept up with changing technology" and a description of a service as "convenient."

The Commission also noted that the longer it takes in the underwriter announcement to identify the underwriters, the more likely it is that the announcement will be found to be a promotional message.

EEO update

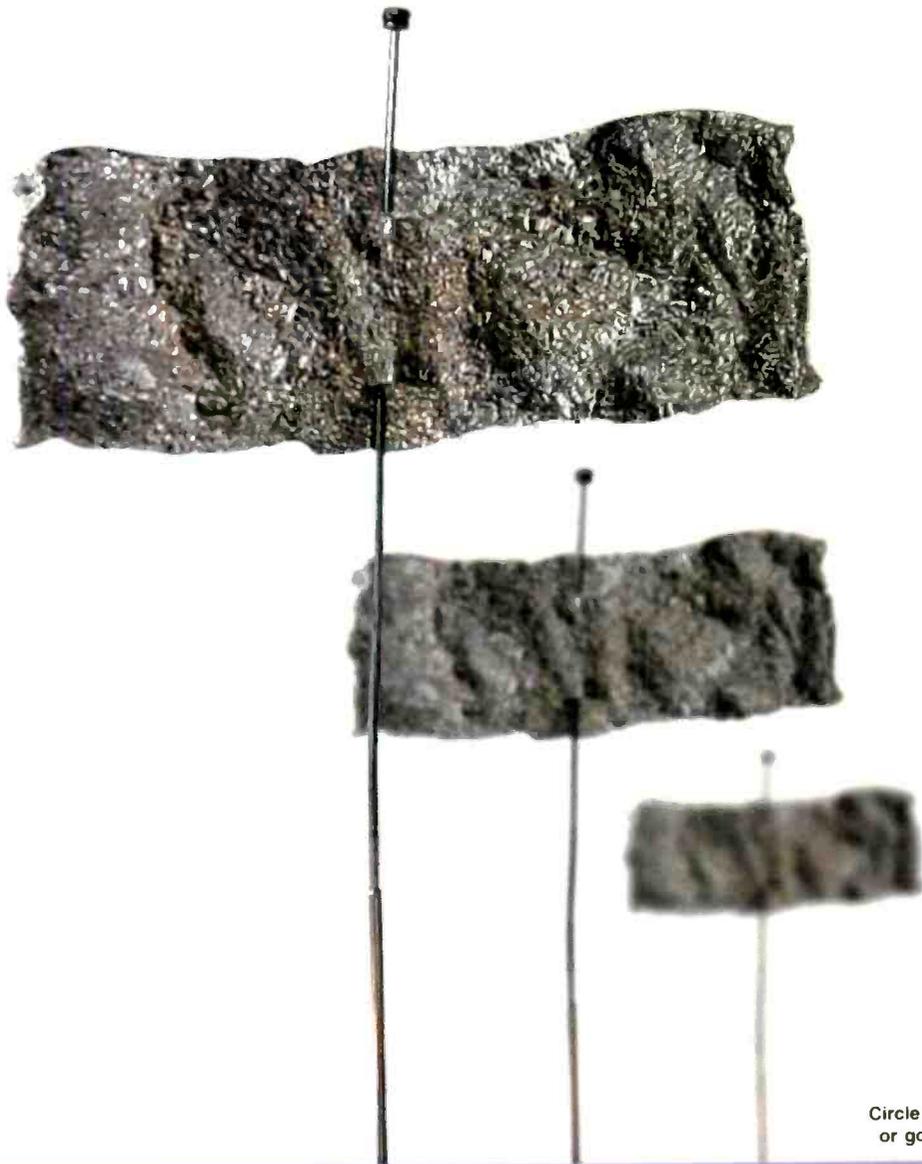
The FCC will not seek review by the U.S. Supreme Court to reinstate the EEO rules that were declared unconstitutional by the U.S. Court of Appeals in the District of Columbia in January. The Commission's position is that it will try to revise its earlier rules to meet the concerns of the Court. That proceeding, however, has not yet begun. While two public interests have filed appeals on their own, the chances that the Supreme Court will take the case without the FCC's participation are very slim.

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

Dateline

February 1, 2002 is the deadline for biennial ownership reports for broadcast stations in Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma

...still running THIS???



Circle (117) on Free Info Card
or go to www.beradio.com.



Antenna Systems



EUROPE

COMMERCIAL AND T.V. FACTORY

Avda. San Antonio, 41
Phone: 976.50.46.96 (6 lines)
Fax 976.46.31.70
50410 CUARTE DE HUERVA
(Zaragoza)

Antenna and Radio Factory:
Camino de los Albares, 14, bajos
Phone: 976.50.35.80 (6 lines)
Fax 976.50.38.55
50410 CUARTE DE HUERVA • (Zaragoza)
Internet: <http://www.omb.es>
e-mail: ombcom@infonogocio.com
VideoConference(RDSI) 976 46 32 00



INTERNATIONAL
DIVISION

3100 NW 72 nd. Avenue Unit 112
MIAMI, Florida 33122
Ph.: 305 477-0973 - 305 477-0974 (6 lines)
Fax: 305 477-0611
Internet: <http://www.omb.com>
e-mail: ombusa@bellsouth.net
Videoconference: 1 305 5940991 / 92



By
Doug Irwin

Testing IBOC

As broadcasting enters a new era, the industry must determine the viability and benefits of the IBOC system.

Those who follow the trades and attend trade shows know by now that iBiquity has completed tests for its FM IBOC system, and tests for the AM version are currently underway. The tests and their procedures were specified by the NRSC. What interests most broadcasters is understanding the test objectives. At this critical point in the acceptance of IBOC, stations should be aware of the efforts being made to develop a workable and realistic system.

NRSC inquiry and objectives

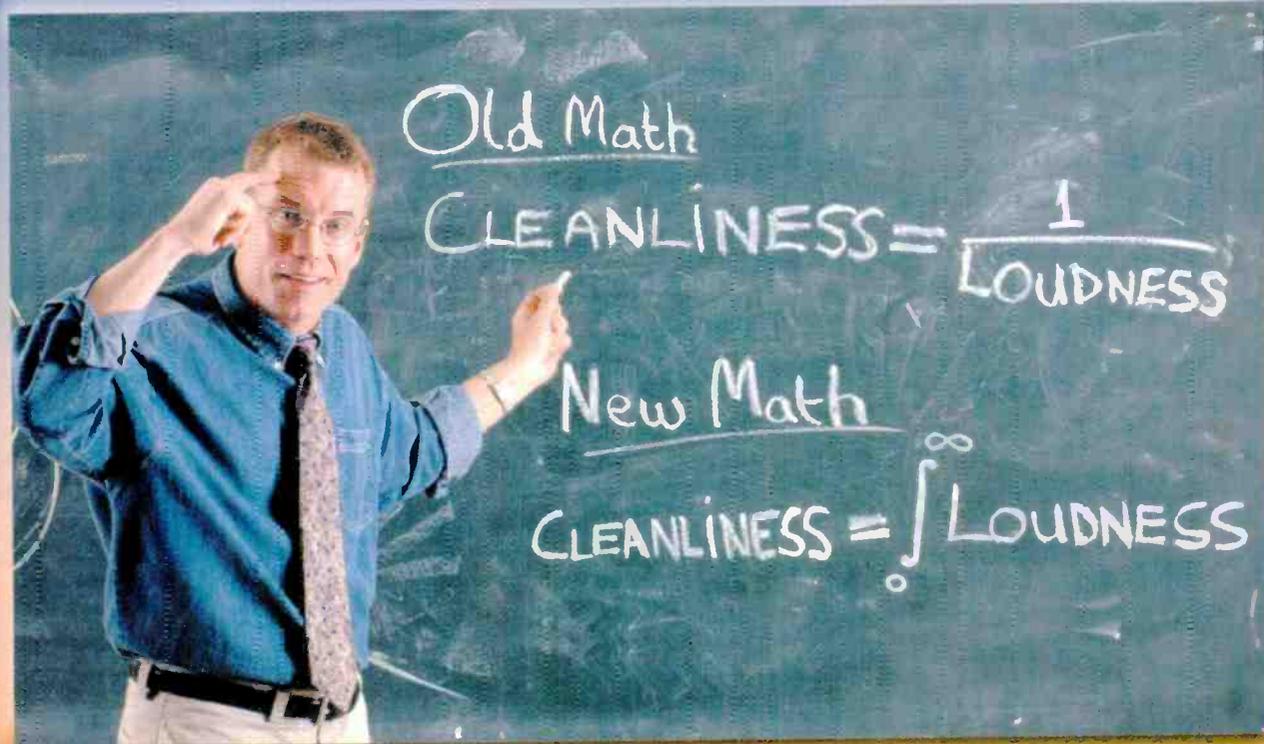
In August 2000, the NRSC released a Request for Proposals offering all parties with functional IBOC DAB systems an opportunity to participate in the NRSC's standards development process. iBiquity was the only organization that responded to this request. At one time, there were three IBOC proponents: USA Digital Radio (USADR), Lucent Digital Radio (LDR) and Digital Radio Express (DRE). Digital Radio Express was acquired by USA Digital Radio in 1999. iBiquity was then formed after the merger of USA Digital Radio and Lucent Digital Radio in August 2000. At the end of 2000, the NRSC had developed comprehensive FM IBOC laboratory test procedures in addition to field test

procedures that focused on two areas. The first area of focus was the performance of the system under adverse ("real world") conditions. The second was the effect that the IBOC transmissions had upon current analog FM transmissions (compatibility). iBiquity carried out the tests using the IBOC systems that had been developed by its predecessors, USADR and LDR.

Simply stated, the tests that the NRSC developed were designed to demonstrate conclusively that an IBOC system would provide a significant improvement over the current analog technology. Tests were developed that were both of an objective nature (laboratory) and of a subjective nature (field tests).

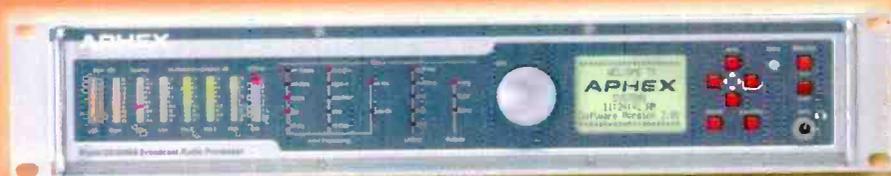
The laboratory tests were carried out by the Advanced Television Technology Center in Alexandria, VA. The NRSC and its observers were allowed access to all ATTC testing, and an NRSC representative took part in the lab's work. The ATTC recorded the data from the tests. In addition to the objective measurements, ATTC recorded audio samples for subsequent subjective tests carried out by Dynastat in Austin, TX. Details of these tests will be discussed later.

Process This!



Introducing

The NEW Aphex 2020MkII



The original Aphex Model 2020 audio processor set the standard for audio quality, loudness and extended coverage. Not content to sit on its laurels Aphex continued to research ways to improve performance even further. The result is the 2020MkII.

New processing algorithms and circuit designs, in addition to the fifteen proprietary circuits* from the original, allow even greater loudness without sacrificing a clean, natural sound. The MkII's increased flexibility also gives a station the ability to create its own unique sonic signature. New features include a split band optical high frequency limiter, a low distortion overshoot compensated low pass filter* (with no spurs), improved remote control interface, RDS, and dual composite outputs.

Audition the new 2020 MkII on your station and you'll find that Aphex has really done its homework—creating a processor with performance and features unmatched at any price. The 2020MkII—in a class by itself.

APHEX
SYSTEMS

*Improving the way the world sounds*SM

11068 Randall Street, Sun Valley, CA 91352 U.S.A.
818-767-2929 Fax: 818-767-2641 www.aphex.com

Circle (118) on Free Info Card or go to www.beradio.com.

* (patented or patent pending)

Testing IBOC

The field tests

For the field tests, the NRSC specified many aspects, including the receivers that were to be used. These receivers were chosen on the basis of market information, as well as their performance abilities in their respective market segments. All four receivers were used for performance tests (in direct comparison to the digital receiver) and compatibility tests.

The NRSC defined the adverse conditions under which the IBOC system was to be tested in the field. These conditions were: a clean channel environment; physical impairments such as distance and terrain shielding; co-channel and adjacent channel interference; and multipath interference. The compatibility study looked at the effects of the IBOC transmission on co-channel, first adjacent, and second adjacent stations.

The NRSC also identified particular stations (and the driving routes) to be used in the field tests.

Members of the iBiquity staff made the field measurements. In most cases, an auditor from the ATTC was present.

Three sets of audio outputs from the respective receivers were recorded on a Tascam DA-98 digital recorder. This audio was used for subjective tests that were carried out later. An on-board computer was used

Type	Manufacturer	Model #
Original equipment Auto	Delphi	PN 09394139
Aftermarket Auto	Pioneer	KEH-1900
Home Hi-fi	Technics	SA-EX140
Portable	Sony	CFD-S22

Figure 1. The various receivers used during the NRSC tests.

Additionally, an NRSC observer witnessed all of the tests.

The measurements were both complex and thorough. From the whip antenna on the roof of the test vehicle, the RF was divided four ways. The first two outputs went to the two mobile receivers as shown in Figure 1. The third output went to the IBOC receiver itself. The fourth went to the spectrum analyzer on-board the truck.

to record data such as signal strengths (derived from the spectrum analyzer) and GPS information. In addition, the computer was used to store images from video cameras facing fore and aft of the vehicle. This visual information allowed the iBiquity testers to correlate reception anomalies heard in the recorded audio that were the result of environmental changes, such as over-

Hear What The Hype Is All About

"The C-3 is THE HIP new guitar mic. It gives your Marshalls that phat-gut-punch we all crave. I'll never cut another record without one."

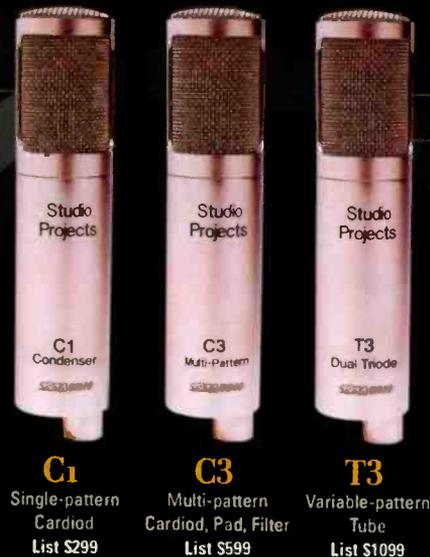
Scott Rouse - Producer, Grammy Nominee, Nashville, Tennessee

I have a microphone "wish list". You have allowed me to check off both the U87 with the C1 and the C12 with the T3.

Ted Perlman - Producer/Arranger/Composer
Bob Dylan, Chicago, Kaci, 2gether, Young MC

One of the best vocal mics in the world is the \$300 Studio Projects C1. You can spend way more for "one of those" mics from Germany if your ego demands it, but the C1 is certainly the sonic equivalent.

Pete Leoni - Producer Engineer, Tech writer and reviewer



C1 Single-pattern Cardioid List \$299
C3 Multi-pattern Cardioid, Pad, Filter List \$599
T3 Variable-pattern Tube List \$1099

All models include shockmount and case.

StudioProjects™

P M I
AUDIO GROUP

PMI Audio Group
23773 Madison St., Torrance, CA 90505 USA
toll-free 877 563 6335 fax 310 373 4714
Visit Us Online at www.studioprojectsusa.com



VT-1

Tube Mic Pre, Discreet Class A/B switching,
with variable Tube Drive. List \$299

passes and large trucks, that were encountered along the way during driving tests.

The field test stations incorporated in the NRSC test procedures were selected to assess system performance in common FM environments. Figure 2 shows the stations that were tested, and Figure 3 shows which environmental characteristic were scrutinized.

As each of these particular cases was evaluated, the data was recorded in the mobile test vehicle, and the audio recordings made were used for later subjective evaluations.

The stations and the results

The various stations were chosen because of certain unique characteristics that were useful in evaluating various test parameters.

Overall coverage. WETA has an extensive coverage area without any strong first- or second-adjacent interfering signals. The coverage of the digital signal was consistent out to the 35dBu level of the analog transmitter.

First-adjacent analog interference. Both WPOC and WNEW have first-adjacent channel interference, which does not have an effect on the digital coverage. Even in the presence of this interference, the digital coverage for each station went out to the 35dBu to 38dBu level of the analog transmitter.

Second-adjacent analog interference. Tests conducted on WNEW in the presence of strong second-adjacent channel interference from WBAB in Babylon, NY, attest to the robustness of the digital system. The digital coverage in this case extended to the 100dBu contour of WBAB. At that point the desired to undesired ratio (D/UD) was approximately -47dB. Similar results were obtained from the KLLC testing in the San Francisco market. KLLC has a strong second adjacent (KFFG) on 97.7 in the southern half of the Bay Area. The digital coverage of KLLC extended to within the 80dBu contour of KFFG.

Second-adjacent digital interference. WD2XAB was used to demonstrate the IBOC system's ability to maintain digital coverage with a sec-

ond-adjacent channel digital interference source. WD2XAB operated at 93.5 in hybrid mode (analog and digital signals broadcast simultaneously) while WPOC operated at 93.1, also in hybrid mode. While running 8W of digital power, WD2XAB still offered digital service up to the point where the desired to undesired ratio (with respect to WPOC) was -15dB.

Dual second adjacent interferers. WHFS has strong levels of second-adjacent interference from stations operating in the same market. WHFS transmits on 99.1, while WIHT transmits on 99.5 and WMZQ transmits on 98.7. The IBOC system broadcast on WHFS still gave partial digital coverage at the 120dBu contour of WMZQ.

radio SYSTEMS • MILLENIUM CONSOLES

601 Heron Drive, Bridgeport, New Jersey 08014
(856) 467-8000 voice (856) 467-3044 fax www.radiosystems.com

SMART CHOICE



Disaster Relief
From now until the end of the year,
Radio Systems will donate \$100
for every console sold
to the American Liberty
Partnership.

EXCELLENT VALUE

The bottom line is that Millenium consoles work because their performance, look and sound present the best console value around.

PROVEN

Over 500 broadcasters use more than 3000 Millenium and RS series consoles to stay on the air every day. Most users who have bought one of our consoles bought another.

FULL FEATURED

You can buy options for a Radio Systems console – but you don't have to! From full remote control to complete monitoring, Millenium consoles work right out of the box!

GREAT LOOKS

Millenium consoles are beautifully styled with glowing soft-touch keypads and rich mahogany side-panels. And, owners can even inexpensively update their older consoles to a Millenium model.

GUARANTEED

Our consoles come with the best warranty in the business with 2-year no charge overnight parts delivery to keep you on the air.

EASY INSTALLATION

Make an afternoon out of installing your next console – not a career! These boards almost seem to wire and install themselves.

SUPERB ENGINEERING

These boards have the low noise and distortion specs that you need to compete with digital alternatives. And full DC control and modular construction keeps the performance clean and repairs a snap for the life of the console.



Circle (120) on Free Info Card or go to www.beradio.com

Testing IBOC

Station	Location	Frequency	Class	Power	HAAT	Digital Power
WETA	Washington, DC	90.9	B	75kW	185m	750W
WHFS	Annapolis, MD	99.1	B	50kW	142m	500W
WPOC	Baltimore, MD	93.1	B	16kW	269m	60W
WNEW	New York, NY	102.7	B	6kW	413m	60W
WWIN	Baltimore, MD	95.9	A	3kW	95m	30W
KWNR	Las Vegas, NV	95.5	C	92kW	351m	920W
KLLC	San Francisco, CA	97.3	B	82kW	315m	820W
WD2XA3	Columbia, MD	93.5	n/a	800W	15m	8W

Figure 2. The stations used for the iBiquity and subsequent NRSC tests.

Coverage with multipath. Tests taken with KWNR in Las Vegas show that the system is robust, even while experiencing high levels of multipath. This was confirmed on tests done with WNEW, transmitting from the Empire State Building. Driving the streets of Manhattan, the user of an analog radio will encounter extreme multipath distortion. Yet, the IBOC system performed extremely well, rarely blending to analog from digital. Further tests on KLLC in San Francisco provided similar results.

Class A facility. Class A tests were performed on WWIN in Baltimore. WWIN has strong second-adjacent interfering stations (WHUR and WPGC from Washington) and a strong first-adjacent interfering signal (WSOX from Red Lion, PA). Yet, the digital coverage was basically the same as the protected contour of the station.

Terrain Obstructions. Even with terrain obstructions, the digital system is able to provide coverage that is comparable to the analog coverage. San Francisco and Las Vegas provided the greatest challenges related to terrain among the stations that were tested. In the case of the KLLC coverage of the Bay Area (with which I am very familiar), digital service was provided throughout the greater Bay Area, with the exception of the areas east of San Francisco that are severely shadowed by the East Bay hills.

Nearly all of the San Francisco stations have fairly large, on-channel boosters to provide coverage in these areas.

Subjective testing and results

It is widely accepted in both the telecommunications and audio industries that subjective testing is the gold standard for audio system evaluations. iBiquity believes that subjective evaluation using participants from the general population provides the best means to assess the true significance of the system's performance. The NRSC believes that the use of the general population gives better insight into the

AUDIO TESTING JUST GOT A WHOLE LOT EASIER!

DSCOPE SERIES III

GREAT PERFORMANCE
GREAT FEATURES
GREAT PRICE

...AND IT'S PORTABLE.

DScope Series III runs on Windows™ 98/ME/2000 and communicates via USB with the processor providing analogue and digital input and output ports, reference synchronization input, oscilloscope monitor outputs and monitor speaker.

DScope Series III provides a comprehensive, value for money test solution for analogue, digital and mixed applications in research and development, manufacturing production test, servicing and installation.

DScope Series III can provide a simplified interface for basic measurements such as amplitude, frequency and frequency response OR a richly featured interface complete with arbitrary waveform generation, FFT analysis, digital interface (e.g. jitter) measurements and user customisation and automation based on VBS script. System snapshots can be saved to and recalled from disk.

For production test, DScope can be reworked so that fully automated testing and data collection can be performed.



CALL US NOW TO ARRANGE
YOUR DEMONSTRATION



Prism Sound
Prism Media Products Limited
William James House,
Cowley Road, Cambridge
CB4 0WX, UK.
Tel: +44 (0)1223 424988
Fax: +44 (0)1223 425023
sales@prismsound.com

Prism Media Products Inc.
21 Pine Street,
Rockaway, NJ
07786, USA.
Tel: 1-973 982 9577
Fax: 1-973 982 9588
www.prismsound.com

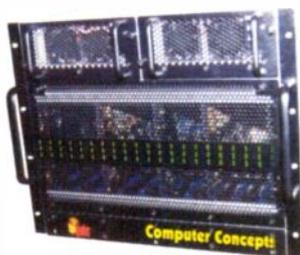
Contact us now for further details on
sales@prismsound.com
or call +1 973 982 9577 (USA, Canada, South America)
or +44 1223 424 988 (other countries).

Circle (121) on Free Info Card or go to www.beradio.com

Switcher on Steroids

Computer Concepts' EpiCenter *revolutionizes* audio switchers! EpiCenter is *more than the most powerful switcher ever!*

EpiCenter handles 1,008 simultaneous audio channels in the 24-bit digital domain. EpiCenter can be configured to any desired combination of hot-swappable analog and digital inputs and outputs. EpiCenter frames can be up to several thousand feet apart with fiber optic



cables (shown at left). And EpiCenter is as affordable as ordinary switchers, but that's where the similarity stops!

Switch to the new generation of consoles with the EpiCenter Digital Audio Engine!

Telos' Smart Surface



Logitek's NuMix

In addition to being radio's *most powerful* switcher, EpiCenter is the *most advanced* too! EpiCenter *adds* digital signal processing features not available in older switchers, like *digital* mixing of *any* number of stereo audio sources—without regard to sample rates—and real time MPEG encode and decode at all popular compression ratios and sample rates. EpiCenter also gives your stations equalization, compression, dynamic limiting, obscenity delay, phone hybrids, mix minus and *every console function* you can imagine. **A d v a n c e d** new—and less costly—console user interfaces such as Telos' Smart Surface,



Logitek's ROC5, ROC10 or Numix work better with EpiCenter than any internal electronics or less powerful digital audio engines. These connect to EpiCenter via MIDI, RS-232, RS-422 or TCP/IP.

Computer Concepts' EpiCenter is a *life-saver* during *news emergencies!* EpiCenter instantly routes *any* audio source to *any* fader or output on *any* console in *any* studio. Jocks love it because every announcer can set up



EpiCenter with cover open showing hot-swappable 24-bit digital cards and open slots for future expansion.

personal custom consoles, with individual microphone EQ and compression, fader positions and presets, as well as access to custom audio on hard drive.

Engineers love EpiCenter because its specs and performance are the best! All internal circuitry is 24-bit digital, hot-swappable, triple redundant and comes with remote diagnostics.

Nothing else helps your stations as much—or is as flexible—as EpiCenter!

With our 27 years as radio's leader in broadcast services, and as the first and most reliable supplier of air studio digital audio systems, Computer Concepts is *your best choice* to take your stations to the next level of seamless digital studios with EpiCenter! Call toll-free—or visit epicenter.fm on the Internet for more details.

EpiCenter gives you...

- Digital audio network routing
- Any combination of ins and outs to 1,008
- Hot-swappable analog and digital inputs
- Hot-swappable analog and digital outputs
- Intermixing of any sample rates
- Intermixing of any compression rates and 1:1
- 100% digital mixing and switching
- Control by Logitek Consoles
- Control by Telos Smart Surfaces
- Control by PC (software included)
- Console Control by Serial, MIDI and TCP/IP
- Fiber optic and CAT-5 connectivity
- Redundant power supplies and audio bus
- Expandability

Computer Concepts Corp.

8375 Melrose • Lenexa, Kansas 66214
1-800-255-6350 www.epicenter.fm

Testing IBOC

to improve audio quality is borne out by the subjective evaluation results.

SCA testing

iBiquity carried out a series of measurements designed to test the compatibility of SCA transmission with that of IBOC. This was not part of the NRSC test, and was not as extensive as the NRSC tests, at least in the number of stations and real-world situations that were examined.

Most of the tests were objective, i.e., done in the laboratory. Using standard broadcast transmission equipment and commercially available SCA receivers, 67kHz and 92kHz SCA transmission were examined. The conclusion is that while a performance degradation can be measured, it is so small as to not effect the SCA system performance. A subjective measurement was done on WETA-FM using receivers and listeners located at the offices of National Public Radio. No one in attendance was able to hear any impairment of the 67kHz SCA in the presence of the IBOC carriers on WETA.

A typical digital SCA (centered at 66.5kHz) was tested in the lab and in the field (on WD2XAB). In the presence of the IBOC carriers, a slightly higher bit-error rate was measured, but the difference was negligible. Performance of an SCA system such as this will not be significantly altered by the presence of IBOC carriers.

On-channel boosters

Field measurements taken on KLLC in the San Francisco Bay Area (as part of the NRSC tests) show that IBOC will not obviate the need for analog booster transmitters that provide fill coverage in areas suffering from severe terrain impairments. Indeed, the iBiquity report states that the same areas that are now covered by analog boosters will be able to get digital coverage by small IBOC boosters.

While one always expects any organization's report on itself to be painted in the most favorable terms, it is hard to do anything but draw the same conclusions iBiquity has after looking

at the test results presented in its report to the NRSC. It is obvious from even the most meager knowledge of communications that our environment is permeated with digital radio transmissions. That technology is not new but is evolving in many favorable ways. The fact that the consumer wants digital audio is a given, as is the fact that analog FM has its drawbacks. The recent launch of XM Satellite

Radio, with its great early success, and the imminent service launch of its competitor Sirius Satellite radio on February 14, 2002, compels the traditional broadcast world to embrace the IBOC technology, for its own good and long-term viability.

Doug Irwin is director of engineering for Clear Channel San Francisco.

Your Complete Console Strategy

- UP TO 3 CONSOLES PER ENGINE WITH BUILT IN ROUTER
- AUDIO FROM ANY ENGINE MAY BE USED IN ANY STUDIO
- ROUTER CONTROL
- FIBER OPTIC AUDIO NETWORK
- REMOTE MIXING ROUTING AND MAINTENANCE FROM ANY NETWORK PC
- REMOTE CONTROL NETWORK
- SUPERVISOR PC
- PC PC
- INTERNET

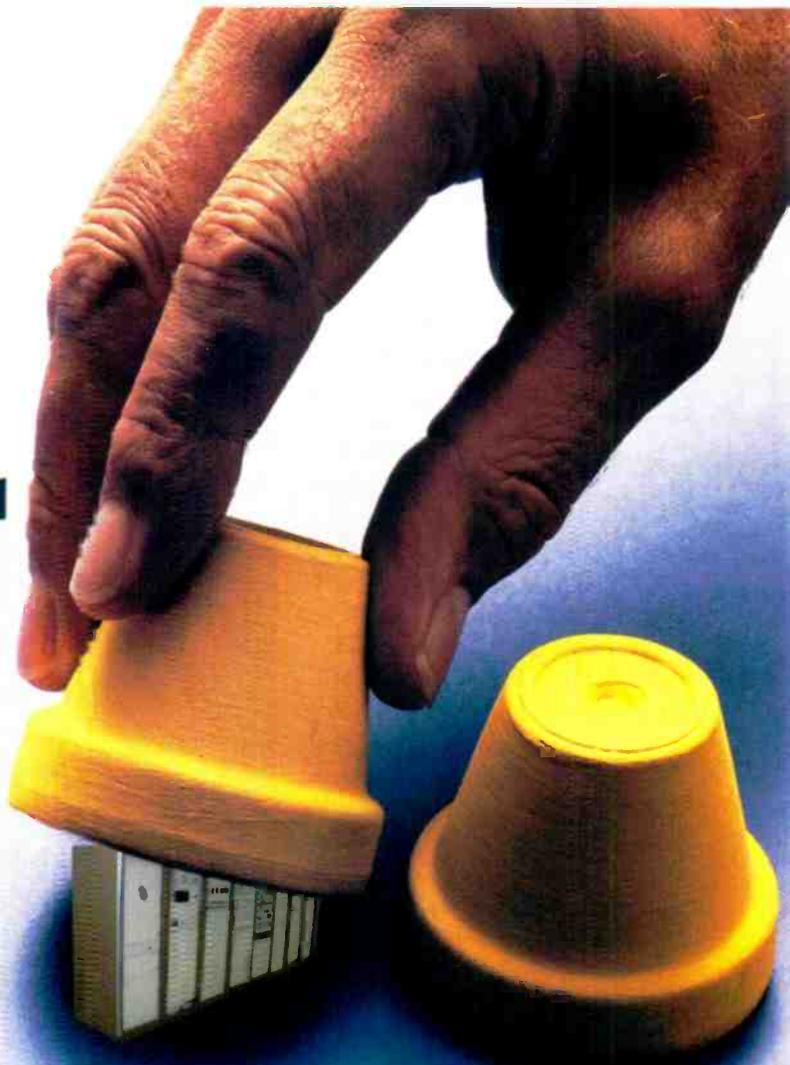
Whether you want to get started with digital consoles or need to easily manage all the audio in your facility, Logitek has the solution. The heart of our system is a router-based digital audio engine that handles all of the mixing, routing and return feeds your studios require plus a whole lot more. Add to this our full line of console control surfaces, router control heads and PC-based control programs and you will find a solution that is just right for you. Why choose between a console and a router when you can have both for the price of one? Call today, 800-213-5870 or visit our website at www.logitekaudio.com.

Logitek

Circle (124) on Free Info Card or go to www.beradio.com

Selecting a new transmitter

By Hal Kneller,
CPBE CBNT

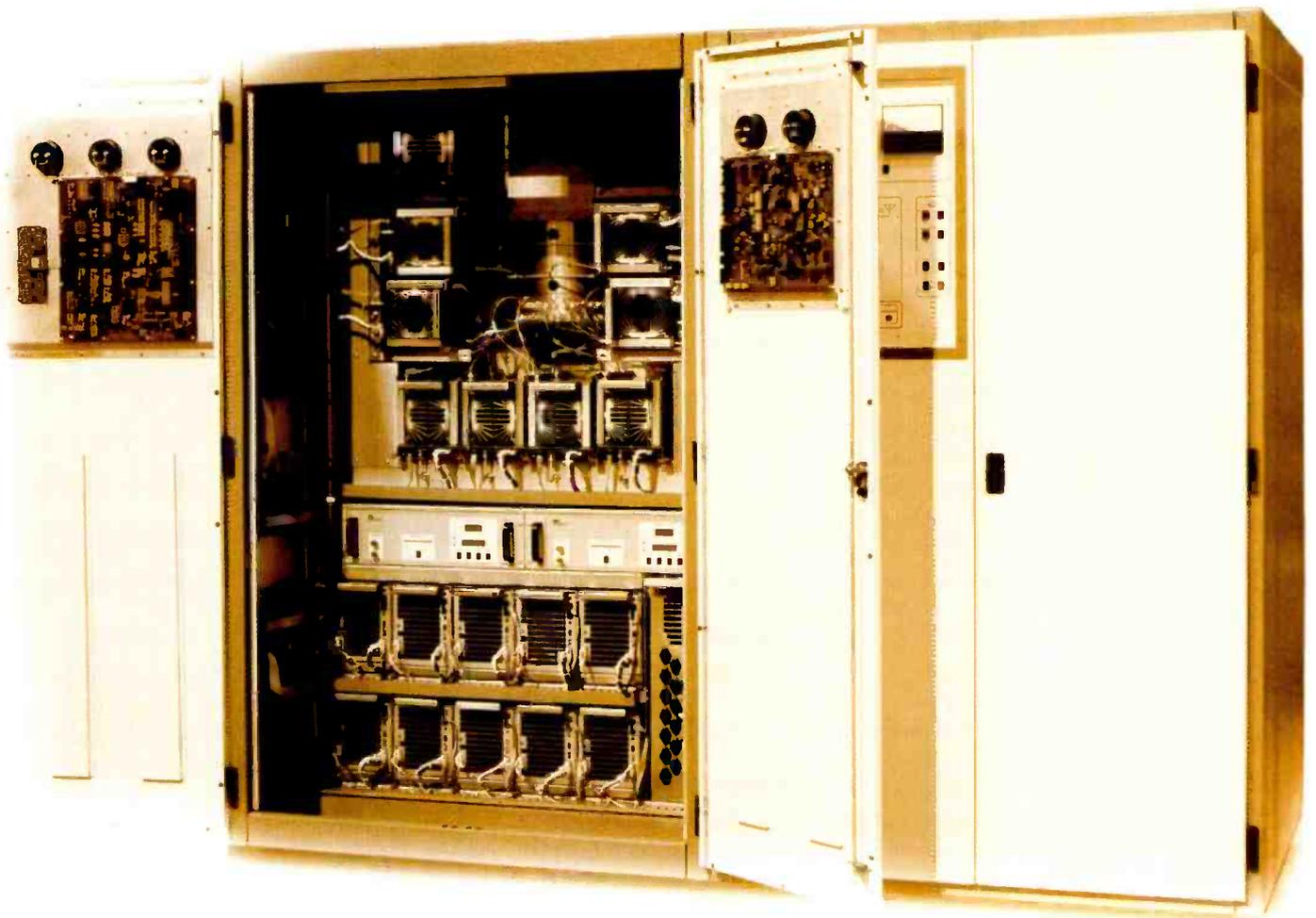


Solid-state technology has taken over the major AM broadcast transmitter manufacturers, and up to 40kW of solid-state power is available in FM. When making the decision to buy a new transmitter, there are several factors to consider. We will look at some of these choices and offer suggestions on how to weigh each of them in your decision.

Redundancy and soft failure modes are the solid-state rule. Remaining on the air despite module failures is the benefit when common points of failure are eliminated. Individual redundancies and features vary by company, so buyer diligence is required.

When shopping for an AM transmitter at any power level, the only choices from the major U.S. manufacturers are solid-state amplifiers. Choosing between solid-state versus tube for FM based on price hovers around the 3kW to 5kW level. For a 10kW solid-state FM transmitter, the added premium over the cost of a tube transmitter is small enough to justify the purchase unless the transmitter is destined for secondary or back-up use. Some manufacturers are making attempts to produce a solid-state line at tube prices, and some have dropped tube transmitters below 10kW. Those building a 20kW solid-state FM transmitter, such as Nautel's Q-20, have a price advantage over others who combine two 10kW cabinets. Pricing at 10kW and below appears reasonably competitive between manufacturers. Still, single-tube transmitters at higher power levels of 20kW and up offer a significantly lower acquisition price.

When contemplating a new transmitter purchase, one must examine time, expense, ease of maintenance, overall reliability and possibly IBOC-compatibility. The cost of ownership should be considered in the purchase decision, since a transmitter's life expectancy is typically 10 to 15 years. There are direct savings in a reduced electrical bill (particularly in AM) and the cost savings in tubes, in addition to the claims of reduced maintenance. For AM transmitters, an immediate breakeven occurs, since there is no real purchase price difference, and electrical savings over older transmitters can be substantial at higher power stations. FM power savings range from negative to marginal, so all cost recovery depends on elimination of tubes and reduced maintenance. The real payback depends on the value of lost airtime and reduced maintenance costs. Remote or difficult-to-access transmitter locations, and major-market installations will benefit from the redundancy and reliability of the newer solid-state units. In smaller markets, some stations may be comfortable not having a backup if a modern, solid-state transmitter is in use. New features available in current solid-state transmitters include automatic switching of dual IPAs and dual exciters, switchless automatic combiners, cooling fans on each module or redundant fans, multiple power supplies and dual controllers. All these factors contribute to significant reductions in lost air time from a transmitter failure.



40,000 Watts Solid State FM Power.

The Nautel Q20/20 comprises two 20 kW stand-alone FM transmitters fully integrated to operate as a 40 kW active reserve transmitter system. For more than 30 years Nautel has built the best radio transmitters by blending solid state technology and innovative engineering design. The Q20/20 provides reliability and peace of mind through built-in redundancies — in all the world you won't find its equal.

Each Q20 features:

- redundant Power Amplifiers
- redundant Power Supplies
- dual Digital Exciters
- dual IPA & Power Supply
- dual Low Voltage Power Supplies
- 68% overall efficiency



Simply the best engineered transmitters

Contact Nautel for more information about the benefits of our full range of solid state FM and AM transmitters.

Nautel Limited, Hackett's Cove, RR #1 Tantallon, Nova Scotia Canada B01 3J0 Phone: (902) 823 2233 Fax: (902) 823 3183 Certified ISO 9001
Nautel Maine Inc. 201 Target Industrial Circle, Bangor, Maine USA 04401 Phone: (207) 947 8200 Fax: (207) 947 3693 Certified ISO 9002
E-mail: info@nautel.com or visit us on the Web at www.nautel.com

Circle (125) on Free Info Card or go to www.beradio.com.

Selecting a new transmitter

Better specs

Overall, solid-state performance has allowed AM and FM analog transmission systems to reach the operating capability limits of the medium. How much better do newer FM solid-state transmitters perform? Several manufacturers report exciter specifications that are essentially passed through the solid-state power amplifier, whereas some degradation of performance is noted when using tube final amplifiers, particularly in AM and FM noise performance. In solid-state use, the FM exciter is the key to high system performance. In current-generation AM transmitters, receivers do not measure up to the quality that can be transmitted (± 0.5 dB 50Hz-10kHz, $<1\%$ THD and IMD with -60dB noise).

Large clusters of commonly owned stations have appeared in markets with fewer engineers to maintain them, making transmitter maintenance key. Historically, tube transmitters suffered from poor designs such as low-head-

room tube-driver sections, self-oscillating tetrodes, and tube failures. Modern single-tube transmitter designs incorporating solid-state drivers have eliminated 99% of these problems. In general, repairs and troubleshooting are easier with a solid-state unit. Manufacturers have greatly simplified identifying and replacing a failed subassembly. While modern tube transmitters outperform their predecessors, a failure still typically results in lost air time. However, a solid-state transmitter will stay on the air at some power level, even if devices fail.

Newer feature sets

During a visit to the Harris facility in Quincy, IL, I noticed a Z10CD transmit-

ter on final test. It had a custom panel that permitted any one of five



Solid-state FM power levels of up to 40kW are now available.

or six frequencies to be selected. A group operator had purchased this unit (to be connected to a wideband antenna) to function as a multistation backup for a market. This would not have been possible with tubes and tuned circuits. This approach enhances

Flex-Studio

Modulux is the #1 selling furniture system

\$4,995
a \$6,200 value

One Size fits all modular design

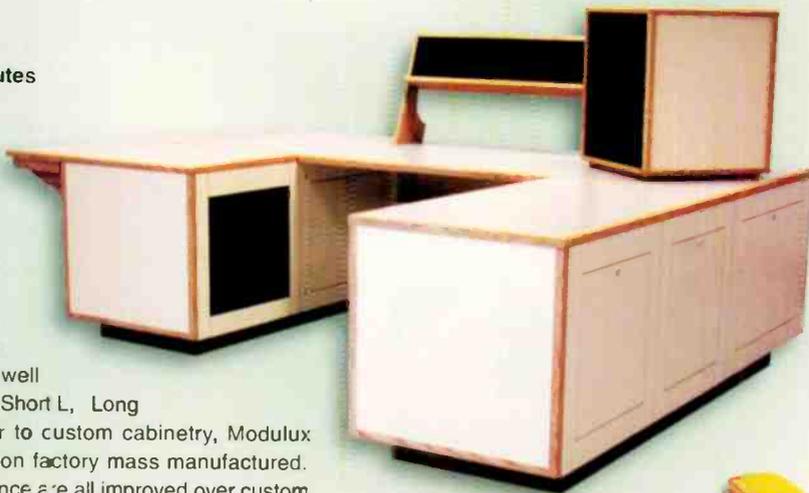
Assembles quickly & easily in minutes

Highest quality laminates & wood

World famous Modulux cabinetry

In-stock for immediate delivery

The Modulux Flex-Studio is a complete modular studio package that can be configured in dozens of different ways to meet nearly any studio design. It can be assembled left or right handed as well as in all of our standard configurations: Short L, Long L, and Unbalanced U. Far superior to custom cabinetry, Modulux engineered studio systems are precision factory mass manufactured. Quality, strength, durability and appearance are all improved over custom built cabinets.



Arrakis Systems inc.

Phone: (970) 224-2248 Web: arakis-systems.com



Circle (126) on Free Info Card or go to www.beradio.com

reliability where it is needed most.

The most important maintenance item for a solid-state transmitter is to keep it clean. New transmitters should be installed in clean room environments as well. Maintenance-cost savings are quickly realized compared to a tube transmitter, which, in addition to more frequent cleaning because of the high voltages, includes such work as filament adjustment and tuning touch-ups to get the most life from the tube. Tube replacement is another cost issue, along with tube sockets and associated components.

By adding the number of solid-state (both AM and FM) transmitters in the field, we may be approaching 10,000 units worldwide, indicating that the tube transmitter's days are numbered, certainly at the 10kW and below power level for FM. As manufacturing costs continue to decrease and new, higher power devices are brought to market, the premium to manufacture solid-state transmitters will continue to be mitigated or even eliminated.

A look at the past

Successful solid-state AM broadcast transmitters were introduced in 1975 when Harris installed an MW-1 (1kW series-modulated using bipolar devices) at KXEO in Mexico, MO. In 1982 Nautel introduced the pulse-modulated AMFET series with up to 10kW of solid-state power, offering the first higher power AM units (using MOSFETS). Harris followed that with the SX series in 1983 with a polyphase PDM design offering 1kW to 5kW. Today's Gates third-generation series is similar. Even first-generation AM solid-state transmitters claimed an operational power cost advantage, eliminated tube cost and had excellent audio performance. Harris and Nautel introduced 50kW solid-state AM transmitters by the mid 1980s. By then, Broadcast Electronics, Continental and several others were selling solid-state AM transmitters (10kW and below) for the U.S. market. Continental has dropped its AM and FM solid-state product line for 10kW

and higher single-tube FM transmitters.

Higher power solid-state FM transmitters (above a few hundred watts) were much slower to appear due to the lack of suitable devices for VHF frequencies. It was in 1991 or 1992 that Nautel introduced the FM7 (using MOSFETS), which eventually migrated to the 10kW power level at which FM solid-state transmitters gained significant market acceptance.

QEI also sold Quantum solid-state transmitters during the mid 90's. Harris introduced the Platinum line soon after and unveiled the Z line in 1996.

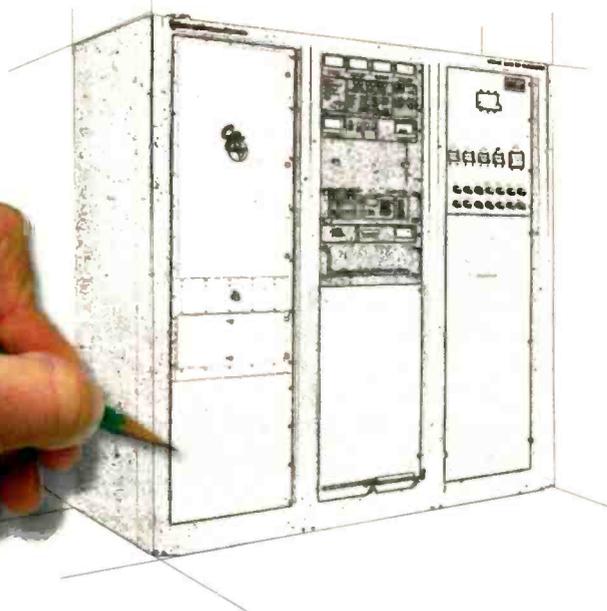
Digital FM exciters have also taken firm hold; several thousand digital exciters have been shipped from various manufacturers. The digital exciters feature composite analog or AES-3 digital inputs, along with an analog SCA input.



Continental Electronics
AN IDT COMPANY

816R Series FM Transmitters

*IS THERE ANY WAY
TO MAKE IT BETTER?*



Now available through select
RF Specialties offices!



www.rfspec.com

800.733.5011

www.contelec.com

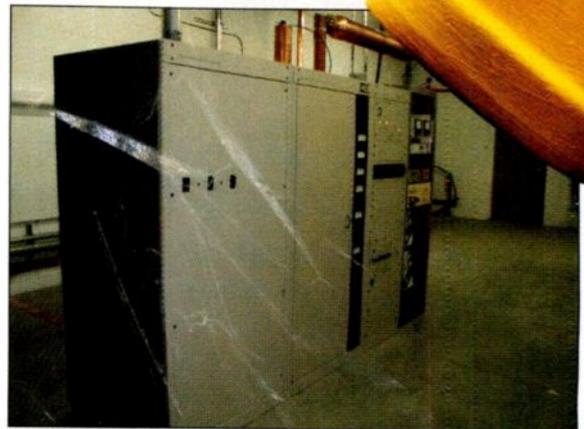
Circle (127) on Free Info Card or go to www.beradio.com

Selecting a new transmitter

Here to stay

Solid-state AM and FM radio broadcast transmitter technology is relatively mature, yet some engineers are still concerned about lightning damage to solid-state devices. Anyone who thinks solid-state is more vulnerable to lightning has not been paying attention. Many communication industry installations use only solid-state transmitters and base stations with big antennas.

Because the minute thermal mass of a transistor junction is less forgiving than a large tube filament, a greater adherence to good engineering practice and planned dissipation paths is required. All transmitters, AM or FM, tube or solid-state,



The costs for tube vs. solid-state for higher-power FM transmitters are competitive. A station's individual application will determine which is better.



Insert Tab A



How to Monitor In a Tight Situation

The new RM-1 is the ideal solution for monitoring needs in tight industrial environments. It's the perfect speaker for machine rooms, VTR monitoring, surveillance, mobile and stationary control rooms, theme park applications or any other situation where monitoring is needed and space is tight.

Features include:

- Dual Stereo Inputs with Independent volume controls.
- Switchable Matrix [L/R/Mono/Stereo] with high intensity multi colored LED's which tally the mode selected.
- Signal Presence/Amplitude Indicator.
- Balanced and Unbalanced I/O's.
- Universal Stereo Headphone jack with ample volume for noisy machine room environments.
- Fully shielded to prevent interference with video monitors or VTR tape machines.



The RM-1 employs a unique new driver technology that results in outstanding frequency response considering the limited space enclosure. This revolutionary transducer was developed by Foster Electric, the parent company of Fostex America.



Fostex

www.fostex.com 15431 Blackburn Ave. Norwalk, CA 90650 • 562.921.1112

Circle (128) on Free Info Card or go to www.beradio.com

should be installed using good engineering practices. This is especially true in the areas of grounding and AC line protection. If properly installed, solid-state transmitters can survive lightning as well as a tube rig.

Manufacturers can do a better job communicating proper grounding and installation techniques and surge suppression in their instruction manuals. Nautel provides an excellent *Site Preparation Guide* that explains and demonstrates proper methods for installing any transmitter.

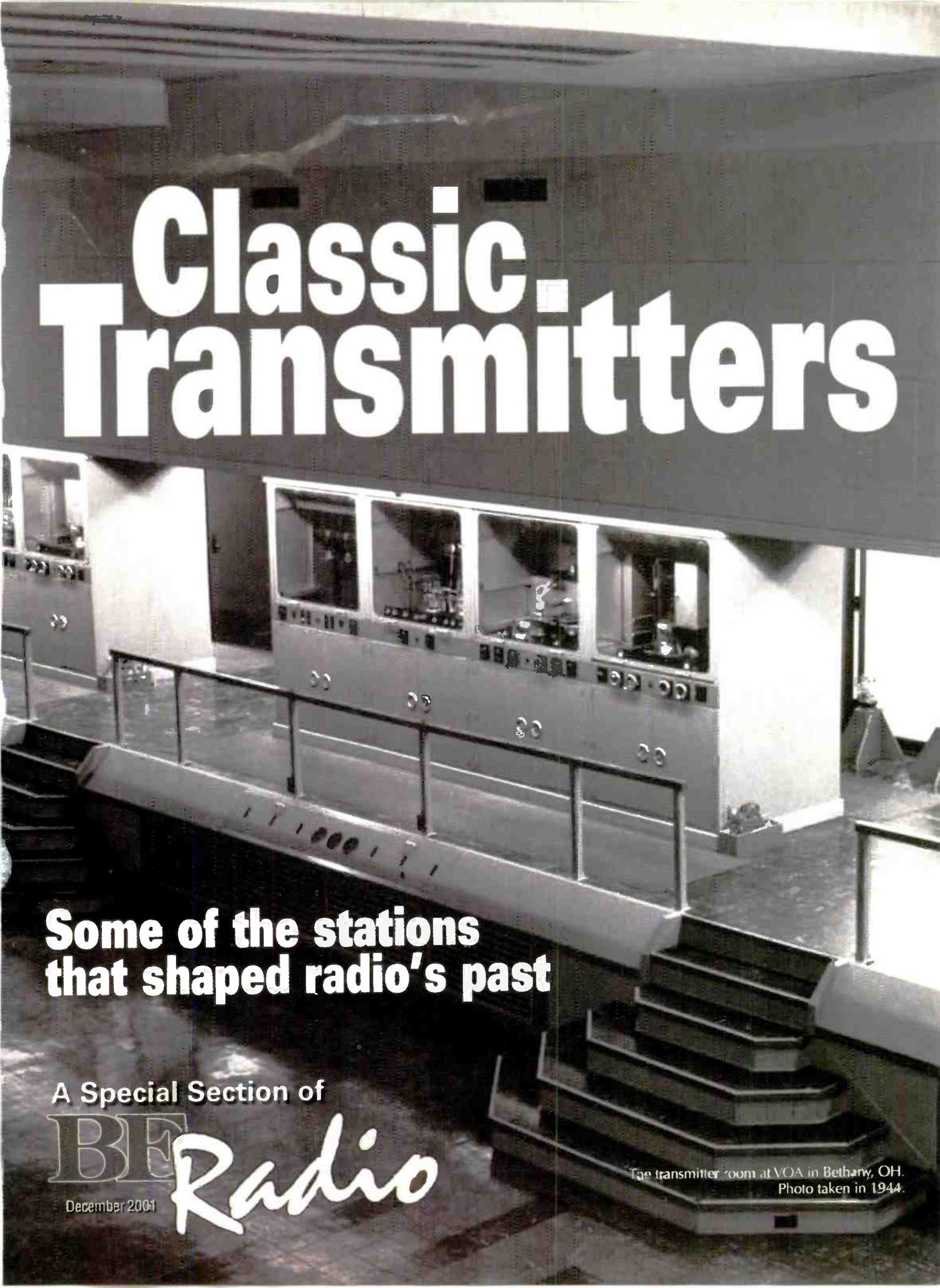
Another issue we hear less about today is the sensitivity of modern AM transmitters to improper loads. Some transmitters no longer even have front-panel tuning or loading controls.

Most current solid-state FM products can be linearized from the factory or in the field for IBOC FM common amplification mode. AM solid-state pulse modulated products should be easily modified, if not already suitable. Several AM transmitter manufacturers are now shipping "IBOC-ready" units.

Thanks to those who provided information for this article: Daryl Buechting, senior manager, radio product management and planning, Harris; Jorgen B. Jensen, manager, sales and marketing, Nautel Limited; Tim Bealor, director, RF systems, Broadcast Electronics; Ernie Belanger, sales and marketing manager, Armstrong Transmitters; and Ed Etschman, vice president, QEI.

Hal Kneller, CPBE CBNT is president and chief engineer of Heartland Broadcasting Corp, WZZS, WZTK, WZSP Zolfo Springs, FL, and director of radio engineering at Florida Gulf Coast University, Ft. Myers, FL, WGPU FM and WMKO.

Classic Transmitters



Some of the stations
that shaped radio's past

A Special Section of

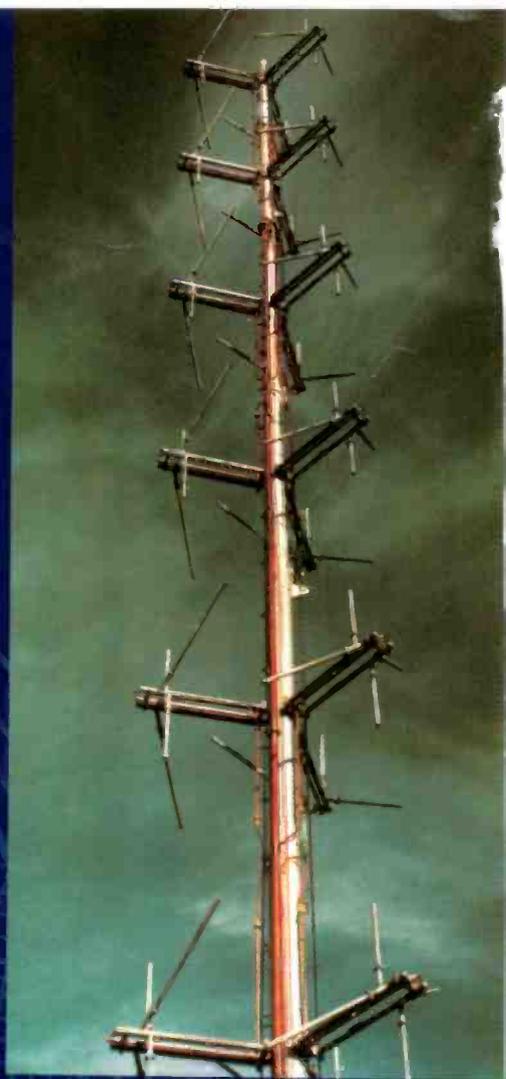
BE Radio

December 2001

The transmitter room at VOA in Bethany, OH.
Photo taken in 1944.



For
multi-station,
wide
bandwidth,
high power
antenna
systems,
the choice
is Dielectric.



Dielectric has the most complete broadband product line including side mount and top mount arrays, transmission line, combining systems, and monitoring systems. We also offer custom engineered towers, installation, and rigging services. Add over 800 years of combined engineering experience on staff and you know that a partnership with Dielectric is *the* choice to make.

See us at NAB Booth # R2343

Dielectric
COMMUNICATIONS

Engineering Excellence Since 1942

Circle (129) on Free Info Card or go to www.beradio.com.
Call your TEAM today! • Toll free 1-866-DIELECTRIC • www.dielectric.com • Raymond, Maine 04071

Classic Transmitters

Some of the stations that shaped radio's past

By Steve Walker

Radio broadcasting in the U.S. has a rich history, and great stories have been told and written about call letter origins, news coverage, format development, programming and promotion snafus, and all the famous TV celebrities that got their starts in radio.

All of those stories enjoy varying degrees of interest from radio broadcasters and their listeners, but there are also hundreds of great stories that are of interest primarily to engineers.

If you've ever gotten together with other engineers at an SBE function, at the NAB or just an impromptu lunch with fellow transmitter hacks, the

conversation has probably turned to stories about weird, funny or unfortunate happenings at some transmitter site or other. Nearly all broadcast engineers have at least one story to tell.

There are stories about haunted transmitter sites, transmitters with minds of their own, plate transformers falling through the floor, guy wires being cut, fried mice, freaky phone lines...the list goes on and on.

Some of the best stories come from some of the oldest transmitter sites. Sites you might term classic. We have gathered a few of these stories together to entertain and inform.

Walker is a freelance writer and station engineer for KBFB and KTXQ in Dallas. Contact Walker at be.radio@primediabusiness.com.



Contents:

- S4 Let's Automate!
VOA, Bethany, OH
What happens when engineers think of ways to make their lives easier? A breakthrough in technology.
- S8 The Modulated Maytag
WAPI, Birmingham, AL
A singing washing machine?
- S12 ... The World's Largest Battery
KLIF, Dallas
The world's largest battery was created by a young broadcast engineer in Dallas.

If you have stories you would like to share or information about radio from days gone by, send them to us at BE Radio magazine, 9600 Metcalf, Overland Park, KS 66212 or e-mail beradio@primediabusiness.com. Please include your contact information.

Let's Automate!

For nearly 60 years, the Voice of America (VOA) has been the USA's primary means of disseminating news and information throughout the world. Today, a network of 22 stations broadcasts material from 40 radio and three fully equipped television stations in Washington, DC, to more than 1,000 stations worldwide. One particular VOA relay station has some interesting stories to tell. Here is one of them.

The Bethany, OH, station was orig-

inally built during World War II. It was built so far inland because there was concern that German submarine activity along the East Coast might result in a coastal station being damaged or destroyed, and Bethany would be its backup. In fact, several of the rhombic antenna arrays at Bethany were aimed toward Europe.

Other antennas at Bethany were used to broadcast directly to Central and South America and to relay Radio Marti to these countries, as they are directly south of the Bethany location.

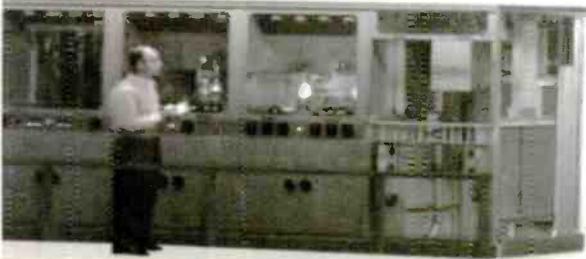
The Bethany station was also used for Armed Forces Radio and Television Service (AFRTS) until the service discontinued the use of the HF band.

Operating at frequencies between 6MHz and 21MHz, time of day and atmospheric conditions required

regular frequency changes at Bethany. In addition to changing loading caps and coils, each frequency change required antenna switching. The antenna system required manual switching.

John Vodenik, a VOA transmitter technician now stationed in California, was an operator at the Bethany relay station. "To switch antennas, a technician had to go outside into the switch matrix, sometimes in extremely cold or stormy weather conditions, and throw at least two of the antenna switches, often more," recalls Vodenik. "It took operating crews of three people as much as seven or eight minutes to change the frequencies. At one point, my crew had it down to a record of less than six minutes—but we had to hustle.

"In an attempt to get our speed up





FROM SEA TO SHINING SEA.

If we're not in your broadcast market, chances are we're on our way. Richland Towers owns and operates an increasing number of broadcast towers across America. **We also now provide project development, tower and facility management services to broadcasters.**

Richland has the financial strength, contacts and resources to be creative in designing a custom tower lease to fit your specific needs. In addition to financial and operational advantages, our multi-tenant towers afford you the highest FAA tower heights, maximizing FCC antenna COR's.

Let Richland deal with the complexities of site acquisition, engineering, planning, construction, maintenance, and all the other components of tower ownership. And save time and money in the process.

To find out more about Richland Towers, visit us on the web at www.richlandtowers.com. Or call us toll free at 1-800-827-4349.

We're well on our way to being anywhere you need us to be. From sea to shining sea.



Richland Towers • Two Urban Centre
4890 W. Kennedy Blvd., Suite 850
Tampa, FL 33609-2552
Toll Free: 1-800-827-4349
(813) 286-4140 • Fax (813) 286-4130
www.richlandtowers.com

United
We Stand 

Let's Automate!



The antenna arrays at the Bethany, OH, site.

so we could continue to beat the other crews, we came up with the idea of automating the antenna switching." So one day, Vodenik stopped at the local hardware store and bought an automation system. It consisted of a 200-ft. roll of 1/8-inch nylon cord.

The crew wanted to make sure that they built the automation systematically, so they decided that as a test they would only automate one switch the first time. So before it was time to switch to 6.030MHz, Vodenik and another crewmember went outside and pre-set all but one switch. They connected one end of the nylon line to the last switch handle, ran the line down the pole and through a pulley at the bottom so that it came off at about 90 degrees. The line then went into the building where an operator

could sit back and relax until it was time to switch. All the operator had to do was tug the line, and the experiment would undoubtedly be a success.

As the scheduled time for the frequency change approached, the crew was anxious to see the automation system in action. After all, this could potentially put an end to the treks into the frigid cold and rain.

When the time came, the transmitter was taken off the air and the work began. The coils

in the RF driver stage were changed, and the 15MHz shorting bar was removed from the output tank circuit. Everyone was looking forward to being able to complete the job without setting foot out of the transmitter room.

When it was time to switch, the crew gathered around the free end of the nylon line, and one crewmember picked it up. Recalls Vodenik, "He pulled on the line—and pulled some more. He pulled and pulled, and still the antenna didn't switch."

No one remembered that nylon stretches, and it surely did that day.

"After we had been off the air about eight minutes, the switch finally dropped. But there wasn't enough force to cause it to close. So someone had to run outside after all



The transmitter control room.

The Bethany VOA site had three Collins 821A1 transmitters. There were 22 different antennas held up by 110 telephone poles, some of which were later replaced with self-supporting towers. The rhombic antennas were 1,000 feet long per leg.

The Bethany station was dismantled in September 1995 as a result of budget cuts and a diminishing need for HF relays. Most programs are now relayed by satellite.



Three Collins 821A1 transmitters were used at the VOA site.

and close the switch. We set another record that day—ten minutes for a frequency change."

Vodenik says the group decided that the system wasn't meant to be automated, and they never tried again. "We had to live down a lot of laughter, but we laughed too."

Years later, Jim Hawkins, who maintains the Jim Hawkins' Radio and Technology Page website visited the site. When he asked why the antenna switching wasn't more automated, he was told, "Because it works fine the way it is."

Photos by Jim Hawkins.

AM Antenna Solutions



RF Components



LBA Tunipole™
Folded Unipole Systems



Diplexer, Triplexer and
Phasor Systems



Antenna Tuning Units

Since 1963

LBA Technology, Inc. is your proven supplier of innovative, digital-ready AM antenna systems. Our products include tuning units, phasing systems, multiplexers, AM/wireless isolation systems and components for every power level. We help hundreds of broadcasters in the USA and worldwide to **reach further – sound better!**

LBA Technology, Inc.

3400 Tupper Drive, Greenville, NC 27834
800-522-4464 / 252-757-0279 / Fax 252-752-9155 / Email Lbatech@Lbagroup.com
www.Lbagroup.com



The Case of the Modulated Maytag

It had been two weeks, and Mrs. Nelson still didn't know what the noise was or where it came from; the thump...chink...thump...chink... that seemed to come from nowhere. At first she was certain it was in the kitchen. Then she was sure it was the guest bedroom. Then it was the kitchen again. The noise seemed to move

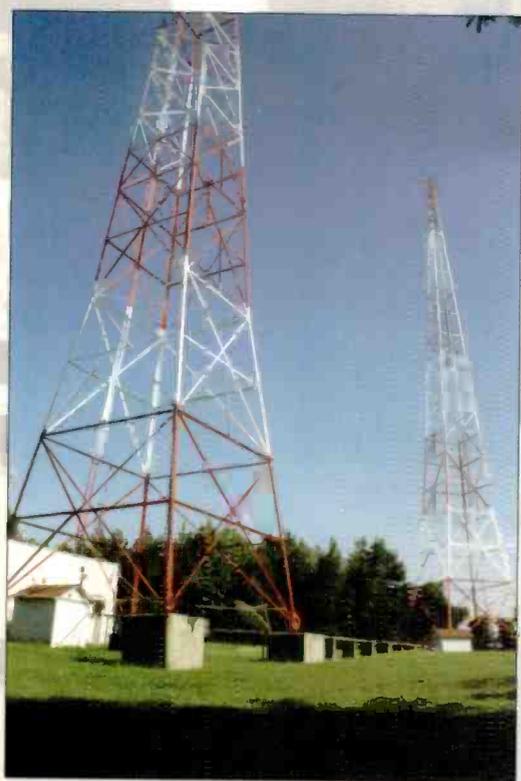
authorized by the FCC. Next to the remote control was a chart showing local sunrise and sunset times for the next few months.

Beautiful weather was in the forecast when Mrs. Nelson told her husband she wanted to stay home all weekend instead of making the usual trip to the lake. She had determined that the noise only came during the day when Mr. Nelson was at work. In fact, it seemed to come and go with the sun. This weekend, she wanted him home during the day. Maybe he would finally get to hear it. Reluctantly, Mr. Nelson agreed.

Sometime during the course of the weekend, and before the tree fell, the Nelsons determined that the noise was coming from the laundry room, which was just outside the kitchen.

On Monday morning, Giardina looked through the scrapbook some-

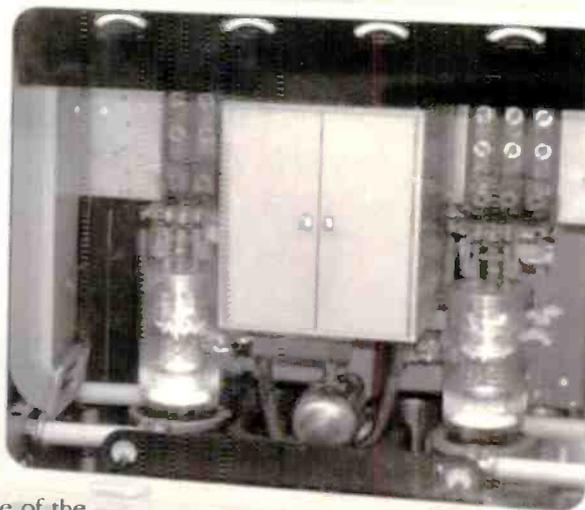
one had made for the station's sixtieth birthday, full of old newspaper clippings and photographs. Those people sure look funny, he thought.



WAPI is non-directional during the day and directional at night.

around, and it came and went at its own whimsy. Each morning she told Mr. Nelson about the noise, but the unmistakable rhythm was never beating in the early morning when he left for his job at the steel mill or in the evening when he returned.

Across town, in a nice two-story building near downtown Birmingham AL, WAPI-AM 107C chief engineer Frank Giardina was showing a new staff engineer how to switch from the 50kW daytime power to the 5kW directional night parameters



But then, WAPI signed on in September of 1922, some 4½ years before Congress created the Federal Radio Commission.

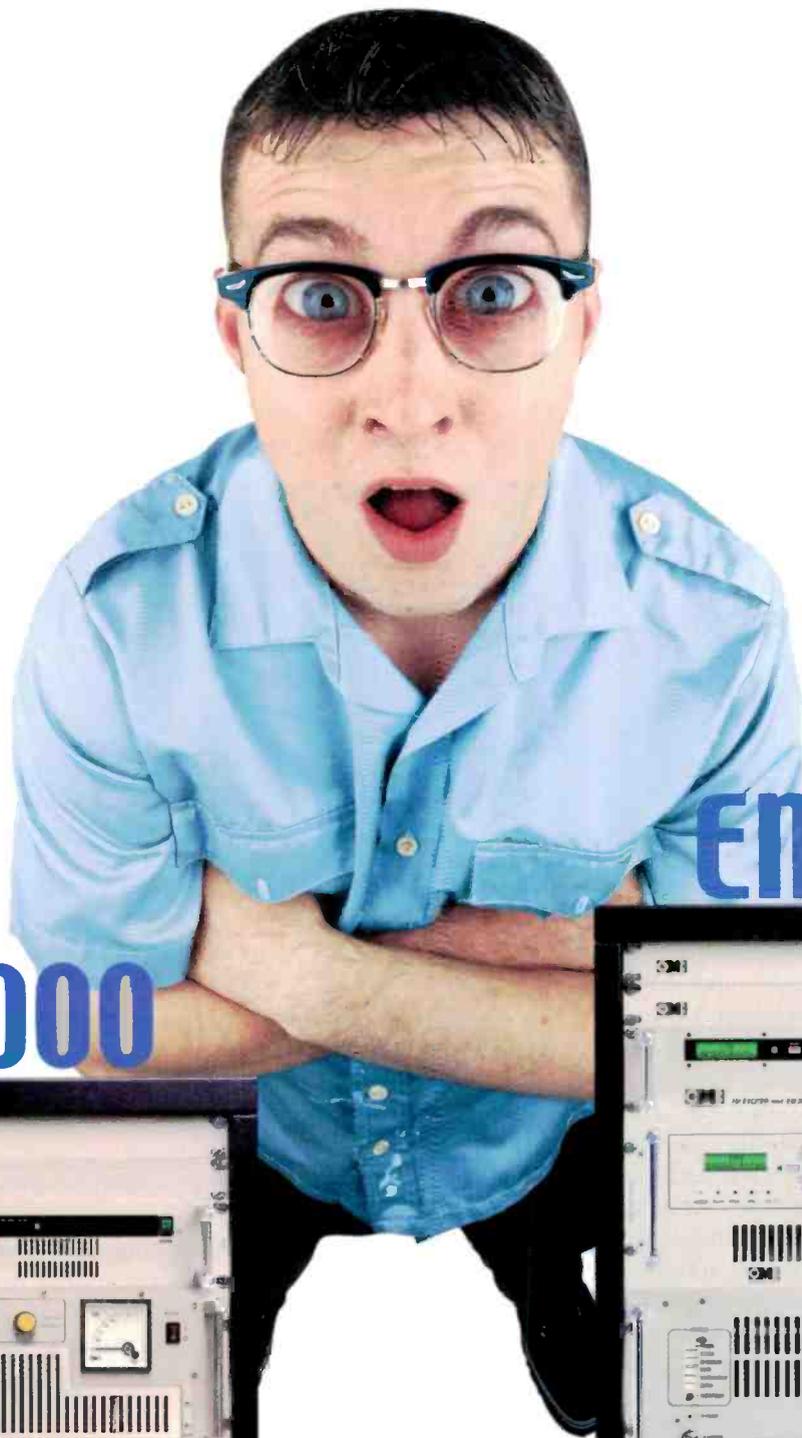
Giardina came across a 1952 picture of some of the early air talent heard



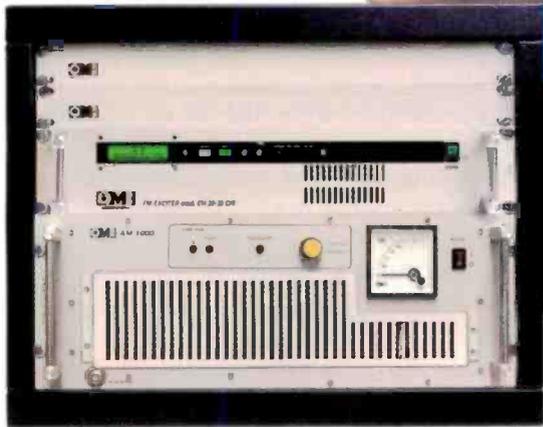
The neighbor's house where the singing washing machine lived is just beyond the transmitter site property line.

Easy to install, easy to place

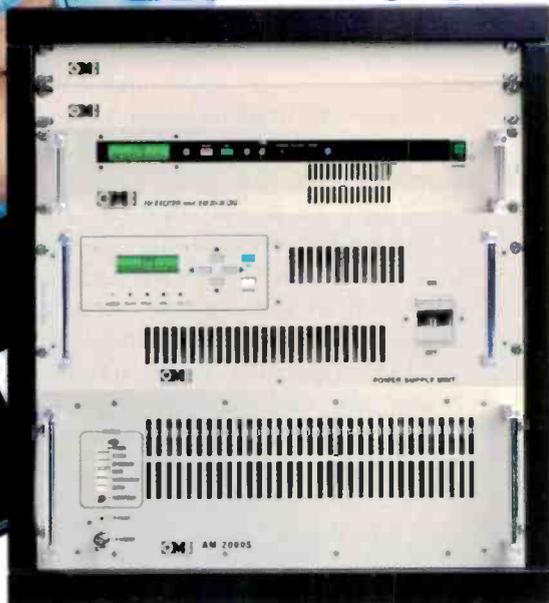
An alternative for small Radio Stations and Backup Transmitter



Solid State
EM 1000



Solid State
EM 2000



Circle (132) on Free Info Card or go to www.beradio.com.



EUROPE

Commercial & Y.V. Factory:
Avda. San Antonio, 41
Teléfs.: 976.50.46.96 (6 lines)
Fax 976.46.91.70
50410 CUARTE DE HUERVA
(Zaragoza)

Antena & Radio Factory:
Camino de los Albres, 14, bajos
Teléfs.: 976.50.35.80 (6 lines)
Fax 976.50.38.55
50410 CUARTE DE HUERVA • (Zaragoza)
Internet: <http://www.omb.es>
e-mail: ombcom@infonegocios.com
VideoConference(RDSI) 976 46 32 00

INTERNATIONAL DIVISION

3100 NW 72nd Avenue Unit 112
MIAMI, Florida 33122
Ph.: 305 477-0973 - 305 477-0974 (6 lines)
Fax: 305 477-0611
Internet: <http://www.omb.com>
e-mail: ombusa@bellsouth.net
Videoconference: +1 305 5940991/92

Modulated Maytag



The locks on the doghouses resonate during the day when WAPI is at high power.

on WAPI: Lum 'n' Abner, Burns and Allen, Amos 'n' Andy, and Baby Snooks. The headline began "Do you remember..." *Not really*, thought Giardina.

Finally he found what he was looking for: a special radio section of *The Birmingham News*, dedicated to WAPI at its first sign-on in its present location. This headline said "WAPI Operating Room Interesting." *Boy, can they write 'em.* The line Giardina was looking for came three-fourths of the way through the article: "Modulation is an im-

Today, WAPI uses a Harris MW-50 during the day (non-directional) and an MW-10 at night. The MW-10 is also used as a 10kW standby transmitter during the day when needed. The two windmill towers were built by the Battavia Wind Pump Company.

portant feature, and this has been taken care of by the latest equipment. Harmonics," the article continued, "are another feature that has been 'well taken care of.'" Giardina thought that this would be great material for the SBE chapter newsletter, but he was about to find something that would be even more newsworthy later that day.

It was just about then that Giardina's phone rang. It was Mrs. Nelson, muttering something about a tree and a fence. It seems that Mrs. Nelson lived just behind WAPI's 50kW AM transmitter site. One of the station's trees had fallen on her fence during the storm that had preempted the

man's terms, the story of how high concentrations of RF can do all sorts of strange things. He was telling her about the locks on his doghouse gates that play music during the day while the station runs at 50kW, when Mrs. Nelson had an idea. "Can it play music on washing machines?" she wondered.

When Giardina accompanied Mrs. Nelson to the laundry room, he heard the noise, the source of which had long eluded Mr. and Mrs. Nelson. She demonstrated how the noise would stop when the lid was touched and start again when it was let go. Likewise, the sound would stop when the lid was open and



Detail of the top loading used on the towers.

weekend's beautiful weather. She was calling to find out what Giardina was going to do about it.

When he arrived at the site, he found that a large pine tree had crumpled a portion of the fence. Pinecones and needles were everywhere, accompanied by the sweet scent of Southern pine in the air. Giardina went to the house to see Mrs. Nelson and found her talking on the telephone. When she finished, she mentioned that she could hear his radio station on the phone all day long.

They sat down to have a cup of coffee while Giardina related, in lay-

man's terms, the story of how high concentrations of RF can do all sorts of strange things. He was telling her about the locks on his doghouse gates that play music during the day while the station runs at 50kW, when Mrs. Nelson had an idea. "Can it play music on washing machines?" she wondered.

When Giardina accompanied Mrs. Nelson to the laundry room, he heard the noise, the source of which had long eluded Mr. and Mrs. Nelson. She demonstrated how the noise would stop when the lid was touched and start again when it was let go. Likewise, the sound would stop when the lid was open and

continue when the lid was closed. Always the same thump...chink...thump...chink. And always only during the day. Another mystery solved. Just a typical day in the life of a radio chief engineer. Apparently the oxidation present on the machine's lid had formed a diode detector—the Nelson's washer had become a crude crystal radio set. WAPI took care of the fallen tree. The Nelsons got the firewood and a new fence. WAPI kept the pinecones. Mrs. Nelson and the washing machine are no longer there, but the doghouse locks still sing.

THINK PENTA FOR POWER TUBES!

Get BRAND NEW Tubes (Made To ISO-9001 Standards) Comparable To The Prices Others Charge For Their Remanufactured Tubes.

Now celebrating its 50th year in business, Penta Laboratories is more committed than ever to providing customers with quality products at very competitive prices. Penta's ultra-efficient manufacturing facilities are certified under ISO 9001 standards and quality control procedures include testing to Mil Standard 1311B. In addition to its U.S. headquarters, Penta Laboratories has affiliated manufacturing entities in Europe and Asia with offices in South America.

While manufacturing quality and price are of great concern, you should know that service is equally important. Penta maintains large inventories of all popular tubes and can ship them expeditiously to meet your requirements. Nobody does it better than Penta. Call toll-free for details, or visit our website.



1951 **50** 2001

Broadcast Tube Specialists!

PENTA LABORATORIES

9740 Cozycroft Ave., Chatsworth, CA 91311
fax: 818-882-3968 • phone: 818-882-3872
www.pentalabs.com • E-mail: sales@pentalabs.com

800-421-4219

ISO 9001
CERTIFIED

YOUR ASSURANCE
OF QUALITY



Circle (133) on Free Info Card or go to www.beradio.com.

The World's Largest Battery

KLIF in Dallas is generally considered the birthplace of Top 40 radio, and Gordon McLendon is considered its daddy. On the air since November 1947, McLendon took a brave step in 1954 when he changed radio forever by instituting a 40-song play-

directional authority at night. The signal had long been unsatisfactory to McLendon. It was obvious to him that both Dallas and Fort Worth deserved to hear his station, even at night, so by 1969 he was determined to get a power increase from 1kW to 5kW at night, no matter what. The idea was to sacrifice nighttime coverage in less populated areas in favor of improved coverage of the entire metroplex.

two rows of six. The array was about a half mile long, and the rows of towers sat 200 feet apart.

With the towers up and the tower crew anxious to put in the ground system, Hultsman was under pressure to get the doghouse power, transmission lines and sampling lines buried. But not all of the sample line had arrived. The lines were 1,347 feet long and consisted of 3/8-inch unjacketed CATV cable, phase stabilized.



list and took the station from a 2% share to a 45% share almost overnight.

The station was 5kW non-directional during the day, but had a 1kW

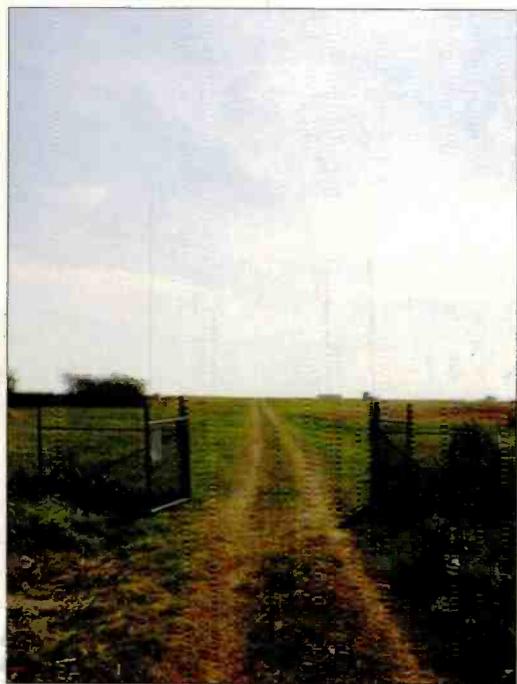


The transmission and sampling lines were specified to be the same length to simplify the phaser design and subsequent tuning. The towers nearer the transmitter building have a substantial amount of cable coiled and buried.

What he ended up with was a 12-tower array about 25 miles east of Dallas in Rockwall, TX, and a nighttime pattern that has been described as looking like a "Zeppelin with fish tails." Along with the 12 towers is a phaser that occupies five 42-inch wide cabinets. The man charged with installing this was Dave Hultsman, now domestic broadcast channel manager for Continental Electronics.

They had been ordered to be all the same length to make the already difficult task of phasing a 12-tower array as easy as possible. This meant that a lot of extra line for the towers nearest the transmitter building would have to be coiled underground.

Knowing that if he dug all the trenches and laid the power and transmission lines, the trenches would probably fill before the rest of the sample lines arrived, Hultsman was



The 12-tower array stretches for almost half a mile.



Sound Advice.

1.

Demand **UNCOMPRESSED** 16-bit linear audio in your all-digital air chain. Compression means compromise and we just won't hear of it.

2.

Select a digital STL that can be configured with **UP TO TWO PAIRS** of linear stereo audio. It's like getting two radios for the price of one.

3.

Exercise your **FREEDOM OF CHOICE**. Choose 32, 44.1 or 48kHz audio sampling. It's your broadcast—select the rate that works best for you.

4.

Choose a digital STL that **CAN ADAPT TO ANY RF ENVIRONMENT** with user-defined 16, 32 or 64 QAM rates. (Flexibility is always a good thing.)

5.

Purchase a **950 MHz RF STL**. The channel allocation is free, and the money you save over a T1 STL goes straight to your bottom line.

Moseley's Starlink SL9003Q is the only 4-channel digital studio transmitter link on the market with all these features. Not just an STL, a sound investment.

Moseley

Circle (134) on Free Info Card or go to www.beradio.com.

111 Castilian Drive • Santa Barbara, CA 93117-3093

World's Largest Battery



The stand-alone tower next to the transmitter building keeps the STL dish off the broadcast towers.

hoping to wait as long as possible to get started. But finally he gave in to the pressure and buried all he had, including three of the sampling lines. There were no doghouses yet, so the lines stuck out of the ground near each tower.

By the time the next shipment of sampling lines arrived, the trenches had caved in, so they had to be dug out by hand. As each trench was cleared, three sampling lines were buried. This continued until all the lines were buried.

Glenn Callison, McLendon's VP of engineering and Hultsman's boss, was in town to check the progress of the site. He grabbed an ohmmeter and put it on one of the sampling lines. It read a dead short. Callison was on a tight travel schedule and wasn't able to troubleshoot the line, so he gave Hultsman the responsibility of figuring out what was wrong.

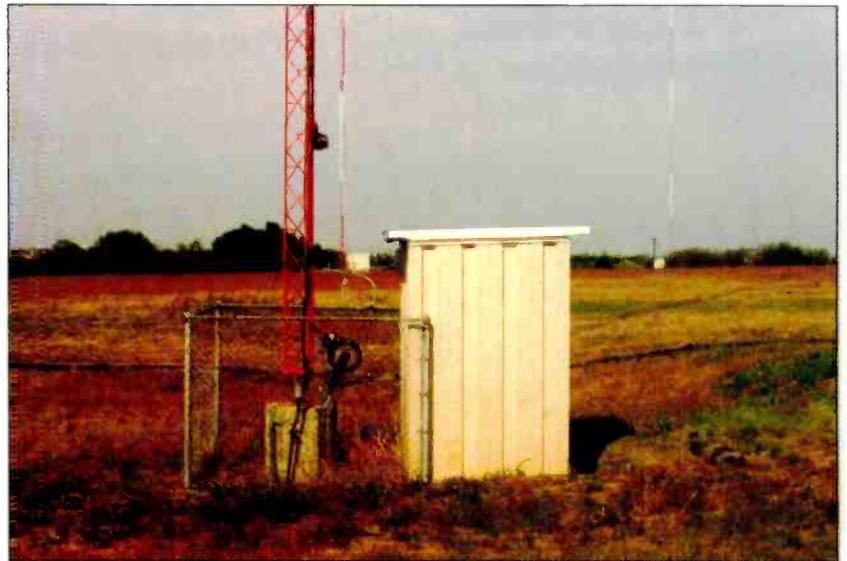
"I had a lot on my plate and had hoped that Callison would deal with the sampling line issue, but the problem was given to me anyway." When Hultsman checked his first line, he didn't read a short. Instead, his meter slammed into the left peg. Knowing he had not discovered negative resistance, he measured for voltage and found a 0.3V potential between the center conductor and the outer shield.

Hultsman recalls, "I checked all the lines and found problems with most of them. I still held out some hope that Callison would deal with this as I was having problems with the power company. I finally got tired of being chewed out about not

having it solved, so I got some rags and a tube cutter and headed out to tower 4. The soil was still a little loose so it wasn't too hard to dig up the line by hand. They were buried about 48 inches deep.

"When I got to the line, I could tell it didn't look right. So I kept digging until I had about a two-foot section completely exposed."

Hultsman then began trying to clean the muddy lines using the rags until finally he saw what had happened. "It looked like the entire line had been eaten up with some kind of acid. It turns out that the dissimilar metals of aluminum and copper, separated by the foam had undergone a chemical reaction with the wet soil, which is very acidic in North Texas, and created what one of my coworkers dubbed 'the world's most expensive battery'—12 cells and a grand total of about 3.6 volts if we could have hooked them all in series."



The base of tower eight and the original doghouse

The Dallas station on 1190 is now KTRA, carrying Fox Sports programming. It has changed hands several times since the Gordon McLendon days, and it is now owned by Clear Channel.

During construction, the site was once mistaken for the Rockwall Airport runway and a disaster was narrowly averted when Hultsman, Rick Neace and several other engineers waved off a landing at the last minute.

The 164 acres used for the site are part of McLendon Ranch. It is a hilly site; some of the towers sit at ground level, some are in pits and others are on little hillocks. As you drive by the site at night on I-30, you can hear the station clearly all the way to Fort Worth. But if you travel very far to the north or south, it seems to go away as if turned off by a switch.

Hultsman is quick to point out that he didn't specify the unjacketed line that created the 164-acre battery. "There were four bidders and the one we went with was the only bidder that quoted unjacketed line. Callison and I both missed it.

"When I tell this story, I always write it off to being a young and inexperienced engineer," says Hultsman. He doesn't tell the story often.

Fix Like New Again...

Revitalize your antenna
with ERI

- Tower reinforcing designs
- Fabrication of materials
- Installation

ERI®

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

Circle (135) on Free Info Card or go to www.beradio.com.



If You Feel Like This



You Need This

Looks like you've got your hands full again. Except you're running out of hands. And because you have many facilities you could use a few more legs, too.

Let Harris' Intraplex STL PLUS™ give you a hand getting your new station up and running quickly and profitably or upgrading your station to the best quality digital on-air sound available today.

STL PLUS™ gives you bi-directional program audio transport over a T1 line, fiber or microwave link. So you can interconnect your studios, offices and transmitter sites. And because it's a digital system, you're delivering pure, crystal clear sound – regardless of the distance. Even if you're surrounded by the highest mountains or tallest buildings.

Now for the PLUS in STL PLUS™: You can also transmit LAN/WAN data, telephone, intercom, and remote control over the same digital line. All of which can rack up some pretty impressive cost savings for your inter-facility communications.

Best of all, STL PLUS™ grows with you as no one else can. It has the industry's largest assortment of plug-in modules. So you can design the perfect system for today and quickly, easily, and affordably upgrade it for tomorrow.

So, contact your Harris representative about STL PLUS™ today. You'll be a leg up on the rest.



next level solutions

SERVICE

SYSTEMS

AUTOMATION

TRANSMISSION

Computer Concepts Epicenter

By Steve Fluker

At a first glance, Epicenter might seem like just another audio routing switcher, but behind the front panel and flashing lights, there's a lot more going on. The Epicenter is designed to give operators the feel of a conventional control room, yet the look of something from the future by interfacing with several of the new digital control boards like the Logitek NuMix or ROC consoles. Epicenter's power comes from taking all of the electronics of a studio and combining them into a central audio control center.

What's inside

Epicenter is housed in a typical routing switcher type chassis, which holds up to 16 audio cards. These audio cards can be digital or analog, and each has 16 inputs or outputs. The Epicenter can tie up to four of these chassis (or bays) together using fiber optics for the interconnection, giving a total capacity of up to 1,008 inputs or outputs in any combination. Each of the Epicenter bays also has slots for additional cards. The bay is controlled by a System card, which contains a microprocessor to tell each of the audio cards what to do. This card is connected to a PC via an RS232 serial port to allow easy programming and setup. The PC is only needed to make changes in the routing, and thus a crash in this computer will not cause a problem with the Epicenter. Redundant system cards in each chassis allow backup should a card fail.

Interfacing to the studios is achieved through the use of a Multi-Protocol plug-in card. This card contains six RS-422 ports to connect to the audio control boards and two RS-232 ports, which can interface to a digital storage and automation computer system. Remote control start and stop logic for automation systems can be controlled via these ports. Logic to start other conventional devices can be accomplished through relays located inside the audio console. These relays are controlled by the Epicenter, not the control board, which opens up even more flexibility.

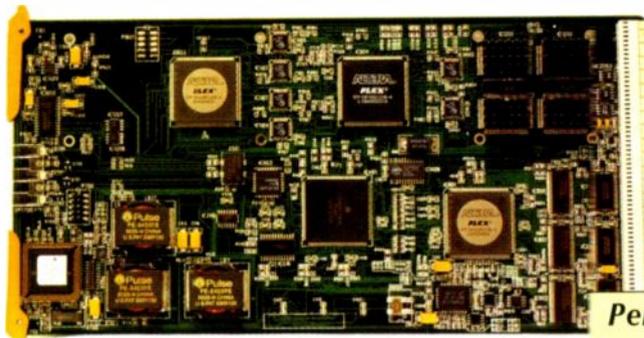
New thinking

In most on-air studios, the control board contains one or two line selector modules to expand the number of available inputs. With a routing switcher, these line selectors can be replaced with a module that can select any input into the switcher. With Epicenter, every pot on the control board becomes a remote line selector that can select any input

into the router. The electronics also provide options for pan, stereo/mono/phase mode selections, gain trim, and a count-up timer. Future expansions will allow equalization and other processing controls through a DSP card.

The main difference between the Epicenter and a standard audio routing switcher is the power of the outputs. In a standard routing switcher, each output can be assigned to play the audio connected to any of the inputs. Epicenter allows each output to become a mixing bus. Through the

use of a control board, or software on a computer, each output can mix up to 24 inputs. The gain of each input can be controlled separately using the



Performance at a glance

- Combines all facility audio routing into one central location
- Routes audio and control logic
- Reduces wire and cable needs
- Interfaces with a variety of control boards and computers
- Flexible, powerful and economical

pot on the board, or through programming of the computer. The audio electronics are housed within the routing switcher. The control surface connects via a CAT5 cable through the RS-422 port. This allows the user to create mix-minus buses controlled by the console, or to be fixed through software.

When wiring the Epicenter, all inputs and outputs are connected to the pack plane through WAGO connectors. Bringing out all of these inputs and outputs to a punch block is advisable and will make it easier to make future changes. Since no audio runs through the studio console, all of the studio wiring is contained in a separate rack room.

It doesn't take long to get the hang of programming the Epicenter. Programming scripts tell Epicenter how to handle inputs and outputs. Start by setting up the control board with a pool of the sources you would like the console to access. Logic and audio features are assigned to the input source via the program. This allows all features to work the same, even on another console in another studio. A name is assigned to each source, which will appear in the display on the control surface over the selected pot.

All the eggs in one basket?

One concern about having a single system controlling audio and containing control board electronics is redundancy

Field Report

and backup. In the arrangement for Cox Radio's six Orlando stations, the Epicenter comprises four bays. Each bay is configured as one large router. A typical control room might have three CD players. Each player is connected to a different audio card in at least two bays. Should a card or bay fail, we don't lose all our players. Our automation system is configured the same way. For the air chain, the digital and analog inputs to the audio processor are fed

simultaneously from different output cards and bays on the Epicenter. If the digital output card fails, the processor will switch to the analog input, and we are back on the air in under a second. Epicenter can re-



The Epicenter is designed to operate with third-party controllers like the Logitek NuMix.

"We're On-Air in Five Minutes."



When you've got audio to cut and no time to spare...

Trust Short/cut 2000™ to get a move on. How fast is it? You'll be editing tracks as fast as you can push the buttons. And when you're working on-air, Short/cut's ten Hot Keys keep your best clips cued-up and ready to go.

We've also tripled audio storage to a whopping 12 hours – and with a hard drive so quiet you can work right next to an open mike.

Whether it's breaking news, phone-ins, sports, interviews, or live events, the new Short/cut 2000 is radio's #1 choice for stand-alone digital audio editing.



360 Systems, 5321 Sterling Center Drive, Westlake Village, CA 91361 • Phone (818) 991-0360 • Fax (818) 991-1360

duce the number of back-up audio processors needed in a six station combo. The inputs and outputs of the back-up processor are routed through the Epicenter and can be routed to any of the six station's air chains.

Soon, the system will be integrated into the news/talk station. Stored console configurations will accommodate local and network programs and allow the setup of the board to be changed through the touch of a button. Epicenter can control background network recordings automatically.

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

More online

See how Cox Orlando's Epicenter proved its value during the stations' coverage of the September 11 attacks. Go to...



Computer Concepts

P F W E	800-255-6350
	913-541-0169
	www.ccc-dcs.com
	support@ccc-dcs.com

Editor's note: Field Reports are an exclusive BE Radio 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 BE Radio to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by BE Radio.

Circle (137) on Free Info Card or go to www.beradio.com

The Sound of Traffic

By
Conrad
Trautmann,
CPBE

Westwood One, Washington DC

After nearly 20 years of working in radio, being involved in the design process of Westwood One's Washington, DC, studio facility was something of a departure from my experience. I learned that sound isolation, sound deadening and noise elimination are not necessarily a primary focus. In some cases, background noise can be a good thing.

Located at 8405 Colesville Road in Silver Spring, MD, are the offices and studios for Westwood One Shadow Traffic, Metro Traffic and SmartRoute Systems. On the 15th floor of a 17-story building that resembles a stealth fighter, the offices and studios occupy a combined space of 21,000 square feet, about 7,000 of which are dedicated to 23 sound studios, four television studios and an operations/traffic/news gathering area. The new facility was designed to consolidate Shadow and Metro Traffic operations, which were located in Chevy Chase, MD, SmartRoute Systems (also known in the Washington area as Smart Traveler), which was located in downtown Washington, and Westwood One's administrative offices, which had been located in Arlington, VA. The primary product delivered from the new facility is traffic information to affiliate radio stations. News and information are secondary. For simplicity, I'll refer to all the occupants jointly as Westwood One hereafter.

Early in the design phase, I questioned the fact that the studios were to have standard office walls, floors and windows, and that the HVAC had no special sound isolation. I was skeptical that this

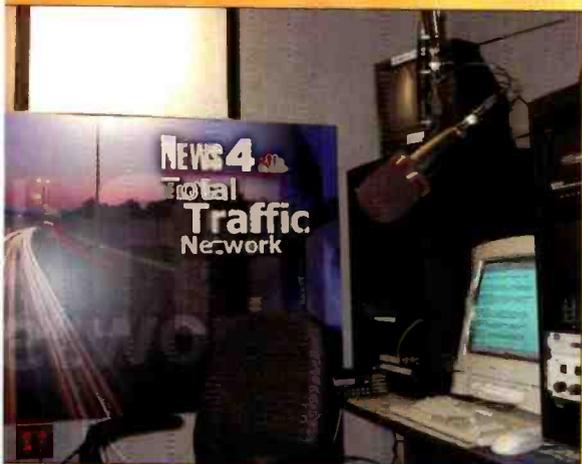
would work successfully, but was assured that many of the other traffic facilities we had around the country were built the same way and all of them worked very well.

Common practice in radio engineering is to strive for the best audio at all times. Despite these efforts, it is not uncommon for programming to complain that the audio is "too clean." Many engineers have used expensive noise-canceling headset mics, wide-band RPU/VCL systems and modified two-way radios, only to be forced to equalize the feed to make it sound like it's not in the studio. Another common scenario is to create a studio with nearly perfect sound-isolation specifications with superior microphones and processing, only to have the news department run an endless loop sound effects bed under the announcer to make it sound like it's coming from the newsroom.

Unlike a traditional radio studio, there are no monitor speakers in our facility. Sound isolation design in a radio station is to prevent sound from one studio from bleeding out of that studio or into another studio while a mic is open. We know that production talent like to listen to their final product through large monitors with 12-inch woofers driven by a 150W power amplifier. Add the common air-talent practice of cranking that new song in the air studio. This is not the case in a traffic or

news studio. In such rooms, the traffic or news announcer is only listening for an IFB or cue from the affiliate station; this is done with headphones. Even with back-to-back studios, the announcer's voice from one room is not a distraction to an announcer in the next room. We take some measures to deaden the sound, such as sealing any penetrations between the rooms and lining the ceiling tiles and adjoining walls with bats of insulation, but the sound level created in the booths is nowhere near that of a typical radio station, and that eliminates the need for an isolated booth.

The Sound of Traffic



A typical TV booth with a MetroSource workstation.

Sound off now

As I mentioned above, noise can be a good thing, and to get the sound of a working newsroom or traffic center on the air, many of the Westwood One studios are designed to face the oper-

ations desk where information is gathered. Many announcers leave the studio doors open so that they can easily communicate with the producers who update them minute-by-minute of traffic conditions. All of these added audio sources also come through on the air.

All cabling is a home run from each studio to a central rack room. SAS 32000 routers route each studio to the affiliate station and handle IFB routing. An announcer can be in any booth in the facility and feed any affiliate station by selecting it on the program router. This offers complete redundancy in the event of an equipment failure in a booth. Stations that cannot be monitored off air or require a feed pre-delay IFB have dedicated lines that can be routed to the studios using the IFB panel. In the Washington market, we feed 37 stations with dedicated audio loops provided by Verizon, and a few have return loops for IFB. We also use ISDN and standard phone couplers for IFB returns.

The rack room relies on backup power from a 15kVA Best UPS, and the

entire facility is connected to a 150kW generator. Since the building air conditioning only runs during business hours, a 35-ton supplemental air conditioning unit was installed to provide climate control. It uses an electronic variable air volume system to allow individual temperature control in the studios and operations center.

Each booth is equipped with a Dixon NM 250 mic mixer, which in addition to standard balanced-line outputs, has unbalanced inputs and outputs, eliminating the need for an impedance-matching box to connect our MetroSource computers and their standard PC audio card. The Dixon mixer also has remote switching capability for mic on/off control and control of external sources. It has three buses, one program, one monitor and a mix-minus for the phones.

The booth also has a Sennheiser 421 microphone, a program router control panel, an IFB control panel (with monitor speaker), a Telos hybrid, a VCR and television, a tuner, cassette deck, and a MetroSource computer.

NTI New Sound Generation

...Would like to welcome the newest member of the Minstruments family, the Digitizer DL1



Everyone needs a good listener

The Digitizer DL1 handles virtually all digital audio formats including ADAT up to 96kHz sampling rate. Simple and intuitive operation to monitor, analyze and troubleshoot any digital signal.

Together, the Minstruments comprehensively provide your audio measurement solutions at an outstanding value.



Please look us up at:

Neutrik Test Instruments (NTI), 3520 Cliffside St., St. Laurent, PQ, Canada, H4T 1A7

Tel: (514) 344-5520 • Toll Free: 800 667 6388 • canaca@nti-instruments.com • www.nti-instruments.com



Pre-built Transmitter Sites

Solid-State Transmitters

Single-Tube Transmitters

Low Power Transmitters

RF Amplifiers

FM Exciters

Digital T1 STL Systems

Digital Spread Spectrum

Digital Stereo Generators

Modulation Monitors

Circle (138) on Free Info Card or go to www.beradio.com



There are several open traffic reporter booths in the traffic gathering area.

The MetroSource computer serves a few functions. First, it runs the MetroSource software, the newswire service that Westwood One originates from our Phoenix newscenter. The MetroSource computer takes the place of a reel-to-reel recorder to record and edit in each room. It also serves as the system to distribute traffic information data to each studio from the producer's area. Information is input into the producer's computer and is made available to all studios.

The operations desk is where all of the information is gathered. Two-way radios provide communication with the

three aircraft we fly and the two mobile ground reporters during morning and afternoon drive. Scanners supply the ability to listen to police and other emergency services for tips on conditions.

Video feeds come from the Virginia Department of Transportation, Maryland Department of Transportation and from WWI's own five cameras placed around the Washington metro. The DOT cameras can be remotely switched, giving access to a total of 50 cameras. Co-locating Smart Traveler adds another six cameras.

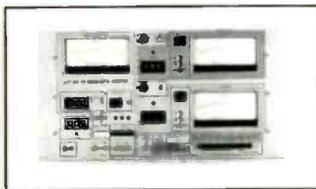
TV-1 fiber lines provided by Verizon transmit many of these video feeds and provide connectivity to the local TV stations. A few of the feeds come in via microwave, and many of the images we access are used on the air of the television stations during the

reports. Each TV studio has a local video switcher that allows the talent to switch between their own camera, the various traffic cameras and maps of the local area showing trouble spots. An in-house video modulator system provides feeds of all of the cameras to each studio through the in-house cable system. This allows the announcers to see what is actually happening.

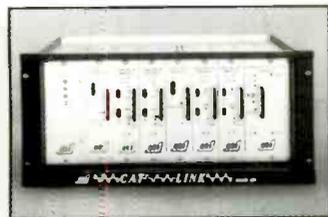
Wise travels

Smart Traveler, which also has producers at the operations desk, translates the information it gathers into content used for the Internet and for on-demand dial-in telephone access. Information entered into the Smart Traveler system is translated from text to voice by an Interactive Voice Response (IVR) system. We also have the ability for announcers to record information in real time into the system, so callers will get a human voice instead of a computer-generated voice.

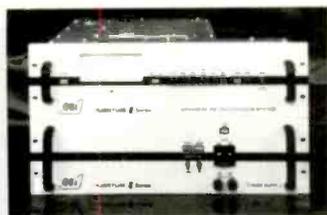
Pulling together a move of this magnitude was no small feat. We started by planning well. The key planners



Modulation Monitors



Digital STL / TSL Systems



Low Power Transmitters

Meeting The Broadcaster's Present And Future Needs



Transportable Pre-Built Transmitter Sites



Solid-State and Single Tube High Power Transmitters

QEI Corporation
One Airport Drive, P.O. Box 805
Williamstown, NJ 08094
e-mail: qeisales@qei-broadcast.com

Toll-free Sales (800) 334-9154
Fax (856) 629-1751
Emergency Service (856) 728-2020
Web Site: <http://www.qei-broadcast.com>

For More Information Call Us Toll-Free At (800) 334-9154

Circle (139) on Free Info Card or go to www.beradio.com

The Sound of Traffic

were John Frawley, VP of operations for Metro/Shadow, Trevor Marriot, director of engineering and our architect, Marc Behrman of Interplan in Washington, DC and me. Next, we



More than 50 terrestrial video cameras can be controlled by an operator at the video wall.

selected a general contractor, Bob Ellingwood, owner of Patwood Construction, who was familiar with local codes and building practices. We depended on Orlando-based Balsys, a studio installation firm run by Tom Bohannon and Larry Lemoray, for the pre-wiring and installation of all radio equipment. Video installation was handled by DSI RF systems and included connection of all the cameras, studio switchers, TV stations, microwave paths and fiber-optic lines in and out of the facility. Our in-house manager of telecommunications, Dick Owen, ordered and supervised the cutover of all dedicated audio circuits, POTS lines, Centrex, ISDN and video fiber.

The Smart Traveler computer systems and studio equipment move was arranged by Peter Sturgis, director of operations and Wendy Richter, system administrator. We combined all operations onto the mainframe relay line in the facility, which connects Smart Traveler to the Internet for Web content and MetroSource for our news feeds to our main office in Phoenix.

Equipment List:

- AMCOS30251 workstation furniture
- Dixon NM-250 mixer
- Sennheiser MD421 microphones
- Telos 9102 Zephyr ISDN codecs
- Telos 125 telephone hybrid
- Middle Atlantic racks and panels
- Dell GX-110 computers for MetroSource
- Sierra Automated Systems SAS32000 router
- Belar LP-1A AM loop antenna
- Belden wire and cable
- MetroSource recorders
- Telos phone hybrids

Westwood One knows what it takes to provide traffic and information to its affiliates and customers. When you hear a reporter on a radio station doing the traffic, there's a good chance it is originating from a facility similar to the one here in Washington.

Conrad Trautmann, CPBE, is vice president of engineering for Westwood One, New York.

AM Transmitters



Model - Pulsar 5000

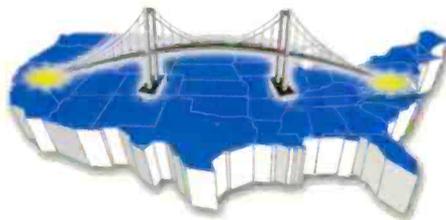
"We Sell Two AM Transmitters Every Week"

- ◆ 250 & 500 watt, 1 KW, 2 KW, 5 KW, 10 KW
- ◆ Solid State PDM
- ◆ 140 % Modulation
- ◆ High Efficiency
- ◆ "They Sound Like FM"

Tele-Link

by Energy-Onix

The only stereo quality STL link to utilize the "Free Internet Highway"
Standard system provides bi-directional stereo.
Versions available with 2, 4, and 8 channels.



Contact Energy-Onix or your Energy-Onix dealer for price & delivery information.

1306 River Street
Valatie, New York 12184

FM Transmitters



Model - ECO-25

"We Sell One FM Transmitter Every Day"

- ◆ 1 KW to 50 KW
- ◆ Exciters 10 W to 300 W
- ◆ Solid State & 1 Tube models

Toll Free Phone: 888-324-6649
Fax: 518-758-1476
E-Mail: info@energy-onix.com
Web page: www.energy-onix.com



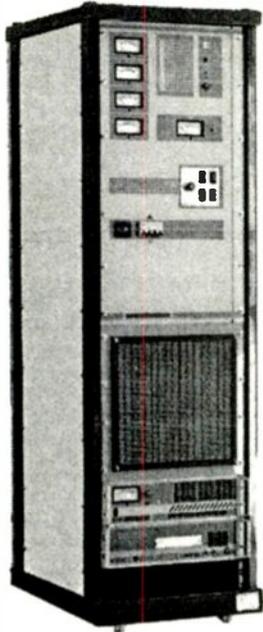
ENERGY-ONIX
The Transmitter People

Circle (140) on Free Info Card or go to www.beradio.com

Superior Broadcast Products

FM Transmitters

All Power levels 20 watts to 30,000 watts
100% Solid State or Grounded Grid



Grounded Grid Models Feature

- Solid State High Performance Exciter
- Solid State Driver
- Ease of Installation
- Fast Delivery
- Motor Driven Tuning
- Complete Front Panel Metering
- Low Pass Filter
- Soft Start Up
- Cost Effective Pricing
- Financing Available
- LED Read out on front panel shows operating parameters

Solid State FM Transmitters

Featuring the latest Cold Mos fet Design
Models range from 20 watts to 10,000 watts

20 watt Exciter	850.00
100 watt Transmitter	2,000.00
250 watt Transmitter	3,000.00
350 watt Stereo Transmitter	3,500.00
500 watt Transmitter	4,000.00
1,000 watt Transmitter	7,000.00

Many other models to choose from

Transmissions Line

Superior Broadcast Products offers a wide range of transmission line and accessories

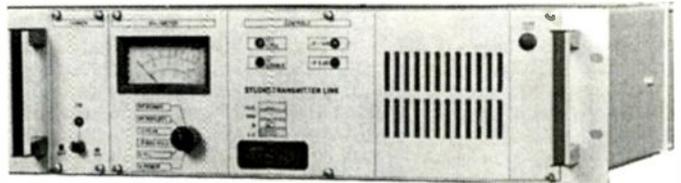
1/2 inch Foam Coax as low as	\$1.40 per foot
7/8 inch Foam Coax as low as	\$3.50 per foot
1 5/8 inch Foam Coax as low as	\$8.50 per foot
2 1/4 inch Foam Coax as low as	\$12.00 per foot

Call for prices on other sizes

High Performance Digitally Synthesized FM Exciter



Studio to Transmitter Link Frequency Agile Composite Transmitter and Receiver



Both Transmitter and Receiver \$3,500.00

Transmitter	Receiver
10 watt output	Active band pass filter
Stereo or Mono	Full Metering
Full Metering	Fast Delivery
Two SCA inputs	Two SCA outputs

One year limited warranty

FM Antennas

Power Levels from 500 to 20,000 watts per bay

One bay	500 watt input	495.00
Two bay	500 watt input	1,200.00
Four bay	2,000 watt input	1,990.00
Six bay	3,000 watt input	3,500.00

Broadband Medium Power

Two bay	3,000 watt input	2,400.00
Three bay	3,000 watt input	3,400.00
Three bay	10,000 watt input	4,000.00
Four bay	3,000 watt input	4,400.00
Four bay	10,000 watt input	4,800.00
Six bay	3,000 watt input	6,250.00
Six bay	10,000 watt input	7,000.00
Eight bay	10,000 watt input	9,500.00

Many other models and power levels

Contact Jimmie Joynt 17194 Preston Road, Suite 123-297 • Dallas, TX 75248

Ph. 800/279-3326 • Fax 800/644-5958 972/473-2577

New Products

By Cindy Holst, associate editor

Optical disc duplicator Primera Technology



◀ **ComposerPro:** Designed for high-volume, in-house disc duplication, ComposerPro uses dual CD-R or DVD-R recorders and a large media input bin to record and optionally print up to 100 discs per batch. Users can duplicate music or data disks. A precision pick-and-place robotic arm transports discs from the input bin to the dual integrated CD-R or DVD-R recorders. After recording, discs are transported to an optional Primera Technology ink-jet or thermal transfer optical disc printer where they are printed in color in up to 2400 dpi print resolution. ComposerPro comes equipped with professional mastering and duplication software for Windows 95/98/Me and NT/2000. The software allows the duplication of many CD formats, including CD-ROM, CD-RW, CD-DA and Video CD. Two models are available.

800-797-2772; fax 763-475-6677
www.primeratechnology.com; sales@primeratechnology.com
Circle (264) on Free Info Card or go to www.beradio.com

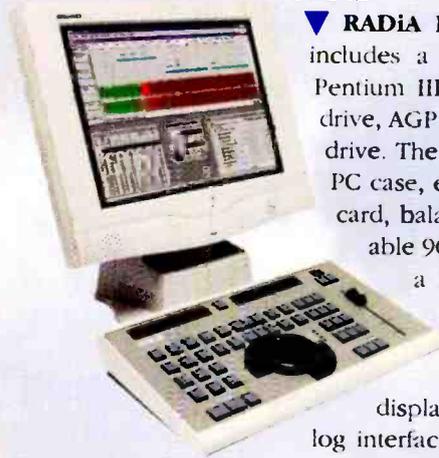


Console wiring kits Systems Store

Pre-wire kits: Installing or moving a studio can be a major undertaking when it involves wiring a console. Systems Store Pre-wire kits can save a considerable amount of time in a project. All console cables, regardless of size or console model, can be ordered and assembled. Systems Store can make wire harnesses to custom specifications of length, cable brand and type, and labeling, and offers a variety of termination options for punch blocks, connectors or unterminated pigtails. All cables are custom made for quick and easy installation.

888-616-7980; fax 314-872-3009; www.systemsstore.com; custsvc@systemsstore.com
Circle (267) on Free Info Card or go to www.beradio.com

Digital audio workstation SADiE



▶ **RADiA Platinum:** This 4-in, 4-out turnkey system, includes a SADiE rack-mount PC featuring a 667MHz Pentium III processor, 128MB RAM, 10GB internal IDE drive, AGP video card with 8MB VRAM, and 48x CD-ROM drive. The system comes with the Studio Audio 19" rack PC case, external SCSI interface, RADiA PCI processing card, balanced breakout cable assembly and a removable 9GB SCSI audio drive. The system also includes a 15" LCD panel display and the RADiA Master Control Panel. The Master Control Panel has transport controls, scrub wheel, edit, locate and function keys, motorized faders, and time displays. The RADiA Platinum offers balanced analog interfacing, AES/EBU and S/PDIF digital I/O. It also interfaces with radio automation systems. The unit offers 24 replay tracks and 24-bit digital audio recording and editing at up to 48kHz.

615-327-1140; fax 615-327-1699; www.sadie.com; sales@sadie.com
Circle (266) on Free Info Card or go to www.beradio.com

Broadband antennas RFS Broadcast

828DA: This model is a circularly polarized Band II antenna with a nominal gain or -1.0dBd per plane of polarization. The antenna is fitted with a horizontal reflecting element to provide improvement in the directionality of horizontal radiation pattern. The thick walled stainless steel design ensures years of trouble-free performance in a hostile environment. For environments where antenna icing may be a problem, optional radomes are available. The 828DA can be used in applications from one up to 10 bays. The parallel feed system facilitates the customization of null fill and beam tilt to suit customer requirements. Three versions cover the FM band, with each version designed to operate over a 10MHz bandwidth. 828 antennas using 1/2 wavelength spacing and covering 87.5MHz to 108MHz are available on request.

203-239-3311; fax 203-239-9260
www.rfsbroadcast.com

Circle (265) on Free Info Card
or go to www.beradio.com

Digital audio processor Orban



▶ **8200 Signature series:** A special edition of 8200 that starts with all of the features of 8200's Version 3.0 software and adds eight new presets custom-tuned by the Optimod line's engineer, Bob Orban and Orban VP of product development Greg Ogonowski. The units also offer standard sample-rate converting AES/EBU digital input and output that can handle 32kHz, 44.1kHz and 48kHz rates. A redesigned front panel commemorates the 10th anniversary of the 8200. The 8200 Signature Series replaces the 8200.

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

Circle (261) on Free Info Card
or go to www.beradio.com

Power beyond the printed word.

Our ability to help
you solve business
problems extends
beyond the great
editorial in
this publication...

PRIMEDIA
Business Magazines & Media
PrimediaBusiness.com

Power



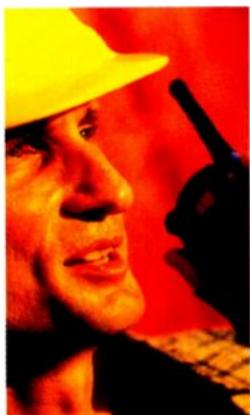
E-Mail

Newsletters.

Get the news you need, as it happens. Sign up for a subscription to one of our e-mail newsletters. Go to PrimediaBusiness.com and click on "I want to subscribe to a newsletter." Or, sponsor one of our targeted newsletters to reach buyers in your market. Contact Rob Shore (rshore@primediabusiness.com or 212-204-2622).

Amplified coverage.

Every Primedia Business publication has a Web site with relevant news and additional resources. Go to PrimediaBusiness.com and click through to the publications you're interested in.



beyond

the

Supplier Directory.

Find a product or service
in our multi-industry

Supplier Directory. Go to
PrimediaBusiness.com

and click on the Supplier
Directory link.





**Custom online
“special reports.”**

Our editorial content and
your sponsorship can help
you increase your sales.

Contact Christina Julian
(cjulian@primediabusiness.com
or 212-204-1411).

printed

word

Banners.

Properly created and targeted Web banners can actually be incredibly effective.

Target by audience or content. Contact Rob Shore (rshore@primediabusiness.com or 212-204-2622).





Industry news, delivered.

Get the latest industry-specific news automatically delivered fresh to your corporate Web site, intranet or extranet. Go to PrimediaBusiness.com and check out Primedia Insight newswire.

Power **printed** **beyond the** **word.**

We can connect you with the exact buyers you're looking for or bring you the information you need to win in today's markets. Click or call today to tap into the power of Primedia Business.

PRIMEDIA
Business Magazines & Media

PrimediaBusiness.com

Transient voltage suppressors dbm Systems

▼ **Audio Surge:** These suppressors are designed to protect high end, professional, and broadcast audio equipment from damaging transients. While nothing can



completely eliminate lightning and transient damage, transient voltage suppressors can make a

substantial difference. The near instantaneous response time of 1 picosecond, provides immediate peak power dissipation of up to 1,500 watts. Audio Surge suppressors are available for most high-end digital audio cards. Audio Surge also manufactures custom suppressors for most audio and control applications.

800-795-7234; fax 601-853-9976
www.cartworks.com; sales@cartworks.com

Circle (254) on Free Info Card or go to www.beradio.com

Equipment rack APW Enclosures

▶ **Steel Relay rack:** These racks are available in a variety of sizes in equal- and unequal-flanged format, with open or closed duct, and non-seismic and Zone 4 seismic ratings, to offer flexible universal spacing. The product family has an array of accessories including aluminium shelves and components to meet a variety of installation needs.

800-628-5858; fax 661-775-2657
www.apw-enclosureproducts.com

Circle (251) on Free Info Card
or go to www.beradic.com



Monitor panel Fostex America



▲ **RM1:** Designed for rack-mount monitoring of signals and suitable for use in rack rooms, editing and dubbing stations, news workstations and remote vehicles, the RM1 provides stereo monitoring in 1RU. The aluminum front panel has many user options so that the audio output can be configured for a variety of applications. Offering two 15W amplifiers, the specially designed transducers provide 80Hz to 15kHz frequency bandwidth. Features include two stereo balanced +4 inputs with 4 XLR/phono Neutrik combo connectors and electronic matrix switching for mode or channel selection, A/B select switch, signal presence indicator and a headphone jack and gain control.

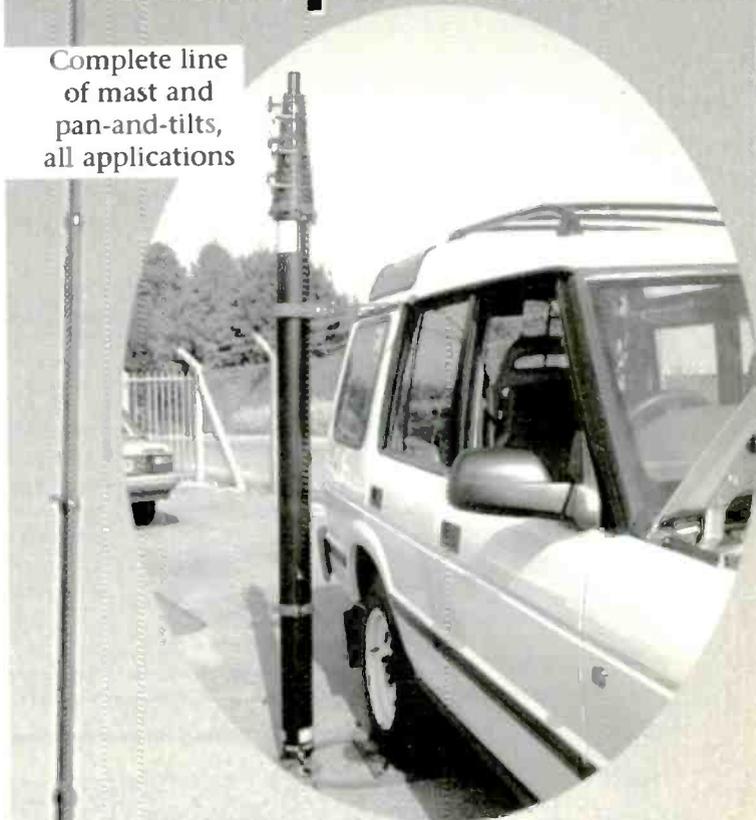
800-7-FOSTEX; fax 562-802-1964; www.fostex.com

Circle (258) on Free Info Card or go to www.beradio.com

www.beradio.com

Portable Mast Serves Multiple Vehicles!

Complete line
of mast and
pan-and-tilts,
all applications



Hilomast Rapid Deployment Unit

- Extends up to 40 feet
- Easily clamps to the vehicle's gutter or to a vehicle roof rack.
- Vehicle weight holds the foot of the mast in place.

Enjoy the benefits of a telescoping pneumatic mast without making it a permanent feature. Carry the mast on the roof. Quickly erect upon reaching desired location.

Contact Jim Osborne for competitive pricing.
email: j_osborne@aoa-gps.com

ALLEN OSBORNE ASSOC., INC.

Tel: (805) 495-8420 • www.aoa-gps.com



Circle (150) on Free Info Card
or go to www.beradio.com



New Products

Stereo graphic EQ
PreSonus Audio Electronics

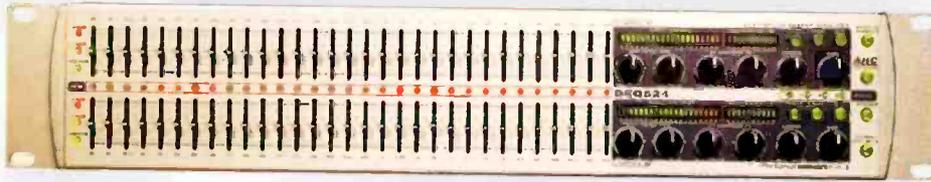


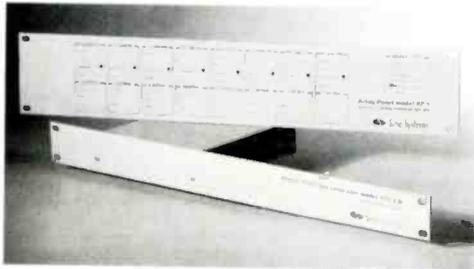
plate controls using a programmable password-style of access. Once engaged, the DEQ624 will retain all programmed settings. The user can recall up to four presets on the DEQ624. The DEQ624 features a brick wall limiter with variable threshold and a downward expander with variable ratio and threshold. The inputs and outputs of the DEQ624 include XLR balanced, 1/4 unbalanced and barrier strips. The DEQ624's adaptive hum cancellation identifies 60Hz hum caused by ground loops and dimmers and uses phase cancellation to eliminate any problem without altering the audio. The DEQ624 also features high- and lo-pass filters (20Hz-20kHz), and Hi Q for selected frequencies.

◀ **DEQ624:** The two 31-band equalizers offer three switchable ranges of operation: $\pm 6\text{dB}$, $\pm 12\text{dB}$ or $+12/-24\text{dB}$. A security feature locks out all front face-

800-750-0323; fax 225-926-8347
www.presonus.com
presonus@presonus.com
Circle (263) on Free Info Card
or go to www.beradio.com

Model RFC-1/B Remote Facilities Controller

it's the most affordable, fully-featured transmitter remote control system available. it's flexible. it's expandable. it has a well-deserved reputation for being very reliable. and it's not difficult on the eyes. what other reasons do you need?



FEATURES

- transmitter control from any telephone
- 8-64 channels of telemetry and control
- programmable control by time and date
- automatic adjustments based on telemetry
- optional printer and modem adapters
- programmable telemetry alarms
- full-featured, affordable, reliable
- integrated rack panel

Sine Systems

visit our web site for more information on our products
nashville, tennessee • 615.228.3500 voice • 615.227.2393 fax-on-demand • www.sinesystems.com

Circle (151) on Free Info Card or go to www.beradio.com

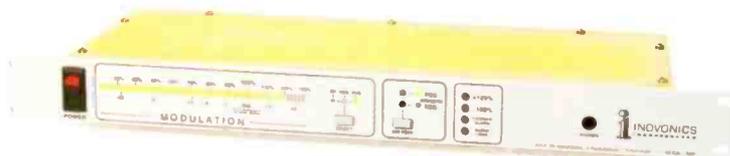
Dependable AM Measurements

Model 520 - \$1750

**THIS AM MOD-MONITOR FEATURES
A TUNABLE PRESELECTOR AND
AN EASY-TO-READ DISPLAY.**

Take accurate modulation readings right off the air with this compact, full-featured Mono-AM monitor. Fixed and adjustable peak flashers complement the peak-holding bargraph readout for clear, interpretation-free results.

Audio-loss, carrier-loss and modulation limit alarms may be remotely located, and an RS-232 port allows full computer/modem control. An efficient outdoor active antenna is optionally available for difficult reception situations.



Inovonics
1305 Fair Ave. • Santa Cruz, CA 95060
TEL: (831) 458-0552 • FAX: (831) 458-0554
www.inovon.com • e-mail: info@inovon.com

Circle (152) on Free Info Card or go to www.beradio.com

Analyzer tools

NTI (Neutrik Test Instruments)

Rub and Buzz: This option is based on the patented transient analysis approach of Leonhard Research, which detects the slightest mechanical defects in acoustic transducers. With test times below 1 second, the Rapid Test equipped with the Rub and Buzz option is the ideal production line test product. The Rub and Buzz option detects every audible failure such as rubbing coils, connecting wires touching the cone, misplaced membrane, excess glue or air leaks. The typical test cycle time of below 1 second with a fast continuous sweep signal makes this option a perfect quality control tool for production lines or acoustic transducers. The Rub and Buzz analysis is combinable with frequency response, distortion and sound pressure level analysis (SPL). The Rub and Buzz option is available for all RT-2M and RT-2X voice band analyzers.

800-661-6388; fax 514-344-522
www.nt-instruments.com
info@nt-instruments.com

Circle (260) on Free Info Card
or go to www.beradio.com

New Products

Software Update Telos Systems

► Version 1.5.5

software: This software can be downloaded and installed using an FTP connection with Zephyr Xstream's built-in update function. In addition to Zephyr Xstream's use of Fraunhofer's coding methods (MPEG-AAC and Low-Delay MPEG AAC-LD), the software adds a Layer-3 dual decoder mode and end-to-end ancillary data support. Eight bi-directional contact closures and serial data transmission are available in MPEG Layer-3 and MPEG-AAC/AAC-LD modes, as well as Layer-2 Mono and Half modes (64kb/s). Version 1.5.5 offers a local control option with a panic dial dial-on contact closure for all eight closures, choice of consumer or professional output line-levels in all models featuring built-in stereo mixers and MPEG Layer-2 support transmission of audio at 32kHz. The software is available free to Zephyr Xstream users.

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

www.telos-systems.com; info@telos-systems.com

Circle (268) on Free Info Card or go to www.beradio.com



Condenser microphone Audio-Technica

▼ **AT4033/SE:** The AT4033/SE includes a re-engineered shock mount, a dust cover, and a custom wooden microphone case. The AT4033/SE features a cardioid polar pattern and uses a vapor-deposited gold-plated aged-diaphragm capacitor element with an internal baffle plate to increase the signal-to-noise ratio of the microphone system. This 2-micron-thick gold-plated diaphragm provides accurate reproduction of even subtle sounds. The AT4033/SE has an extended flat frequency response of 30Hz to 20kHz, a wide dynamic range, and the ability to handle high SPLs (up to 145dB, 1kHz at 1% THD, 155dB with 10dB pad) without sacrificing high-frequency performance. The AT4033/SE features a floating-construction element to achieve peak performance and isolation from noise and vibration.

330-686-2600; fax 330-686-0719

www.audio-technica.com; pro@atus.com

Circle (252) on Free Info Card or go to www.beradio.com



FREE!!!



DIGILINK-FREE

Live On Air & Automation Software

- Fully Featured - High Powered
- 1 WEEK PLAY SCHEDULE
 - Timed Record Schedule for News
 - Uses Standard PC Sound

AVAILABLE FOR DOWNLOAD AT:

www.Arrakis-Systems.com



Circle (153) on Free Info Card or go to www.beradio.com

New Products

Interface access Extron



◀ **Hideaway HAS 400:** These mountable, mechanically operating architectural enclosures provide access to computer-video interfaces and A/V connectors and controls. There are

four versions of the Hideaway HSA enclosure: the 400 series (HSA 400 and HSA 402) and the 800 series (HSA 800 and HSA 802). The 400 series pivots open, presenting the connectors at a 49° angle to the tabletop. The 800 series rises vertically from the installation surface, presenting the connectors at a 90° angle to the tabletop. All models in the Hideaway Series include room for four single-space Extron Architectural Adapter Plates (AAPs). These AAPs are available with hundreds of connector combinations, customizable for any application. The Hideaway enclosures can be optimized using the Extron RGB 580xi remote interface.

800-633-9876; fax 714-491-1517
www.extron.com; support@extron.com
Circle (257) on Free Info Card or go to www.beradio.com

Handheld microphones Electro-Voice

▼ **Cobalt series:** Available in four models, the Co4, Co5, Co7 and Co9, the Cobalt series of mics use Neodymium technology to provide quality sound for an inexpensive price. All the mics feature cardioid pickup patterns. The Co4 is designed for micing of acoustic and electric instru-



ments, and voice. The Co5, Co7 and Co9 are designed for vocal use. Each model offers unique features including controlled proximity effect, low handling noise and an on/off switch. Rugged construction makes them ideal for remote broadcast use. A wireless transmitter version is also available.

800-392-3497; fax 952-887-5588
www.electrovoice.com; pro.sound@telex.com
Circle (256) on Free Info Card or go to www.beradio.com

Is your radio station ready for the digital upgrade?

Digital LNBS and Microwave Filters

Let Satellite Export prepare you for the digital conversion with our complete Patriot Antenna package. Program providers recommend a solid antenna, with a minimum size of 3.8 meters for best reception. The Patriot Antenna is 2° compliant and will not warp like most mesh or fiberglass dishes.

Upgrade your station with the **BEST**

PLL LNBS



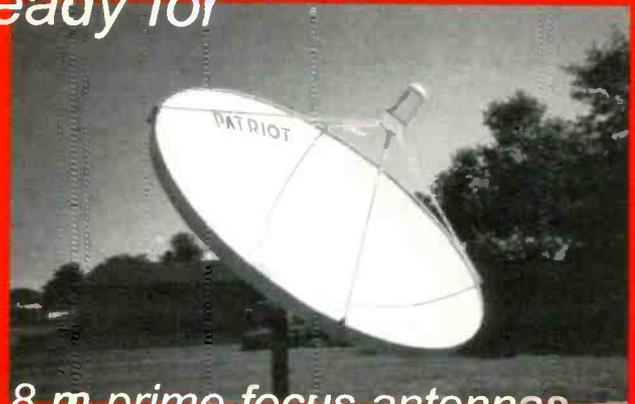
C-Band Feeds



Patriot Antenna Systems

704 North Clark Street, Albion, MI 49224

800.470.3510 • 517.629.5990 • 517.629.6690 fax



3.8 m prime focus antennas

Order Online Today!

PATRIOT
COMMERCIAL ANTENNA SYSTEMS

www.sepatriot.com • info@sepatriot.com

Circle (154) on Free Info Card or go to www.beradio.com

New Products

PC sound card

Digigram

► **MiXart8CN:** A CobraNet input/output module for the miXart8 sound card, miXart combines onboard processing with audio mixing functions.

When connected to third-party CobraNet-compliant devices, miXart8CN is the foundation of audio systems distributed over large-area networks. The core of the system, the miXart8, has eight (or four stereo) analog input/output paths, including four studio-quality microphone preamps on its input bank. The CobraNet interface is managed via a daughterboard, yet only a single PCI slot is needed in the host computer. Eight channels of CobraNet input and eight channels of CobraNet output are provided, operating independently of the analog inputs/outputs. The network connection, using standard 100BaseTX Ethernet protocols, is available on two redundant RJ-45 jacks, which provide on-board backup.

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

www.digigram.com; Input@digigram.com

Circle (255) on Free Info Card or go to www.beradilo.com



Forced air-cooled loads Bird Electronic

► Digital Air series:

10kW and 25kW Digital Air VHF models join the line of 5kW, 10kW, 15kW, and 25kW Digital Air UHF models. Bird's Digital Air designs offer elimination of liquid coolants, which allows reliable, low maintenance operation without concerns over pump and plumbing systems at transmitter sites. These loads remain cool to the touch, and permit exhaust to be ducted to the outside. Advanced computer simulation (CAE) provides answers and rapid verification of specific user requirements such as altitude ducting. Extensive high-frequency electrical CAE modeling has also been used to optimize these products for digital broadcast. With electrical CAE, the VSWR of hundreds of configurations can be examined before a prototype is built.

440-248-1200; fax 440-248-5426

www.bird-electronic.com; sales@bird-electronic.com

Circle (253) on Free Info Card or go to www.beradilo.com



Worried About Giving Off the Wrong Signals?

... All You Need Is a Little

C O N F I D E N C E

When your livelihood depends on making everything look and sound great, a Furman MS Series Confidence Monitor can help you be sure your signals are delivered as planned. The aptly-named monitors ensure that analog audio, digital audio, or video signals are present and meet established quality standards before being broadcast, recorded or otherwise distributed.

All units feature high-output magnetically shielded speakers; wide-range, high-visibility, 14-segment meters with dimmer and VU/PPM switch; selectable +4 dBu or +8 dBu meter reference; a high-power, low-distortion headphone amplifier; Phase indicators; Signal Present indicators on all

input/output ports; Speaker Mute switch, Volume and Balance slide controls; and universal 100-240 VAC agency-listed external power supply.

Plus, they don't take up a lot of room - each unit is housed in a single-space chassis that occupies minimal rack area. An up-to-three-year Limited Warranty is also part of the package. Try the MS Series, and watch your confidence soar!



FURMAN SOUND, INC., 1997 South McDowell Blvd., Petaluma, California 94954-6919 **FURMAN**
Phone: 707-763-1010, Fax: 707-763-1310, Website: www.furmansound.com, E-mail: Info@furmansound.com

Circle (155) on Free Info Card or go to www.beradilo.com

New Products

Reference guide

PiROD

▼ **TIA/EIA Q&A:** As a prelude to the forthcoming revision of the TIA/EIA standard for communications towers, PiRod has published a Q&A offering insight on the changes most likely to occur. While shedding light on the



imminent changes, the 12-page booklet also offers an explanation on how those changes will generally impact tower design. For a free copy of *Revision G: How It's Going to Impact Your Job*, contact PiRod at 1545 Pidco Drive, P.O. Box 128, Plymouth, IN 46563-0128, or call 219-936-4221. PiRod can also be reached via fax or online.

877-467-4763; fax 219-936-6796
www.pirod.com

Circle (262) on Free Info Card
or go to www.beradio.com

File conversion tools

Netia Digital Audio

► **Dispatcher, Web Dispatcher, Autofill:** An automation tool that can convert and export sound files directly from the Netia Radio-Assist database to any target destination. Specific functions define different profiles. Each profile includes conversion format, sampling rate, coding and destination. Dispatcher converts and exports these files according to the predefined profile. Web Dispatcher is a direct application of this automation and adds a new Internet tool to the Radio-Assist range. Selected audio data is put online for a website. Internet sound files are lifted directly from the sound bank and converted to Real G2 format, then transferred to the Internet server via FTP. Associated XML and Media Object Server data are also distributed. Web Dispatcher generates the new Web pages and publishes the selected sound files. AutoFill is a multiple-format import automation tool.



973-364-7511; fax 973-364-7522; www.netia.fr

Circle (259) on Free Info Card or go to www.beradio.com

Multiplexer

AEQ

Ranger: An audio and data multiplexer for a full duplex channel E1/T1 of up to 2Mb, with capacity for 15 circuits of 15kHz, 31 circuits of 7.5kHz or 61 circuits of 3.5kHz, or the corresponding data channels V-35 or X-21 interfaces at 64, 128 or 256kb. From a multipoint network, a suite of Ranger and other E@sy equipment can be controlled. The equipment is housed in a modular rack format, including two universal autorange power supply units. The rack handles up to eight audio and data cards. Ranger offers three audio quality compression modes: 3.5kHz (32kb), 7.5kHz (64kb) and 15 kHz (128kb), all of them with low encoding/decoding delay features.

954-424-0203; fax 954-424-0902

www.aeqbroadcast.com; aeqsales@aeq.es

Circle (250) on Free Info Card or go to www.beradio.com



The RF People

Silicon Valley POWER AMPLIFIERS

Our growing product line.

SATISFACTION GUARANTEED



150 watts
300 watts



450 watts
600 watts



1000 watts



850 watts
1,200 watts



1,500 watts
2,000 watts



3,000 watts

Phone:- (408) 986 9700

Fax:- (408) 986 1438

e-mail:- sales@svpa.com

website www.svpa.com

Circle (156) on Free Info Card or go to www.beradio.com

Win a

Neumann
KMS
105,



LPB
Silent Mic
Boom,



or ATI
ML200!

Find the microphone icon on
each BE Radio cover from
2001 and
you could win.



Sweepstakes Rules

Introduction:

NO PURCHASE NECESSARY. A purchase does not improve your chances of winning. Void where prohibited by law.

Sponsors:

The Sponsors of this sweepstakes are Primedia Business Magazines & Media Inc. at 9800 Metcalf, Overland Park, KS 66212; Neumann USA at One Enterprise Drive, Old Lyme, CT 06371; Audio Technologies Inc. at 328 W Maple Ave., Horsham, PA 19044; and LPB at 960 Brook Road, Unit 5, Conshohocken, PA 19428.

Timing:

Sweepstakes begins at 12:00:01 am EST on December 10, 2001 and ends at 12:00:01 pm EST on January 20, 2002.

Eligibility:

Sweepstakes open to all current subscribers of *BE Radio* in the United States as of December 10, 2001 and excludes the employees and immediate family (spouses and parents, siblings, children and each of their spouses) of Sponsors, the prize manufacturers, their parents, affiliates, subsidiaries, advertising agencies and any other company involved with the design, production or execution of the sweepstakes.

How to Enter:

Complete the online form located at <http://www.beradio.com>, or you may enter by carefully typing or hand writing the following information on your company letterhead or a standard 8½" by 11" sheet of paper: 1. Your name, job title, company name, address, telephone number, fax number and e-mail address; 2. A complete and accurate description of the location of the mic icon on each 2001 issue of *BE Radio* (Volume 7, dated January, February, March, April, May, June,

The Sportscaster's DREAM MACHINE!

i-mix
TLV400



TieLine i-Mix is the world's first fully featured intelligent remote mixer with built in ISDN and POTS Codecs with provision for wireless and IP. Free demo! Test drive the TieLine yourself.

AVC **TIE LINE** AMERICA

Call Toll-Free

888-211-6989

Circle (157) on Free Info Card or go to www.beradio.com

Operate From Across the Desk or Across the Country...

MixMax!



- ★ 6 CHANNEL STEREO MIXER
- ★ On Board CPU and RS-232 Port
- ★ 8 Presettable Macros / 8 TTL Outputs
- ★ Computer Control or Stand Alone Operation

Get Details

Jim Withers 314-345-1030
www.radiomax.com

Circle (158) on Free Info Card or go to www.beradio.com

NEW Is "Processor Delay" driving your DJ

crazy?

Use **MoniSwitch** to eliminate it!

MoniSwitch is a special audio switcher that automatically switches the DJ's headphones from "air" to "local" when the mic is on. Those weird echoes and flanging effects are gone!

Quick and easy installation...

works with any console's

Mic Tally output.



For detailed info:

MoniSwitch is IN STOCK at all
Henry Engineering dealers.

www.henryeng.com

Tel: 626.355.3656

Fax: 626.355.0077

Circle (159) on Free Info Card or go to www.beradio.com



FM BROADCAST ANTENNA

FMR Series



- Circular polarization
- Series fed element
- Internal feed
- Brass/Copper construction
- Excellent bandwidth

PROPAGATION SYSTEMS, INC.

719 Pensacola Road

Ebensburg, PA 15931 USA

814-472-5540 • FAX 814-472-5676

E-mail: sales@psibroadcast.com

Web site: psibroadcast.com

Circle (160) on Free Info Card or go to www.beradio.com

July, August, August Product Source, September, October, November, December 2001). Please be as specific as possible in describing the location of the mic icon on each 2001 issue of *BE Radio*. Mail your entry to *BE Radio* Microphone Sweepstakes, P.O. Box 12901, Overland Park, KS 66282-2901 or fax it to (913) 967-1905. If you do not have all the necessary issues, you may obtain issue-cover copies by sending a self-addressed stamped envelope to *BE Radio* Cover Request, P.O. Box 12901, Overland Park, KS 66282-2901.

All entries (mail and online) must be received by January 19, 2002. Multiple entries are not permitted. One entry per person per mailing address and per e-mail address. Sponsors are not responsible for late, lost, damaged or misdirected mail, faxes or e-mail. Submitted entries will not be returned and become the property of Sponsors. Entries will be reviewed by the *BE Radio* Sweepstakes committee ("Judges") for completeness and accuracy. All decisions of the Judges are final and binding in all matters relating to the Sweepstakes.

Winner Selection and Notification:

Three (3) winners will be chosen at random from all correctly submitted entries (entries with 13 correct answers) on or around January 21, 2002. If there are no entries with all 13 correct answers, three (3) winners will then be chosen at random from all correctly submitted entries with 12 correct answers. Winners will be notified by phone or mail on or about January 21, 2002. Odds of winning depend on the number of correct, eligible and legible entries received.

Prizes:

The first winner chosen will receive a Neumann KMS 105 microphone (approximate retail value \$595). The second winner chosen will receive an ATI ML200 mic preamp and power supply (approximate retail value \$299). The third winner chosen will receive an LPB Silent Mic Boom (approximate retail value \$179). The total approximate retail value of all prizes is \$1,077. Cash will not be awarded in lieu of prizes. Prizes are not transferable or exchangeable. Substitution of prizes will not be permitted except by Sponsors, who reserve the right to substitute a prize of equal or greater value if indicated prizes are not available.

Miscellaneous:

Winners release the Sponsors, the prize manufacturers and each of their parents, affiliates, officers, agents and employees from any responsibility or liability in connection with any loss, accident, or death incurred in connection with the use of or the installation of the prizes won in the Sweepstakes. The winners hereby consent to the use of their names and/or likenesses by the Sponsors for advertising purposes without additional compensation unless prohibited by law. The verified winners will be required to sign an Affidavit of Eligibility and a Publicity/Liability Release. Any requested materials must be returned within ten (10) days of the date of notification. Failure to comply with any request in the allotted timeframe will result in disqualification and the selection of an alternate winner. Any tax liabilities are solely the responsibility of the winner. All federal, state, local, municipal and provincial laws and regulations apply.

By participating, entrants acknowledge and agree to be bound by these rules, and the decisions of the Judges, which are final. Sponsors do not make and are not responsible for any warranty (including fitness for particular purpose) or guarantee with regard to any prize or portion thereof.

To obtain the name of the prize winner, send a self-addressed, stamped envelope after January 25, 2002, to "Mic Sweepstakes Winner," *BE Radio* Microphone Sweepstakes, Primedia Business Magazines & Media Inc., P.O. Box 12901, Overland Park, KS 66282-2901, USA.

Other Terms and Conditions:

Sponsors assume no responsibility for any error, omission, interruption, deletion, defect, delay in operations or transmission, communications line failure, theft or destruction or unauthorized access to, or alteration of entries. The Sponsors are not responsible for any problems or technical malfunction of any telephone network or lines, computer online systems, servers or providers, computer equipment, software failure of any e-mail or entry to be received by Sponsors or congestion on the Internet or at any website, any combination thereof or otherwise, including any injury or damage to entrants or any other person's computer related to or resulting from participation or downloading any materials in the Sweepstakes.



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

- **BROAD BANDWIDTH** for better sound.
- **GROUND ANTENNA** for lighting & static electricity.
- **ELIMINATES ISOCOUPLES** in VHF & UHF antenna lines.
- **BEST ANTENNA FOR DIRECTIONAL ARRAYS.**

ALSO

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

FOR INFORMATION CALL, FAX OR WRITE:

nott ltd.

4001 La Plata Hwy
Farmington, NM 87401



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

Circle (163) on Free Info Card
or go to www.beradio.com

AES/EBU DIGITAL AUDIO DISTRIBUTION AMPLIFIERS

DDA106-XLR (1X6) • DDA112-BNC (1X12)
DDA112-XLR (1X12) • DDA124-BNC (1X24)
DDA206-XLR (Dual 1X6) • DDA212-BNC (Dual 1X12)
DXA112-XLR (1x12) • DXA124-BNC (1x24)



- Accepts sample rates from 27 to 96kHz
- Transformer balanced inputs
- Data reclocking and regeneration
- Adjustable input cable equalization
- Loop-thru inputs w/switchable terminations
- Sample rate, Status and Error indicators
- Up to 12 XLR or 24 BNC outputs

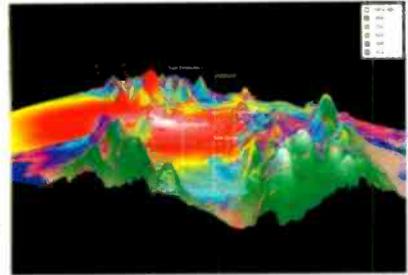


AUDIO TECHNOLOGIES INCORPORATED

Dedicated to sound engineering
ATI • 328 W. Maple Avenue • Horsham, PA 19044
800-959-0307 • 215-443-0330
Fax: 215-443-0394
<http://www.atiguys.com>
Free Brochure Available Upon Request

Circle (162) on Free Info Card
or go to www.beradio.com

BROADCAST ENGINEERING CONSULTING SOFTWARE



Longley-Rice over 3-D Terrain

Professional software packages for preparing FCC applications & plotting coverage. For Windows & NT.

- Create "real-world" coverage maps & interference studies with Longley-Rice, PTP, FCC, Okumura & other models using polygon map features.
- Search for AM, FM, TV, DTV, & LPTV channels with graphics oriented programs and FCC databases.
- Plot STL paths in 3-D using 3-Arc second terrain databases...and more!

VSoft COMMUNICATIONS
Broadcast Communications Software
and Engineering Consulting

800-743-3684 • www.v-soft.com

Circle (161) on Free Info Card
or go to www.beradio.com

Control Your World With CircuitWerkes

POWERFUL DIAL-UP CONTROLLER



Outstanding Features: Exceptional Value

- 10 dry relay contacts out.
- Auto-answers on user settable ring # and auto-disconnects.
- Each relay can be assigned to any tone & can be momentary, latching with distinct on/off codes, or interlocked latch with others.
- Up to 8 digit user set password prevents pirating.
- Each relay is programmable to close at beginning or end* of tone and can beep when activated. Closures after acknowledgement beep!
- Proprietary two-tone & detection delay modes eliminate false trips.
- 4 Status inputs beep when queried, alarm dial & control relays.
- Telco Hybrid lets you control equipment & monitor local audio.
- Settings remain after power failure.

Programmable DTMF Decoder



The DS-8 DTMF Sequence Decoder

- Each of the eight relays may be independently programmed for codes and mode.
- Program it with any DTMF phone.
- All connections on screw terminals
- Retains settings after a power failure

Decode Network Tones & More



The DTMF-16 DTMF Decoder

- Decodes all 16 DTMF tones.
- Bridging input & hi current opto-isolated outputs.
- Two tone decoder & anti-falsing filter improve reliability & versatility.
- Momentary or Interlocked Latching output modes.
- Silencer option removes all DTMF tones the audio output.

Call your favorite dealer or visit our web site for the latest info and downloadable tech manuals!

<http://www.circuitwerkes.com> (352) 335-6555 \ fax 380-0230
CircuitWerkes 3716 SW 3rd Place - Gainesville, FL 32607



Transcom Corporation

AM & FM Transmitters

Visit our new internet site at www.fmamtv.com
Send your email request to: transcom@fmamtv.com

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

FM TRANS-MITTERS

300W	FM	1988	Harris FM 300K Solid State - Single Phase
1KW	FM	1981	Harris FM 1K Single Phase
1KW	FM	1968	Harris FM 1H
2.4KW	FM	1995	QEI Quantum Solid, State, Single Phase
2.5KW	FM	1984	Harris FM 2.5K Single Phase
2.5KW	FM	1980	Harris FM 2.5K Single Phase
2.5KW	FM	1979	Harris FM 2.5K
2.5KW	FM	1976	Collins 831D Single Phase
5KW	FM	1985	BE FM 5A
6KW	FM	1994	Henry 6000D Single Phase
10KW	FM	1974	Harris FM10H-K
15KW	FM	1980	McMartin BF15,000
25KW	FM	1978	Collins 831G2C
25KW	FM	1980	CSI T-25F
30KW	FM	1988	BE FM 30A
30KW	FM	1988	BE FM 30A
30KW	FM	1983	BE FM 30
50KW	FM	1982	Harris Combiner w auto Exciter-transmitter switcher

EXCITERS

- BE FX 30 & FX 50
- Continental 802B
- Harris MX-15

AM TRANS-MITTERS

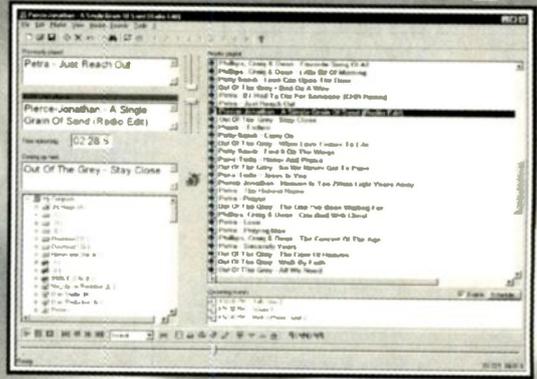
1KW	AM	1981	Harris MW1A
1KW	AM	1982	Harris MW1A
5KW	AM	1996/8	Harris "Gates" 5 Solid State
5KW	AM	1980	Harris MW5A
10KW	AM	1986	Harris MW10B
50KW	AM	1978	Continental 317C-1

- Potomac Ins. AA51 Audio AnyL (new)
- Belar SCM-1, SCA Monitor
- Moseley TRC-15 Remote w Hallikainen
- Moseley TRC 15-A Remote Control System
- Delta 4 port SW 1 5/8 mod.#6730E
- SCA Generator (MX-15 Module)
- ATI Line Amplifier
- Optimod 8100A (card 3 thru 9)
- Dummy Load, 5 KW water cooled
- Dummy Load 2.5 KW air cooled

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

Circle (165) on Free Info Card or go to www.beradio.com

Powerfully Simple



- F** Plays mp3, wav and many other popular audio formats
- E** Plays many video formats
- A** Automatic Overlap (segue) and Fade outs
- S** Schedule Spots and Liners
- T** Only Requires One Soundcard (any brand)
- P** Plays Live Satellite Feeds
- U** Full Blown Automation or Live Assist
- L** Logs time and date of files played
- R** Silence Detection for on-air security
- E** Windows 95/98

- Easy to Use
- Free Support
- Up and running in minutes
- Many features, little training required

Download Free Demo
<http://www.raduga.net>
Or call for more info!
513-887-0714

Finally, a software package for radio that doesn't require a degree in computers.

Raduga

Radio Station Automation Software



Circle (166) on Free Info Card or go to www.beradio.com

Buy simplicity,
reliability and service.

EAS

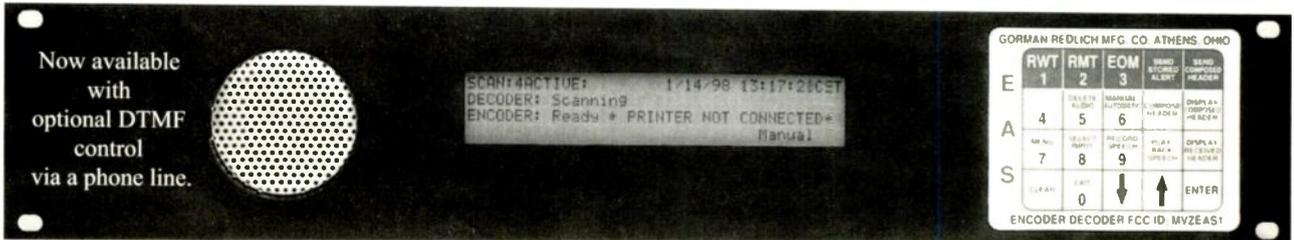
Price \$1750.00

Equipment in-stock
for immediate delivery.

Phone 740-593-3150

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

FAX 740-592-3898



Now available
with
optional DTMF
control
via a phone line.

- 5 two-way RS inputs/outputs for computer, remote signboard & character generator
- 6 audio inputs on standard models. All audio inputs & outputs are transformer isolated from encoder-decoder board
- Automatic interruption of program audio for unattended operation
- 4 line 40 character LCD display with LED backlighting
- 20 key keypad to program unit, set modulation level, set input levels
- Now available with optional built in character generator which can crawl alert messages and station ID on the hour

- Will handshake with automation equipment
- 2 year warranty
- 2 minutes of digital audio storage
- 25 pin parallel printer port for external printer
- 52 terminals on the rear to interface with other equipment by removable plugs
- BNC fitting with 600 OHM balanced audio cut for second transmitter

Web Site: www.gorman-redlich.com • E-mail: jimg@gorman-redlich.com

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

The Traffic C.O.P. for Windows™

The Affordable Alternative in Traffic Software

Once you view our FREE CD demo, we know you will want the software

*Still the same low price
Still the generous small market discounts*

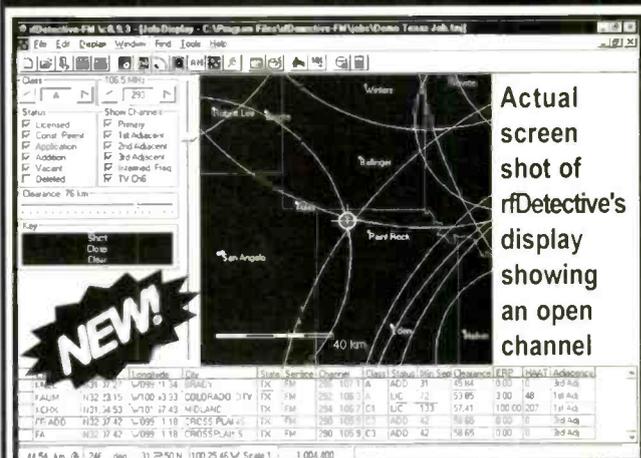
No Obligation!
See what the Traffic C.O.P. for Windows can do for you!

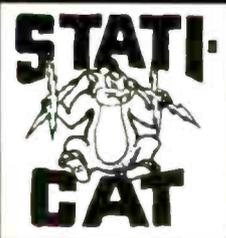
Call Now (800) 275-6204
www.broadcastdata.com

WALK

Circle (169) on Free Info Card or go to www.beradio.com

FM Channel Study Software for your PC





STATI-CAT

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

AFFORDABLE - RUGGED LIGHTNING PROTECTION

The Stati-Cat Lightning Prevention System

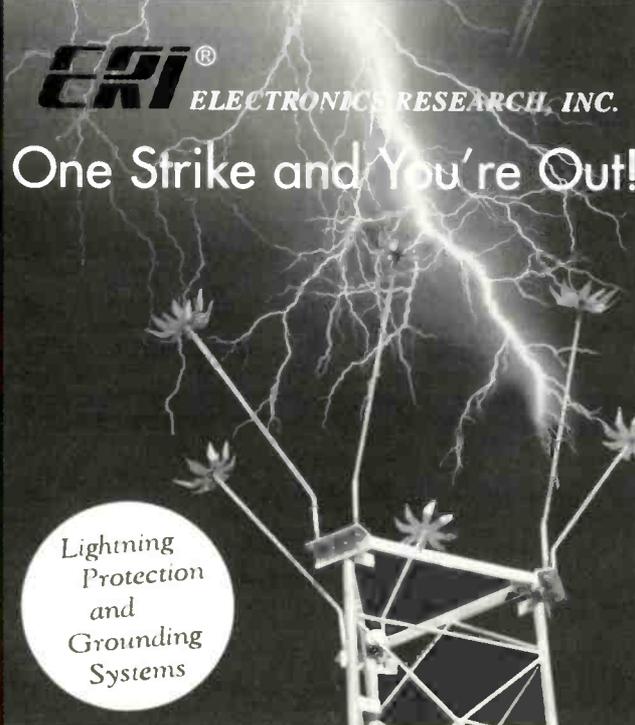
provides a continuous, low-resistance discharge path for the static electric charge on tall structures. DISSIPATION POINTS ARE 1/8" STAINLESS STEEL RODS (not wires) ground to needle sharpness.



Cortana Corporation, Inc.

Write or call toll-free for a free brochure!
 P.O. Box 2548, Farmington, N.M. 87499-2548
 Call 888-325-5336 FAX (505) 326-2337

Circle (171) on Free Info Card or go to www.beradio.com



ERI[®] ELECTRONICS RESEARCH, INC.

One Strike and You're Out!

Lightning Protection and Grounding Systems

Protect Your Investment

ERI[®] 812-925-6000
 7777 Gardner Road
 Chandler, IN 47610
www.ERInc.com

Circle (173) on Free Info Card or go to www.beradio.com



Rebuilder of Quality Tubes Since 1940.

75412 Highway 25
 Covington, LA 70435 U.S.A.
 1-800-624-7626
www.freeland-inc.com
 E-mail: freeland-inc.com@freeland-inc.com

We offer fast, quality service and a generous warranty.

THE COST EFFECTIVE ROAD TO POWER TUBES
 SAVE ABOUT 50% OFF NEW TUBE PRICES



Circle (172) on Free Info Card or go to www.beradio.com

CROWN TANOY orban

Complete Solutions for all your Equipment & Technical Needs



• EQUIPMENT SALES
 • STUDIO & RF ENGINEERING
 • AUTOMATION
 • TURNKEY STUDIOS

www.LightnerElectronics.com
 Telephone: (814) 239-8323
 1771 Beaver Dam Road
 Claysburg, PA 16625

AUDIOARTS ENGINEERING 

Circle (174) on Free Info Card or go to www.beradio.com

Switcher tools

Designed by broadcast engineers for broadcasters, our audio and digital audio switchers offer excellent sonic quality, removable I/O connections, contact closures, serial remote control capabilities and flexible mounting accessories.



SS 12-4

Active crosspoint switcher/router with 12 stereo inputs and 4 stereo outputs.



10X1

Passive switcher/router with 10 stereo inputs and one stereo output or vice-versa.



3X2

Active crosspoint switcher with 3 stereo inputs and 2 stereo outputs.



SS 8.2

Active crosspoint switcher with 8 stereo inputs, 2 stereo plus 2 mono outputs.



8x1 DAS

Routes any one of eight AES/EBU digital inputs to 3 common outputs.



SS 3.1

Passive switcher/router with 3 stereo inputs and one stereo output or vice-versa.



ACS 4.1

Active crosspoint switcher with 4 balanced/unbalanced stereo inputs and one stereo output with Visual Audio Level Control.



6X1

Passive switcher/router with 6 stereo inputs and one stereo output, or vice-versa.



SS 2.1/BNC

Passive switcher/router with 2 composite audio, video, or AES/EBU inputs to 2 composite audio, video, or AES/EBU outputs, or vice-versa.



8X2

Active crosspoint switcher with 8 stereo inputs, 2 stereo and 2 mono outputs



SM-6

Stereo mixer with 6 stereo inputs, a stereo output and front panel on/off switches.



SS 2.1/TERM

Passive switcher/router with 2 stereo inputs to one stereo output or vice-versa.

Check out our web site for product information, list pricing and a list of distributors!

Internet: www.broadcasttools.com E-mail: btli@broadcasttools.com

Voice: 360 . 854 . 9559
Fax: 360 . 854 . 9479

BROADCAST
tools inc.
Innovative Problem Solving Tools For Broadcast

Circle (175) on Free Info Card or go to www.beradio.com

BE Radio GALLERY

BE Radio

FOR SALE

SPACEWISE® QUALITY STUDIO FURNITURE

STURDY CUSTOMIZED HIGH QUALITY
WOODSHOP BUILT LARGE SCALE
MODULAR SYSTEMS AND ACCESSORIES

800-775-3660 INFO@SPACEWISE.COM

WHY PAY MORE ELSEWHERE?

AcousticsFirst™
Toll-Free Number: **888-765-2900**

Full product line for sound control and noise elimination.
Web: <http://www.acousticsfirst.com>

get into gear
advertise your product or service
in the BE Radio Classifieds!

PROFESSIONAL SERVICES

Structural Analysis



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



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

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

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

RUSS BERGER DESIGN GROUP

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

MISCELLANEOUS

www.mikeflags.com

PUBLICATIONS

WWW.RADIOSHOPPER.COM

New & Used Equipment
Engineering & Web Links
Publications & Catalogs
Parts & Services

CLASSIFIED

www.beradio.com
beradio@primediabusiness.com



Editor - Chris Scherer, CSRE, cscherer@primediabusiness.com
Technical Editor, RF - John Battison, P.E., jbatcom@bright.net
Associate Editor - Cindy Holst, cholst@primediabusiness.com
Contributing Editor - Skip Pizzi, beradio@primediabusiness.com
Sr. Art Director - Michael J. Monk, mmonk@primediabusiness.com
Assoc. Art Director - Robin Morsuch, rmorsuch@primediabusiness.com

Technical Consultants - Harry C. Marin, Legal
Kevin McNamara, CNE, Computers and Networks
Mark Krieger, CIST, Contract Engineering
Russ Berger, Broadcast Acoustics
Donald L. Markley, P.E., Transmission Facilities
Yasmin Hashmi, International Correspondent
Stella Plumbridge, European Correspondent

Vice President - Peter May, pmay@primediabusiness.com
Publisher - Dennis Triola, dtriola@primediabusiness.com
Marketing Director - Patti McKenna, pmckenna@primediabusiness.com
Vice President, Production - Thomas Fogarty, tfogarty@primediabusiness.com
Sr. Director of Production - Curt Prodes, cprodes@primediabusiness.com
Group Production Manager - Charlie Rosenthal, crosenthal@primediabusiness.com
Ad Production Coordinator - Natasha Franz, nfranz@primediabusiness.com
Classified Ad Coordinator - Mary Mitchell, mmitchell@primediabusiness.com
VP, Audience Development - Christine Oldenbrook, coldenbrook@primediabusiness.com
Circulation Director - Susi Cordill, scordill@primediabusiness.com
Circulation Manager - Gayle Grooms, ggrooms@primediabusiness.com

MEMBER ORGANIZATIONS

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



PRIMEDIA

Business Magazines & Media
Chief Executive Officer - Timothy M. Andrews, tandrews@primediabusiness.com
President - Ronald Wall, rwall@primediabusiness.com
Chief Operating Officer - Jack Condon, jcondon@primediabusiness.com
Sr. Vice President, Business Development - Eric Jacobson, ejacobson@primediabusiness.com
Sr. Vice President, Integrated Sales - Dan Lovinger, dlovinger@primediabusiness.com
Vice President, Content Licensing & Development - Andrew Elston, aelston@primediabusiness.com
Vice President, Corp. Comm. - Karen Garrison, kgarrison@primediabusiness.com
Vice President, Finance - Peter Pescatore, ppescatore@primediabusiness.com
Vice President, Marketing - Kristin Zhivago, kzivago@primediabusiness.com
Vice President, New Media - Andy Feldman, afeldman@primediabusiness.com
PRIMEDIA Business-to-Business Group - 745 Fifth Ave., NY, NY 10151
President & Chief Executive Officer - David G. Fern, dfern@primedia.com
Chief Creative Officer - Craig Reiss, creiss@primedia.com
PRIMEDIA Inc.
Chairman & Chief Executive Officer - Tom Rogers, trogers@primedia.com
Vice Chairman & General Counsel - Beverly Chell, bchell@primedia.com
President - Charles McCurdy, cmcurdy@primedia.com

BE Radio, Volume 7, Number 13, ISSN 1081-3357 is published monthly (except semi-monthly in August) and mailed free to qualified recipients by PRIMEDIA Business Magazines & Media Inc, 9800 Metcalf, Overland Park, KS 66212-2215 (primediabusiness.com). Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Current and back issues are and additional resources, including subscription request forms and an editorial calendar are available online at beradio.com.

SUBSCRIPTIONS: Non-qualified persons may subscribe at the following rates: USA and Canada, one year, \$45.00. Qualified and non-qualified persons in all other countries, one year, \$60.00 (surface mail), \$100.00 (air mail). Subscription information: P.O. Box 12937, Overland Park, KS 66282-2937.

ARCHIVES & MICROFORM: This magazine is available for research and retrieval of selected archived articles from leading electronic databases and online search services, including Factiva, LexisNexis, and ProQuest. For microform availability, contact ProQuest at 800-521-0600 or 734-761-4700, or search the Serials in Microform listings at proquest.com.

POSTMASTER: Send address changes to **BE Radio**, P.O. Box 12960, Overland Park, KS 66282-2960.

REPRINTS: Contact Reprint Management Services (RMS) to purchase quality custom reprints or e-reprints of articles appearing in this publication at 866-268-1219, ext. 100 (717-399-1900 outside the U.S. and Canada). Obtain quotes and place orders online at reprintbuyer.com or send e-mail to primediabusiness@msreprints.com.

PHOTOCOPIES: Authorization to photocopy articles for internal corporate, personal, or instructional use may be obtained from the Copyright Clearance Center (CCC) at 978-750-8400. Obtain further information at copyright.com.

MAILING LISTS: Primedia Business makes portions of our magazine subscriber lists available to carefully selected companies that offer products and services directly related to the industries we cover. Subscribers who do not wish to receive such mailings should contact the Primedia Business subscriber services at 800-441-0294 or 913-967-1707.

CORPORATE OFFICE: Primedia Business Magazines & Media, 9800 Metcalf, Overland Park, Kansas 66212; 913-341-1300; primediabusiness.com.

Copyright 2001, PRIMEDIA Business Magazines & Media Inc. All Rights Reserved.

Statement of Ownership, Management, and Circulation

1. Publication Title BE Radio	2. Publication Number 1081-3357	3. Filing Date 9/27/01	
4. Issue Frequency Monthly	5. Number of Issues Published Annually 12	6. Annual Subscription Price Free To Qualified	
7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4) Primedia Business Magazines & Media 9800 Metcalf Ave. Overland Park, KS 66212 (Johnson County)		Contact Person Gayle Grooms Telephone: 913-967-1931	
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer) Primedia Business Magazines & Media 9800 Metcalf Ave. Overland Park, KS 66212 (Johnson County)			
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank) Publisher (Name and complete mailing address) Dennis Triola, Primedia Business Magazines & Media 9800 Metcalf Ave. Overland Park, KS 66212 (Johnson County) Editor (Name and complete mailing address) Chris Scherer, Primedia Business Magazines & Media 9800 Metcalf Ave. Overland Park, KS 66212 (Johnson County) Managing Editor (Name and complete mailing address) None			
10. Owner (Do not leave blank. If the publication is owned by a corporation, give the name and address of the corporation immediately followed by the names and addresses of all stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, give the names and addresses of the individual owners. If owned by a partnership or other unincorporated firm, give its name and address as well as those of each individual owner. If the publication is published by a nonprofit organization, give its name and address.) Full Name Complete Mailing Address Primedia Inc. 745 Fifth Avenue New York, NY 10151 USA			
11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities. If none, check box <input checked="" type="checkbox"/> None			
Full Name Complete Mailing Address None			
12. Tax Status (For completion by nonprofit organizations authorized to mail at nonprofit rate) (Check one) The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes: <input type="checkbox"/> Has Not Changed During Preceding 12 Months <input checked="" type="checkbox"/> Has Changed During the Preceding 12 Months (Publisher must submit explanation of change with this statement)			
PS Form 3526 (if applicable), October 1999			
13. Publication Title BE Radio	14. Issue Date for Circulation Data Below August 2001		
15. Extent and Nature of Circulation			
		Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)		16,320	17,140
b. (1) Paid (includes advertiser's proof and exchange copies) (2) Paid In-County Subscriptions (based on Form 3541) (Include advertiser's proof and exchange copies)		14,268	14,760
Paid and/or Requested Circulation		0	0
(3) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution		312	295
(4) Other Classes Mailed Through the USPS		0	0
c. Total Paid and/or Requested Circulation (Sum of 15b (1), (2), (3), and (4))		14,580	15,055
d. Free Distribution by Mail (Samples, complimentary, and other free)		690	617
(1) Outside-County as Stated on Form 3541		0	0
(2) In-County as Stated on Form 3541		0	0
(3) Other Classes Mailed Through the USPS		0	0
e. Free Distribution Outside the Mail (Carriers or other means)		354	1,000
f. Total Free Distribution (Sum of 15d and 15e)		1,044	1,617
g. Total Distribution (Sum of 15c and 15f)		15,624	16,672
h. Copies not Distributed		1,739	2,085
i. Total (Sum of 15g and 15h)		17,364	18,757
j. Percent Paid and/or Requested Circulation (15c Divided by 15g times 100)		93.3%	90.3%
18. Publication of Statement of Ownership <input checked="" type="checkbox"/> Publication required. Will be printed in the December issue of this publication. <input type="checkbox"/> Publication not required.			
17. Signature and Title of Editor, Publisher, Business Manager, or Owner Gayle Hutchens Grooms, Circulation Manager		Date 9/27/01	

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

View an online product demo whenever you see this logo.
www.beradio.com

Advertiser Index

	Page Number	Reader Service Number	Advertiser Headline	Advertiser Website		Page Number	Reader Service Number	Advertiser Headline	Advertiser Website
Allen Osborne Assoc., Inc.	71	150	805-495-8420	www.ooo-gps.com	Lightner Electronics	82	174	814-239-8323	www.lightnerelectronics.com
Aphex Systems	23	118	818-767-2929	www.aphex.com	Logitek	29	124	800-231-5870	www.logitekaudio.com
Armstrong Transmitters	13	111	315-673-1269	www.armstrongtx.com	Moseley Associates	47	134	805-968-9621	www.moseleysb.com
Arrakis Systems	18	115	970-224-2248	www.arrakis-systems.com	Nautel	31	125	902-823-2333	www.nautel.com
Arrakis Systems	32	126	970-224-2248	www.arrakis-systems.com	Neutrik	54	138	800-661-6388	www.nt-instruments.com
Arrakis Systems	73	153	970-224-2248	www.arrakis-systems.com	Nott Limited	79	163	505-327-5646	www.nottltd.com
ATI- Audio Technologies	79	162	800-959-0307	www.atiguys.com	OMB America	21	117	305-477-0974	www.omb.com
Broadcast Data	81	169	800-275-6204	www.broadcastdata.com	OMB America	43	132	305-477-0974	www.omb.com
Broadcast Software Intl	17	114	888-851-USA1	www.bsusa.com	Patriot Antenna Systems	74	154	800-470-3510	www.sepatriot.com
Broadcast Tools	83	175	360-854-9559	www.broadcasttools.com	Penta Laboratories	45	133	800-421-4219	www.pentalabs.com
Burk Technology	13	109	800-255-8090	www.burk.com	PMI Audio Group	24	119	303-373-9129	www.pmiaudio.com
Circuitwerkes	79	164	352-335-6555	www.circuitwerkes.com	Primedia Business New Media	59-66	142	212-204-2622	www.primediabusiness.com
Computer Concepts	27	122	800-255-6350	www.epicenter.fm	Prism Sound, Ltd.	26	121	+44-1223-424988	www.prismsound.com
Comrex	9	107	978-263-1800	www.comrex.com	Propagation Systems	78	160	814-472-5540	www.psbroadcast.com
Continental Electronics	33	127	214-381-7161	www.contelec.com	QEI Corporation	54-55	139	800-334-9154	www.qei-broadcast.com
Copper Development	11	108	800-CDA-DATA	powerquality.copper.org	Radio Systems	IBC	102	856-467-8000	www.radiosystems.com
Cortana Corporation	82	172	505-325-5336		Radio Systems	25	120	856-467-8000	www.radiosystems.com
Dielectric	36	129	866-DIELECTRIC	www.dielectric.com	Raduga	80	166	513-887-0714	www.raduga.net
Energy-Onix	56	140	518-758-1690	www.energy-onix.com	Register Data Systems	13	110	478-745-5500	www.registerdata.com
ERI Electronics Research	49	135	812-925-6000	www.ERlinc.com	RF Engineers.com	81	168	352-336-7223	www.rfengineers.com
ERI Electronics Research	82	173	812-925-6000	www.ERlinc.com	RF Specialties	28	123	816-628-5959	www.rfspec.com
ESE	81	170	310-322-2136	www.esweb.com	Richland Towers	39	130	800-827-4349	www.richlandtowers.com
Fostex America	34	128	800-7FOSTEX	www.fostex.com	Sierra Automated Systems	7	106	818-840-6749	www.sosaudio.com
Freeland Products	82	172	800-624-7626	www.free-and-inc.com	Silicon Valley Pwr Amplifier	76	156	408-986-9700	www.svpa.com
Furman Sound	75	155	707-763-1010	www.furmansound.com	Sine Systems	72	151	615-228-3500	www.sinesystems.com
Garman Redlich MFG Co.	80	167	740-593-3150	www.garman-redlich.com	Studer	19	116	+44-1-870-7511	www.studer.ch
Harris	3	104	513-459-3400	www.harris.com	Superior Broadcast Company	57	141	972-473-2577	www.superiorbroadcast.com
Harris	50	136	513-459-3400	www.harris.com	Telos Systems	15	113	212-241-7225	www.telos-systems.com
Henry Engineering	78	159	626-355-3656	www.henryeng.com	TieLine America	77	157	888-211-6989	www.tieline.com
Honeywell Obstruction Lighting	14	112	805-581-5591	www.honeywell.com	Transcom	80	165	800-441-8454	www.ftomtv.com
Inovonics	72	152	831-458-0552	www.inovon.com	V-Soft Communications	79	161	800-743-3684	www.v-soft.com
Intermax	77	158	314-345-1030	www.radiomax.com	Wheatstone	IFC	101	252-438-7000	www.wheatstone.com
Klotz Digital	5	105	678-966-9900	www.klotzdigital.com	Wheatstone	BC	103	252-438-7000	www.wheatstone.com
LBA Technology	41	131	800-522-4464	www.lbagroup.com					

Request free information with the Free Info card or go to www.beradio.com.

Sales Offices

NATIONAL SALES DIRECTOR

Steven Bell

9800 Metcalf Avenue
Overland Park, KS 66212-2215

Telephone: (913) 967-1848

Fax: (913) 967-7249

E-mail: sbell@primediabusiness.com

EUROPE/UK

Richard Woolley

P.O. Box 250
Banbury, Oxon OX16 5Y5

Telephone: +44 1295 278 407

Fax: +44 1295 278 408

E-mail: richardwoolley@compuserve.com

CLASSIFIED ADVERTISING

Jennifer Shafer

Telephone: (800) 896-9939

(913) 967-1732

Fax: (913) 967-1735

E-mail: jshafer@primediabusiness.com

LIST RENTAL SERVICES

Lisa Dinkel

Telephone: (913) 967-1872

Fax: (913) 967-1897

E-mail: ldinkel@primediabusiness.com

EDITORIAL REPRINTS

Reprint Management Services

Telephone: (866) 268-1219, ext. 100 or (717)

399-1900

Fax: (717) 399-8900

E-mail: intertec@rmsreprints.com

Taking stock

By Skip Pizzi, contributing editor

It's been a year to remember—or perhaps to forget. Wall Street witnessed figurative and real collapses, and radio has felt the ripples generated from that.

All this short-term noise makes it hard to discern the real trends in the industry. The best we can do is make a year-end inventory of the issues as the tumultuous first stanza of the new millennium comes to a close.

Hot buttons

Satellite radio finally got started in 2001. XM Satellite Radio came from behind and launched its service first (originally scheduled to debut on Sep-

tember 12, it was postponed to the 25th), while we're still waiting for Sirius Satellite Radio to get going. Early response has been positive, with XM receivers jumping off the shelves by some reports. The loudest complaints have been that each radio has to have its own subscription, with no discounts for multiple-receiver households.

IBOC continues to develop but faces unresolved regulatory, broadcast deployment and consumer retail-channel obstacles. Its prospects remain uncertain, and compared with other here-and-now developments, IBOC appears speculative and distant, and its benefits (at least for FM) seem negligible.

Online radio services continue to proliferate. While most streams are still geared for the dial-up user, with audio data rates around 20kb/s, a growing number of services target the broadband listener with audio at 60kb/s to 100kb/s. When properly implemented, the latter rates are indistinguishable from CD or DAB services to most consumers.

The rights picture changed radically in 2001, with broadcasters who stream the air signals becoming liable for new music, sports and talent usage assessments. This caused many broadcasters to rethink their online business plans, and curtail their webcasting efforts. Thus, the primary focus of online radio is shifting from an alternate or extended method of delivery for local broadcast services to a new medium of its own, with Internet-only radio streams now beginning to dominate the environment. Given the concurrent cutbacks in peer-to-peer file-sharing services like Napster, many online music seekers have turned to streaming radio services for legal and easy access

to free music online. Navigation improvements and program listing services on streaming media players and third-party websites have made surfing easier and more elegant.

Next up

It seems likely that satellite radio will become a force with which terrestrial broadcasters must reckon. Not all is rosy in S-DARS land, but the future seems promising

for XM and Sirius, with ripening opportunity to gain a foothold in 2002 and beyond.

As broadband Inter-

net deployment continues, and broadband wireless Internet emerges, online radio (dominated by Internet-only services) will also become a stronger competitor. Consider that today's broadband brings around 1Mb/s to the consumer's home, while next-generation systems will typically provide >20Mb/s, with such service likely to become available by 2004.

In other countries (notably Canada and the UK), Eureka 147 DAB services are slowly gaining momentum as affordable receivers begin to hit the market. The new year should see some progress there, though worldwide the largely replacement approach favored by Eureka DAB broadcasters has minimized the new services' attraction.

As mentioned here in the past, new broadcast channels that offer fresh and otherwise unavailable content appeal far more to listeners than those that simply improve the quality of existing services (particularly when new hardware purchases or subscriptions are involved). Thus, iBiquity's choice to make the IBOC format a qualitative-only enhancement (like most Eureka services) seals its fate as a less interesting development to consumers, who prefer the many new content offerings of other emerging platforms.

Perhaps the best outcome is that U.S. terrestrial radio may be gradually encouraged to increase or restore its localism, reduce its commercial loads, and increase its programming diversity and quality in order to compete with advancing new services. As elsewhere, what doesn't kill radio will make it stronger.

The ultimate asset in radio remains its human resources. Without them the medium is worthless. There are new opportunities emerging to lure them away, so broadcasters should do their best to keep these crown jewels intact.

A final watchword as we gather for this particularly poignant holiday season can be borrowed from Garrison Keillor: "Be well, do good work, and keep in touch." ☞

What doesn't kill radio will make it stronger.



Congratulations to
Dan Braverman



on
25 Years of
Broadcast Excellence



From all your employees at Radio Systems



Wheatstone

DIGITAL AUDIO NETWORK ROUTER

- **BI-DIRECTIONAL FIBEROPTIC OR CAT-5 INTERLOCATION CONNECTIVITY**
- **ALL DIGITAL DOMAIN AES SWITCHING**
- **ANALOG OR DIGITAL (AES SAMPLE RATE) INPUTS**
- **BOTH ANALOG AND AES DIGITAL OUTPUTS**
- **SERIAL CONTROL AND DISPLAY WITH WHEATSTONE CONSOLES**

THE 2001 MAKES AUDIO NETWORKING PRACTICAL. It's simple to install, easy to learn, and certain to reduce system costs. Compact enough for small applications, yet stackable for tremendous growth potential, it's design consists of 7" rackmount digital routing cages, each capable of handling 512 simultaneous audio channels on its backplane.

Units can be stacked to suit particular card complements (analog or digital input and output cards or optical network cards) but more significantly cages can be separated by great distances and network their audio through either bidirectional fiberoptic links or a single CAT-5 wire. **ONE INTERCONNECT DOES IT ALL:** 64 channels of simultaneous bidirectional digital audio, interstage communication, X-Y controller commands plus auxiliary RS-232 data streams. This single interconnect between your studio and central rackroom can save you tens if not hundreds of thousands of feet of wire in a typical installation.

The 2001's graphic based setup software is intuitive and easy to use, with all the authorization and security levels you could want. And of course we have a full

complement of control panels and PC applications to choose from—all designed for straightforward operation and a rapid learning curve.

With 25 years of experience, Wheatstone has the infrastructure in place to help you build your OWN infrastructure. Contact us for answers.



MIXED SIGNAL SWITCHING is easily accomplished with a choice of AES digital or ANALOG 24-bit A>D input cards, and of course 24-bit digital or 24-bit D>A ANALOG output cards, all of which can be serviced from the front of the cage. All signals are routed entirely in the digital domain.