June 2001
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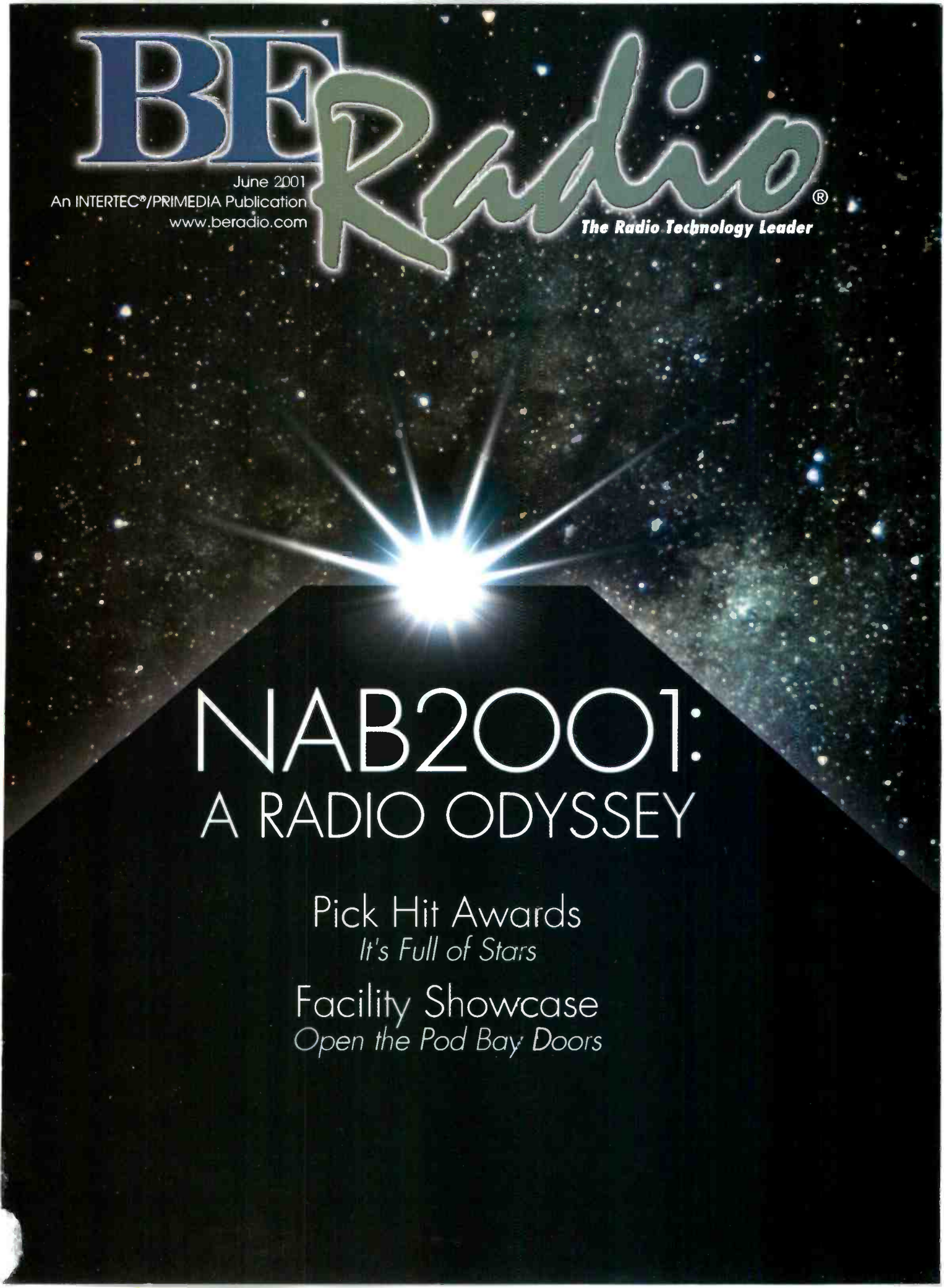
The Radio Technology Leader



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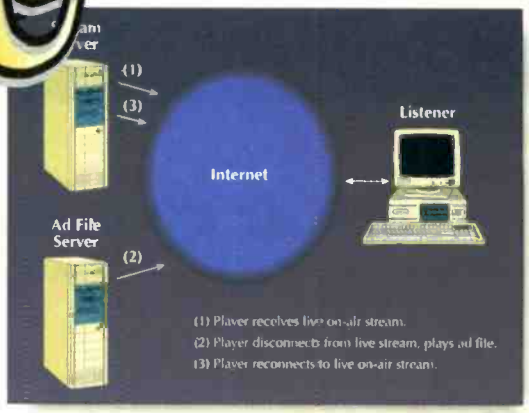

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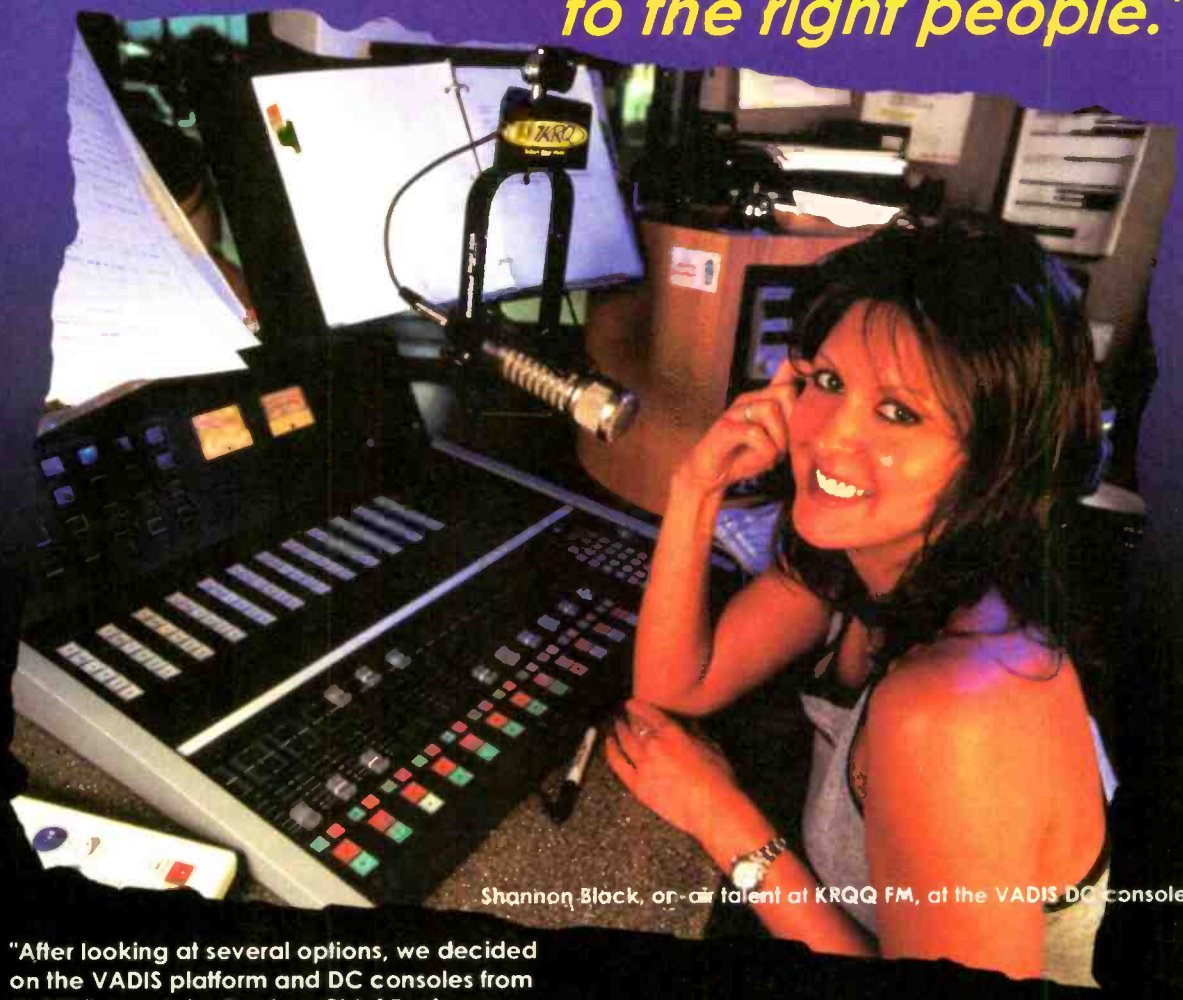
ON THE COVER: The first NAB convention of the new millenium was an adventure in radio's evolution filled with traditional and new technologies. The show review includes our reporter coverage, the Pick Hit Awards and the New Products section. Cover design by Michael J. Knust.

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



Shannon Black, on-air talent at KRQQ FM, at the VADIS DC console.

"After looking at several options, we decided on the VADIS platform and DC consoles from KLOTZ," says John Decker, Chief Engineer, Capstar Communications, Tucson. "Why? First, our install would be much faster since most of the plant wiring could be reduced to a simple Ethernet line and a fiber optic cable connecting each room with our rack room.

"Secondly, all four stations were to be housed in the same facility, and we had to share audio sources all around the plant. This is a function that is part of the KLOTZ system. Our entire plant is now based on a digital audio 'back-bone' that provides an improved audio signal.

"We also purchased five DC consoles. The air talent finds the DC consoles simple to operate. They can put any source in our plant on any fader of the console with a simple LCD button in the meter bridge. Giving the operator the ability to call up any source to a fader is great since each operator prefers a different arrangement of sources on the console."

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June Issue

Read it online. Plus, technical tips, streaming stations ratings and more.

ERI Names Beeler for Sales
Electronics Research Inc. has named Scott Beeler as the Director of Worldwide Sales for the entire ERI range of manufactured products. MORE

SBE Certification Celebrates 25 Years
In November 2000, the Society of Broadcast Engineers certification program celebrated its silver anniversary. MORE

Gentner Clarifies Burk Deal Details
Gentner Communications reemphasized that the GSC3000 and VRC2500 broadcast remote control product lines are now available for purchase through traditional channels via Burk Technology of Littleton, MA. MORE

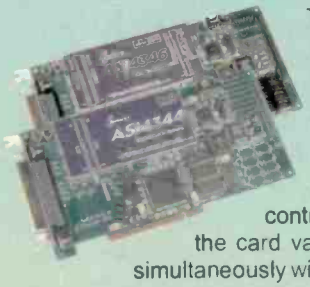
On The Air

A Monthly Newsletter from Broadcast Software International — Issue 4

News

First Professional MP3 Audio Cards

BSI and AudioScience have teamed up to create soundcards that play four MP3 files simultaneously without a software CODEC. The $2095 ASI4344 and the $2795 ASI4346 were available on May 1st, exclusively at BSI.



This is the first time a professional audio company has created devices specifically for the MP3 format. The two cards decompress audio files on their own hardware so the processor doesn't have to. With these cards, the skipping and slowness that plague broadcasters with MP3 files have been eliminated.

The concept of decompressing audio on an audio card has been used with other formats, however the Frauhofer Institute has controlled the CODECs for the MP3 format. Putting the CODEC on the card vastly improves PC performance, so playing multiple MP3 files simultaneously will be no different to your PC than playing multiple linear files.

"Our corporate mission is to respond to customer requests. AudioScience has a record of leadership in the digital audio market. When BSI and AudioScience formed the concept of combining our hardware with MP3 technology it made sense for both of us," says AudioScience President Richard Gross.

"The radio industry has been heading towards an audio card like this one ever since the MP3 format became popular. Broadcasters wanted to use MP3 files, but could not get the consistent sound they needed," says Ron Burley, BSI President. "We were happy to have AudioScience as a partner in this because of their record of creating products users want, rather than finding customers for the cards they decided to make."

BSI will be the exclusive distributor of the new audio cards. And only BSI will distribute the upgrades to two other cards, the ASI4334 and the ASI4336, allowing them to play triple MP3 files. The $200 upgrades allow you to buy the earlier card with upgrade for the same cost.

Quote of the Month

"WaveCart is really an awesome tool. When I trained our weekend board-ops, who had no radio experience, it took only about 15 minutes before they had a real grasp on it."

Clive Millett
KKVV- Las Vegas, NV

Calendar

Aug 16-18, WaveStation Weekend Training Session

Birthdays:
June 18 1942, Paul McCartney
June 19 1903, Lou Gehrig

Tip

Online Tech Data

If the net clock for your station is locked in the PD's office or you can't find the wiring diagram for your audio switcher, you'll probably find the info you need at www.bsiusa.com/support. The BSI web support area has a database that includes wiring instructions for connecting to external devices, whether or not you're using BSI software! It also includes network program & tone clocks. You'll also find complete online manuals for all BSI programs.

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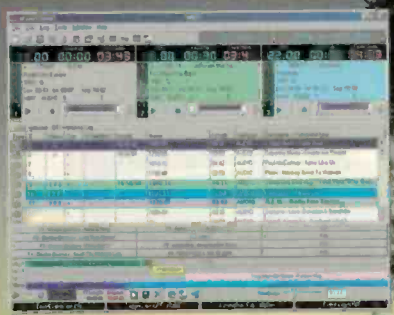
Our WaveStation 3.0 has all the features of the too-expensive systems, but is priced reasonably like software, not gold-plated broadcast hardware. We often hear, "It can't be true!" Over 3000 satisfied users prove the contrary.

WaveStation uses linear or compressed audio files. Features include WebCast ability, on-screen voice-track editing, time-shift recording and serial port control. Offers full automation, satellite, voice-track and live assist. Works with Windows 2000, 95, 98 or NT.



Get one for only $1499

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User File

WJIL - Dan Kolenda

Dan Kolenda visited BSI for WaveStation Weekend in February. "I thoroughly enjoyed it. It's so good to be able to see BSI President Ron Burley demonstrate things. Reading the manual is great, but being able to see him do it, the lights just all come on. He really wants to help us, instead of just trying to sell a product. Ron kept saying that BSI was a user-driven company, and you can really feel that from what he says to you."

Dan has been using WaveStation for a while now. Although he was familiar with the product, there was more to learn. "I've always had a little bit of reluctance to try new things because I might go off the air. WaveStation Weekend really raised my confidence level. I don't mind experimenting more now. And the technology has changed so much that this really brought me up to date. I also think it's good to ask for a roommate," he says, "I planned to go, not for a vacation, but to learn. My roommate and I sat in our room and just bounced ideas off each other."

The thing Dan liked most about the $1499 WaveStation Weekend was the personal aspect. "I really enjoyed talking to the different technicians. I've talked with them before over the phone, but being able to sit down and pick their brains was worth its weight in gold."

Send us your story.

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Surviving the Internet

By Chriss Scherer, editor

We all know that habits change. Radio listening habits (and naturally radio itself) have undergone some changes from their origin. The most dramatic change was in radio's very early days when usage changed from a messaging medium to an entertainment and information medium. Another significant change was the shift in focus of the radio being the centerpiece of the home, when radio listeners "watched" the radio. This occurred when TV was introduced, and radio slowly moved to a background medium in many cases. Since then, the habit changes have been smaller, introducing only minor differences.

Internet time, a phrase that is often heard today, has real meaning. Changes in habits and technology are occurring much more quickly today. The changes in radio took place over a period of more than 75 years. Now we see technology, and subsequently habits, changing every month or even more often. Changes in online usage as a result of these technological advances are readily recognized.

In May, Scarborough Research released the results of a National Internet Study that examined Internet usage habits and changes in the way Internet consumers embrace online and traditional media. This is Scarborough's first study on the topic, and more are planned.

Some of the general statistics are not surprising to me. It reports that 48% of Americans have used the Internet in the past 30 days, and 42% have consumed some form of streaming media. Further investigation would no doubt reveal that these users are younger as opposed to older people.

The decline in usage of other media as a result of the time spent online shows that the Internet is winning the competition for attention–except in radio. By combining the reported consumption statistics (that is, the percentage of those who consume certain media less and those who consume a certain medium more now that the Internet is available) for various forms of media, the results are: TV viewing down 16%; magazine readership down 12%; newspaper readership down 6%; radio listening up 2%. Some respondents indicated no change in their media habits, and radio again came out ahead with 81% while other media forms showed less favorable responses.

What does this mean for radio? It means that radio is not being affected as much as other media forms. Radio is retaining its audience better than other media forms.

I believe that this can be attributed to radio being an aural medium. You can listen to the radio while performing other tasks: working in the office, working around the house, surfing online. In some cases, listening (online or terrestrial) can be tied directly to the online experience.

Radio, TV, magazines and newspapers all offer additional information online. It's common to see references to additional online stories within an article or during a TV show. It's difficult if not impossible to read something online and also read something in print or watch it on TV. It's not so difficult to listen to the radio and work online.

Listening online may not be the preferred choice because of sound quality or data transmission limitations (other surveys show that at least 60% of the computers on the Internet connect with 56K or slower modems). But regardless of the transmission means, radio and surfing work well together.

Radio is facing its own evolution as terrestrial radio is introduced to IBOC and challenged by satellite radio and Internet radio, but in the end, it's all radio in some form. The same ties can be created and expanded upon. Radio and the Internet work well together. As people stop buying newspapers and reading more information online, the radio will always be turned on in the background.

Chriss Scherer, editor
chriss_scherer@intertec.com

Do you surf and listen? Does your station offer an online presence to enhance the listening experience? Tell us about it at beradio@intertec.com.

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ISDN*

- Layer III for 15 kHz at 64 kb/s
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POTS

- 15 kHz full-duplex audio on a standard telephone line
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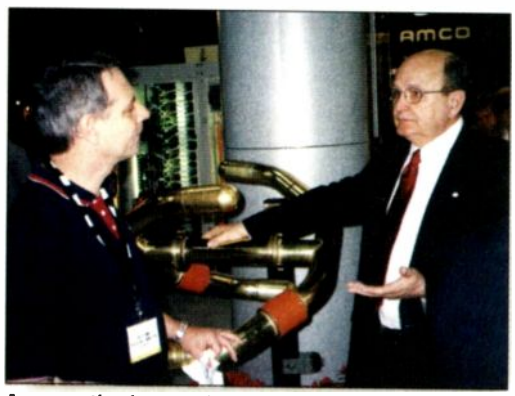
Make it so!

By Jim Paluzzi

While you attended the NAB, you kicked the tires and identified the purchases you want to make. What comes next? Cut the purchase order? Pull out the corporate purchasing card? How do you go from capital *decision* to capital *execution?* You must find a way to "make it so!" For many managers, deciding *what* to buy is the easy part of spending your capital budget. The hard part is deciding *how* to buy it.

There are many ways to make a purchase; knowing how to order can make the difference in truly adding value to your radio station. Purchasing errors are more than expensive; mistakes can result in lost productivity that hurts morale and the bottom line.



A convention is a good place to learn about equipment and comparison shop, but save the final decision for neutral territory.

Take a look at your purchasing categories, ask yourself (and potential vendors) some questions, and you will likely experience the rewards of money well spent. Let's discuss two types of high-ticket capital investments.

Physical plant

Building studios, transmitter buildings and towers is not the core business of most broadcasters. But management can be tempted to assign the task of designing and building technical facilities to the engineering department in an effort to save money. This is usually a mistake.

It may be better to delegate major construction projects to a general contractor or to a series of subcontractors that your engineering team can supervise. There are at least three reasons why it usually makes sense to outsource major capital projects.

Indirect costs. While your technical staff is probably more than capable of learning the construction trade, it will take time for your staff to master the learning curve. The costs of learning how to build something for the first time are often buried in the budget, since your staff gets paid anyway. You may never know the real cost of having your staff handle your physical plant projects.

The costs of ignorance. Few things can create as much grief in an organization as a capital project in trouble. It is safe to assume that mistakes will occur at the construction site; that is why it may be wise to outsource the heavy lifting to someone who does this work for a living. It all boils down to who pays for those mistakes.

On time, on budget. A general contractor or a subcontractor should have fewer responsibilities than your engineering staff. Before awarding a contract, see how many concurrent jobs the contractor has scheduled during your construction period. If the contractor is evasive on this issue, find another contractor.

The last thing you need is to pull your engineering team off a construction project to deal with a crisis.

Include penalties in your contract for failing to complete construction by a stated deadline. Penalties are your best insurance that a construction crew is going to stay on the job, even if your contractor has a more lucrative contract in the wings.

There is a middle ground between "doing it yourself" and hiring a general contractor: buying boxes instead of buildings. Increasingly, broadcasters are purchasing prefabricated studios and transmitter buildings, rather than "stick-building" their facilities. This allows broadcasters to take advantage of mass production cost savings—with the promise of greater quality control.

The advantages of prefabrication are magnified at public radio stations at state institutions, where studio facilities are often a neglected part of a much larger, multi-purpose building. The hazards of lowest-cost bidding, combined with the politics and bureaucracy that too often surround public works projects, conspire to ensure that many stick-built facilities will be inferior to their prefabricated counterparts.

Automation systems

Once considered a necessary evil at neglected sister stations, digital playback systems now deliver the pulse of most radio stations. While the process of selecting an automation system that is right for your station is a lot like buying a car, here are some purchasing tips that will serve you well before you buy:

Never buy based on a demo. Arguably, a vendor's product demonstration represents that company's best sales effort. On the other hand, your best predictor of how the system will work at your station will be your observation of how the product works in the field—without the vendor present. Find at least two installations of the proposed system at facilities similar to yours. Travel to those stations and spend a day talking with

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management, engineering and operations.

Ask to have several people demonstrate the system. If you hear frequent references to only one person at the station who "really knows how to make this thing work," run away from the product. If the automation system is user-friendly, everyone should know how it works.

A visit to the factory can be useful in determining the quality of service after a major purchase.

Visit the factory. To evaluate the quality of technical support you are going to receive after you purchase your system, head for the factory. Given investment cost of the system, vendors will be hard pressed to turn down your request for an on-site visit. Forget the multimedia presentations in the boardroom. Instead, head for the repair bench and talk to the technicians. Ask about the most common hardware problems they face.

Visit the help desk and ask the staff to describe the most common problems they encounter. Ask about the help desk tracking system. Any serious help desk operation has software that allows staff to document and track trouble calls. Finally, look for a help desk that has a high level of *respect* for the products they sell—and the users who buy those products.

Be carefulwith factory training programs. Staff members certainly need training on a new automation system. The question, however, is not whether your staff should be trained, but rather, "Who should train your staff?"

Factory trainers usually understand their equipment and their software, however, not all trainers have a background in station operations. Indeed, few trainers have *any* formal background in training. As a result, system training can be highly frustrating for the staff—and hardly worth the expense.

Instead, find a user who understands how the system works. Offer that person the money you would have spent on factory training. Then, you will have someone training your staff who can focus on the basics of how to get things working, rather than a technically thorough (but otherwise irrelevant) "systems overview."

Capital investments will constitute a larger portion of a radio station's budget in the decade ahead. Stations that establish effective procedures to execute capital purchases will receive an even greater return on their investment.

Jim Paluzzi, Ph. D., is general manager of Boise State Radio.

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Ryals Lee/ FSU Photo Lab

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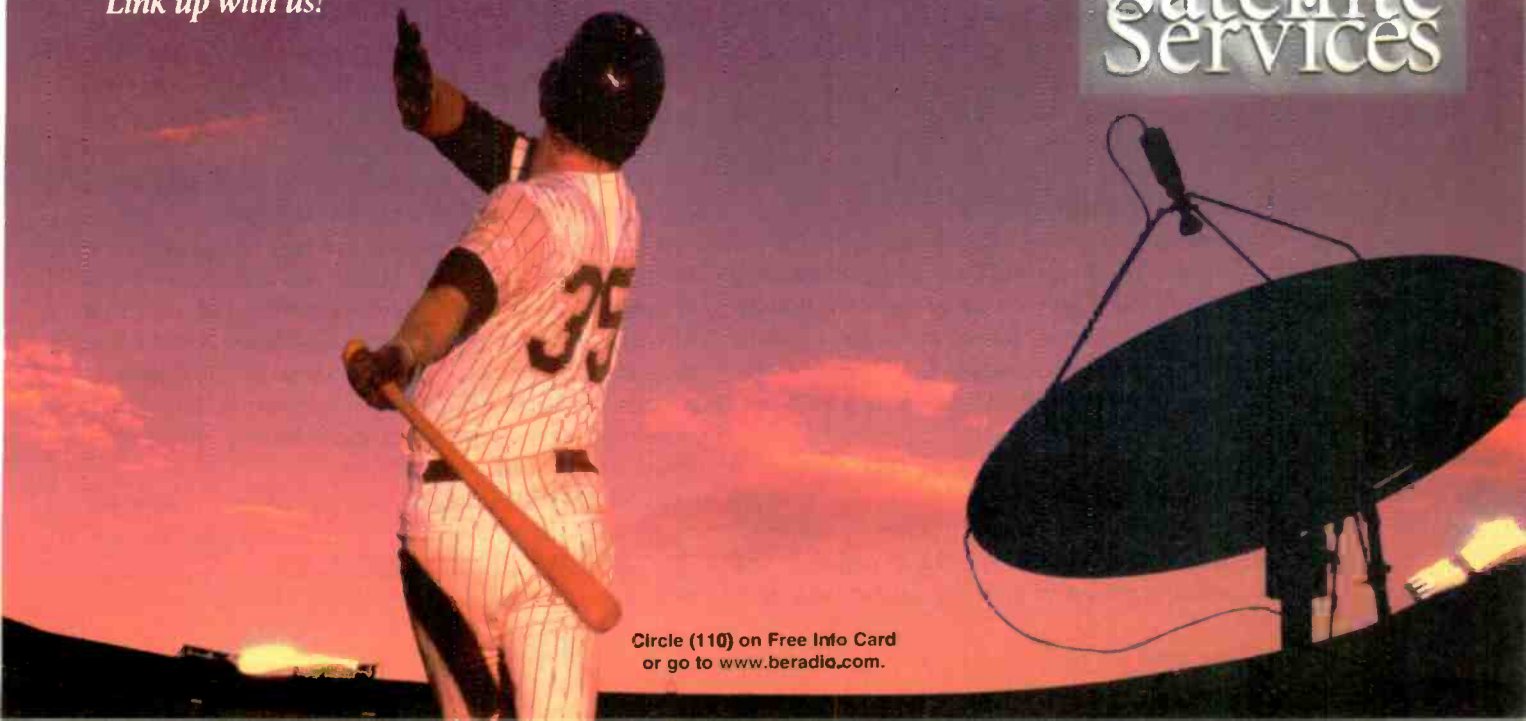

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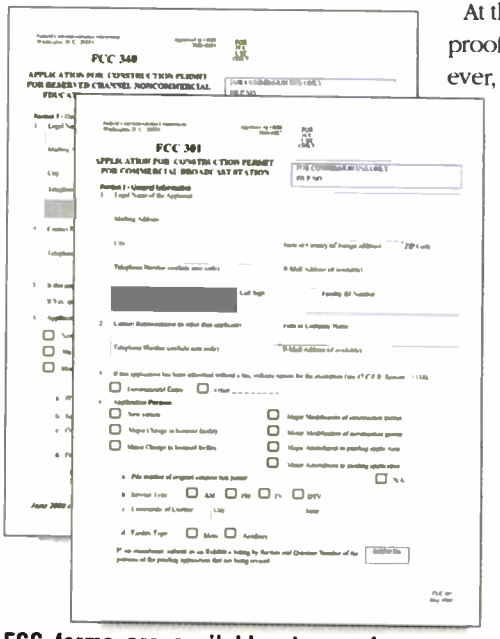
The licensing process

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

Whoever said, "the more things change, the more they remain the same," must have had the FCC in mind. More than 50 years ago, Form 301 was thin and did not demand much in the way of exhibits. Today, Form 301, still thin and demanding little in the way of exhibits, requires many statements of fact that must be backed up by full engineering analysis so that exhibits can be presented on demand. However, today's Form 301 must be filed electronically.

It is also illuminating to compare the Commission's present day paperwork requirements with those of 50 years ago. Nowadays, there are more forms to be completed, and the Commission is requesting data in forms that are more examiner-convenient than the original Form 301. I think the latter was designed to get the information displayed in a relatively easy manner for the applicant without much consideration for the examining engineer.

In this article we're going to run through the engineering process of getting a license for a broadcast station and talk about the new electronic filing forms. It is important to bear in mind that, apart from technical matters, the FCC has sticky fingers and expects its palm to be greased with every application, using Form 159 when sending cash, and 175 in the cases of auctions. However, these forms are best left in the hands of the attorneys.



FCC forms are available at www.fcc.gov as updateable PDF files.

Getting a construction permit

In the interest of correctness, I like to emphasize the fact that the first step in building a broadcast station is obtaining a Construction Permit (CP). Too many times we find the expression "getting a license" is used in the press and the daily papers. That's fine for non-technical people, but "getting a license" is very different from "getting a CP," and it has a different meaning.

Before starting work on a new broadcast application, it is important to check with the FCC to be sure that the appropriate window will be open. The Commission tends to require windows for almost everything; perhaps in an effort to control workflow to their overloaded engineers.

At the same time, be sure that a current application form is used. Many changes are being made. Sometimes it seems that monthly changes are occurring, and it's important to check expiration dates. The current OMB approval data appears in the upper right-hand corner. The expiration data appears in the bottom right corner. Also be sure to use the latest rules; these seem to change frequently nowadays.

At the time of writing this, the old AM DA proof of Performance Rules apply. However, there is a Notice of Proposed Rule Making (NPRM) proposing some substantial changes and reduction in required field work. By now, the new Rules may be in force.

The first step towards a CP is finding a frequency, unless it is intended to file on an existing station or an identified frequency. The next step is obtaining and reading a copy of CFR 47, the FCC Rules and Regulations. Although most of the rules governing the completion of Form 301 can be found in Part 73 of the Rules, there are a few paragraphs in other sections of CFR 47 that require reference prior to submitting the application.

Today's FCC will not accept Form 301 on paper. The filing must be electronic. This means that the filing is more of a statement of intent than a technical document, as in the old days when voluminous documentation had to be submitted. It seems that with the advent of Docket 80-90, the FCC has become window oriented. It is almost impossible now to file any application unless the appropriate window is open, and it is essential to keep an eye on FCC releases.

In my opinion, the new engineering data portions of Form 301 are important improvements to the Form, although they can be a dangerous trap for a careless filer. Almost every page of the Form calls for the repetition of technical data entered on previous pages. It is easy to make a typographical error from page to page, with disastrous consequences: any inconsistency will result in return of the application.

On the old Forms antenna data was requested once, but on the new forms it seems to be required frequently, and

Note: Form 301 is used as a generic term in this article, the same things apply for all versions of Form 340 (NCE) as well.

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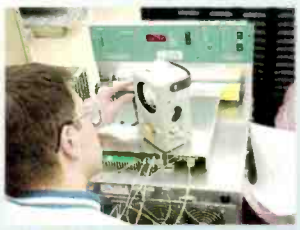

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FM 100

FM 250

FM 500

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every entry is a possible source of error and rejection. Non-DA and day and night directional operation data are requested on separate pages, for a total of 10. This feature is a great improvement on the old system.

In the case of un-tamable directional antennas, augmentation data are requested and clearly outlined. This format makes the FCC engineer's job a lot easier, but it puts more stress on the applicant engineer because of the earlier mentioned risk of conflicting entries and consequent dismissal. In lieu of presenting pages of expensive drafting work to demonstrate that the system will work as proposed, many boxes must be checked yes or no, and other boxes show compliance with parts of Part 73.

Form 302 is used for the license application.

The page requesting data on operation during critical hours is a good idea. It can be easy to forget that such things as critical hour operation have to be considered when racing against time. I missed a critical hours check on a Form 301 about 40 years ago. The critical hours section would have prevented my embarrassment, and I hope it will save engineers in the future. It's very easy to say that a good engineer would think of it; but sometimes in a rush things are overlooked until too late.

Form 301 FM

Form 301 for FM requires two pages of technical information and the checking of about ten boxes to show compliance with several paragraphs of Part 73 and other parts.

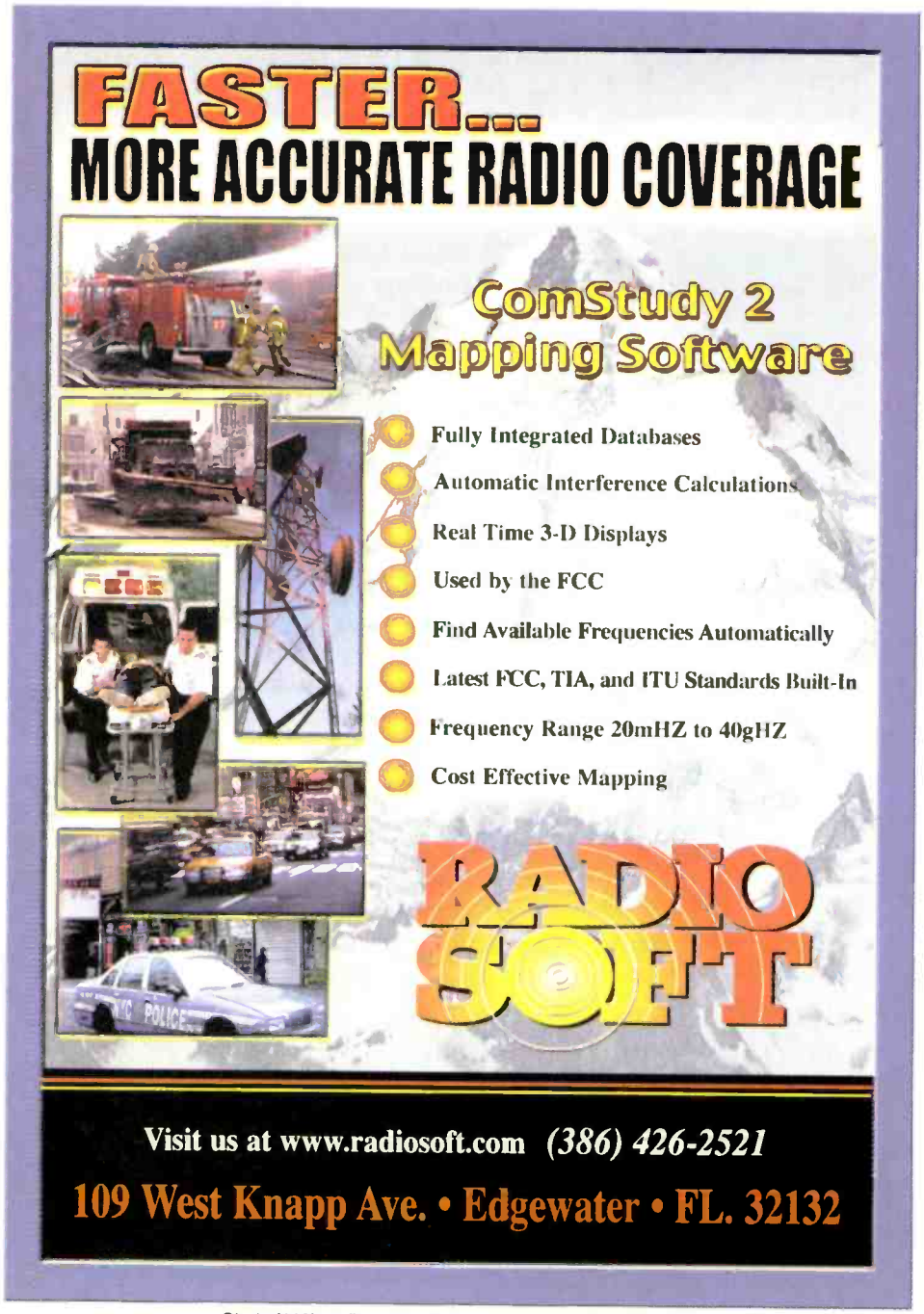
Unlike AM DA applications, FM DA data is not supplied with Form 301FM. Instead, the desired relative fields are listed (after consultation with the antenna supplier to ensure that they produce a DA with the required pattern), and the application is based on that data.

When the CP is issued and equipment ordered, the antenna supplier runs a pattern proof on the actual antenna and/or a scale model. This material is filed with Form 302FM when making application for the station license, in much the same manner as AM DA license application is filed. The main difference is that, in the case of FM DAs, the FCC accepts the promise of the proposed DA pattern, avoiding checking the whole application.

Licensing AM DAs involves making a number of radial measurements to demonstrate that the promised pattern has been achieved and that the antenna is operating as promised. This is known as the Proof of Performance, and it takes weeks to make and analyze the radials runs and produce the exhibits the FCC needs. The AM Proof of Performance is expensive and time consuming. The FM DA testing proof is not as costly as for AM DAs.

Barring conflicting applications, errors, petitions to deny or other problems, the application is accepted. One then begins to wait, and wait, and wait.

E-mail John at batcom@bright.net.



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Shown above is the top-rated "Big Boy" morning drive personality pointing to the SS32 touchscreen at KPWR, Power 106 FM in Los Angeles. For details, visit ss32.com or call 1 888 GET SCOTT.

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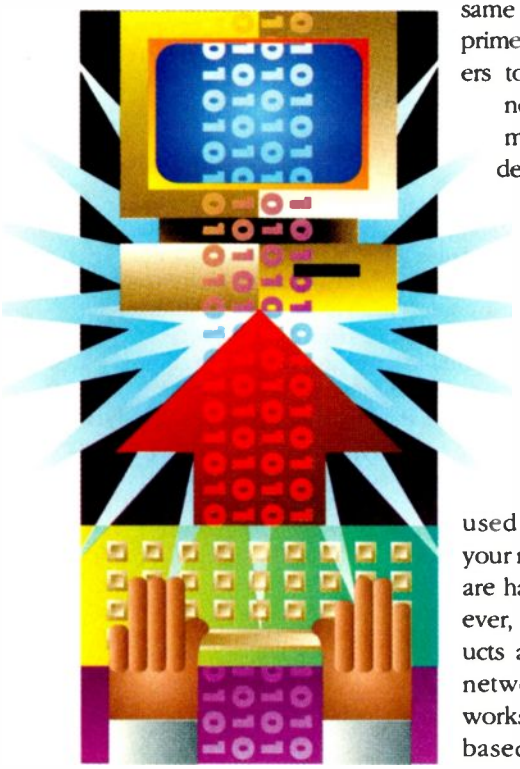
Remote access–equipment requirements

By Kevin McNamara, CNE

Last month, I discussed three methods to remotely access your server–dial-up, extranet and the virtual private network (VPN). This month, we will look at some of the hardware and software required to implement those solutions.

Security

Extending the accessibility of your company server can prove to be a valuable resource for your employees that spend time away from the office, or perhaps a means to bring timely information to a remote broadcast; but, at the same time, you provide a prime opportunity for hackers to gain entry onto the network. Whichever remote access solution you decide upon, the first and most important detail to be considered is securing the network. You have no doubt heard of, or perhaps even have set up, a firewall.



There are several ways to establish remote network access.

The firewall is a security mechanism used to control access to your network. Most firewalls are hardware devices; however, several software products are available for small networks and individual workstations. The hardware-based firewall has been around for several years, and is also known as a "proxy server" or "gateway."

The concept behind it is simple: an outside user would first establish contact with the proxy server, which would require the proper authentication, typically in the form of user name and password. Once the user is verified and authorized, the proxy server will then establish a "session" between the user and server. You will recall that the networking model that is in use today is defined by a document known as the Open Standards Interconnect (OSI) and is comprised of seven layers: physical, data link, network, transport, session, presentation and application. Each layer provides services to the other layers immediately before and/or after it. Firewalls generally operate at either the Network or Application layer.

A proxy server is an example of a firewall operating at the application layer. Essentially, a firewall operating at the application layer eliminates the direct flow of data between the network and an outside user. Firewalls operating at the "network" layer route traffic based on the source and destination addresses, as well as the intended port of each IP packet. The definition and use of ports is a lengthy subject but, simply put, it presents "virtual slots" used to map connections between two hosts at the Transport Control Protocol (TCP) or User Datagram Protocol (UDP) levels. Network firewalls permit traffic into a network based on a set of rules that are programmed by the network administrator. The rules determine what type of traffic is permitted on the network and what will be blocked. The current generation of network routers has sufficient intelligence that allows them to be programmed to act as a simple firewall.

Dial-up access

By far the simplest method for remote access, dial-up access to your network can be accomplished in a variety of ways, depending on the number and location of users that will need to use the network. The most rudimentary method to implement dial-in access would be to add a basic PC workstation equipped with one or more modems and a network card to your existing network. Outside users would dial the telephone line(s) that have been assigned to the modem(s). The login process may vary depending on the type of network operating system and configuration of the host PC. Most dial-in access uses the standard dialer client program that you probably use to dial-in to your Internet Service Provider. You would create a dial location containing the telephone number and protocols for your dial-in number.

Another means to gain remote access would be to use a program such as PC Anywhere or Co Session that would mimic the operation of the PC located in the office as if you were there. One drawback of this method is that someone could watch what you are doing remotely on the office PC and possibly gain privileged information.

Accommodating a larger user base is slightly more complicated and requires either the use of centrally located modem banks or access provided by the telephone company. Modem banks are typically rack-mounted equipment frames that accept plug-in modem modules.

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New commissioners named

By Harry Martin

The White House announced that President Bush will send to the Senate the names of Kevin J. Martin, Kathleen Q. Abernathy, and Michael J. Copps, three long-time Washington insiders, to fill FCC vacancies. In addition, Andrew Levin, telecommunications counsel to the House Commerce Committee, is likely to be nominated by the White House to replace Commissioner Gloria Tristani, who has indicated she will leave by the year's end.

Martin, a Republican, was legal adviser to outgoing Commissioner Furchtgott-Roth. He is currently the Special Assistant to the President for Economic Policy. He also was Deputy General Counsel for the Bush-for-President Committee. Martin will be nominated for a five-year term expiring in June 2006.

Abernathy, also a Republican, is a lawyer who worked in private practice and at the Commission before taking positions in the wireless industry. Most recently, she was Vice President for Public Policy of BroadBand Office Communications; she was formerly Vice President for Regulatory Affairs for AirTouch Communications. While at the FCC, Abernathy was a legal advisor to Commissioner Sherry Marshall and Chairman Jim Quello. Abernathy's term will expire on June 30, 2005.

Copps, who will fill the open Democratic seat, has spent 15 years in the office of Senator Fritz Hollings in a number of positions, including Chief of Staff. Most recently, he served as Assistant Secretary of Commerce for Trade Development and as Deputy Assistant Secretary of Commerce for Basic Industries.

It is anticipated that Martin, Abernathy and Copps will be confirmed by the end of June.

Third-adjacent channel LPFM restriction added

At the direction of Congress, the FCC has adopted low-power FM station third-adjacent channel interference protection standards. Although the Commission's original LPFM rules specified co-, first-, and second-adjacent channel spacings between LPFM stations and full-power FM and FM translator stations, and co- and first-adjacent channel spacings between LPFM stations, they did not include standards to protect either full-power or LPFM stations operating on third-adjacent channels. Congress enacted legislation last December requiring the Commission to revise its rules to include such standards.

As a result, 653 otherwise technically acceptable LPFM applications filed during the two LPFM windows last year have become short-spaced to existing full power FM and/or FM translator stations operating on third-adjacent channels. The Commission will allow these stations to file minor technical amendments to move up to two kilometers to bring their applications into compliance with the new rules. These curative minor amendments were to be filed in May.

The Commission simultaneously opened its last two LP100 filing windows for LPFM applications in the states and territories not included in the earlier LP100 windows. The window closed June 15. Applicants from the earlier windows that have third-adjacent channel short spacings of two or more kilometers, and therefore are ineligible to file curative minor amendments, will be afforded an additional later window within which to file major amendments that specify technical facilities that meet the new spacing requirements.

The revised rules also eliminate the portions of the Commission's rules that permitted LPFM applications from pirate radio station operators that had either (1) voluntarily ceased unlicensed operation of a station no later than February 26, 1999 or (2) ceased operation within 24 hours of being directed by the FCC to terminate unlicensed operation. Under the revised rules, an LPFM license will not be granted to any party who engaged in any manner, either individually or with a group, in the unlicensed operation of any station in violation of the Commission's rules.

Jailed licensee fined by FCC

The FCC recently determined that the licensee of a broadcast station could no longer be legally in charge of day-to-day operations of the station while incarcerated at the state penitentiary. The FCC levied an $8,000 fine against the licensee for effectively transferring the station before going to jail. This unauthorized transfer resulted from the licensee entering into a management agreement which delegated virtually all decision-making authority over the station's programming, staff and finances as to a non-owner. Although the licensee claimed he was still operating the station from jail, the FCC stated that imprisonment takes away one's role in station operations. The licensee is serving time for insurance fraud.

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

Dateline

All radio stations in the following states, both commercial and noncommercial, must file their biennial ownership reports on or before August 1: California, Illinois, North Carolina, South Carolina and Wisconsin.

July 10 is the deadline for placing in stations' public files their quarterly lists of community problems and responsive programming broadcast during the period May 1 to July 31.

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NAB2001: A RADIO ODYSSEY

The convention evolution continues as the long-existing terrestrial radio coexists with the burgeoning Internet radio and the about-to-be launched satellite radio.

The convention grows larger each year with even more to see, so it's unlikely you were able to see everything. The *BE Radio* reporters covered the floor and searched for the new products being unveiled.

Our post-convention coverage includes the research of our reporters, the Pick Hits awards winners and our New Products section. In August, the annual *BE Radio Product Source* will also feature many products unveiled at NAB2001.

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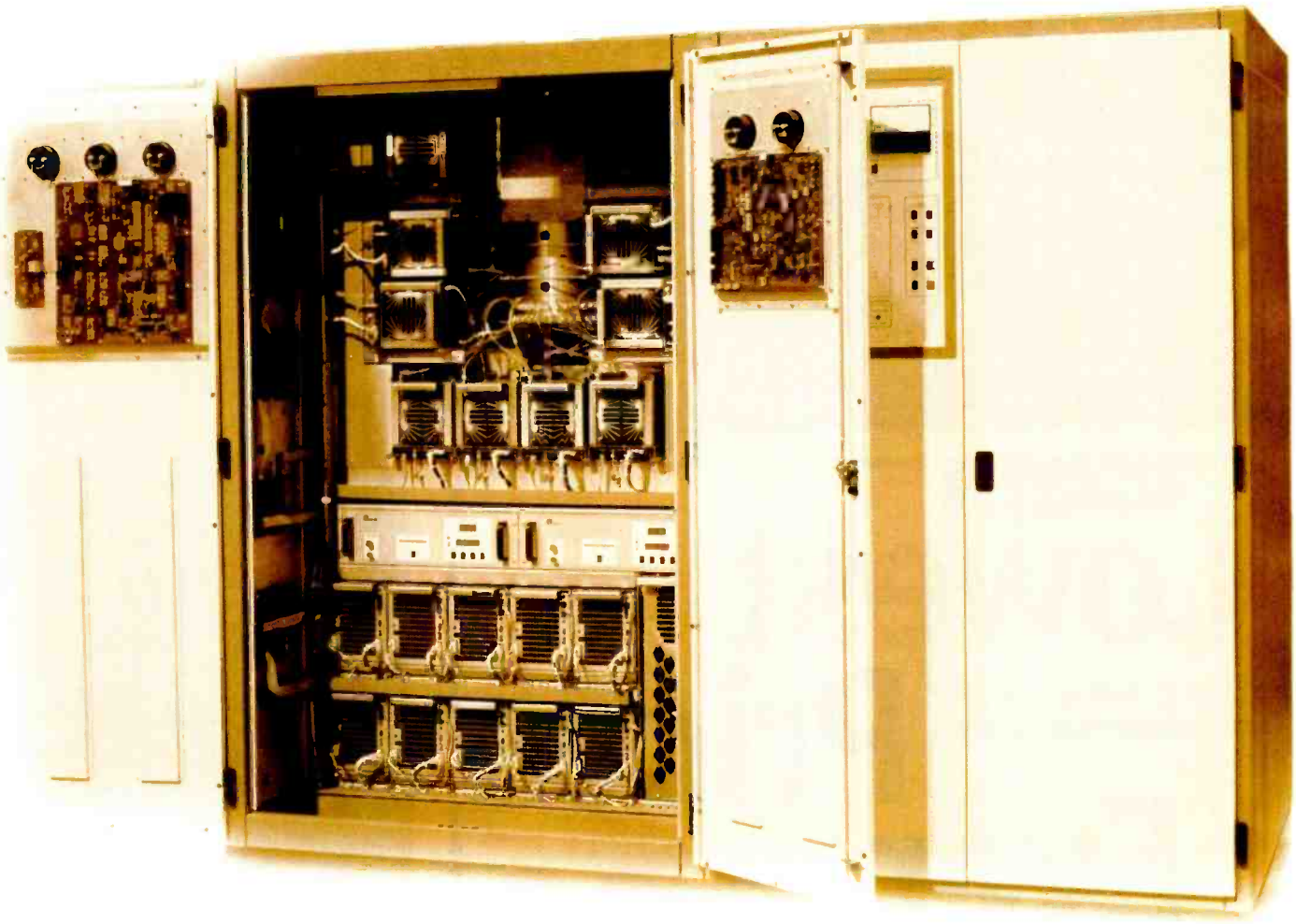
On-air playback and automation

The innovative phase of on-air playback systems has reached its peak. This year's presentation was composed of further refinements to mostly existing products.

The biggest splash was in free software. Two companies, Arrakis and Smarts, offered free versions of automation software, following a trend that has been used in other industries that rely on computer software. It is likely that more companies will follow this lead with similar specific-feature versions.

Most companies displayed software with additional facility integration capabilities. The Cart Chunk standard, a means to include file data and a hot topic last year, has been adopted by many manufacturers. Other efforts have been made to include or enhance newsroom and production capabilities.

Ad insertion was also a big buzz because of the RIAA and AFTRA items in the news. Most systems can now support some type of ad insertion within their systems. Still other manufacturers were showing multiple stream capabilities and database functions for program-associated data to be sent with webcasts.



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NAB2001: A RADIO ODYSSEY

Transmitters, towers and antennas

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

Discussions with FM engineers unearthed concerns about radio's future when considered with reference to streaming, DAB/IBOC, RBDS, satellite radio, and new applications of some laws of electronics such as the Crossed-Field Antenna and the EH Antenna.

IBOC readiness was a common discussion point among antenna exhibitors.

Dielectric's 20MHz bandwidth FM antenna, designed for tower-top mounting, made its appearance this year.

A rather solid and unobtrusive device received a lot of attention this year from antenna manufacturers. Combiners, essential to hybrid IBOC operation, were displayed in all shapes and sizes, and varying claims of low insertion loss from companies such as Shively and ERI.

Andrew displayed a new coaxial cable, which uses an improved, corrugated center conductor that avoids center-conductor scoring caused by cable expansion and contraction.

Last year's NAB was full of anticipation regarding the CFA, and we had hopes for a high-power test in the Isle of Mann, but the tests have been delayed.

The AM transmitter field had an entry from Harris in the form of the 3DX50. This transmitter has a completely new design.

Nautel showed a solid-state 60kW AM IBOC transmitter with eight very efficient compact modules in the PA stage.

Broadcast Electronics' contribution this year was the 20kW solid-state transmitter, which includes a combiner and an innovative control system.

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Satellites, STLs and RPUs

By Hal Kneller, CPBE

The hot item of discussion for radio propagation was not terrestrial distribution, but rather the upcoming satellite radio services. Both XM Satellite Radio and Sirius Satellite Radio will begin their services this year.

The satellite news for stations is that SEDAT (*Spectrum Efficient Digital Audio Satellite Transmission*) has been deemed not-so-efficient and was to be terminated at the end of

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May. ABC Networks will migrate its remaining full-service satellite formats to Starguide III.

Public Radio Satellite Service (PRSS) unveiled to NPR affiliates a new concept to store and forward programming on an as-needed basis, featuring a user interface and scheduling/programming system to replace the OS-2-based SOSS, with the possibility of returning programming via Web FTP. This also holds promise for the many commercial networks distributed by PRSS.

IBOC digital broadcasting was on the radio agenda. Ibiquity offered a van demonstration on and off the show floor.

On the STL and RPU side, Moseley has added a T1 backup capability to its Starlink SL9003Q 4-Channel linear STL and showed a (non-portable) 450MHz digital RPU system, the Aries 400S (see *Pick Hits*, page 43).

Marti Electronics unveiled an RPU transmitter, the SRPT-40A, which features a new synthesizer, more powerful RF amp and a new front panel, including reflected and forward power metering. Also shown was a new analog composite STL transmitter, the STL-20C/950. The STL-10A features a new 10W amplifier along with a new front panel. Also shown was a new Cellcast for digital systems for use with digital cellular phones and overseas. It includes a POTS port as well.

Energy-Onix bills its new TeleLink as "the world's only reliable STL that utilizes the Internet." TeleLink requires at least a 128kb/s connection and can have one studio unit feeding multiple transmitter sites at great distances.

Bext is the exclusive broadcast representative for Breezecom (wireless equipment) and showed a T1 equivalent 2GHz spread-spectrum RF link.

By far, IBOC digital broadcasting was on the radio agenda most frequently, and it was talked about the most at the many coffee klatches and in exhibitor booths. While NPR has an official "no official" position on it, NPR staged a two-day pre-NAB seminar at its Public Radio Engineering Conference almost entirely devoted to IBOC.

Portable recorders

By Doug Irwin

For remotes, life is good when your gear is light, and the less of it you have, the better. Now, eliminate as many of the moving parts from each piece as you can, and soon you'll

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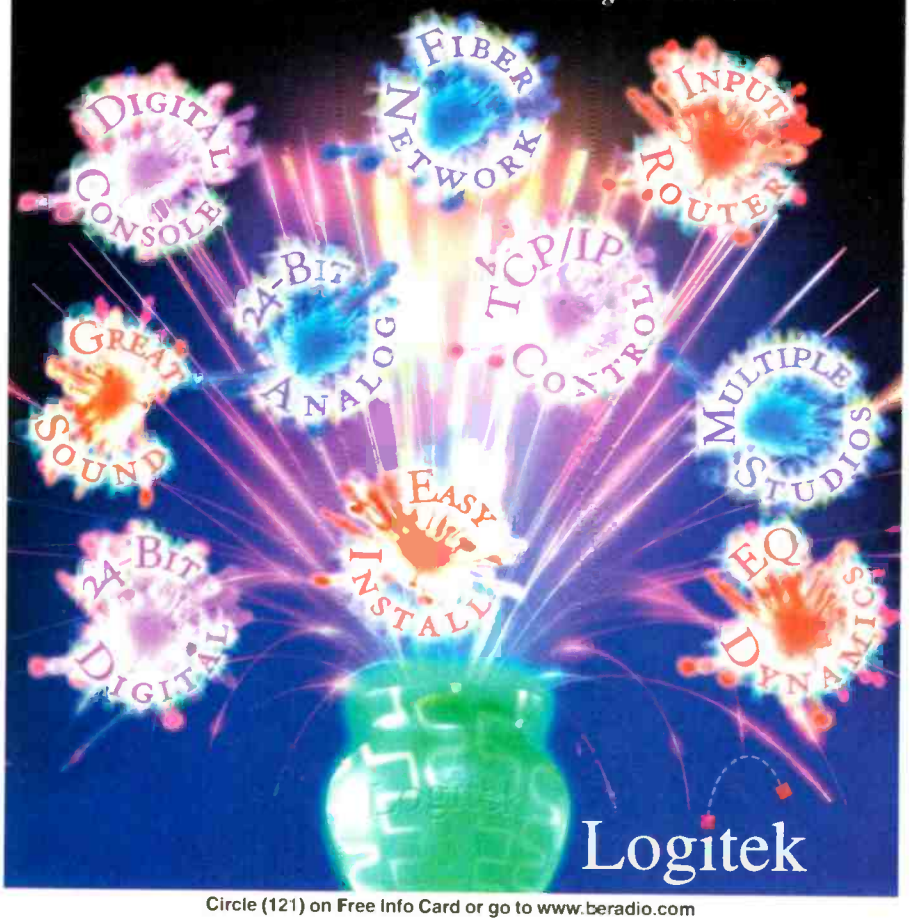

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NAB2001: A RADIO ODYSSEY

spend more time thinking about the quality of your material, instead of worrying about finicky equipment.

HHB showed the Portadisc MDP500 minidisc recorder. It has a professional-grade minidisc transport, and the unit boasts many of the features found in a rack-mount equivalent, such as analog and digital I/O and a parallel remote control.

Marantz offered the PMD-690. It uses ATA-type PC cards or flash memory PC cards with an adaptor. Recordings are saved as .mp2, .bwf or .wav files.

Denon is marketing a portable recorder that uses flash memory. The DN F20R has XLR balanced inputs and RCA unbalanced inputs and outputs.

Sonifex has added features to the Courier. Editing is possible with a jog wheel and LCD screen built in.

The handheld Nagra ARES-P, displayed last year, places all the transport functions at the user's fingertips.

Digigram also had its version of the recorder, the RCX220.

The Orban Opticodec line includes one model with an audio recorder, in addition to its audio encoding and streaming capabilities.

As is so often the case, broadcasters continue to benefit from new technology brought about by rapid advances in computing and data storage.

Test & measurement

By Doug Irwin

The explosive use and integration of the AES format in radio broadcast facilities has prompted several manufacturers to get in the game by building test equipment especially for AES signals.

Graham-Patten introduced an addition to its SoundPals line called the DTG-1. This unit is a small digital waveform generator with AES3/AES3-ID outputs. The audio signals are switch-selectable and include sine waves at six pre-set frequencies.

Dorrough introduced the TG-10A, a waveform generator with digital and analog outputs. With direct digital synthesis, the TG-10A generates accurate, stable and repeatable waveforms.

Prism Sound has introduced the D-Scope III digital/analog measurement system. This system uses a laptop or other PC for the user interface.

NTI, Neutrik Test Instruments, unveiled the Digilyzer DL1, which joins the Minilyzer ML1 and Minirator MR1. This handheld device measures and evaluates digital signals.

Audemat has release the FM-MC1, the upgrade from the established line of RF quality measurement tools. Also introduced was the Goldeneagle, a multiple FM receiver that automatically monitors the quality and continuity of up to 40 FM signals.

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NAB2001: A RADIO ODYSSEY

Microphones

By Doug Irwin

Radio is discovering the joys of condenser microphones. There has been a proliferation of new models over the last several years, many of which are in the price range that can be justified at a radio station that has already invested heavily in its facility and air chain.

The busy show floor offered a wide array of products to tempt even the most casual observer.

Neumann displayed the TLM 103 and the TLM-193; both relatively inexpensive condenser mics. The KMS105, originally designed for handheld use, was also shown for on-air use.

AKG has several condenser microphones in its line that are within most radio budgets, including the the C4000B and C 4500-BC.

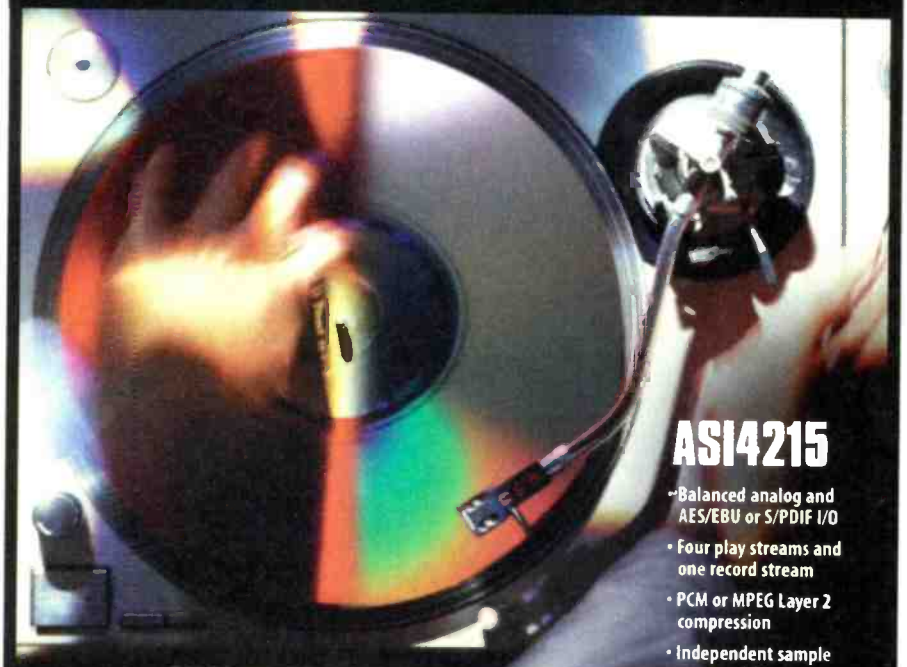
Audio Technica has an extensive line of inexpensive condenser mics. The very inexpensive AT 3525 is followed by the AT 4047, the AT 4050 and the AT4060 tube.

If your comfort level lies more in line with the well-known dynamic microphone manufacturers, Shure has the KSM32SL, and Electro-Voice has the RE1000.

Sennheiser has an extensive line of wireless microphones, starting with the 100 Series UHF line up through the top-of-the-line 5000 Series. Additionally Sennheiser offers the 1000 Series, using digital modulation techniques.

LBP unveiled the Silent Mic Boom , which quiets a traditional design.

FUTURE PROOF



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Wired audio transport

By Kent Kramer, CBRE

Orban has entered the audio codec market with the Opticodec 7000 and 7400. The 7400 is a 2RU codec that supports a possible six ISDN 'B' channels depending on the configuration.

The Opticodec 7000 is a portable codec that supports many of the same features, but adds a waveform editor with full tape transport controls and tapeless recording via PC flash memory cards.

Harris Intraplex showed the Intralink-IP. Shown last year as a concept product, the Intralink-IP will ship later this year. The Intralink-IP provides a bi-directional audio or data path over a 10/100Base-T network.

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MP-3	$980	0.8Kw
MP-4	$1,280	0.8Kw
MP2-4	$1,820	2Kw
MP3-5	$2,270	3Kw
MP3-6	$2,740	3kw

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NAB2001: A RADIO ODYSSEY

Comrex is now shipping the GSM module for the Matrix codec.

In addition to its other codecs, AETA Audio demonstrated the Scoop E-Z. The Scoop E-Z has a two-channel mixer and operates on POTS, ISDN, GSM and satellite (Inmarsat).

The Telos Zephyr Xstream, Xstream MX and Xstream MXP were introduced (see *Pick Hits*, page 42). The Xstream includes all of the original Zephyr functions and adds new features: MPEG 2 AAC, IP/Ethernet connectivity for remote control, software upgrades and audio streaming and DSP audio processing (in the MX and MXP only) based on the Omnia audio processor. The Xstream is also capable of auto negotiating the algorithm of incoming calls.

A tour of the show floor provided many opportunities for informative discussions.

Software Authority presented version 5.0 of its Zephyr Remote software. It also supports the Xtream codecs.

JK Audio showed several products aimed at simplifying remote broadcasts. The Remote Mix Sport now features a wireless telephone interface. Wireless phone connections are possible for owners of older Remote Mix products. The newly introduced Daptor One converts the headset jack on a cellular phone to an RJ-11 jack for connection to any of the Remote Mix interfaces (see *Pick Hits*, page 42).

Musicam USA, manufacturers of the CDQPrima codec series, introduced the Voyager, a POTS codec capable of low delay (100ms) with bi-directional 15kHz mono audio at bit rates as low as 24kb/s. Musicam USA is now the exclusive North American distributor of the AudioTX Communicator software codec. Operating on any modern laptop with a sound card, the AudioTX Communicator can communicate with any other codec via ISDN.

Audio Processing Technology showed the full duplex, multi-channel, multi-algorithm audio codec, the WorldNet Rio-X21.

Audio consoles

By Barry Thomas, CSRE, CBNT

Klotz Digital exhibited its console lines based on the VADIS audio engine.

Logitek's digital audio console systems are similar in that they are based on a separate audio engine that is driven by a console-like control surface. The Digital Audio Engine is

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Columnist
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now networkable over a 1GB optical fiber and can be networked with up to 31 additional engines.

Telos Systems was ubiquitous on the radio show floor with the SmartSurface studio controller (see *Pick Hits*, page 40). SmartSurface looks like a 16-channel console, but it's a control panel for audio routing systems that have mixing and processing built in, such as the SAS 32000 and 64000 series audio routers and the Computer Concepts Epicenter.

Product demonstrations were of great interest to many show attendees.

Wheatstone, in addition to highlighting its Bridge 2001 Digital Audio Network Router, showed the A2000 linear audio console, a 23-channel modular analog console designed with flexibility and features of larger consoles without a larger price tag.

Wheatstone also highlighted two new consoles from Auditronics, the 2600, a 12-input, modular analog console that fits tight spaces and tight budgets, and the ALM-12d (amazing little mixer) digital console, a low-priced, 12-channel digital audio console that combines the functions of a small digital audio router and a full-featured audio console.

Harris/Pacific Research & Engineering had the BMX Digital console. Designed for large and major-market installations, it features twice the mix buses as its analog counterpart. The BMX Digital is available in frame sizes of 22, 30, or 38 inputs and is fully modular.

Arrakis Systems displayed its Revolution audio console, which can operate either as a digital or analog console. It offers all the standard busses, muting and controls in a 12 or 18-channel mainframe.

LPB again showed the Blue 5C console, which is ideal for small broadcast studio installations.

On the analog side, Radio Systems demonstrated the Millenium consoles, and Ward-Beck displayed the Renaissance R2K console

Digital audio workstations

By Conrad Trautmann, CSRE

Portability was the DAW trend this year. Previously, manufacturers raced in order to beat each other in releasing the newest feature. Increases in sampling rates and additional plug-

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ins for processing and effects continue to be the competition points. This year, portable hardware was everywhere. The other major feature many manufacturers were touting was Windows 2000 compatibility.

Manufacturers such as Digidesign (Pro-Tools) and Syntrillium (Cool Edit) have provided their base software at reduced cost or even for free, and are charging a-la-carte for plug-ins and upgrades as necessary.

In the Sadie4 system software, used by the RADIA, SADiE 24-96 and the Artemis systems, Cart Chunk support has been added. This allows the system to interface to BE's Audiovault, BSI's WaveStation, ENCO's DADpro32, Pristine System's RapidFire and Scott Studio's SS32.

Sadie added support for AES31. Also introduced was the RADiA Platinum.

Fairlight has introduced a Plug-In Manager, which allows third party plug-ins to work with their software.

MediaTouch unveiled the iMediaEdit, which addresses the need for a low-cost editor that is easy to use. iMediaEdit runs in Win98/NT/2K and uses any Windows-compatible sound card. It features single button record, play, and stop commands using the function keys at the top of the keyboard.

SBS introduced a modular rack-mount system called FlexRack, that includes modules for signal conversion, a silence sensor, and a gain amp. More modules are being developed as well. Also shown was the FlexDA matrix distribution amplifier.

Wire, cable and routing

Belden has marketed its CAT6 MediaTwist cable as its annuity product capable of carrying any signal a radio station might need to route—now and in the future. Also shown was DataTwist, CAT5 cable.

Gepco displayed the 5596 extended distance AES3 audio cable, capable of reliable transmission 60% farther than other types of twisted-pair cable.

Neutrik showed the EtherCon ruggedized RJ-45 data connector, ideal for harsh and demanding environments.

Wheatstone displayed the Wiremax studio wiring interface system. Designed to act as a centralized connector interface between Wheatstone

Interfaces, wire, cable and routing

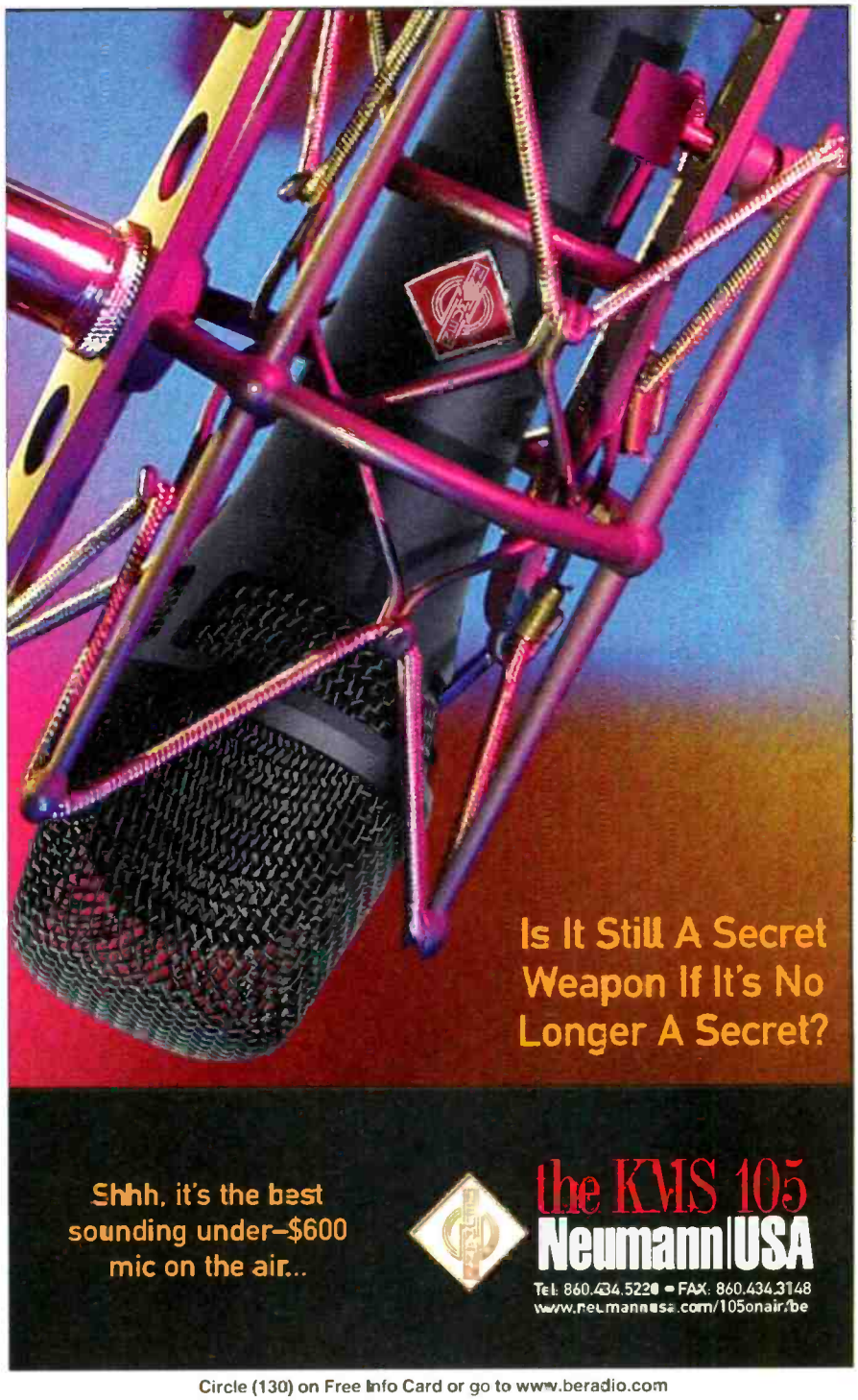
By Jim Pauzzi, CBT

Interfaces

Sound Devices showed the USBPre 1.5, which takes an analog audio input and converts it to USB for connection to your laptop (see *Pick Hits*, page 40). It also has S/PDIF outputs in case you'd rather record to DAT. It has multiple inputs, with two balanced mic inputs, two balanced line inputs and two unbalanced tape inputs.

Radio Design Labs (RDL) had numerous new offerings including the FP-MP1 mic pre-amp and the FP-PEQ3 three-band parametric equalizer.

Broadcast Tools debuted several items: the Time Sync and Time Sync II (see *Pick Hits*, page 41), the AVR-8 voice response alarm announcer and the BOR-4 Box O' Relays.



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NAB2001: A RADIO ODYSSEY

consoles and studio sources, prewired interface cables connect the console to the WireMax interface frame, which would most likely be mounted underneath the audio console. Also shown was the Bridge 2001 router (visit the Demo Room for more info).

NAB 2001 offered an abundance of information and useful products to all in attendance.

Symetrix discussed its plans in developing the AirTools audio routing system. This modular system places smaller rack-mount units wherever they are needed.

Sierra Automated Systems (SAS) debuted the 32KD digital audio router (see *Pick Hits*, page 40).

Audio processing

By Chriss Scherer, editor

Aphex demonstrated the 2020 Mk II, the successor to the original 2020. It now has a dual-band optical pre-emphasis limiter, overshoot-compensated low-pass filters and a dual-output stereo generator with RDS interface. Also on display was the 1100 tube mic preamp, a two-channel mic preamp.

Eventide announced the BD960 profanity delay replaces the BD941/942 units. It adds the ability to cover objectionable material with a pre-recorded item, like the old cart-cover systems. Also shown was the Eclipse Harmonizer, which includes a full complement of pitch change, reverb and special effects program presets in 1RU.

Last year, IDT unveiled the DVP-FM. This year, the line has been expanded to include the DVP-AM and DVP-Web, designed for the specific applications. Also new to the IDT line are the Digital Encoder Plus, and FM stereo generator and limiter, the Digital Band Processor, a four-band processor with adjustable crossovers, and the Virtual Voice Processor, a FET process mic processor.

Inovonics introduced the Omega_FM is a software-based, four-band digital audio processor. It includes a stereo generator.

Omina displayed the Omnia-6. It now meets the BS 412-9 for European transmission standards. Also shown were the Omnia-3, Omnia.fm and Toolvox mic processor.

Orban has release software version 1.0 for the Optimod 8400, which

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debuted last year. Also shown was the Optimod PC, a PC card with all the functions of the Optimod processor. It will be available later this year.

Symetrix has developed the Air Tools 6100, a 24-bit profanity delay. It can handle up to 20 seconds of 20kHz stereo audio.

TC Electronic/TC Helicon demonstrated the TC-Helicon VoicePrismPlus Human Voice Modeling/Format Processor. This vocal processor implements the company's exclusive of Voice Modeling technology.

The *BE Radio* Reporters

- John Battison is the technical editor, RF, for *BE Radio*.
- Doug Irwin is director of engineering, Clear Channel, San Francisco.
- Hal Kneller is president and chief engineer of Heartland Broadcasting, and director of engineering for WGCU-FM/WMKO, Fort Myers, FL.
- Kent Kramer is engineering manager for Big City Radio, Los Angeles.
- Jim Paluzzi, Ph. D., is general manager of Boise Radio, Boise, ID.
- Barry Thomas is president of Media Systems Design, Los Angeles.
- Conrad Trautmann is vice president of engineering for Westwood One, New York City.

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NAB2001: PICK HITS

TEN SHINING STARS

Reported by Cindy Holst, associate editor

Each year at NAB, 10 Pick Hit winners are selected by a panel of professionals working in the field. All are industry experts. All selections were made independent of the magazine's editorial staff. The quality of the judging ensures each trophy winner meets the criteria of providing an innovative product that addresses a significant issue in radio technology. These 10 products outshone the rest at NAB2001.

For complete rules governing the Pick Hits selection process, see page 68.
The list of judges can be found on page 43.

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▼ **Smart Surface:** A control system designed to exploit the capabilities of mixing/routing engines and computer-based audio applications. Bearing a slight resemblance to traditional on-air consoles, SmartSurface provides many

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▲ **USB-Pre 1.5:** A complete, portable audio interface for hard disk recording. Designed for USB-equipped Windows and Mac OS computers, USBPre 1.5 adds S/PDIF input and output to Sound Devices' USBPre Digital Audio Interface. USBPre 1.5 includes all the connections required for 24-bit audio acquisition with notebook or desktop computers. Features include: two active-balanced microphone preamplifiers with 48V phantom power, 24-bit A/D converters, instrument DI, line-level inputs, front panel level metering, with headphone monitoring of both analog source and computer audio. USBPre is completely bus powered, eliminating batteries or external power supplies.

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NAB2001 PICK HITS

ISDN transceiver
Telos Systems

▼ **Zephyr Xstream:** The newest member of the Zephyr family of ISDN codecs, Zephyr Xstream introduces MPEG4 AAC-LD coding, the newest compression algorithm from MP3 inventor Fraunhofer Labs, for Layer-3 audio quality with transmission times so low. Zephyr Xstream is fully backward-compatible with the original Zephyr. Zephyr Xstream is a rack-mount-style transceiver specially designed for use with a single ISDN line or other low-bitrate transmission paths. Two-channel flexibility over a single ISDN circuit or two synchronous links can be used to transmit and receive 20kHz stereo audio to and from a single location, or two mono channels to and from separate locations.

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Wireless telephone adapter
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▶ **Dapter One:** This little black box converts the 2.5mm headset jack on your cell phone to a modular jack. This RJ-11 jack connects directly to any JK Audio RemoteMix series mixers. You will continue to use your wireless phone to dial or answer the call, but you will use the microphone and headphones plugged into your RemoteMix during the call. Daptor One does not require any batteries or power supply. It contains a mini hybrid circuit that converts the earpiece and microphone signals into a balanced RJ-11 phone line signal. Mic signals from the RemoteMix are sent into the wireless phone, while the earpiece signals from the wireless phone are sent into the RemoteMix Headphones. The hybrid circuit minimizes crosstalk between transmit and receive.

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The Pick Hits Judges

Bud Aiello, CBNT
Director of Engineering Technology
National Public Radio
Washington, DC

Mark Humphrey, CPBE
Chief Engineer
WPLY-FM/WPHI-FM
Philadelphia

Doug Irwin
Director of Engineering
Clear Channel San Francisco
San Francisco

Andy Laird, CPBE
VP Radio Engineering
Journal Broadcast Group
Milwaukee

Jeff Littlejohn, CBRE
VP Engineering Services
Clear Channel Communications
Cincinnati

Milford Smith
VP Radio Engineering
Greater Media
East Brunswick, NJ

Larry Sturgeon, CPBE
Director of Engineering
Clear Channel Baltimore
Baltimore

Barry D. Thomas, CSRE
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Scott Whitcomb
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The complete rules can be found on page 68.

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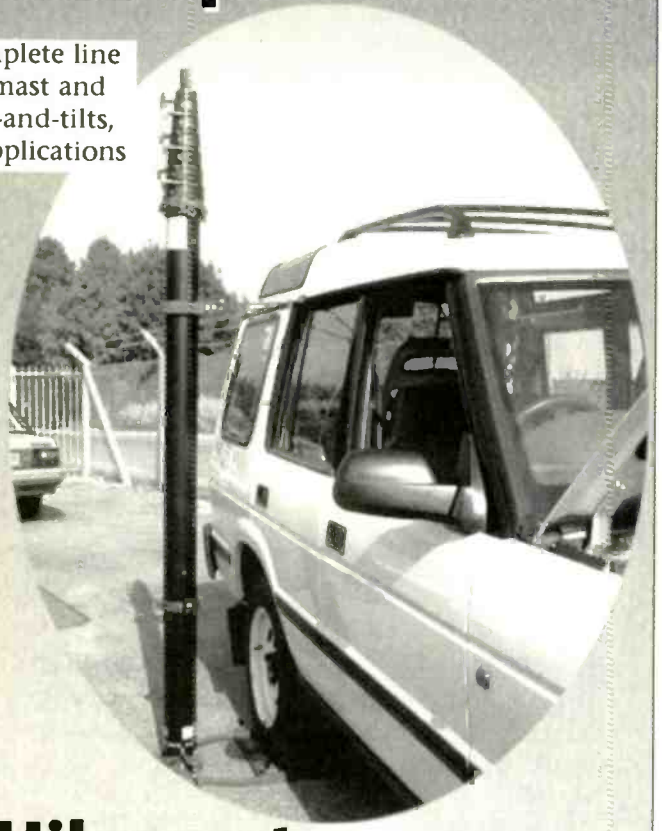

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No wait for Waitt

By Chriss Scherer, editor

Eleven studios for six stations in three months? No problem.

The control rooms have similar layouts but are customized for each individual station.

When the green light was given for the Omaha stations owned by Waitt Radio to relocate to a new facility, there was an abundance of ideas and work, but not time. Maintaining the current facilities, and planning and building the new facilities, is a problem that many facilities face. From the beginning, it was decided that the new facilities would be functional and still be a showcase.

Omaha is Arbitron-ranked 75th in market size. While not a large market, this installation shows that large market ideas and methods can be carried out in smaller markets.

There are six stations in the facility KQKQ-FM Sweet 98, KZFX-FM The Fox, KCTY-FM The City, KKAR-AM News/Talk, KAZP-AM ESPN Radio and KOIL-AM Radio Disney. There are a total of 11 studios, including six air studios, four production studios and one general-purpose studio. Extra space was allowed, including a room for a future studio. The studios are built around a central news-gathering and continuity/production area.

Before the move, the studios occupied several locations around Omaha. This project consolidated the operations. What is truly remarkable about this installation is that the construction project was completed in only three months. This was possible through careful planning and by efficient use of outside services, like those of system integrator RDA Systems

Project preparation

The new studio building was formerly occupied by a cable company which helped because electrical service was already in place. Satellite dish clearances–both physical and zoning–were already okay. As a bonus, a generator and 50 a transformer (power balancing) were already installed in the building.

An added benefit of the facility location is that it is on the main road through downtown Omaha. This provides easy visitor access and provides a high-visibility location. The studios occupy a three-story building. The

Waitt Radio

rack room and generator are on the first floor. Operations and news offices, and the studios are on the second floor. Administration and sales offices are on the third floor.

Audioarts R-60 consoles are the center of all the control rooms.

To speed the construction time, the project was prewired by RDA Systems in St. Louis. The RDA Systems prewiring services, called Pre-Completion, allowed the bulk of the wiring and furniture preparation to be done before it was delivered to the studio site. Construction could begin in Omaha while cables were prepared and terminated in St. Louis. This process has the added benefit that building contractors and broadcast engineers are not in each other's way as the work progresses. It took seven weeks to prewire the racks in St. Louis.

Once the facility walls were completed, the equipment, furniture and prewired systems were delivered, and the process of putting all the pieces together began. Some of the equipment in the facility was purchased new for the move. Some equipment was brought from the former studio locations and re-installed. The installation took five weeks.

In the rack room

The master control room consists of 10 racks, with a 16-foot long main distribution wall. A six-server, 16-workstation AudioVault automation system is housed in master control. Master control is also equipped with an SAS 64000 routing switcher, most of the air chain equipment, telephone systems, 13 distribution amps, and eight satellite receivers. A separate room, located near the base of the on-site tower, houses two racks with STL transmitters and RPU receivers. This was done to reduce the length of the coaxial feed because audio wire is cheaper than coaxial cable and is easier to route. Also, audio signals do not suffer the same losses over distance as RF signals.

All Audio Vault, SAS router, distribution amp and satellite wiring was brought out to the main distribution wall and punched to Krone 6639 termination blocks. The master control room layout did not afford as much space on the main distribution wall as RDA and the stations' engineers wanted, but the Krone have twice the wiring density of a standard 66 block, while occupying the same footprint. The Krone blocks also have an added feature of a built-in patching capability. A special jumper can be inserted to either bridge or break the connection.

PROJECT PARTICIPANTS

Owner: Waitt Radio
Architect: HGM Associates
System Integrator: RDA Systems
General Contractor: Divercon

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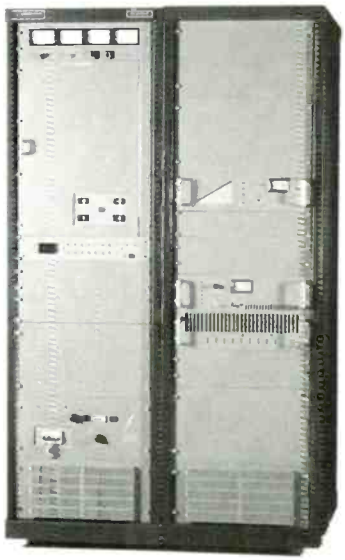

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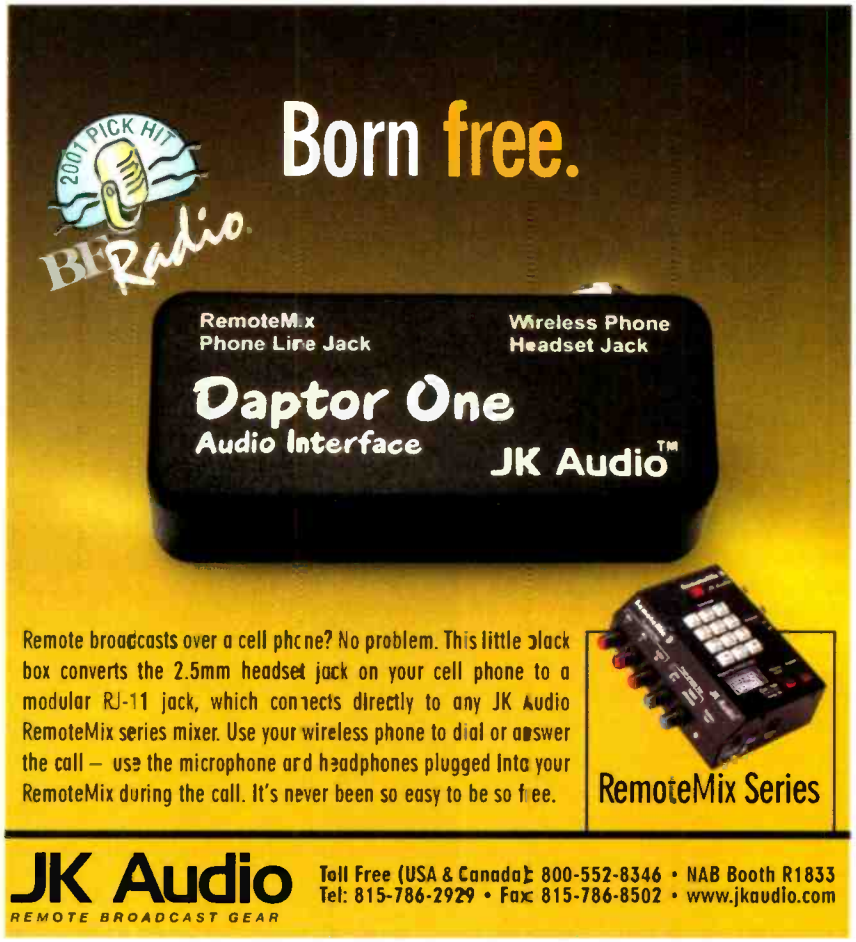
Master control has 10 equipment racks. The first five contain station broadcast equipment, with each rack being dedicated to a particular station. KAZP and KOIL share a rack. These racks also contain common equipment such as the SAS router, satellites and DAs. The last five racks house all of the AudioVault equipment.

Equipment List

360 Systems Shortcut, Tascam 122MKII cassette, Tascam MD-301 minidisc, Denon DN720R cassette
Audioarts R-50 (8), Fidelipac Dynamax (1), Autogram Pacemaker (1) consoles
Audiometrics, Audioarts SDA-8600 distribution amps
Benchmark HPA-1 headphone amps
Broadcast Electronics AudioVault playback systems
Broadcast Tools 6×1 switcher
Cooledit Pro DAW
Denon DN951-FA CD players
Electro-Voice RE-20, Electro-Voice ND-27, Sennheiser MD421 microphones
Eventide BD980 profanity delay
Gentner TS-612 telephone system and Gentner DH-20 hybrids
JBL 4208A, Yamaha NS-10M speaker monitors
Krone 6639 punch blocks
Lowell equipment racks
Mager Systems furniture
Marti STL-10, Marti CR-10, Moseley PCL606, Moseley PCL-6000, Intraplex T-1, QEI Catlink STL/PRU systems
Musicam USA CDQ Prima, Telos Zephyr codecs, JK Audio Remote Mix
Eventide H3000, Yamaha SPX 900 effects processors
Sierra Automated Systems 64000 routing switcher
Symetrix 528 mic processors
Burk ARC-16, Moseley MRC-1620 and Potomac Instruments transmitter remote controls
GS Metals Flextray Cable Tray
Gepco 552608GFC AES 8-pair cable, Gepco 5526EZ single-pair AES cable, Gepco 5596EZ single-pair AES cable, Gepco D5596EZ dual-pair zip AES cable
Belk-Tec 25-pair CAT5 cable
Clark Wire & Cable control cable



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Waitt Radio

Ten racks face the distribution wall. Most of these racks were prewired by RDA Systems before being shipped to Omaha.

These racks each have a 20-amp service. The AudioVault servers also have redundant power supplies that are fed from their own UPS. This extra precaution makes sense, since the on-air playback system is a crucial component of the on-air operations.

Each on-air studio has a 6×1 switcher. The outputs feed the audio processing and STL link for Each station. The switcher inputs are the respective studio console program output, studio console audition output, and the three outputs from the AudioVault. One station carries the Disney format, and it has the three AudioVault outputs summed into one switcher input, since a console is not needed during most of the automated programming schedule.

The 6×1 switcher connections are extended to punch blocks on the distribution wall. For additional flexibility, the Krone blocks include a patching function, so anything can be routed into a station's airchain.

In addition to the spare inputs on the SAS router, a tieline feed is routed back to each control room (as a console input) from the rack room, so any source can also be patched directly into a console as needed. As installed, the SAS router has a capacity of 128 mono inputs and 128 mono outputs. Additional capacity is available.

The stations' STLs are RF links with equalized phone lines for backup.

The studios

In all but two small production rooms, new Audioarts R-60 consoles were installed. Other standard studio equipment included CD and mindisc players, cassettes, Cybex KVM extenders for the AudioVault, Symetrix 528 mic processors, and RDA Sys-

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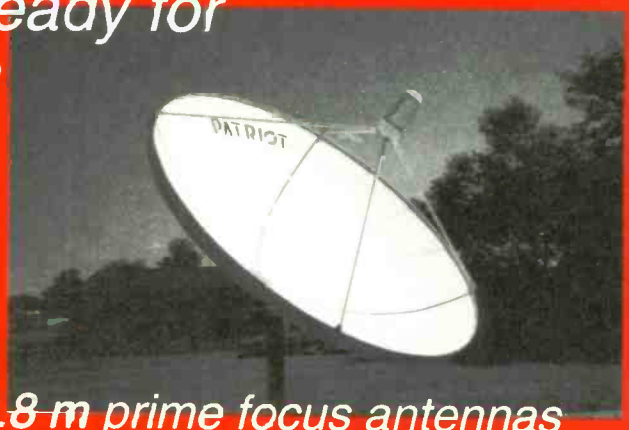

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The production rooms also serve as back-up control rooms.

tems Custom Interconnect Panels.

Each studio has an interconnect panel for additional I/O connections. There is also one in the rack room. These panels are ideal for occasional connections or last-minute hookups. Each panel has several input and output connectors and can connect to the console or the routing switcher.

The furniture was built by Mager Systems. All the studios have the same general layout, but each room has certain custom elements influenced by station needs and room configuration. One unique feature on the console is the recessed switches for the guest mic positions. The water-resistant switches are mounted into beveled openings, so they are out of the way from anything placed on the counter surface.

All the stations have a central remote control point located in the continuity/call screener area.

Thanks to the following people for the assistance in preparing this article: Darwin Stinton, chief engineer, Waitt Omaha; Mike Hendrickson, director of engineering, Waitt; John Nielsen, assistant chief engineer; Kerry Petersen, AudioVault engineer; Joe Raftery, Project manager, RDA Systems.

More photos of Waitt Omaha can be seen in the Studio Spotlight.

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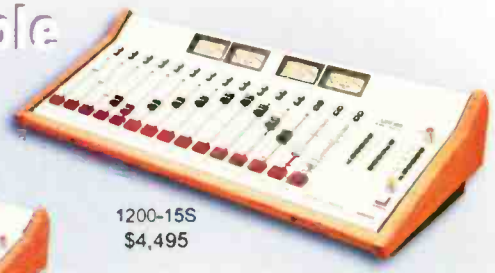
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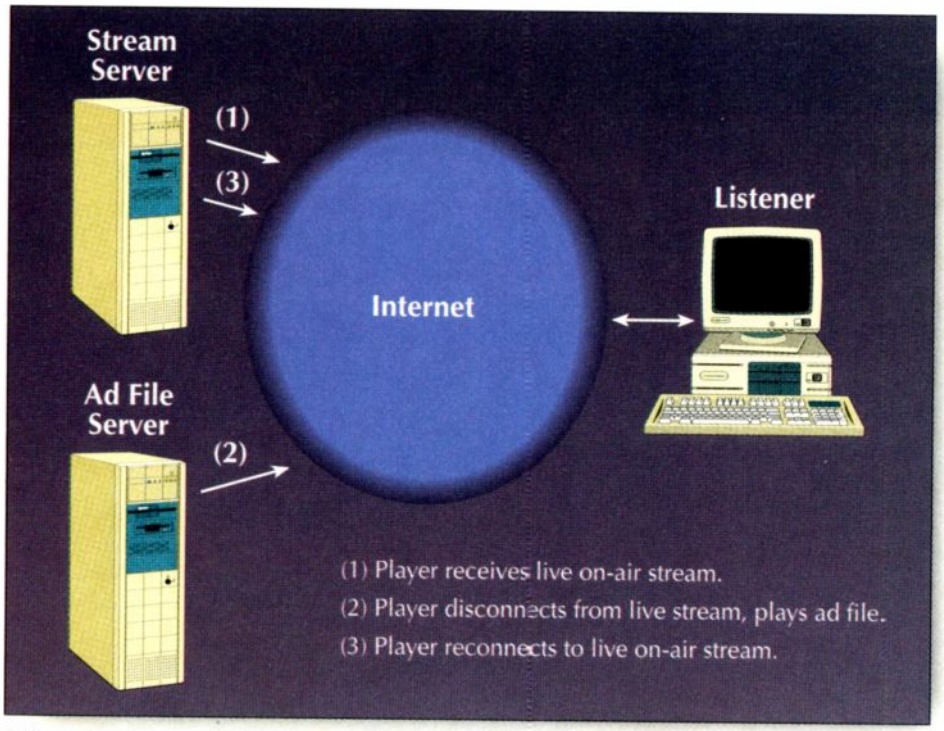
Ad insertion

By Ken Nosé

Ad insertion systems address the problem of matching advertisers with an audience when broadcasting on the Internet. In the simplest terms, current ad insertion systems take the existing station audio, interrupt it, and replace it with new content for the Internet audience. The people who listen to a radio station on the air hear one set of ads, and listeners on the Internet hear another set of ads. Ad insertion systems are designed to work with your radio station as is for the most part, so you don't have to dedicate any studio resources to programming a separate Internet feed.



Ad insertion systems can take existing station audio, interrupt it, and replace it with new content.

In operation, an ad insertion system gets cues from station automation software so that it knows when the start and end of an advertisement block takes place. The ad insertion system can then switch over at the start of an advertisement block and substitute ads for the Internet audience in the place of the local on-air ads. The system has the smarts to queue up ads that fit exactly within the time available for the ad block, and to do so in a way that the Internet listener doesn't suffer from rough transitions into and out of the inserted ads.

Managing smooth transitions between the live station audio stream, the stored ad files, and back to the live stream is one of the biggest technical hurdles that ad insertion systems have to deal with. In some vendors' systems, the ad substitution happens entirely in the audio domain. In this case, the ad insertion system is typically a piece of hardware located at the radio station that takes a feed of the station audio and receives control information from the station automation software. It is basically a smart audio switcher that stores the Internet-only ads locally and has some intelligence of its own in selecting which ads to play. Its output is an audio feed of the station's on-air signal with different ads for the Internet audience dropped in at the appropriate times. Because it is typically a self-contained piece of hardware, timing of transitions can be exact so that the Internet listener always hears smooth segues between the stored ads and the station audio.

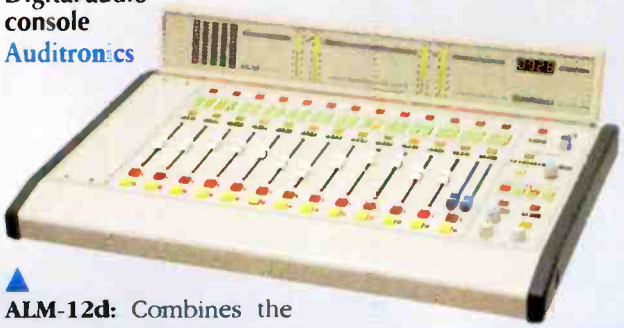
Other systems work entirely in the software domain, like the example in the diagram. The client software used by the listener plays the stream of your station audio normally, and then switches to playing replacement ads from stored files when instructed to do so by the ad insertion system. When the replacement ad files are done playing, the client software reconnects back to the live radio stream. Because the client must switch between sources, and the stored ad files may come from anywhere on the Internet, the issue of lining up the replacement ads on top of the station's audio becomes trickier. Unpredictable network latencies in retrieving ad files, and in reconnecting to the live stream when the ad files are done playing, make it more difficult to maintain smooth transitions.

Most of the big name players don't currently provide a mechanism for switching between sources without some interruption in the audio. Software-based ad insertion systems use different mechanisms on both the server and player sides to address this shortcoming. Some ad insertion systems have the listener download additional software that does local ad caching, or uses mechanisms for pre-buffering ads at the server to minimize delays switching between the files and the live stream.

Ken Nosé is chief software architect of NeoSonic Industries, Cleveland.

New Products NAB 2001

Digital audio console
Auditronics



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NAB 2001 New Products

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ENCO Systems

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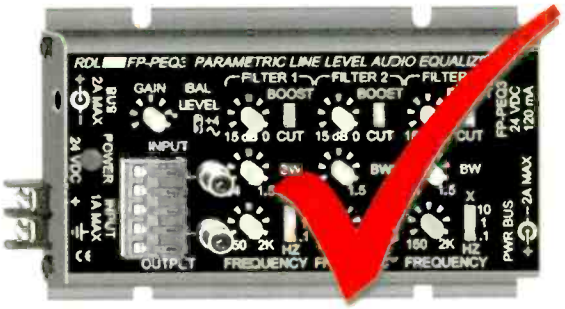

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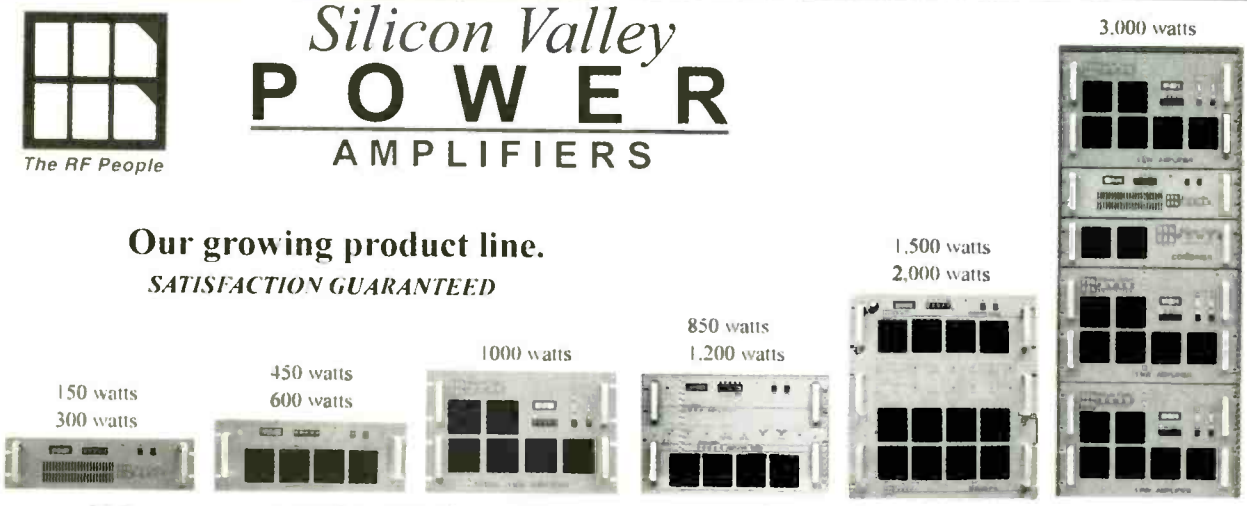

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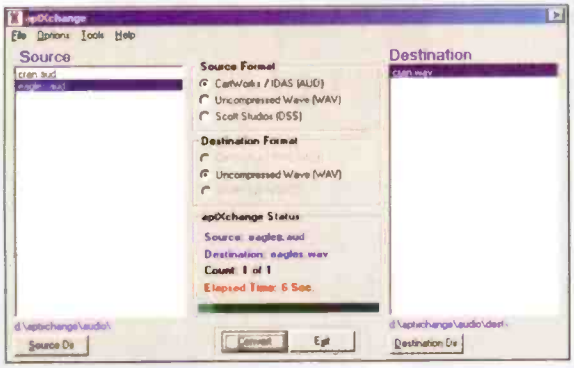

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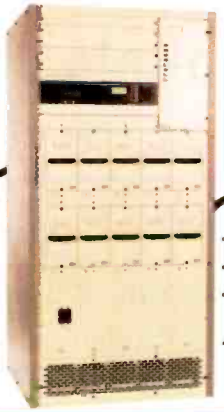

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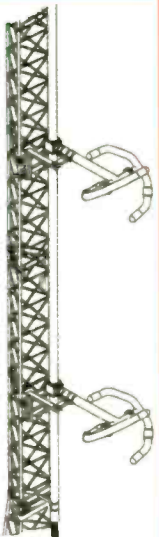

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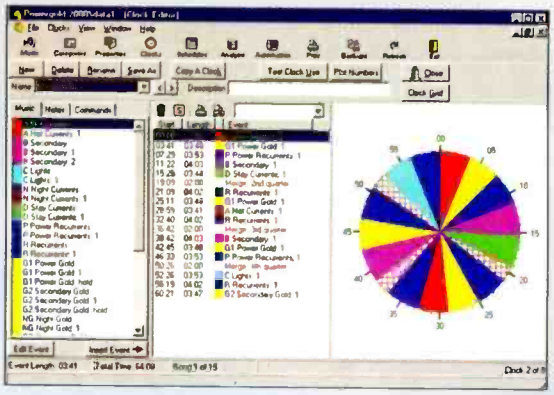

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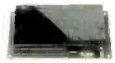

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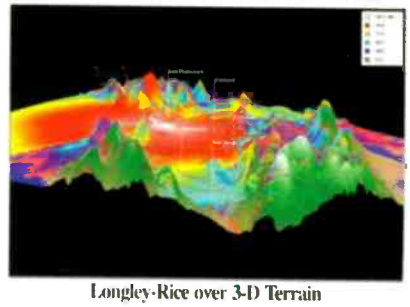

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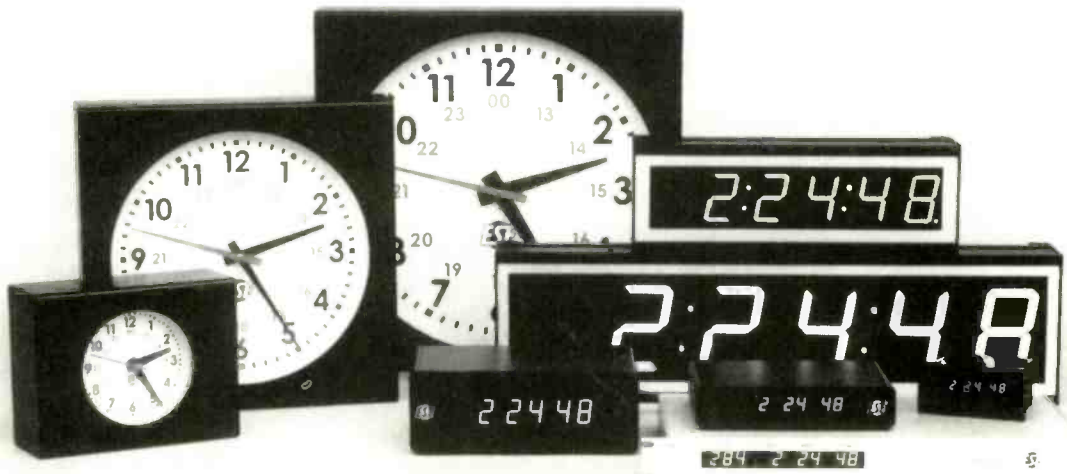

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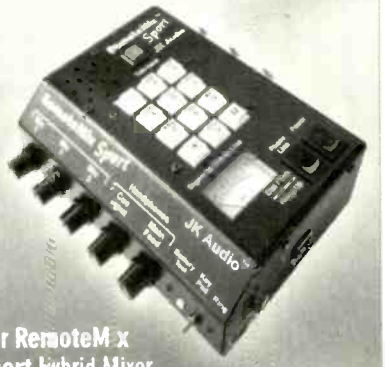

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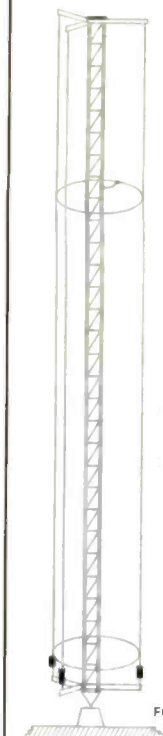

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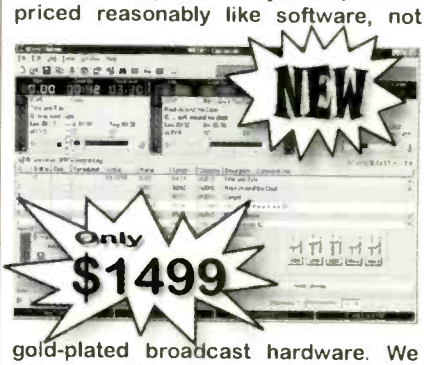

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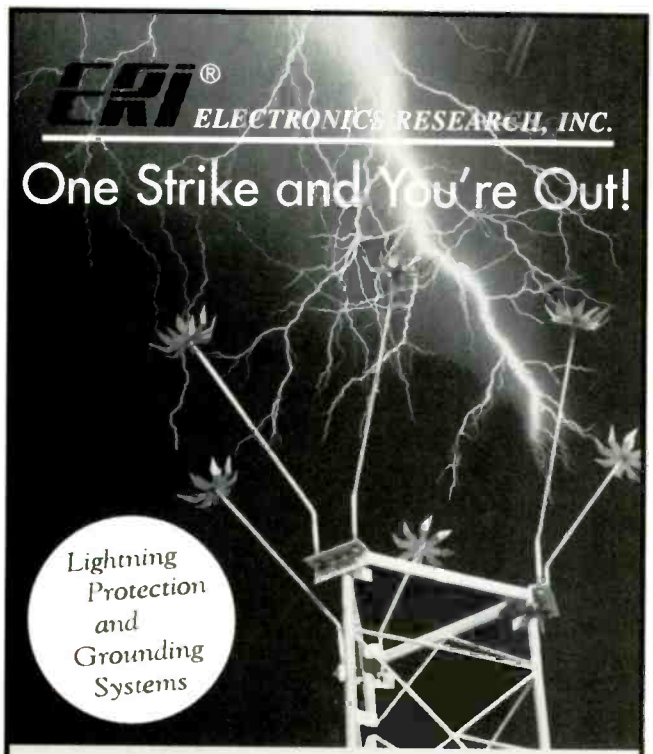

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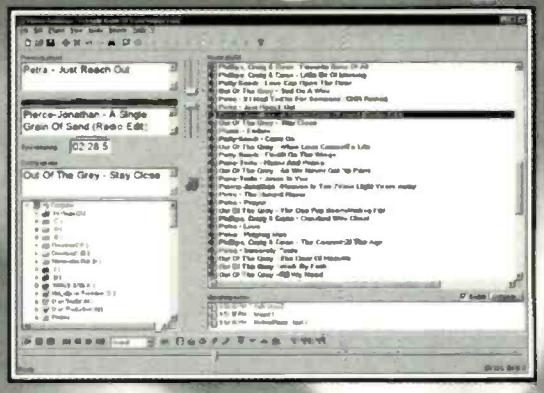

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1. Products must be new and not shown at a previous NAB Spring Convention. In some cases, distinguishing a new product from a modified older one is difficult. For "Pick Hits" purposes, a new product is one with a new model number or designation.

2. Products must have some positive impact on the intended user's everyday work. Judges search for equipment intended for use on a regular basis. Products should provide new solutions to common problems.

3. Products must offer substantial improvement over previous technology. Unique circuit architecture need not be included, but some new approach or application must be involved in the product's design.

4. The price of the product must be within reach of its intended users. The judges seek products appropriate to a wide range of facilities.

5. The products must be available for purchase within calendar 2001. Equipment must be on display on the show floor, currently (or imminently) in production, and some type of product literature *must* be available. Judges take the exhibitor's word on availability dates. Products demonstrated in private showings do not qualify.

6. The Pick Hits Judges operate independently from one another and remain anonymous to everyone including other judges until the selection meeting. This ensures that the products chosen are truly representative of the industry, that the judges were not persuaded in any way, and that the entire selection process is as fair as possible.

7. The editorial staff of *BE Radio* magazine serves only as a moderator during the final selection process and has no influence or decision in determining the winners.

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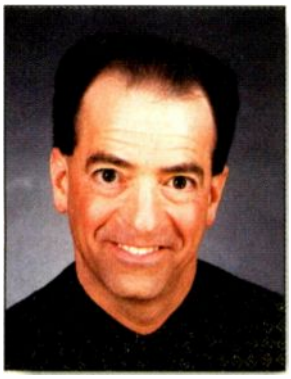
Leave the driving to us?

By Skip Pizzi, contributing editor

NAB 2001 provided the opportunity to see and hear the latest on IBOC digital radio. IBiquity presented demonstrations of off-air IBOC audio reception and a mock-up of what might become a video sidecar to the IBOC receiver. The latter was actually the work of Impulse Radio, which is developing a system that could use the relatively small amount of auxiliary data (including opportunistic bandwidth) in the iBiquity format to feed text and images to a Web browser-like display in IBOC receivers or IBOC-equipped vehicles.

In addition, prototype IBOC-FM receivers at NAB 2001 presented the digital signal as an *enhancement* feature. Users tune to a station's analog FM signal, and after a few seconds, if an adequately robust IBOC signal is available on the channel, the receiver automatically and seamlessly switches to the digital audio. An indicator illuminates when this occurs, similar to the stereo pilot light, and if multipath distortion or noise is present in the analog signal, these artifacts disappear when the IBOC light comes on. Otherwise, the audio quality stays about the same.



The user experience is like viewing a thumbnail or a progressive JPEG image on the web – it comes in small or rough at first, then resolution improves after a few seconds. In the channel-surfing world of car-radio listening, this can be considered an efficient use of the digital signal: no need to bother with long channel-acquisition time required for IBOC signal while tuning around, but once a listener decides to stay with a channel, the higher quality kicks in.

Quantity vs. quality

Downplaying the qualitative improvement of IBOC and stressing the quantitative addition of a visual component could be the right approach to sell IBOC to broadcasters, advertisers, electronics manufacturers and consumers. Broadcasters would have a potential return on conversion investments because a premium upcharge could be levied (or at least a value-add offered) for the visual display of IBOC advertising. The screen gives equipment vendors something to catch consumers' eyes and entice them to purchase.

The Impulse Radio display approach seems right, as it uses an optimized XML subset, and envisions a flexible and adaptive server method that can accommodate synchronous national and local elements in a narrowband environment. But important questions remain: 1) Will this display format be set as a standardized optional element of the IBOC specification, so authoring tools and a wide array of common content can be quickly developed? 2) Will there be enough bandwidth available to allow the system to work? To help with the latter, pre-caching of content in the receiver would be possible (or more likely, required), but the frequent channel-changing behavior of most listeners will limit the applicability of this technique.

There is something fundamentally troubling about a format designed by a unilateral, proprietary group and not driven by an open standards process.

The regulatory challenge

The iBiquity model virtually guarantees there will be no growth in the number of audio services provided by IBOC, which some discussion at the NAB 2001 Broadcast Engineering Conference suggested might be a stumbling block for regulatory approval of the format. Even if iBiquity is an appropriate system design, there is something fundamentally troubling about a digital broadcasting format designed by a unilateral, proprietary group and not driven by an open standards process.

Such an approach will favor the interests of the group producing the design; in this case, the constraint of no new audio services is an example. This serves most broadcasters' current needs. (Having gone to great expense to reduce competition via consolidation, why open the band up to more channels?) It's also the driver for most broadcast investments and recent interest in iBiquity, i.e., its defensive value in certifying that new technology will not threaten the less competitive environment that broadcasters have recently crafted. Given this mandate, iBiquity engineers seem to have accomplished their objectives (at least for FM, so far), producing a VHF-optimized, narrowband COFDM-based system that relies on an analog backup channel.

Ibiquity may represent the best technology for the job, but without an open standards process that sets requirements and defines an open specification to meet them, we will never know for sure. If the FCC rubber-stamps a format proposed by private interests, it will be neglecting due diligence and abdicating its ultimate responsibility as steward of the public interest. So while the latest IBOC-FM format is looking more marketable, it may be worth waiting a little longer for a proper, and subsequently unassailable, approval process to be set before we starting baking the silicon.

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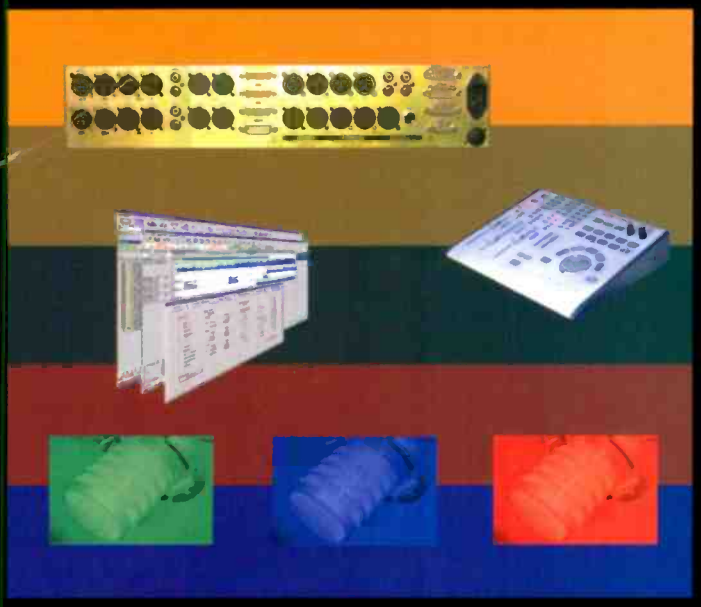

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