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THE RADIO TECHNOLOGY LEADER
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ON THE COVER:
When Journal Omaha began planning its facility consolidation project, just deciding where to relocate was an elusive task. Photo by Chriss Scherer. Cover design by Michael J. Knust.

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Currents Online

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

NPR Seeks HD Multicast Receiver Bid

At CES, NPR released a request for information for a potential group buy of up to 50,000 HD Multicast receivers.

Dave Scott Retires

The 46-year radio veteran has retired from full-time operation and management duties with Scott Studios and Computer Concepts, both divisions of Dmarc Broadcasting. He will continue working for the company as a consultant and product architect.

Harris Launches Software Systems Business Unit

The new business unit brings together the resources of Harris' automation business and Encoda Systems, which was acquired by Harris in November 2004.

Broadcast Electronics to Host HD Radio Seminar at NAB2005

Hold the date: Saturday, April 16, at the Las Vegas Convention Center.

Broadcast Warehouse, Translantech Partner

The initial plans are for Translantech Sound to promote and support BW in the United States, arranging demos and offering telephone technical support and parts/maintenance.

Sirius to Offer Satellite TV Service for Cars in 2006

The service will use Microsoft's Windows Media platform and offer several channels of children's programming.

Orban/CRL Announces Mobile Broadcast Laboratory Schedule

Stops will include the NAB Convention in Las Vegas, several SBE chapter meetings and key radio station groups.

Mathis Moves to Clear Channel Mississippi

Jerry Mathis will be responsible for 10 stations that are divided between two clusters, one in Meridian and one in Tupelo, MS.

Site Features

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The formula for success

During the past few weeks IBOC appears to have gained a second wind. The Consumer Electronics Show, held last month in Las Vegas, saw several IBOC announcements that should help propel the efforts for some months to come.

Some of the key items include Neural Audio being recognized for its surround sound compatibility with HD Radio (SRS Labs was recognized a few months ago), Ilab America has joined the effort to create reference receiver designs for manufacturers, and NPR released an inquiry for as many as 50,000 HD Radio receivers with Tomorrow Radio capability. The top item was the agreement of 21 radio owners to commit to adding IBOC to their stations. This move commits another 2,000 radio stations to the existing 500 that have arranged license agreements.

Outside the CES, the NRSC has hinted that it may soon release its recommendation for an IBOC standard. So much activity in such a short time, and the NAB convention is still two months away.

Now that hopes are high and good feelings abound, the real work must begin. This activity on the manufacturing side is great, but there is still the consumer side that needs its injection of hopeful interest.

What will it take to convince listeners to accept IBOC? Ibiquity has said that it is leaving that effort to the receiver manufacturers and broadcasters. There is some logic to that stance, but Ibiquity has too much invested in IBOC to allow it to fall to the fate of others. Even the receiver manufacturers can help inspire consumers, but the real push is up to the stations.

In some ways, this effort to gain consumer interest in terrestrial digital radio hearkens to the early days of radio. When radio broadcasting first began, consumers had to be convinced that the new wireless music boxes had something to offer them. In those days, providing almost any audio entertainment or news was an easy task. Outside of player pianos, record players and music boxes, there were few choices.

In those days, the rules were different. Radio was being pitched as a completely new medium. There were also added incentives for some station owners. Why did Crosley own radio stations? To sell radio receivers.

I'm not suggesting that Clear Channel or Entercom should start manufacturing radios (or should they?), but Kenwood, Pioneer, JVC, Visteon and others can only do so much. Today, the broadcasters must create the need. But how do we do it?

Everyone agrees that content draws listeners. This is one of the reasons cited for the current success of the satellite radio providers, portable media players and Internet radio stations. This is the key that seems to be ignored.

Audio quality is important, but in a minimal way. Does every source on XM, Sirius or an Ipod sound as pristine as the original 24-bit, 96kHz session master? Listeners have shown that they can be rather forgiving on audio quality—especially compared to a golden ear standard. Of course listeners cannot compare the pure linear source to the stream that contains less than five percent of the original data.

Extra data is nice, but that is an added benefit, not the driving force. Broadcasters must focus on the content. The listeners will follow.

FM IBOC has two advantages for unique content: Surround sound and SAC. AM IBOC doesn't offer the added or enhanced content capability, but there are ways to find that niche.

What else can be done? Stations need to create excitement about IBOC. Add a running line to the station slogan (just be sure to use the adjective "HD Radio" properly): "Now broadcasting with HD Radio technology." Stations can partner with a local electronics outlet to supply HD Radio receiver systems with installation to contest winners. Use the surround or SAC capability for a concert or other special event. Only a few will hear it at first, but let them feel left out. If the content is attractive, they will want it and support it.

For more about the proper use of the term "HD Radio" see Viewpoint in the May 2004 issue of Radio *magazine.*

Chriss Scherer, editor
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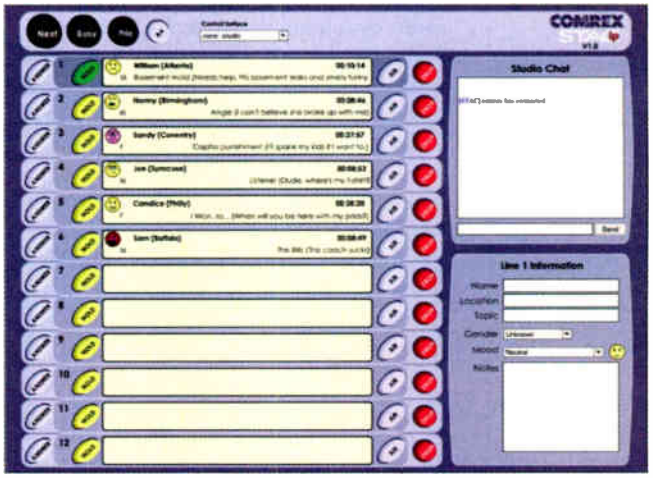

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COMREX

Effective facility consolidation

By Kevin McNamara, CNE

Over the past 15 years, broadcasting has gone through some dramatic changes; the FCC's relaxation of the ownership limits left most station employees without a clue as to whom they were going to be working for from one month to the next. To realize the "economies of scale" that owning multiple stations in a single market can provide, we witnessed a large-scale consolidation effort by many group owners to maintain a single facility in which to support the operations of their new acquisitions. The consolidation frenzy that ensued usually included a move to larger space to accommodate the additional support staff and studio/technical area. In the analog world, this meant recreating a new infrastructure to support the additional programming efforts.

While it took a while for broadcasters to consider the benefits of PC-based networking due to the cost of hardware (unless, of course they could trade it) and a lack of availability, their networking effort was generally limited to back-office applications. Due to the efforts of a few forward-thinking companies and some advances in analog-to-digital conversion hardware, network-based digital audio transport really didn't take off until the mid-1990s. The migration to centralized digital audio storage certainly helped minimize the need to create additional analog infrastructure, but the dream of operating the entire facility over networks was just out of reach.

802.11a and g systems typically provide sufficient bandwidth for regular office needs. Image courtesy of Linksys.

The state of current networking technology now permits users several flexibility for the reconfiguration of any office environment. Whether you are planning a major consolidation or just routine changes within your current facility, you have some new opportunities to exploit technology and, while you're at it, maybe save a few dollars. Here is an update on two technologies that will help you achieve an effective consolidation.

Wireless networking

Wireless networking continues to prove itself as a worthy and reliable transport medium. The price point of implementing wireless has reached a level where it is significantly cheaper than running dedicated cabling. The maximum throughput of wireless networks is still limited to 54Mb/s (using the 802.11 a or g standards) but this throughput is more than adequate for most users. I would not recommend wireless for mission-critical, bandwidth-gobbling applications such as streaming audio, however the IEEE has started the formulation of an updated standard called 802.11n. This new standard promises throughput increases of at least 100Mb/s and significant increases in operating distance through the use of diversity multiplexing techniques. A properly deployed wireless network provides a great deal of flexibility and ease when it comes to adding or relocating users.

Voice over Internet Protocol (VOIP) may be one of the most exciting and promising applications in networking. In simple terms, VOIP represents several sets of protocols that permit properly designed network backbones to carry voice and data information using packet-switching, similar to the traditional circuit-switched telephones. A few of the popular protocols include the following.

H.323. The original protocol, first developed by the ITU, is a method to broadcast point-to-point/multipoint multimedia content (i.e. video conferencing and broadcasts). The protocol was subsequently expanded to support voice and data telephony.

Media Gateway Control Protocol (MGCP). A proprietary VOIP protocol developed jointly by Cisco and Telcordia, MGCP uses a server to manage call traffic between two or more connections. The ultimate control of calls is handled by an interface device (called a call agent, typically a smart telephone) required at each user location. Control of the calls may also be handled by custom gateways.

Session Initiation Protocol (SIP). SIP was developed by the ITEF for establishing a VOIP connection between two or more users. SIP works at the application layer, which provides control over the creation, modification and termination of a call. A server processes the data packets between clients.

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Ultimately you will need to connect to the public switched networks. There are basically two methods to connect VOIP to the public network:

1) Several telephone carriers provide direct access through their network. This is typically delivered from an on-premise (office) VOIP router connected to the carrier through a high-speed connection (i.e. T1).

2) VOIP routers can be configured with analog ports, which are intended to be connected to POTS lines.

Note that there are several other vendors who provide less commercial VOIP solutions using PCs or small interface devices intended for personal use. VOIP is a relatively new technology that has matured, and should be considered to replace traditional telephone systems.

I think VOIP has some really interesting applications in a broadcast environment. Consider a facility that has enabled VOIP uses its existing network backbone for communications. This permits telephony connections between any reasonably high-speed connections that are attached to the backbone. There are several examples.

1) Telephone extensions can be added to off-site facilities, such as alternate studios, transmitter sites or even remote locations (talk stations–imagine the possibilities for last minute remotes).

2) If the station is in a location that serves multiple area codes (i.e. serves multiple states, outside LATAs) it may be possible to install VOIP routers in the various target areas to have direct access to various local exchanges.

3) Group operations can use existing packet-switched (assuming interconnected facilities) backbone for telephone traffic.

4) VOIP would permit quick restoration of phone service in alternative locations, assuming VOIP router is located off-site.

These are just a few of the resources available that will make a consolidation and facility reconfigurations more painless. We are significantly closer to the concept of operating an entire facility over a common network infrastructure, thus eliminating the time and expense required to run and terminate miles of twisted pair cables.

McNamara is president of Applied Wireless, Elkins Park, PA.

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So if you *are* looking to touch your listeners, you should be looking at the Aphex Model 230.

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Market sizes under new rules

By Harry Martin

The new Arbitron method of determining market size has been in effect since Oct. 8, 2004, when the FCC lifted a freeze on the filing of assignments and other applications with multiple ownership implications. The new market definition is used to determine the total number of radio stations existing in the market and, depending on the market size, the number of radio stations an entity may own in a market. Interim rules for counting stations in non-Arbitron markets, and another rule that provides for counting noncommercial radio stations in determining market size, now are also in effect. Importantly, the number of stations an entity may own in a market has not changed. The new rules only establish new methods of calculating the number of stations in the market that may be owned by a given applicant.

Changing Methodology. The contour-overlap method defined the market as all of the stations whose predicted city-grade contours overlapped with those of the stations owned or to be acquired by the entity under study. The new Arbitron counting method uses Arbitron's metro survey areas, where they exist, for determining compliance. Arbitron has defined metro markets in the more populated areas of the country, and with few exceptions the stations included in those markets remain stable from year to year.

However, the new market definition does not rely solely on determinations by Arbitron. Arbitron merely defines the market. To calculate the number of stations in any Arbitron metro, use the Media Access Pro database maintained by BIA, a broadcast consulting service. The BIA database includes more detail about markets than Arbitron does. For example, Arbitron includes only commercial stations that meet certain minimum reporting standards. BIA attempts to include every commercial and noncommercial station licensed in an Arbitron metro, as well as some stations licensed to communities outside the metro market, including Mexican or Canadian stations. This is consistent with FCC-mandated methodology, which requires inclusion of all commercial, noncommercial and foreign stations that are designated by BIA as "home" to the Arbitron metro; and any other licensed commercial and noncommercial stations whose communities of license are located within the boundaries of the metro.

Non-Metro Markets. For the 40 percent of U.S. commercial stations that are not included in Arbitron metro markets, the FCC has adopted a revised interim contour-overlap method to determine market size and resulting ownership limits. This method is similar to the prior contour-overlap method, except the FCC now excludes from the total number of existing stations in the market those stations owned by the entity being analyzed but which do not have contours overlapping the "common overlap area" and, thus, are not counted as owned by the entity. The commission also excludes from the market count any stations whose transmitter sites are more than 58 miles from the edge of the common overlap area. The FCC will not accept the use of alternative signal contour prediction methodology (i.e., Longley-Rice) for demonstrating compliance with the interim overlap rules.

Hybrid Markets. When any station that is shown by BIA as home to an Arbitron metro has a community of license located outside the boundaries of that metro, it must demonstrate that the stations owned by the entity being analyzed comply with the FCC's multiple ownership rules in the home Arbitron metro and the Arbitron metro in which the station's community of license is located. Where the community of license is located outside a metro market, but the station is counted as home to an adjacent metro market, rule compliance in the community-of-license market must be determined by using the interim contour-overlap method.

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

Dateline:

Radio stations in the following states must meet these renewal application and related deadlines in the coming months:

Texas: Renewal applications, EEO program reports and biennial ownership reports must be filed on or before April 1. Post-filing renewal announcements must begin on April 1.

Arizona, Idaho, New Mexico, Nevada, Utah and Wyoming: Renewal pre-filing announcements must begin on April 1 and continue on April 16, May 1 and May 16. Renewal applications, EEO program reports and biennial ownership reports then must be filed on or before June 1.

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While the mic icon is part of the logo and was also used in the 10 Years logo, the challenge was to find the hidden icon placed on the cover. Sometimes it was easy to find. Sometimes it was a real challenge.

We received a large number of responses, of which more than half correctly identified all 13 cover locations (12 monthly issues plus the September Product Source).

The entries with all 13 correct answers were placed into a random drawing for the three prizes.

This year's winners and their prizes are:

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Rick Benson
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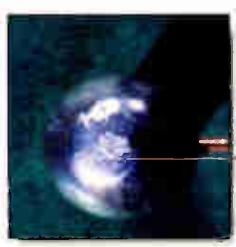

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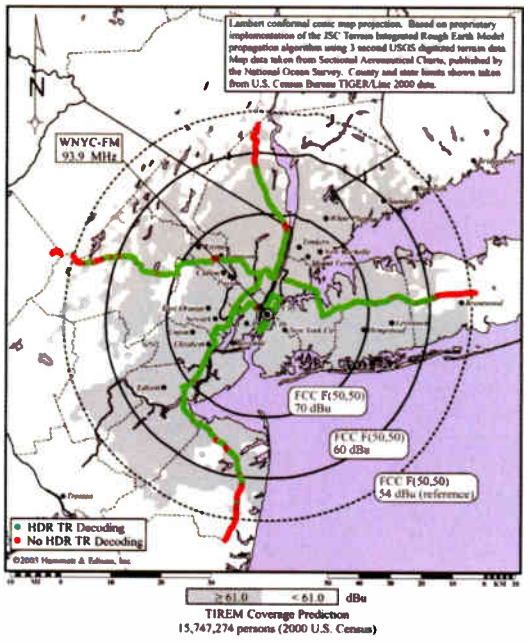
terrain features could degrade the Tomorrow Radio service area. On the other hand, given ideal conditions the service area could exist below 60dBu.

Moving forward

While the Phase Two work was performed many months ago, NPR has not been inactive with the project.

During 2004, NPR conducted three tests to better understand and evaluate various aspects of multichannel IBOC. The tests covered listener perception of the quality of low bit-rate codecs, listener perception of the Ibiquity HDC codec at various bit-rates, and interference between the host analog signal and the extended-hybrid operating mode.

The listening tests on coding rates provided two interesting conclusions. First, that listeners cannot find HDC codec at various rates from 48kb/s and above. In an A/B comparison, differences could be heard, but the normal listener will not have the A/B opportunity. The second conclusion finds that the 96kb/s FM mode could be split into two 48kb/s streams with minimal if any disturbance to the listener. This mode would provide an equal level of quality for two streams instead of the original 64kb/s vs. 32kb/s split in the Phase Two Tomorrow Radio tests.



Results of one of the New York field tests.

At the 2005 CES in January, NPR presented a request for information for a potential group buy of as many as 50,000 HD Multicast receivers to all licensed HD Radio receiver manufacturers. This news piqued the interest of the radio receiver manufacturers at the convention. In addition, NPR will launch new NPR HD Radio program streams covering music and news/talk, which will be targeted for secondary channel use. The target launch date for the first of these NPR channels is June 2005. In addition, the NRSC has created a new working group to work with this technology.

Random Sample

By Chriss Scherer, editor

One of the ongoing debates concerning the overall success of IBOC relates to its acceptance by consumers. Many feel that the promise of improved audio quality alone is insufficient to warrant consumer appeal. While adding interest to broadcasters and a potentially new revenue stream, the addition of data and other services are also not cited as the element that will propel IBOC to consumer acceptance.

Would you pay for an HD Radio receiver if it had more channels of public radio than traditional FM?

The arguments focus on one item that will drive consumers to IBOC: content. Exclusive content has driven cableTV and satellite radio to its success. By providing new and unique content via terrestrial IBOC, it is anticipated that the listeners will embrace the technology.

Unfortunately, programming must appeal to a wide audience to support a station's efforts. If a station could continue to serve its established audience and create a unique niche audience simultaneously, a new listener base can be served without risking the existing listenership. This will be possible with HD Multicast.

In an In-Stat/MDR survey conducted in December 2004, respondents were asked "Would you pay for an HD Radio receiver if it had more channels of public radio than traditional FM?" While the results do not show a resounding affirmation of the thought that more is better, they show that consumers are at least attracted to the concept of added content.

Source: Digital Radio: Who Is Tuning In? *IN0401188ME Dec. 2004, In-Stat, www.instat.com*

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Here are some sneak preview screen shots!

For updates and more information on the **BELAR FMHD-1** and **AMHD-1** go to

www.belar.com/hdradio.htm

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Insight to IBOC
February 2005 Part of the *Radio* magazine DAB Answer Series

One is good, two are better

Prepare for multichannel IBOC

By John Battison, technical editor

The road to IBOC development has been long and sometimes rough. The swell of stations considering and implementing the system show favorably on the technology, and the anticipated NRSC announcement to further establish a standard helps to cement the path that has been set. The system itself is still seeing development an innovation.

While stereo has been the pinnacle of enhanced radio for many years, surround sound and multichannel sound audio have moved into the spotlight, mainly through home theater and enhanced consumer audio formats.

In the November *Insight to IBOC*, we looked at the progress of surround sound with IBOC. In this installment we turn our attention to the multichannel technology, such as that developed for the joint project from NPR, Harris and Kenwood called Tomorrow Radio. The official technical designation is supplemental audio channel (SAC). The industry has more generically named the system HD Multicast.

Conceived by NPR in 2002 and demonstrated in early 2004, this expansion of audio services is particularly gratifying to NPR stations because it opens new avenues for high-quality programming. On Jan. 9, 2004, the triumvirate announced the completion of development and successful testing of the project.

Although this new system was fronted by a noncommercial entity, its use is not restricted to noncommercial stations. As a direct result of the tests at the end of 2003, the future looks bright for acceptance of this system.

Following the successful development of transmitting and receiving equipment, a series of in-depth field tests were conducted to evaluate reception and coverage not only at fixed locations, but also in mobile receivers. Standard FM reception characteristics in the stationary receivers are well known, but the vagaries of mobile reception needed to be evaluated to ascertain their effect on the SAC signal. It was important to ensure that the signal was sufficiently robust in the real world to provide adequate second program service in the absence of the blend-to-analog feature of the main program channel.

Supplemental audio channels were added to the standard IBOC radio

How Tomorrow Radio Works

by Dave Agnew

Supplemental audio is an Advanced Application Service (AAS) for FM HD Radio and is therefore input and encoded in the Data Importer, which manages and encodes all the data services for HD Radio. The Importer is PC-based hardware running Windows 2000 Server, with software provided by an Ibiquity-licensed manufacturer. Even though the supplemental audio is encoded by the Importer, it does not use bandwidth reserved for data services. Instead, it uses a portion of the 96kb/s assigned to the main HD Radio audio channel.

The Tomorrow Radio tests assigned 32kb/s for the supplemental channel, leaving 64kb/s for the main channel, resulting in good quality audio for both audio channels. It is proposed the minimum data rate for the main channel will be 48kb/s, leaving 48kb/s for the supplemental channels. The extended hybrid mode will allow total throughputs up to 124kb/s to provide more flexibility in main and supplemental channel assignments. The Importer communicates with the Exporter or HD Radio exciter via Ethernet and controls main and supplemental channel bandwidth allocations as required.

The diagram on page 3 shows the location of the Importer within

continued on page 3

Inside

A special supplement to
Radio
THE RADIO TECHNOLOGY LEADER

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One...Two

spectrum by splitting the digital FM spectrum into two channels. For the initial tests, the regular 96kb/s was split into a main channel of 64kb/s and a supplemental audio channel of 32kb/s respectively. Since that time, NPR listening tests have shown that two 48kb/s channels will provide satisfactory audio performance.

Field testing

NPR retained the engineering firm of Hammett and Edison to perform the necessary field testing of the system. Four areas of the country were selected. In 2001/2002 IBOC preliminary testing was carried out by WETA (90.9MHz) in Washington, DC, and WNYC-FM (93.9MHz) New York. The routes selected for the new test series were similar to those used in earlier IBOC signal tests. In San Francisco the test involved KALW (91.7MHz) where earlier IBOC test routes were used and KKJZ (88.1MHz) in Los Angeles/Long Beach where three new test road loops were used.

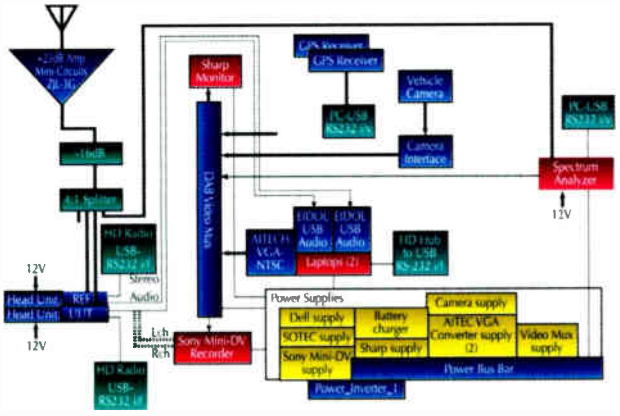


Figure 1. The original mobile test setup.

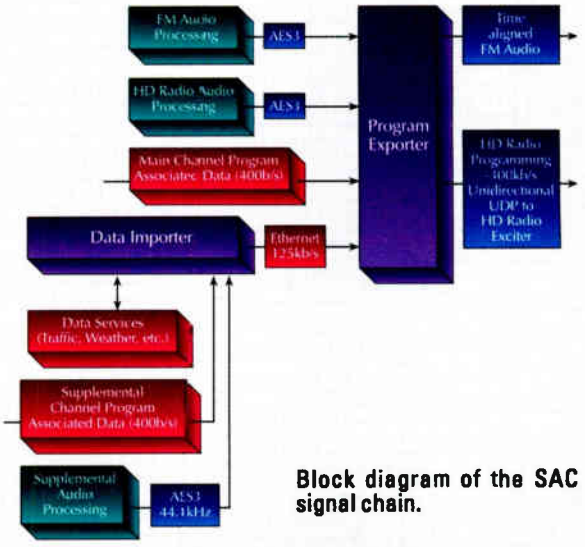
All four of the test areas were originally measured in August and September of 2003 and rechecked from October through December 2003. The original installation used two receive antennas, a preamplifier and a power splitter. This was not considered satisfactory because of RF noise and uncertainty involving the RF network. The change to a single antenna resulted in an improved, simplified arrangement.

The original PAC audio coder used in the earlier tests was replaced by the HDC audio coder for the later tests. This retesting was performed in the Washington and New York markets. Apparently the difference in the results was not considered to be strongly significant and it was confined to the eastern market stations.

Figure One shows the mobile test equipment as originally connected. Figure Two shows the test equipment setup as finally modified.

continued from page 1

the HD Radio chain, the signal flow and associated data rates. The supplemental program audio feeds the Importer's digital audio card and the program-associated data (PAD) is delivered via Ethernet. The audio is encoded with an Ibiquity HDC codec and then multiplexed with PAD and other data services. This multiplexed signal then feeds the HD Radio exciter or Program Exporter via Ethernet. The maximum Importer output data rate is about 125kb/s.



Block diagram of the SAC signal chain.

The signals feeding the Program Importer could also directly feed an HD Radio exciter. In this case, the two HD Radio exciter outputs will feed time-aligned FM audio and the RF output to the HD Radio transmitter.

The Importer data is multiplexed with the main channel audio and its associated PAD in the HD exciter and then modulated on-channel ready for amplification by an HD transmitter. In the case where the Exporter is used, the fully encoded HD Radio signal is output on a dedicated unidirectional UDP link with a data rate of about 300kb/s.

Supplemental audio is poised to be one of the first data services used in HD Radio and is a key differentiator from the current analog service. Supplemental audio offers new revenue generating opportunities and a new pipeline to deliver more services and diverse programming choices. Tomorrow Radio tests have proven successful, and receiver manufacturers are adding this functionality into receivers in anticipation of expected FCC approval for broadcast in 2005.

Agnew is senior FM applications engineer with Harris Corporation, Broadcast Communications Division.

Image credits:
Page2, 3 -Test setup diagrams courtesy of Kenwood
Page 6 -TIREM map image courtesy of Hammet & Edison

The *DAB Answer Series* is an ongoing series of supplements that cover the technology of digital audio broadcasting.

Open Mic
The potential of SAC

Two managers—one from a public radio station and one a comercial radio station—share their thoughts on the IBOC SAC.

Scott Hanley
Director/General Manager
WDUQ
Pittsburgh, PA

What would your station(s) do with the SAC?

We would counter program ourselves—news/jazz against jazz/news. It is our best strategy to encourage receiver adoption by the people who love our station the most.

Do you currently have material that could be used for the SAC?

We would run the stream through an Enco station with jazzworks supplying the localized jazz content, and NPR and other material routed through from NPR and other sources, live or stored in the Enco. The #1 digital channel would mirror what we do on analog now.

Would your station run the SAC full time?

Presuming the fidelity is as good at 48kb/s as what I've heard, we would run SAC full time.

John Caracciolo
President
The Morey Organization
WLIR, WDRE, WBON
Long Island, New York

What would your station(s) do with the SAC?

Long Island is a unique radio market, with our close proximity to NYC. The dial is saturated with every format imaginable, but there is a big hole for Long Island sports and information. The same NYC market that saturates radio programming is also saturated with professional sports teams; so many teams and not enough radio outlets for play-by-play. I would use the secondary audio for play-by-play of Long Island's pro teams that currently have no outlet.

Do you currently have material that could be used for the SAC?

WLIR is a heritage alternative rock radio station; our collection of live radio concerts and unsigned live music is overwhelming. I would see a very big opportunity for this library to get some play on the SAC.

Would your station run the SAC full time?

I would run it fulltime and give our listeners the option of hearing unique, special programming on a regular basis.

One...Two

Test results

To provide clear and concise test results the report includes maps that show the routes followed, the measured field strengths and signal assessment. The four test areas were chosen to represent four types of

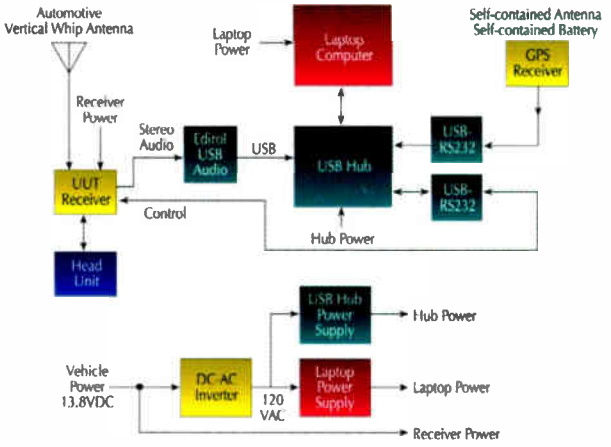


Figure 2. The modified mobile test setup.

terrain. The standard FCC method of predicting coverage obviously would not suffice for these widely differing terrain conditions. The Terrain Integrated Rough Earth Model (TIREM) was used because it evaluates the profile between sites and selects the most probable mode of propagation that results based on terrain profiles. This system uses the USGS three-second terrain database and is considered to be the most accurate method of predicting signal strength where propagation paths are accurately known.

The FCC defines the receiving antenna height as 30ft. above ground. This value was used in the TIREM calculations. Because of this, some of the contours shown represent specified field intensities, which may or may not be the same as FCC service contours. The Hammett and Edison Report includes a large number of maps that show the performance of the received SAC signal while driving around the metro of the test city.

Because of the size of the city of New York several maps were provided in the report. Shown on page 6 are the results of one of the New York City campaigns. The report shows that a 61dBu TIREM service area was obtained for the SAC channel.

Based on the contents of the report, it appears 95 percent certain that Tomorrow Radio will provide a usable service area within an FM station's 60dBu to 70dBu service area, assuming that the IBOC performance of production line receivers from Kenwood and other manufactures will be the same as the equipment used in the tests. It is possible that short-spaced co-channel or adjacent-channel stations and unusual

The right choice in an On-air console

Big or small; stand-alone or router-based; which is right for you?

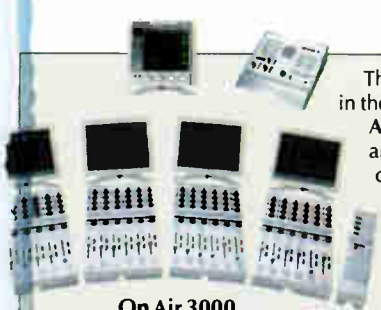
By Chriss Scherer, editor

When you enter an on-air studio, what's the first piece of equipment you usually notice? Most likely it's the console. In many cases it's the largest piece of equipment in the room, but even if it's not, it is the center focus of the studio operation. The various sources used at a station are all vital players in program creation, but the console is the center of control.

Most facilities house at least two studios, so it makes sense for the console used in each studio to be identical or at least share common components and operational characteristics. In a larger facility, the commonality not only reduces the spare parts inventory, it provides built-in redundancy and eases the transition for uses between studios.

Resource Gulde

A sample of available on-air consoles



On Air 3000

There are eight digital consoles in the **Studer On Air** series. The **On Air 500** has six channel faders and two master faders. It can operate on ac power or 24Vdc for remote use. The **On Air 500 Modulo** separates the fader, master and meter sections for discrete mounting. It can also accept a second six-fader module. The **On Air 1000** is based on the On Air 2000, and offers 10 channel faders and two master faders. Settings can be saved and recalled for each operator. The **On Air 2000M2** is the successor to the company's first digital radio console, the 2000. It features six-channel mixer sections and a master module. One to four mixer sections can be attached. The **On Air 2000M2 Modulo** allows the components to be separated for discrete mounting. The **On Air 3000** and **On Air 3000 Modulo** use color TFT screens and six-channel modules to create a mixing surface. As many as eight fader modules can used. Additional modules provide extended control. The **On Air 5000** is based on the company's D941 console and supports 32 faders in I blocks of four-channel fader panels. All the consoles feature an integrated audio routing system. The 500 includes Lexicon effects processing. All other models include dynamics and effects processing.

www.studer.ch

D-75

Audioarts offers three digital consoles in its line as well as the **ADR-32** router. The modular **D-75** comes with four stereo busses, dual-domain outputs, sample rate conversion on all digital inputs, and interchangeable input module daughter cards for easy analog-to-digital field switches. It is available in a 13- or 21-input frame. New LED meter displays add to the functionality of the D-75 meterbridge with full-scale digital peak plus VU metering. All switching features LED illumination and an automatic timer, built-in machine interface and clock all come standard.

The **R-55e** expands the feature set of its predecessor and has illuminated LED switches and a flip-up meterbridge that provides direct access to the I/O connectors and logic programming dipswitches. The low-profile, modular console features two stereo program busses, two mono busses, optional telephone caller input and opto-isolated logic control with built-in machine interface.

The **D-16** combines the function of a router into the console by routing input to any fader or to any monitor feed. Inputs are shown in bright LED dot-matrix displays above the faders and monitor controls. It features two analog and digital stereo outputs, two mono analog outputs, four mix-minus outputs, 14 input faders plus two caller faders; four mic preamps and complete monitoring.

www.wheatstone.com

The right choice in an On-air console

The choices for an on-air console are many. The decision was previously based on physical size first, with consideration for a handful of options. Today the choices are analog or digital, and stand-alone or router-based. Physical size is still relevant, but features and use are the key decision elements. And while the dividing lines between categories sound clear, there are some designs that blur the division between stand-alone and router-based.

Legacy or leading-edge?

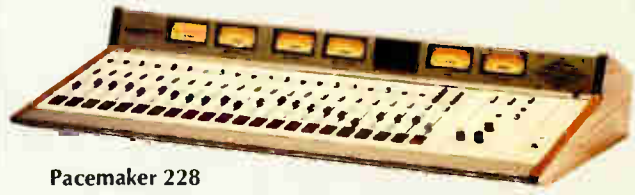
If an analog console is your choice, the router integration aspect is not a critical consideration. Analog consoles can be configured to work with a router, but the router is not necessarily a key component to the operation. Overall, analog consoles provide solid performance with proven technology.

Because of the discrete wiring installation, analog consoles can be part of a system that is easier to understand than digital designs. Input and output changes are made with physical components, although a refined wiring plan can facilitate these changes when they are necessary. An analog console may also be more forgiving of less reliable power.

The discrete console approach is still a viable option in some facilities. Recent Facility Showcase features in *Radio* magazine have highlighted some of these uses. This approach is more common in small to medium facilities.

Once a tool for the privileged few, digital consoles have grown in popularity and in available choices, while the cost of these consoles

Autogram offers three analog console lines. The **Mini-mix 8A** and **12A** are eight- and 12-fader mixers with 12 and 25 inputs respectively. Each features two dedicated mic inputs and a mix of balanced and unbalanced inputs with VCA control and LED level meters in a tabletop package. The **Pacemaker 618, 648, 828** and **1032** offer multiple inputs in a compact space. The model number describes the configuration of control faders and stereo inputs (i.e. six faders and 18 stereo inputs). Each includes eight patchable mic preamps.



Pacemaker 228

The **PM218** and **PM228** are modular designs that can hold 18 or 28 hot-swappable modules. As many as eight mic preamps can be patched as needed. All the consoles feature a tabletop design with multiple output busses and P&G faders. The Pacemaker and PM series provide a mix-minus bus.

www.autogramcorp.com

Logitek Brings Large Console Flexibility

to small workspaces

Remora-10 console at Cache Valley Broadcasting, Logan, UT

Possible Remora Configurations

Remora-4: four faders with controls for input assignment, monitors, and console functions

Remora-10 (shown): addition of six-fader module brings additional mixing capability with another stereo LED meter

Remora-16: incorporates Remora-4 base unit with two 6-fader modules

Remora-22: incorporates Remora-4 base unit with three 6-fader modules

You don't need to settle for less when designing small on-air or production rooms.

Logitek's Remora Digital Console brings you all the flexibility of larger consoles in a very small footprint. As a control surface for our Audio Engine digital router, the Remora offers you access to all inputs and outputs on the Audio Engine, multiple mix-minus busses, dedicated talkbacks, and more. Remora consoles give you fast, convenient tabletop installation—no need for cutouts or custom furniture designs. And, its attractive full color displays plus stereo LED meters give you all the information you need at a glance.

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Logitek

Console Router Systems

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5622 Edgemoor
Houston, TX 77081 USA 713.664.4470 **800.231.5870** **www.logitekaudio.com**

The right choice in an On-air console

has continued to fall. Many digital console manufacturers offer products that are priced competitively with analog designs.

Digital consoles can be stand-alone systems or part of a router-based audio network. Because of the digital signaling, some are able to function in both environments, blurring the line between stand-alone and router-based. Digital consoles offer enhanced features and optimum audio performance.

The latest trend in router-based systems has completely changed the personality of the digital console. In fact, the device in the control room may not even be a console at all, but rather a control surface that communicated with a centrally located routing and mixing mainframe. The control surface has no audio in it. It functions like a fancy keyboard on a computer. The marriage of control surface and router has reached a peak in design efficiency.

The control surface takes the function of a routing controller to provide a way of selecting an audio source and destination, and then

LPB offers the **MX** series in several frame sizes and input configurations. All feature dual stereo output busses and two mono outputs, which are ideal for mix-minus feeds. The **MXA-4**, **MXA-5** and **MXA-6** are the most compact of the line and feature slide faders. The MX consoles range from six to 18 modules with slide or rotary faders and standard or narrow module configurations. The console modules contain all the electronics. No active components are mounted on the motherboard or frame. Faders control VCAs for quiet operation. All consoles are available as tabletop (standard) or drop in.

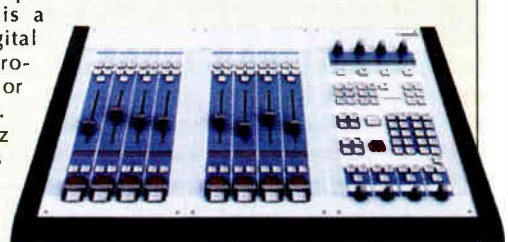
MX18EW

www.lpbinc.com

Klotz offers a console/router system based on the **Vadis** audio engine. Available in two frame sizes, the **880** and the smaller **210**, both provide I/O and control of any source connected to it. The 880 frame holds 21 modules, and multiple frames can be linked to create an audio network. The **Vadis DC II** attaches to the Vadis audio network and provides console surfaces from four to 24 faders.

The **Paradigm** is a stand-alone digital console that provides an eight- or 16-fader surface.

New to the Klotz line is **Aeon**. This flat-panel console features a modular control surface and graphic configuration software that allows individual users to configure the system. Available in eight-, 12- and 16-fader surfaces, each four-fader module is in its own housing. The Monitor-DSP-Master Control Module offers access to DSP functions via rotary encoders and large displays. It comprises central bus assignment, 20 assignable push-buttons for monitor sources and 10 assignable function buttons. The Aeon can stand-alone or connect to a Vadis network.



Aeon

www.klotzdigital.com

adds the ability to alter audio levels. The work is done in the mainframe, which may also apply equalization or dynamics control.

By connecting all the sources and destinations to a central mainframe, the need to route discrete audio paths is reduced. Instead of multiple pairs of audio and control wiring between studios and a technical operations center (TOC), a few runs of cable can provide the needed connectivity.

This central wiring plan makes sense when an automation system, a satellite receiver and codecs are all located in the TOC, but when audio sources must be located in a studio, the need to run separate audio paths may still exist. There are two approaches to reducing this discrete wiring need.

Both use the idea of placing an audio frame in the studio. One approach is a rack-mounted frame that can be a regular audio mainframe or a scaled-down version. The other approach relies on the console having audio capabilities built in, so that audio is connected to the console directly. Either way, the connected audio, such as a mic preamp or table-top audio editor, is made available to the audio network. It can then be routed and recalled to any available output in the facility.

Display and control

While not unique to consoles in general, the use of LEDs to illuminate displays has seen an increase in popularity. The variety of colors and intensity of LEDs provide the appropriate aesthetics, but the long lifespan of LEDs makes them attractive for maintenance.

Even stand-alone consoles can benefit from their use. A console that uses incandescent lamps can usually be fitted with LED replacements. The initial

The **Axia Audio** system conveys audio and peripheral data streams over standard Ethernet hardware and cable, reducing infrastructure costs. A CAT-5 or fiber conveys multiple audio channels, control, program-associated-data, VoIP telephone and computer data. A 100Base-T link can carry 50 bidirectional stereo channels of 48kHz, 24-bit linear PCM audio. A variety of audio terminals, called Nodes, can be distributed around the network to provide audio routing and control. Mixing functions are controlled with the **Smart Surface**, a console control surface that provides a familiar console controller for adjusting levels and assigning inputs and outputs.

www.axiaaudio.com

Smart Surface

cost for the LEDs will be greater than a box of bulbs, but the annoyance of constantly replacing lamps will end. In the end, the cost of the LED over its lifespan will at least equal the same cost of the necessary lamps to cover the same period.

Router-based consoles provide a simple way to identify selected sources, typically with read-outs on each channel. Likewise, there can be read-outs for master sections. A console's status can easily be determined with a glance.

While audio meters are an annoyance (if they are noticed at all) to most announcers, console meters have evolved as well. You can still see mechanical VU meters on many systems, but digital displays are taking over, whether as an LED-based meter display or an on-screen meter. The on-screen console display can also include a clock and event counter. Some console designs use the display to indicate configuration status as well.

One additional feature of digital consoles is their use of soft keys. By dynamically changing the function of buttons, commonly used tasks can be assigned to fixed keys, while less frequent assignments can be provided on assignable keys.

The cost of a digital console and router system may seem to be significantly more than stand-alone consoles, but the addition of a router and probable reduction in wiring will likely make the cost comparison less diverse. The final decision on which method to implement is affected by the long- and short-term needs, the potential upgrade needs, and the ability to implement needed changes.

Generation 8

Wheatstone consoles have always provided flexibility by supplying multiple program and mix-minus outputs. Wheatstone offers two choices in analog consoles. The **A-7000** features four stereo outputs, two mono outputs and four mix-minus busses. Any module can be placed in any slot for greater flexibility. The **A-5000** is an analog console that can be converted to digital in the field. The digital choices include seven different models, most of which are modular. The **D-4000** features four stereo mix busses, six VU meters and four mix-minus outputs. The **D-8000** can integrate with the **Bridge** router for greater flexibility. The **Generation 3**, **Generation 4**, **Generation 5**, **Generation 8** and **Generation 9** control surfaces fully integrate with the Bridge router to provide several accessible features from the control surfaces. A system can be designed with multiple output busses, mix minuses and sends. The G5 through G9 versions provide multiple color displays on the meter bridge for output level display, input channel displays and other information.

www.wheatstone.com

Remora

All **Logitek** consoles are built around the **Digital Audio Engine** platform, which combines routing, switching and console functions into one mainframe unit. Usually two console control surfaces can be connected to one Engine, depending on the number of audio inputs needed for each. Multiple Audio Engines can be linked to provide additional I/O and routing. Two control surfaces, the **Numix** and the **Remora**, are available. Both come preconfigured with four stereo mix busses, one cue channel, 24 clean-feed mix-minus outputs and a three channel submixer. Special functions can be assigned with the Configuration Command Library. Logitek will unveil the Mosaic console series at NAB2005.

www.logitekaudio.com

Revolution

Arrakis offers four consoles. The **Revolution** is modular console in three frame sizes. It includes a separate I/O frame that accepts analog or digital sources, and it can be controlled by a console surface or a PC to create a virtual console. The engine also provides two serial connections for external control including a virtual talk host turret with a PC monitor. The **12,000** series modular analog consoles are available in three frame sizes (8, 18 and 28 modules) and feature VCA level control and dc logic switching. Four input modules are available. The **1200** series analog consoles provide five, 10 or 15 channels to support 10, 20 or 25 inputs respectively. The **Nova-10** console accepts consumer audio sources through its RCA jacks on the rear panel. All Arrakis consoles feature P&G faders.

www.arrakis-systems.com

The right choice in an On-air console

BMX Digital

The **Harris Vistamax** is a networkable audio management system that can start with a single BMX Digital or Vistamax-enabled console and expand from there. A variety of system cards provide flexible configurations. The **RMX Digital**, **BMX Digital** and **VSDM** consoles can operate as stand-alone consoles or fully integrate into the Vistamax system. All three have modular designs. The RMX Digital features four program busses, four telco/codec inputs with mix-minus and dual stereo meters. The BMX Digital features four program busses, four utility buses, two send buses, telco/codec inputs with mix-minus and five stereo meters.

The **Legacy** is a stand-alone digital console with four program buses, a stereo send bus, selectable off-line mix, four telco/codec input modules, three stereo bar graph meters and a digital clock and timer.

The **Airwave** is available in two modular versions: analog and digital. The Airwave digital accepts analog or digital sources by changing an input configuration card. The **Impulse** is a modular, digital console that can also accept analog or digital inputs.

www.broadcast.harris.com

No, We Didn't Put AM Transmission On A Low Carb Diet.

But We Did Pack A Ton of AM Power into a 650 lb Package!

Designed for the demands of both analog and digital transmission, the new **4MX 50** — based on BE's patent pending 4M Modulation™ — packs an unparalleled 89% typical efficiency into a small footprint with a price to match. All 32 power amplifiers, each with their own power supply, are hot pluggable and can be removed and replaced while the transmitter remains on the air. Dual, low voltage power supplies allow full operation with no loss of power or service even if one should go off line. Local operation, diagnosis and status are performed on a 15" XGA graphical user interface and remotely via IP. Power levels from 50 kW down to 250 W meet all your power requirements, day and night. Contact BE for details.

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The **Rubicon** is a modular mixing control surface that integrates with the **SAS 32KD** Digital Audio Network for mixing, switching, level control and effects. The surface is modular, customizable and fully programmable. Frame sizes are available from eight to 40 modules. The 32KD can route 512 signals in a 6RU frame. Additional frames can be linked via fiber optic connections. Additional inputs and outputs can be connected to the 32KD network with Riolink units to provide 32 input or output channels in studios and other locations away from the 32KD frame.

Rubicon

www.sasaudio.com

The **AEQ BC 2000 Digital** console and **BC 2000D** router provide a traditional radio console feel with a modular control surface. Motorized faders and are available on the mixer modules. The surface includes 32 programmable keys for integration with other equipment. Equalization, dynamics, delay and other DSP functions can be used. An AES 10 MADI module can be used to send grouped inputs and outputs via coax or fiber. The router can be used stand-alone or integrated with the console. The router can provide up to 2,048 inputs by 2,048 outputs. Intercom panels can be added to the system as well. Multiple router frames can be linked via MADI.

BC 2000 Digital

www.aeqbroadcast.com

a NEW way to do Radio Automation...

a business AND technology 'Solution'

$100 per month

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

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send us your approved PCs and we will load software, configure, and network test your PCs. This is a free service in the Xtreme 'Solutions' program.

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Arrakis maintains training studios in its corporate headquarters in Fort Collins, Colorado. The Arrakis Xtreme 'Solutions' program provides free training at its studios in Fort Collins. Come visit our beautiful facility nestled in the foothills of the Rocky Mountains and enjoy the area's hiking, biking, skiing, canoeing and other recreational activities.

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

the XTREME 'Solutions' program

live on air, hard disk automation, satellite automation, scheduling, & production

Xtreme is a complete solution for live & automated On Air Radio systems. Pay one very low monthly fee, and we do the rest. We supply the audio hardware, software, and support, while all that you supply is the PC. Without a large initial equipment investment there is no financial risk or capital expense: the old automation system can be upgraded out of current operating costs. With free system configuration and training you receive the help you need to make a smooth transition to the new system. With free hardware replacement, ongoing repairs are worry free. Free telephone support helps train new staff, and free software upgrades means you have the latest product features at no cost. The only hardware that is not included is the PC computer and we can help you with that too... also for free. The 'Bridge' hardware supplied by Arrakis contains the audio sound cards, routing switchers, and control logic so that the PC requires NO special hardware or setup. This means that the PC can be off-the-shelf, and unmodified so that it is easily serviced locally. The Xtreme 'Solutions' program is per workstation for complete redundancy and backup. Imagine an AM/FM combo with production room for only $300 per month. With more than 15 years of automation experience and thousands of Arrakis automation systems in the field around the world, Arrakis can provide you with the solution that meets BOTH your business AND technology needs.

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XTREME~digilink

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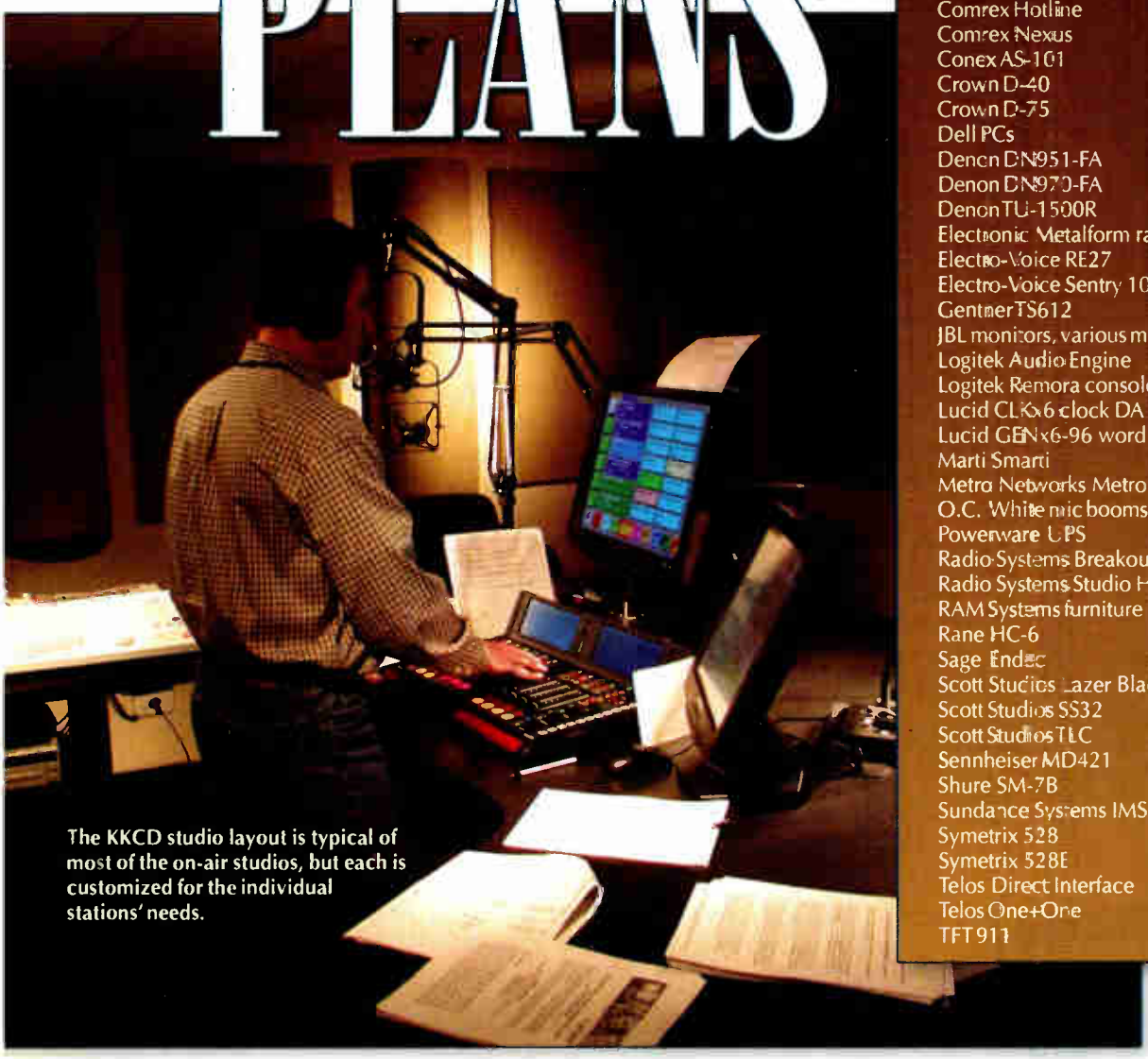
Arrakis

The best laid PLANS

By Chriss Scherer, editor



The KKCD studio layout is typical of most of the on-air studios, but each is customized for the individual stations' needs.

Equipment List

360 Systems Shortcut
Adobe Audition 1.5
Airtools 6100
AKG C414
ATI DA416
ATI TV Wonder
Audiometrics CD-10
Audioscience 6114
Avocent Longview KVM
Belden wire and cable
Broadcast Tools SCR32
Broadcast Tools Silence Monitor III
Broadcast Tools SS8.2
Burk ARC-16
Burk EAS
Burk RX4
Comrex Hotline
Comrex Nexus
Conex AS-101
Crown D-40
Crown D-75
Dell PCs
Denon DN951-FA
Denon DN970-FA
Denon TU-1500R
Electronic Metalform racks
Electro-Voice RE27
Electro-Voice Sentry 100
Gentner TS612
JBL monitors, various models
Logitek Audio Engine
Logitek Remora consoles
Lucid CLKx6 clock DA
Lucid GENx6-96 word clock generator
Marti Smarti
Metro Networks Metro Source
O.C. White mic booms
Powerware UPS
Radio Systems Breakout Box (BOB)
Radio Systems Studio Hub +
RAM Systems furniture
Rane HC-6
Sage Endec
Scott Studios Lazer Blade
Scott Studios SS32
Scott Studios TLC
Sennheiser MD421
Shure SM-7B
Sundance Systems IMS-Tx/IMS-Rx
Symetrix 528
Symetrix 528E
Telos Direct Interface
Telos One+One
TFT 911

A successful consolidation project depends on proper planning, even when those plans continue to change

BCM 104 High Resolution Broadcast Microphone

Think Of It As A Stealth Fighter For Your Voice

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Neumann has been doing a lot of listening lately. We've been listening to the radio, and what we've heard is that the world really does need a better broadcast mic. A much better one. Introducing the first Neumann mic built expressly for broadcast applications. Our new BCM 104 is a condenser mic that can handle any talent that's thrown at it, and make it shine. And best of all, it does it at a price that's "broadcaster friendly."

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The world's best* IP-Audio

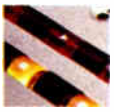
*Okay, you caught us. It's also the world's *only* IP-Au

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

If you need a routing switcher but aren't made of money, consider Axia, the Ethernet-based audio network. Yes, Ethernet. Axia is a *true network*. Place our audio adapter nodes next to your sources and destinations, then connect using standard Ethernet switches and Cat-6. Imagine the simplicity and power of Ethernet connecting any studio device to any other, any room to any other, any building to any other... you get the idea.

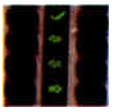
Axia SmartSurface provides the perfect blend of flexible features and intuitive control. Easy to learn and easy to use, it's tailor-made for talent-intensive formats.

Programmable soft keys and recording device transport control buttons give instant control of all audio functions.



Ergonomically designed channel start and stop buttons, with guards that prevent accidental activation.

Each channel's main, special-purpose, phone and preview assignments are quickly accessible. Automatic mix-minus for each fader!



Available Telos Console Director panel with Status Symbols® provides easy, intuitive control of phone-based segments.

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

AxiaAudio.com

Routers are OK... but a network is so much more modern. With Axia, your ins and outs are next to the audio, where they belong. No frame, no cards, no sweat.

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

ENCO

radio.

Scott Studios

We're already working with some great companies. Check AxiaAudio.com to find out who's next.

Broadcasters General Store BSW *Axia products are available in the USA from Broadcasters General Store and Broadcast Supply Worldwide. See www.AxiaAudio.com/buy for more information*

broadcast studio system.

dio broadcast studio system. Damned marketers.

Scalable, flexible, reliable... pick any three.
An expensive proprietary router isn't practical for smaller facilities. In fact, it doesn't scale all that well for larger ones. Here's where an expandable network really shines. Connect eight Axia 8x8 Audio Nodes using Cat-6 cable and an Ethernet switch, and you've got a 64x64 routing switcher. And you can easily add more I/O whenever and wherever you need it. Build a 128x128 system... or 1024x1024... use a Gigabit fiber backbone and the sky's the limit.

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

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

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

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

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

AXIA
A TELOS COMPANY

There's a better way to get audio out of your PC. No more 1/8" connectors – with Axia your digital audio stays clean and pristine.

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

Control freaks, rejoice: PathFinderPC software for Windows® gives you systemwide control of all routing functions with just a click of your mouse.

best laid PLANS

In most cases, the plans are set and followed with minor variations because of challenges. In the case of Journal's Omaha stations, just finalizing the plan was the challenge.

In the 90s, Journal acquired the eight stations it now owns in Omaha. The stations occupied two facilities, so it would seem that consolidating their operations would not be difficult. The two locations were on opposite sides of town: John Galt Blvd to the south and 72nd Street to the north. Journal also acquired the tower adjacent to the north facility.

Six stations were housed at John Galt. Unfortunately, moving the northern two stations to the southern facility was not practical because of space limitations. In addition, the northern facility also had limited space—about 10,000 square feet—but a solid 20-year lease made it too expensive to abandon the 72nd Street facility. Likewise, subletting the space was proving to be a challenge. The lease on the John Galt facility was not as tight.

With these limitations in place, an initial plan was developed in 1999 to move the studio operations to the northern 72nd Street space and to move the business operations to the southern John Galt Blvd. space. This process was begun at a gradual pace, but in 2002, the plans were drastically changed. The owner of the 72nd Street building sold the property to Journal.

The KEZO studio was a conference room before the remodeling.

Recognizing an opportunity, the plans were reviewed. It would be better to have all the station operations and business offices in one place. To do this, additional space was needed on 72nd Street.

An additional building was planned to house all the studios. The stations' studios would move into the new building. The existing building would be gutted and remodeled for the business offices.

While the existing studios on 72nd Street were not perfect, the company realized that there was a substantial investment already in place with the current facility. Instead of scrapping everything but the shell, the plan was revised once more. The existing studio building would house the studios and operations staff, and the new building would house the business offices.

On the clock

Once the final plan was set, a new challenge arose: The lease on the southern facility was due to expire in July 2004. With less than two years to complete the project, the clock was ticking fast.

The building on 72nd Street had seven existing studios. While two

The height of the KEZO studio furniture can be adjusted with a push-button control system.

The KOMJ studio has a live morning show. At other times during the day, the station is automated and the studio is offline so it can be used for production.

Timeline:

Feb 2003	Started plans with architect for new building
Aug 2003	Broke ground
July 2004	Lease on John Galt expires, extended by one month
Aug 2004	All stations in new facility
Sep 2004	John Galt site is empty

stations were already housed here, these stations would also move into updated studios before the other six would move in. Now that it is completed, the studio building holds 11 studios for the eight stations: six full-time on-air studios, three production studios, two AM studios for automated stations that can be used offline for production.

An added benefit to staying on 72nd Street is that

The co-host position has access to the Scott Studios automation system and an Internet computer.

Journal owns a tower about 1,000' from the studios. This tower supports three of the company's FM stations. The tower site is also used as the distribution point for all the STLs, bit wired and wireless. The stations plan to install IBOC equipment over the coming months, and the STLs are designed to carry the digital audio and data.

Transition from old to new

While a good deal of equipment was reused from the previous installations, two significant changes in operations were made. The first concerned the

The production studios have small consoles because all the signal manipulation and mixdown is done in the DAW software.

audio storage and playback. The DOS-based Computer Concepts Maestro, which was supplemented on-air with CD players and other local sources, was replaced by a Scott Studios SS32. Except for mics, remotes and other live feeds, and telephone calls, all audio is stored on the automation system. Once installed, the stations will also edit phone calls on the computer with Scott's Lazer Blade.

The other major change was from discrete consoles and multi-pair wiring to a centralized audio engine and digital wiring plan. Logitek Audio Engines and console surfaces handle the routing, while a Radio Systems Studio Hub+ handles the infrastructure. The Audio Engines are connected with fiber optic cable. An additional Engine at the tower is connected via fiber, and a backup fiber link runs on a Sundance Systems Fibox to provide eight stereo paths and an AES clock sync.

The Journal Stations in Omaha

KBBX-FM - Radio Lobo
KEZO-FM - Z-92
KHLP-AM - K-Help
KKCD-FM - CD105.9
KOMJ-AM - Magic 590
KOSR-AM - Fox Sports Radio
KQCH-FM - Channel 94.1
KSRZ-FM - Star 104.5

KHLP is the other AM station studio that can be used offline for production during automated segments.

Studio layout

The general design goal for the studios was to place a production studio between each air studio whenever possible. This is mainly to accommodate any possible future needs of expansion. It also allows the production studios and offline AM studios to support the active air studios.

The center core of the studio building housed the original seven studios. These studios remained in place, and additional studios were built for the new stations. All the studios except one remain in the center core. The exception is the KEZO studio, which was previously a conference room. While the studios on the interior do not have an outside wall, windows were placed so that every studio could see to the outside in some way.

The previous studio design had lots of windows in each room, which made the rooms live. One of the first efforts was to remove most of the windows, which not only improved isolation, but reduced the highly reflective surfaces.

Cable connections between studios and the tech center are via CAT-6 cable. A contractor terminated all the CAT-6 cables on each end to RJ45 patch bays. Likewise, the cables in the tech center were terminated into RJ45 patch bays in the racks. A wiring wall was not built as part of the installation. As a further time savings, the Studio Hub installation hastened equipment interconnection faster

by using prefabricated RJ45 cable assemblies instead of requiring cables to be cut to length and with connectors being attached.

Coaxial cable was not run to any studio. To supply television feeds, an ATI video card with TV tuner capability was installed in each studio computer. Controlled by KVM extenders, the computer-supplied video helped reduce the clutter of another piece of equipment. It also removed the challenge of wiring the TV audio into the console.

Each studio was built to house as little equipment was necessary. Because of the central router approach and audio storage system, the need for copious sources in each room was drastically reduced. This not only provides a cleaner look in each studio, it also removed almost every possible source of noise.

Locating all the computers in the tech center presented a challenge for the production studios. CD burners are used regularly and needed to be located in these studios. Because the rooms are now so quiet, these burners are now the noticeable noise source.

The tech center has two rows of racks. Instead of a wiring wall, trunk cables for each studio terminate in the racks.

Whenever possible, audio sources are delivered via AES-3. Audio on the automation system is stored in a linear format. Even productions are kept digital through their creation. Once created in Adobe Audition, the file is mixed down to stereo with Audition and saved as a WAV file. The file is then opened in Scott TLC (Trim, Label and Convert) to trim the file as needed and provide the necessary labeling for the SS32.

Built-in backup

Production 2 serves as the main backup air studio. In addition, each studio can be bypassed so that the SS32 directly feeds the STL through the Audio Engine. A studio is bypassed using the soft keys on a console surface. An operator presses and holds one button while selecting another to activate a studio. This prevents someone from accidentally placing a studio on the air or taking it off. The same operation is used for the AM studios that are used offline during the day.

Each studio's Internet computer also provides backup audio. These computers can access the SS32 network and audio files. The computer's sound card is attached to the Logitek network. An operator can play a file with a media player and enable the Internet computer as a console source. Each studio has two CD players, although they rarely see any use.

The vestibule connecting the business building to the studio building leads to a small lobby that can be used as a meeting room.

As an added backup, the retired Maestro computers will be upgraded and used as local sources at each transmitter site.

Additional audio connectivity is provided in the announcer prep area. The computers located here have access to the SS32 network. Audio cuts can be loaded, trimmed and labeled from these workstations. While not an ideal acoustic environment, voice tracking could be enabled from these desks if needed.

The division of the on-air and business operations allows each side to function without distracting the other, but their close proximity provides the convenience of easy communication when needed. While not an expansive space, the eight stations have sufficient room to operate without being cramped, providing a natural workflow for each station to excel in serving its audience.

Facility Focus
the technology behind MRN

Radio Systems StudioHub+

StudioHub, the complete CAT-5 facility wiring solution from Radio Systems, is the wiring backbone chosen by the Journal stations in Omaha. Based on IT-standard CAT-5 wiring, StudioHub simplifies facility wiring by converting the myriad of audio and remote connections into reliable, economical RJ-45 connectors. The systems also uses DC-Link, a phantom power system that is carried on every CAT-5 cable to power remote devices, such as headphone and mic amps, intercom systems and router controllers.

StudioHub has wiring solutions for virtually every console, digital delivery system and source device in use today. For a true end-to-end wiring system capable of carrying analog, digital, GPI or Ethernet signals, StudioHub is the time saving, future-proof, innovative answer.

www.studiohub.com
856-467-8000

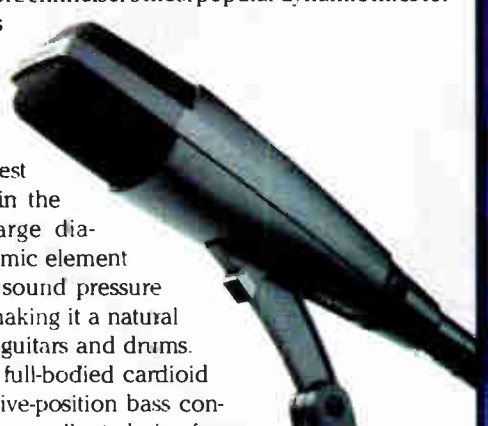
AudioScience 6114

Aimed at high-performance broadcast applications requiring MP3 recording and playback of analog and AES/EBU digital audio, the ASI6114 provides four stereo outputs, one stereo input, one record stream, four or eight play streams, and a powerful MRX multi-rate digital mixer. Audio format choices include MP3, MPEG Layer 2, Dolby AC2 (playback only) and linear PCM. Other features include TSX time scaling that allows compression or expansion of play streams up to ±20 with no pitch shift, AES/EBU and S/PDIF digital audio input and output (software selectable) with sample rate converters on all inputs, AES/EBU sync input, and SoundGuard transient voltage suppression to protect against lightning and other high-voltage surges. The audio adapter has 8MB of DRAM for on-board buffering. Up to eight cards can be used in one system.

www.audioscience.com
302-324-5333

Sennheiser MD 421 II

The MD 421 II continues the tradition of the MD 421, which has been one of Sennheiser's most popular dynamic mics for over 40 years serving the broadcast, MI and installation markets. It's one of the best known mics in the world. The large diaphragm, dynamic element handles high sound pressure levels easily, making it a natural for recording guitars and drums. The MD 421's full-bodied cardioid pattern, and five-position bass control make it an excellent choice for a variety of applications. Known for its sturdy design, clear sound reproduction, diverse use and effective feedback rejection, the MD 421 is a classic.



www.sennheiserusa.com
860-434-9190

Logitek Electronic Systems Remora

Combining powerful operational capabilities with a small footprint, the Remora digital console from Logitek is the ideal choice for facilities where space is at a premium. As a control surface for the Logitek Audio Engine, a Remora console can have access to virtually any audio source in your facility. Advanced capabilities such as EQ / dynamics, talk show delay, multiple mix-minus busses, and intercom functions are all possible. Four configurations are available, ranging from four to 22 faders.

The Remora's attractive desktop design is ideal for multi-use rooms. It's the only full-featured console that can be moved out of the way when the room is needed for something else. Call today for more information on the Remora, and Logitek's new digital console to be unveiled at NAB.

www.logitekaudio.com
800-231-5870

Site security

By Rolin Lintag

Six steps to ensuring a safe site

Unmanned transmitter sites in remote locations are vulnerable to break-ins. Engineers need to protect a facility not only from loss or damage but also from disruption of broadcast operations. It is important to plan for and rationalize the security measures that fit your specific needs.

Is what I'll get worth the risk I'll take?

This is always the basic agenda of a break-in. If the intruder perceives that he cannot accomplish his goal by targeting your facility, he will look somewhere else. Although no amount of security can deter a determined intruder, a burglar will definitely look for an easier target rather than risk being slowed down by a facility's defenses and be caught in the act. Transmitter buildings located on moun-

Figure 1. This gate latch offers little protection against unwanted entry.

Figure 3. The padlock guard prevents the use of sledgehammer and bolt cutter to dismantle the lock. This is used on a gate that prevents vehicular entry.

tains are perceived to be easy targets because entry and escape can be done unnoticed. This is why most of the break-ins occur during weekends and nights to take advantage of the victim's perceived inability to respond. If vehicle access is possible facilitating hauling of equipment within 10 minutes, then your facility is a good candidate for a break-in. Even if the goal is not to steal, the perpetrators will not risk being noticed or identified, slowed down and later on caught with substantiating evidence. One good example of being an easy prey is shown on Figure 1.

Being an easy prey is one reason for vandalism; having lots to lose is another invitation to becoming a victim. One station in Hot Springs, AR, was victimized when a small power generator was left outside the building that could be seen from outside the fence. That generator was stolen and after a few months, a break-in inside the building was accomplished (presumably by the same culprits). They took a vacuum cleaner, power tools, a small refrigerator, cans of denatured alcohol, a sleeping cot and MREs (meals ready to eat). It was all done in under 10 minutes from the time the alarm was received by the station operator to the time that the sheriff arrived on site.

The lesson learned is a classic one: Do not invite trouble by showing off the cash that can be taken from you.

Defending your keep

It is not enough to simply install the traditional hardware for security measures. First, decide on what you want to accomplish before you work on the hardware. A large part of the security measures you will take are psychological and not physical. The best defense is to discourage a break-in attempt from the start. If an attempt is made it should be frustrated by making it hard for the perpetrator to gain personal and vehicular access into the property. The attempt should be detected as early as possible with the objective that law enforcement will be on site before the building is breached. Even at this point, it is not too late to discourage a break-in by testing his will to continue.

SiteSecurity

Slow a criminal's entry into the building and deprive him of hauling the bounty easily. Should the perpetrator be successful in the break-in and law enforcement fails to catch him in the act, facilitate identification of the culprit and lost assets. Investigators will need the inventory list and other proof for insurance claims as well.

With the above plan in mind, enumerate the goals you want to achieve then work on what needs to be done.

1) Prevent a break-in within the property. This means having the appropriate fence, locks and warning signage to prevent entry of unauthorized personnel or vehicles on the property. For most stations using guyed towers, there is an outer perimeter fence that secures the entire real estate and another inner fence that surrounds the transmitter building. The outer fence is the first line of defense, and you certainly would want to know if there are unauthorized intrusions as early as possible.

Warning signs at the gate and if possible around the perimeter should remind trespassers that the area is a federally protected property. Although signboards by themselves will not prevent unauthorized entry, these will serve as proof that you have done your part by warning potential intruders of possible consequences of their actions. Make it

Figure 2. Signboards can warn trespassers of the severity of entering the station's premises.

hard for unauthorized vehicles from entering the property by using large-diameter poles as gates.

The padlock can be protected from sledgehammer blows or a bolt cutter through custom designed padlock guards. Although this will not deter a determined intruder, it will put up a good fight before giving way. Padlocks and combinations should be changed regularly to prevent resigned personnel and others from unauthorized access. All rusty and damaged chains should be replaced with new ones that are not smaller than the smallest padlock you are using. Remember that a chain is only as strong as the weakest link.

2) Prevent a break-in inside the building. The inner gate should have the same fence, locks and signs as the outer perimeter fence. A motion sensor focused at this inner gate will confirm that an intruder is trying to enter the building fence. The station operator can call the police when an alarm is confirmed. Two separate alarms should be triggered to rule out false alarms. This should give police time to reach the site before a break-in within the building is successful.

A camera on top of the door, either a decoy or a real one, can add pressure to the perpetrator that his presence is no longer unnoticed. A motion detector like those used on garage doors can light the door entry with one of the outlets powering an audible alarm. This audible alarm is not only to discourage the culprit from continuing but also to attract attention as well from law enforcement or neighbors nearby.

The building door should be made of heavy gauge steel with at least two bolted locks. A pair of magnetic switches connected to the remote control status alarm can alert the operator if the door is opened.

3) Prevent or minimize loss of assets within the building should a break-in succeed. Keys to cabinets and other rooms like the generator room or storage room should be hidden from plain view. Do not allow the intruder easy access to other rooms and cabinets. Only authorized personnel should know where the keys are hidden.

Power tools and other common items that are easy to sell should be inside locked cabinets. Invest in an engraving tool and put identification marks on all assets. This also means taking inventory of all assets inside the building with pictures stored in another location, such as the main studio. Lost assets can be tracked if properly identified. This will also help law enforcement track down the culprits.

Figure 4. Bolted door locks with a cover slow the entry of an intruder.

Some perpetrators may have prior knowledge of a facility. This is why it is important to have a policy of classifying information about the site to contracted people like electricians, HVAC technicians, lawn care services, tower crews, fuel deliveries and other contracted services. Do not share padlock combinations, reveal that a camera is fake, where keys are hidden and other sensitive information.

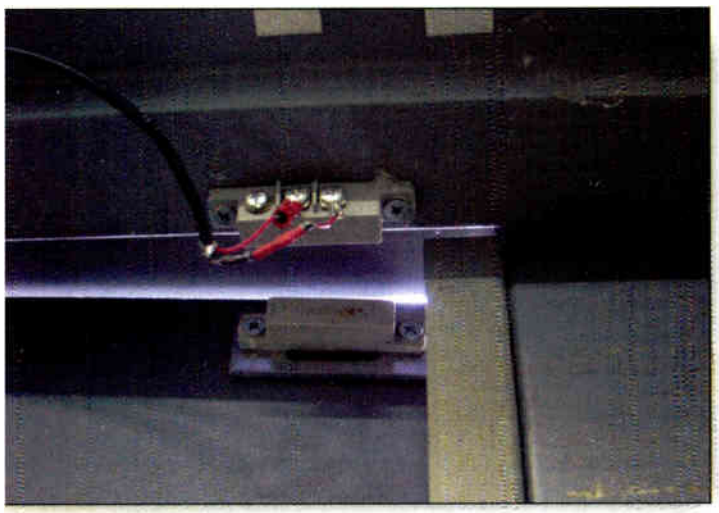


Figure 5. A magnetic switch connected to the remote control can alert the station operator that someone is entering the building.

4) Prevent broadcast operations from being disrupted. You can be successful in achieving this goal as the building is not breached, provided that the main power is not cut off or the transmission line is not damaged. There is not much you can do against a terrorist attack other than to slow down the break-in and let law enforcement catch with the culprits.

Prevent equipment from being taken out of the rack by using tamper-proof screws, such as Bryce Hex-Pin or Torx screws. These special screws cannot be loosened by the common Phillips and blade screwdrivers. Needless to say, the special bits and screwdrivers should be hidden from plain view.

5) Get the immediate response of law enforcement to the site. Make sure that 911 responders can easily identify the site by placing a signboard address marker at the entry gate. Don't post the identity of the station. The street number is sufficient. It is also a good idea to develop a rapport with local law enforcement prior to any incident. Every broadcast station should have a relationship with the local community in the first place. The local police should be able to provide an idea on how fast they can get to the site from their usual nighttime patrol duties.

The local police may be willing to walk through the facility and help assess the security risks of the station. The services of a security company should also be arranged if the bill fits the budget.

6) Be prepared.

Lintag is an RF engineer for Victory Television Network, Little Rock, AR.

It's good to be the King

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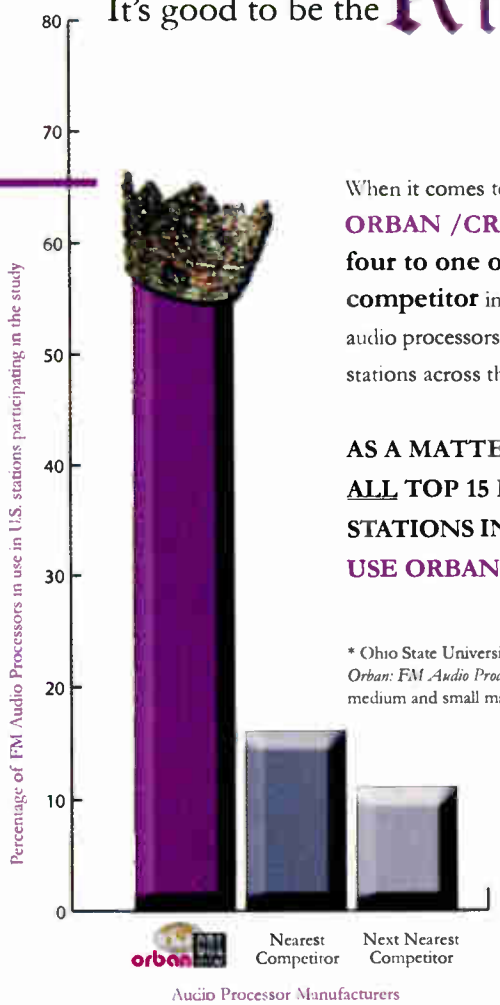

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* Ohio State University Fisher College of Business, *Orban: FM Audio Processors* 2004 study of 665 major, medium and small market radio stations in the U.S.

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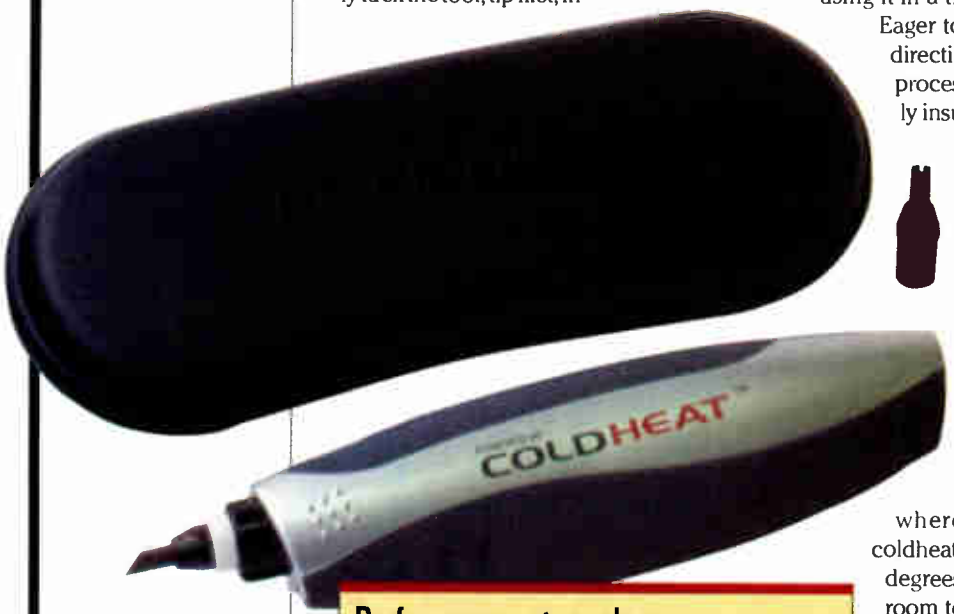
orban CRL SYSTEMS
www.orban.com

Cold Heat Soldering Tool

By Kent Kramer, CBRE

Order now! Operators are standing by! I'm sure you have seen the TV spots for the latest and greatest products that we just can't live without. Recently there was one that caught my eye and as an engineer, might have caught your eye as well. It's advertising the Cold Heat cordless soldering tool.

The commercials promise that you can solder wires together and then immediately tuck the tool, tip first, in your pocket without burning you and your shirt. As an engineer, a good soldering iron is an essential tool in my kit. A really good bench set is critical to making solid repairs and connections. So when I first saw the commercials for Cold Heat, I have to say I was skeptical of its capabilities.



Performance at a glance

Heats and cools quickly
Operates on four AA batteries
Averages more than 700 joints per battery pack
Tip heats only during soldering
Includes plastic case
Interchangeable tips

When I was offered a chance to demo the soldering tool without the chance of feeling taken for my money, it was too good to pass up. First, I'll lay out a few observations and details on the soldering tool. It operates on four AA batteries. It also comes in a small carrying case that protects it from being damaged in your tool kit. It also has a plastic cover that goes over the tip to protect it, and a bright blue LED below the tip provides light directly on your work. A red LED on top of the tool shows when the tip is hot. I found the tool to be easy to hold on to but had some difficulty controlling it when using it in a tight area on a circuit board.

Eager to figure out how it works, I picked up the directions that came with it. It's actually a simple process. Heat is generated when the two electrically insulated electrodes make contact with metal.

It's a controlled short circuit. That is the simplest explanation. The electrodes cause a short circuit across the surface of the material being soldered. This is how the tool claims to cool so fast. Once the short circuit is removed, the current has stopped and the heat is gone.

The tip is made of a material called Athalite, which is covered by patents and pending patents for the manufacturer. The tip is two pieces of Athalite with an insulator between them. This split tip is where the action occurs. According to coldheat.com, the tip temperature reaches about 800 degrees Fahrenheit within 1.2 seconds and cools to room temperature in less than three seconds.

It was easy to confirm the rapid heating. Once a short was in place, the solder would melt. Testing the cooling aspect took some time; I had to overcome the instinct to avoid being burned. It took several attempts before I could bring myself to grab the tip three seconds after making a connection. Once I did, I was surprised and relieved to find that the tip was cool.

You might wonder what Athalite is and where it comes from. After reading about it and searching the Internet, all I can say is that it's a patented, resistive material that supposedly is fairly malleable and the Cold Heat people are keeping its real composition pretty quiet. From what I was able to learn, they are talking to several companies on how to apply it to more applications. Keep your eyes open for the name in the future.

Get connected

The demo model came with a small piece of project board and a few attached resistors. I quickly read through

the instructions and found that the first thing I needed to remember is to not press hard. The tips are fragile and pressing down doesn't make the heat transfer faster because even though the tool is on, there is no heat until you make a connection between the split tips.

The directions state clearly that "the tool is intended for hobby or light professional use in electrical projects with medium-sized components."

I tried the tool on an XLR connector and had little luck at first. It took some practice but after a while I was able to make connectors as fast as with my bench soldering iron. Instead of laying the tip inside the connector's soldier cup and then getting soldier to flow, I used the edge of the cup to create the short and allowed the whole cup to heat to get the solder to flow. Once I figured it out, it wasn't too bad. However, do not make an XLR connector and then touch the tip. It gets hot and stays hot for several minutes because of the amount of heat needed to solder a connector this size.

I also tried Cold Heat on several types of circuit boards I had lying around the back room. One problem I found was that due to the amount of heat needed at times to get a component to release from the board, I lifted more than one solder trace. After some practice I got better at it but I would recommend practicing before trying to repair the only board in your transmitter that you don't have a spare for. The small piece of project board was an easy victim when it came to lifting the copper traces on it. Something else to remember, because of the heat involved, is that connections stay hot a lot longer. So when soldering on temperature sensitive material, heat sinks are a must. It's also difficult getting into tight areas on boards when you need to work between components. It is a bit bulky at the end.

Cold Heat comes with a bevel tip but also has chisel and conical tips available. Each tip has a unique shape for various uses, and can be changed by simply pulling the current tip out and sliding the next tip in. The manufacturer also states that the tips work best on 18 to 20 AWG wire. Battery life is rated at about 700 to 750 joints, although this will likely be a lot less if you are making XLR connectors.

Overall, it's a nice package and I can see its uses in broadcast engineering, especially in a portable kit for on-the-spot repairs. It's not going to replace the soldering iron in your regular kit. If it saves you a little time every time you use it by not having to wait for your corded iron to heat and cool, it will pay for itself after a while.

Kramer is director of radio engineering for Radiovisa, Sherman Oaks, CA.

Cold Heat

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

Tascam CD-RW750

By John Landry

Tascam has long been known by broadcasters for value, and the new CD-RW750 is a good stand-alone CD recorder for the money. Built as an updated version of the CD-RW700, the 750 adds the feature of CD titling.

On unpacking the CD-RW750 appears heavy. It weighs 14lbs, much of that weight being the end brackets that have rack mount ends formed into them. These can be removed if they are not needed. The front panel is uncluttered, with controls laid out in the same fashion as a tape deck. Most of the secondary functions—for example, enabling the Auto Track Advance—are accessed through a simple command menu using a rotary control to scroll through the menu, then pressing the rotary knob to enter that change. There are no skip or search buttons on the front panel. They are present on the wireless remote, however, as are all the secondary menu functions.

Performance at a glance

- Records CD-R and CD-RW media
- Automatically converts 32kHz or 48kHz digital signals to 44.1kHz
- Rack mountable
- 24-bit A/D and D/A converters
- Automatic track advance
- CD track label feature
- Wireless remote control
- Analog (unbalanced) or digital (S/PDIF) inputs and outputs
- Front-panel headphone jack with volume control

The unit will record on CD-Rs (intended for one use) or CD-RWs (designed for reuse). Some CD players, particularly older consumer units, may not read CD-RWs. Partly for this reason, we do not use them in our facility and only CD-Rs were used for our testing. The manual did not specify any brand of media, so our testing was done with unlabeled and unbranded CD-Rs. This was not a factor in our testing as all of our discs burned and played.

Take the test

Our first test involved rate conversion. The recorder automatically senses and changes a digital sampling rate, making it possible to do digital transfers from MDs, DATs and other digital signals that are sampled at 32kHz or 48kHz. Using the S/PDIF digital input, we used a DAT tape recorded at 32kHz and fed it into the S/PDIF inputs. The bar graph VU display tracked the same as the ones on the DAT machine. The digital signal level is adjustable, but only from the menu commands and not from the front panel. Because the level was OK we started recording. We then repeated this process with DAT recorded at 48kHz. This disc was then finalized and played on one of our house standard CD players. A side-by-side comparison revealed that there was no audible difference between the resampled CD copy and the DAT originals.

Our next test was to make a digital dub of an hour-long DAT that had been pre-indexed into cuts for mastering. We used the direct digital input feature, which bypasses the automatic rate sensing/changing circuitry. We also used the monitor feature, which provides a loop of the A/D converter through the D/A converter for real time confidence monitoring. The first cut on the DAT was 1:06, and we listened and watched the display as the indicator changed automatically from track 1 to 2 at that precise moment in the program. The final disc was indexed perfectly, and the client was happy.

The new feature in the CD-RW750 is CD text. Each track can have a name 23 characters long in the display window on the recorder or on any player or computer enabled to read it. Using the selector knob to scroll through all 26 letters upper case, all 26 letters lower case, 10 digits and a dozen symbols, and pressing the knob to advance the cursor each track can be named. We found this to be a cumbersome process and gave up after two cuts. We did not test the synchronized record feature, which uses a silence sensor

Track labels are assigned using the jog wheel and display.

with an adjustable level to start and stop in the record mode. We also did not test the timer function, which allows you to start the machine in record or play when the ac main power to the line cord is turned on with an external timer. We didn't see the timing function being used much in a broadcast studio. The synchronized recording may be useful to some.

The Tascam CD-RW750 is an easy-to-use, moderately priced CD recorder that would fit the bill for many tasks in the production and on-air studio. It is the ideal replacement for analog cassette and DAT tape machines. The cost savings in media when switching from DAT to CD-R would be favorable. It is simple, straightforward and substantial.

I will note that our first demo unit did not work out of the box, but it was a demonstrator unit. Who knows what happened to it before arriving here. Tascam had a replacement unit to us a week later. Aside from the CD titling, the CD-RW750 is cosmetically and functionally the same as the CD-RW700.

Landry is a maintenance technician at CBS Radio Network, Westwood One, New York.

Tascam

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New Products

By Kari Taylor, associate editor

AC generator
Contour Hardening

Real Power: Real Power integrates into the existing control units of a truck. Unlike the inverter-based generator systems, this system requires no alteration of the truck's existing dc electrical system. There is no need for a dc converter or inverter with this ac generator. The unit mounts between the truck's frame rails and is driven by the truck's transmission. The 8kW model offers 120V and 240V outlets with 8,000W of continuous, ac power and the 12kW model offers 12,000W of continuous, clean ac power. This unit is maintenance-free because there are no brushes to replace.

888-867-2184; fax 317-879-2484
www.contourhardenign.com

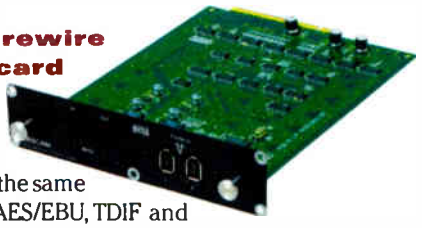
USB audio, MIDI interface
Edirol

UA-25: This USB audio/MIDI interface features an aluminum chassis, which offers two benefits: It can withstand hard impacts that are normally associated with traveling or working in the field, and the aluminum acts as a shield against high-frequency interference from other electrical components. This product is USB powered, so users never have to plug it into a wall socket, but it manages to power condenser microphones with 48V phantom power. The unit's audio output is +4dBu from the balanced 1/4" outputs. This system has an analog mild compressor built into the interface, which allows more discrepancy in setting the microphone levels and allows the user more freedom from audio clipping. The interface provides 24-bit/96kHz audio performance, MIDI I/O, S/PDIF optical I/O and Neutrik XLR/TRS inputs with microphone preamps.

360-594-4273; fax 360-594-4271
www.edirol.com; sales@edirol.com

Firewire expansion card
Tascam

IF-FW/DM: The IF-FW/DM is an expansion card that follows the same design as the ADAT, AES/EBU, TDIF and analog expansion cards for the DM-24. Features include 24-channel input and 24-channel output when used with the DM-24; 16-channel input and output when used at 88.1kHz or 96kHz sample rates with the DM-24; MIDI input and output for use with DAW software; supports ASIO, MME, WDM and Apple Core Audio standards; is Mac OS X and Windows XP compatible and provides two IEEE-1394 firewire jacks.



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

Audio restoration, transfer services
Kenneke Communications

Audio restoration: This company restores and transfers old audio recordings from tape, vinyl or wire to modern digital media, such as CD, DVD and MP3. Using specialized computer equipment, it can remove hiss, pop and static from old, damaged recordings. It can also restore damaged, unplayable magnetic tape. Kenneke Communications can provide media transfer and restoration services for common and uncommon magnetic media. Its restoration services can restore most audio magnetic media, such as reel-to-reel, cassette, cart and other standard magnetic media. Using a digital audio workstation it can edit and enhance source material as well.

541-619-6490; www.kenneke.com; kenneke@kenneke.com

Software upgrade
Symetrix

Symnet Designer v5.0: The most important feature included in the 5.0 release is support for the line of Symnet Express hardware. The addition of these units brings the total number of audio processors in the family to 15. Units will now return to last state when the power is cycled on and off. This is critical in live performance situations where parameter changes can occur on the fly. Portions of the software code have been rewritten to optimize certain processes, and to take advantage of the more efficient 100MHz SHARC processors used in the Express hardware. An auto firmware upgrade function has also been added to simplify the process of upgrading hardware sites from previous software versions.

425-787-3222; fax 425-787-3211
www.symetrixaudio.com; symetrix@symetrixaudio.com

LED lamps
Ledtronics

PNL-1145 series: These direct incandescent replacements for the discontinued GE ET5/6 incandescent high-voltage panel indicator lamps are found in a wide range of products. These energy-efficient, long-life illuminators feature a fixed LED, a removable lens, a threaded metal shaft and adjustable nuts and washers that enable the lamp to be front-mounted or rear-mounted in panels as much as 2.2" thick. Additionally, 12" leads are provided to expedite integration into the electrical system. These lamps are available in several voltages: 24Vdc, 48Vdc, 125Vdc and 250Vdc. The lamps may be ordered in 67Vac, 115Vac and 230Vac.

800-579-4875; fax 310-534-1424; www.ledtronics.com

Cable tester
Behringer

CT100: The CPU-controlled CT100 accepts most connector types: XLR, mono and TRS (1/4", 1/8" and TT), RCA and MIDI. It shows which input pin is connected to which output pin. Separate LEDs indicate proper shield connection and phantom power presence. The tester also offers an installed cable test mode and a continuity check plus a test tone generator with output levels of -50dBv, -10dBv and +4dbV at 440Hz or 1kHz. The unit can also indicate the presence of phantom power.

877-672-0816; fax 425-673-7647
www.behringer.com; support@behringer.de

Turntables
Vestax

PDX2000, PDX2300: The PDX-2000mkII offers the same features as its predecessor, including a high torque motor design, fast start up time (from zero to full speed in 0.5 seconds), fine pitch and ultra pitch. In addition, the PDX-2000mkII features a new, streamlined platter and next generation ASTS (anti-skipping tonearm system) design. The PDX-2000mkIIPro and PDX-2300mkIIPro offer the same features as the PDX-2000mkII, with the addition of Vestax's proprietary, dynamic, spring-balanced tone-arm system to further reduce tracking error during scratch performances.

516-333-9100; fax 516-333-9108; www.vestax.com

Ethernet audio bridges
Digigram

ES220 and ES220-L: The ES220 converts two analog audio channels into digital audio to insert them into an Ethersound network, and simultaneously extracts two digital channels from the network to convert them into analog audio. It offers a cost-effective solution to build Ethersound networks with inputs and outputs in many locations for applications such as audio distribution, background music and paging, monitoring or archiving and logging.

The ES220-L is configurable to provide two Ethersound inputs or two Ethersound outputs at a time. Both feature GPIOs and offer 1RU mounting for three units and mounting brackets for under-table fixing are available.

703-875-9100; fax 703-875-9161
www.digigram.com; input@digigram.com

Upgrades and Updates

Broadcast Electronics is providing an upgrade path for all stations using the BE Audiovault with the PRSS Content Depot delivery system. Content Depot will be implemented in 2005 by National Public Radio's Distribution division. All Audiovault users, regardless of the age of their system, will be able to interconnect their system with Content Depot at no charge.
www.audiovault.com/contentdepot

Orban is now shipping the Opticodec-PC LE, which was first shown at NAB2004. The pro version, PE, has been shipping for some time. The LE version limits a netcaster to one stream at 32kb/s or less. The Opticodec-PC uses Coding Technologies' AAC Plus codec.
www.orban.com

Edirol has begun shipping the R-1 portable WAV/MP3 recorder. Since its announcement, the unit has been refined to version 1.03 offering compatibility with 4GB Compact Flash cards. The R-1 is a mobile recording device that offers 24-bit effect processing, and operation from two AA batteries.
www.edirol.com ■

In the January Field Report on the SAS Rubicon, the Performance at a Glance section stated that the surface has four bus assigns per module. There are actually eight bus assign buttons per module. Each module can support as many as 18 bus assignments.

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Contributor Pro-file

Meet the professionals who write for *Radio* magazine.
This month: Field Report, page 52.

Kent Kramer
Director of Engineering
Radiovisa
Los Angeles

Kramer's career spans more than 17 years and covers market sizes from unrated to number one. Starting in Huntington, IN, in 1988, every stop along the way provided a growth experience that took him to his first chief engineer position in 1995 in Columbus and his first director of engineering position in 2002 in Los Angeles. He credits practical experience, constant work on his knowledge base and a lot of time dealing with start-up operations as giving him not only a technical insight, but an operational insight to the business of radio.

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THE RADIO TECHNOLOGY LEADER

Written by radio professionals
Written for radio professionals

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www.beradio.com

Sign Off

By Kari Taylor, associate editor

www.beradio.com

Do you remember?

The September 1998 issue of *Radio* magazine featured a Field Report on the Harris DRC1000 digital console. The unit's standard configuration consisted of a programmable control surface with 10 faders and on/off buttons. Instant selection of bus routing and console programming was available. The features of this console included built-in effects, sample rate converters on each input, 22 AES3-ID or analog inputs, and programmable routing matrix and a 32-bit processor.

The board offered numerous programmable effects. Each channel's five-band equalizer could be set for multiple types of frequency adjustment, including shelving, cut boost and notch, and all were bandwidth adjustable. Harris also offered a larger version, the DRC2000.

Sample and Hold

When tuned to your online radio station, how long is your average listening session?

Source: RRadio Network, "Survey 27", August to October 2004.

That was then

This month marks the 80th birthday of WTIC-AM in Hartford, CT. Originally sponsored by Travelers Insurance Company, WTIC began broadcasting in February 1925 at 860kHz with a 500W Western Electric transmitter and two 150' towers atop the Travelers' Grove Street building. In August of 1929 WTIC received a new RCA 50kW transmitter and the station began broadcasting at 1060kHz, sharing time on the frequency with WBAL Baltimore.

WTIC's first staff in 1925. Early radio operators were required to listen to emergency messages from ships at sea and interrupt regular programming if necessary.

Eleven years later in early 1940, Travelers Broadcasting began operating an experimental FM station, W1XSO (later to become WTIC-FM). And on April 11, 1948, WTIC began operation at its current frequency, 96.5MHz.

By the late 50s, Travelers Broadcasting owned AM, FM and TV stations and had filled the Grove Street studios. The group moved to a new facility, called Broadcast House, which was a showplace with new studios, new equipment and room for growth.

Today, WTIC is continuing its tradition of being at the forefront of technology by preparing to install digital equipment in its facility.

The Wheatstone GENERATION-5 has the POWER and FEATURES Stations Demand the MOST

LOTS More!

Our Generation-5 provides your operators with a straightforward traditional control surface coupled with all the benefits of digital technology. It gives you the flexibility of system-wide source, mix and destination control (any signal any*where*), a powerful mix-minus section and a complete event store, name and recall system. One wire from this surface can control THOUSANDS of wires in your technical operations center.

And while the G-5 *feels* like an analog console, its DSP-based mixing engine keeps your digital sources digital while converting analog sources to switched digital, eliminating crosstalk and noise. It can furnish remote and telcom functionality on any input fader without fear of feedback—a real plus in back-to-back daily operations. Its built-in graphic displays keep operators on top of things with just a glance. And since the entire system is software based, you can accommodate any format with a press of a button.

Like all our Generation Series consoles, the G-5 has complete failsafe options available, such as automatic fail-over DSP and CPU cards and redundant power supplies. We can even provide scheduling software and studio mounted satellite cages that can be configured to mix independently from your main routing system.

At WHEATSTONE** we've built and sold over a thousand digital audio consoles.* The G-5 is a culmination of all that experience. *Benefit from our expertise — choose **WHEATSTONE!

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GENERATION 4

A Straightforward, Easy-to-Use Control Surface

There's no long learning curve required to immediately start using this traditional layout specifically envisioned for operators of all skill levels.

***BRIDGE TECHNOLOGY** enables the GEN-4 surface to operate far beyond the limits of its studio mainframe. Integration with the Bridge digital audio network router provides systemwide access to all station on-air and off-air audio resources via interlinked CAT-5 or fiberoptic cable. And of course, we all know **EXPERIENCE COUNTS!** With over eighty Wheatstone Generation control surfaces already operating in the field, you can be assured your installation will proceed smoothly and on time.*

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