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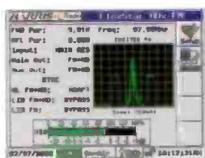
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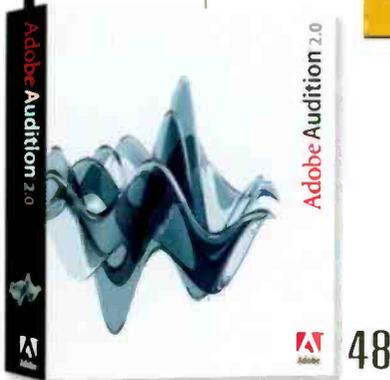


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### ON THE COVER:

Computer-based audio storage and playback is the primary focal point of facility operations. Cover design by Michael J. Knust.





# Remote Broadcasting over the Internet



*The remote from Mexico was a spectacular success, in no small part thanks to the flawless sound which the Tieline G3 provided over the public Internet*

**-Mike Rabey Chief Engineer  
Entercom Indianapolis**



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## Currents Online

Selected headlines from the past month.

### Cumulus Media Completes Acquisition of Susquehanna

There are reports that some staff changes have been made at the former Susquehanna stations, which is not unexpected with any ownership consolidation.

### Public Emergency Communications Network Emerges

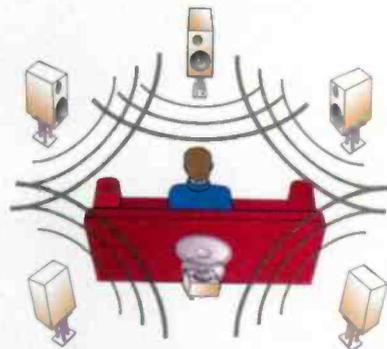
The National SOS Radio Network is a free communications network based on the estimated 100 million FRS-compatible radios already used by the public.

### WZLX Offers 24-hour Surround Sound Broadcasting

The transmissions will be carried on WZLX's digital HD Radio channel, which simulcasts the analog FM program.

### John Battison Honored with SBE Lifetime Achievement Award

Battison has played a significant role in the radio industry; from working in radio stations to founding the Society of Broadcast Engineers in 1963.



### Survey: Radio is Important to Americans

The survey found that 78 percent said radio is important in their everyday lives.

## Site Features

### Today in Radio History

Important dates that have shaped radio are available online. These dates are also listed on the 2006 Radio Industry Calendar.

### Technical Glossary

Need a reference for all the new technology terms? We have it for you.



### Currents Online Weekly E-mail

Get the *Radio* magazine headlines delivered to your e-mail box every Monday morning. Subscribe today for the latest radio technology headlines.

### Digital Radio Update Twice a Month

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### NAB2006 Photo Blog

*Radio* magazine brings NAB2006 to you in photos from the convention. From the sessions to the meetings to the show floor, see it all in the *Radio* magazine daily photo blog.

## Find the mic and win!

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Xport lets you easily send and receive audio using a POTS phone headset jack. Gives a whole new meaning to the phrase “phoning it in.”

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## A quick recap

After several months of planning and preparation, the week-long flurry of activity of NAB2006 has already come and gone. Now the post-show discussion begins. Our June issue will have details of the products and services that were shown at the convention, but until then, here are some of the prevailing ideas and themes from the show.

Just as in previous years, the top item of interest was once again digital radio, and HD Radio was in the spotlight. There were some exhibits discussing DRM and a few mentions of FM Extra. There was nothing on Cam-D.

While the RF side of HD Radio is not necessarily new, the capabilities of multicasting and datacasting garnered lots of interest. While the big players are investigating the second and third phases of deployment, the smaller groups and stand-alone owners are finally taking notice of HD Radio. Several transmitter manufacturers told me that they were answering basic questions from groups that are now looking to get started.

The early adopters are already on board. Now the middle adopters are beginning to take note.

One absence on the convention floor was Ibiquity itself, which did not have a booth, although representatives from the company were making the rounds. Some people think that this was a poor choice from Ibiquity, but I disagree. While the out-of-site, out-of-mind mentality is easy to apply, it's more important to keep a broad perspective in mind. What would Ibiquity have shown in its booth? More HD Radio receivers? Done that. Discuss the technology? Already heard that. Ibiquity was represented in the booths of transmitter manufacturers, antenna manufacturers and automation suppliers. Just like Fraunhofer and Coding Technologies didn't push MP3 and AAC Plus from a booth, neither does Ibiquity have to.

The second main discussion item can be described by the word co-opetition, the merging of the words cooperation and competition. When two companies compete for the same market segment it seems impossible that there could be some common ground for both players to work together on something that would be mutually beneficial, but that's exactly what happens. On further investigation, it can be seen that the competitive element between the two companies actually has some areas that do not overlap. With some coordination, the missing elements of one can be paired with the strengths of another to develop the competitive cooperation: co-opetition.

There were two prominent examples of this at the convention: Nautel and Continental working together to market their FM product lines in the United States and Canada, and Radio Systems and Axia providing Axia IP audio connectivity in the Radio Systems Millennium consoles.

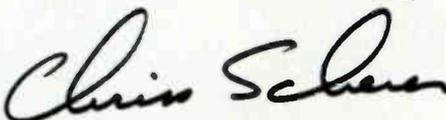
Both efforts pair the strengths of the players. While in the short-term there may be some loss in a given aspect, the long-term will likely benefit both more. It also benefits radio broadcasters by providing additional choices and options.

This level of cooperation is something new, but there are examples of past efforts that paved the way. One came to pass about a year ago when Translantech Sound partnered with Broadcast Warehouse to work on audio processing. Others are less familiar, such as the small Harris console that was actually an Arrakis console on the inside.

We haven't seen the end of these partnerships yet.

The third popular topic wraps audio inside an IP package. IP Audio—also not the newest technology—seemed to be a part of many things. The three more popular forms of IP Audio, Ethersound, Cobranet and Axia, were in lots of exhibits. Even OMT had a display with Wheatstone's version. IP audio is making its way into our studios, and it's also being shown to be viable outside as well.

Distribution of audio via codecs from Comrex, Tieline, Musicam and Prodys showed that IP networks are a viable means of audio contribution. We have seen examples of this previously from Audio TX and Energy-Onix, but we are now on phase two of the technology.



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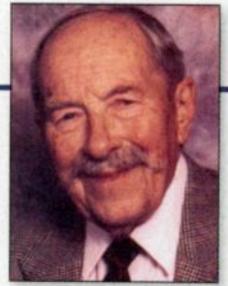


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## Three phases are better than one

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

Most engineers come to radio having been brought up on single-phase 240V primary power supplies with a small pole transformer hanging outside the house. Many small radio stations exist efficiently with a similar type of power supply. But when transmitter power increases are authorized it becomes necessary to consider a three-phase power supply and its attendant additional wiring.

On the surface, three-phase operation may appear to be a lot more complicated than single-phase work, and for that reason

is not preferred by some engineers. In his early work, Nikola Tesla, the father of three-phase operation, showed that it was actually more efficient than the more popular single-phase system.

However, in larger stations three-phase power is generally the choice for

actually falls to zero three times each cycle. A three-phase system power never falls to zero. This creates smoother and better operating characteristics in the three-phase systems.

Transformers can be smaller in a three-phase system because the kVA rating will be about 150 percent higher than for similar size single-phase transformer.

The load in a three-phase system is generally connected in one of two ways: wye or a delta connection. The wye connection is sometimes called a star connection.

### Carry the load

With a delta connection, each section of the three loads receives the full wire-to-wire voltage. In the case of the star connection shown in Figure 2 the voltage across each leg will be  $1/\sqrt{3}$  times the line voltage. Sometimes the center point of the star connection is grounded but not always. Some transmitters obtain reduced power operation by switching the power transformer from a delta to a star connection.

The number of phases used in a primary power supply is not limited to three. Six, nine or even 12 can be used. In some applications multiphase operation is frequently more efficient. Multiphase operation is often used in high-power transmitters because with a given type of rectifier it is possible to obtain more power and a higher dc voltage from a multiphase rectifier system.

Three-phase operation is flexible. It's possible to exchange the number of phases as desired by varying the manner in which the secondaries are connected and by using additional transformers.

There is, however, a caveat in connection with the use of three-phase motors—especially fan motors. Always connect a phase monitor on such a circuit. If a phase fails, motors will usually continue to run but will be too slow, with resultant tube or equipment damage.

### Special use

There is an interesting special circuit, which is mentioned in case a reader comes across one in an older, high-power transmitter. The primary connections may be puzzling. The circuit uses two transformers to convert three-phase power to two-phase for hum-free operation of the filaments of the final pair of tubes operating in phase quadrature. This is called the Scott connection (named after its inventor), and it is shown in Figure 3. The two secondary outputs go to the final tube filaments.

One of the problems that broadcast engineers experience is that of harmonics in the power supply. Harmonics in a three-phase system are frequently produced by variable speed drives for ac motors and electronic drives for dc motors. Power supplies for ac/dc that use pulse width

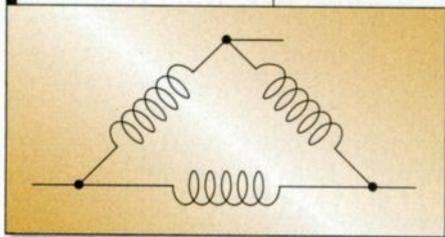


Figure 1. A typical delta connection.

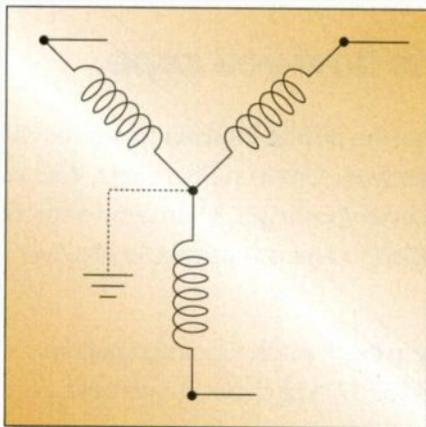


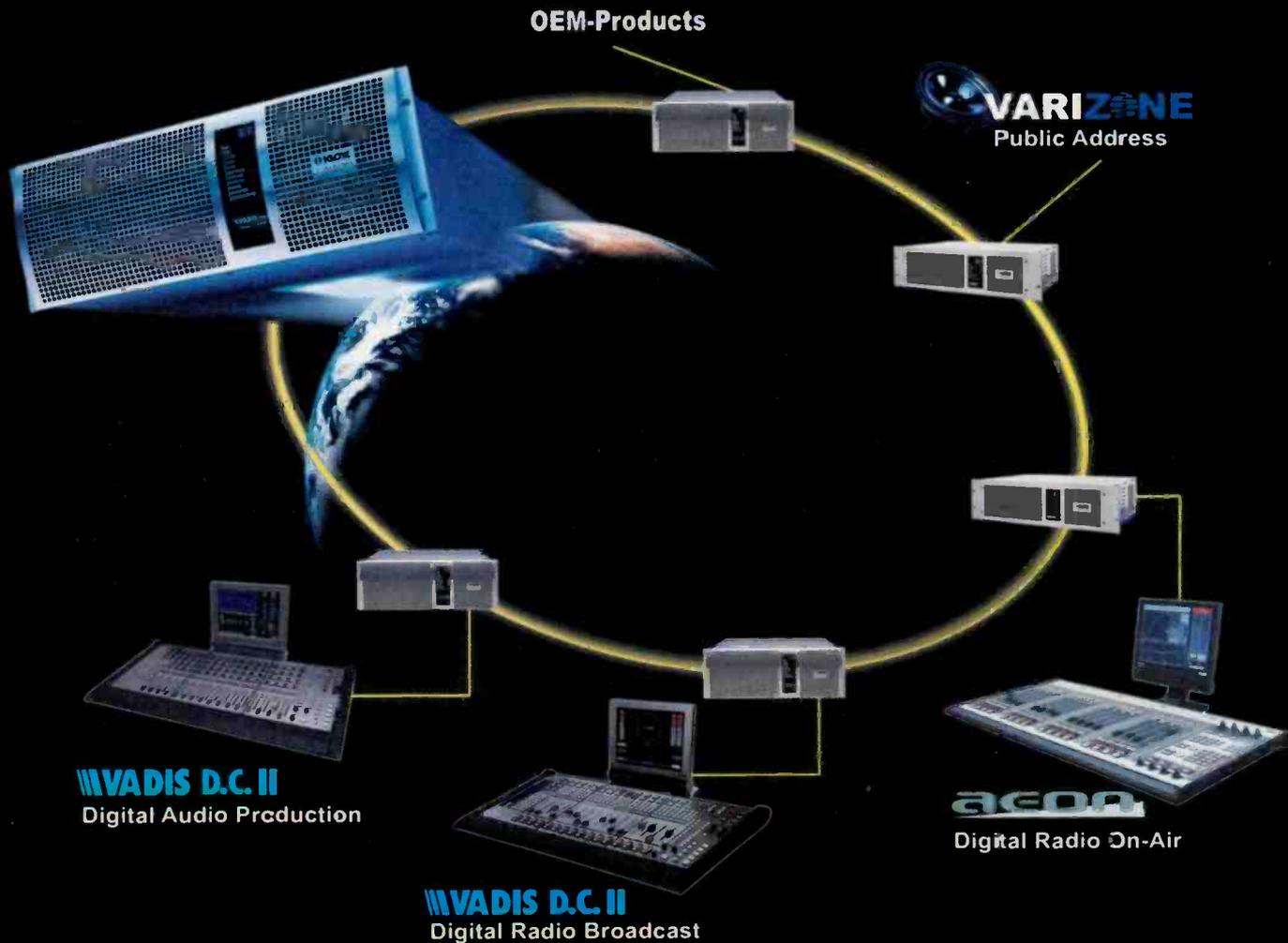
Figure 2. A star or wye connection with the optional ground connection.

several reasons. When the load on a three-phase system is properly balanced, a 25 percent to 30 percent saving may be made on the cost of the conductors for a single-phase system with the same kVA rating.

The power delivered by a three-phase system does not pulse in the same way as a single-phase supply in which the power

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modulation are a good example of electronic devices producing harmonics.

Circuit breakers that trip when not expected, as well as overheated wiring and transformers are frequently the result of harmonics on the power line. Harmonic generation can have a positive or a negative sequence. Positive sequence harmonics rotate in the same direction as the fundamental and, as might be expected, negative harmonics rotate in the opposite direction.

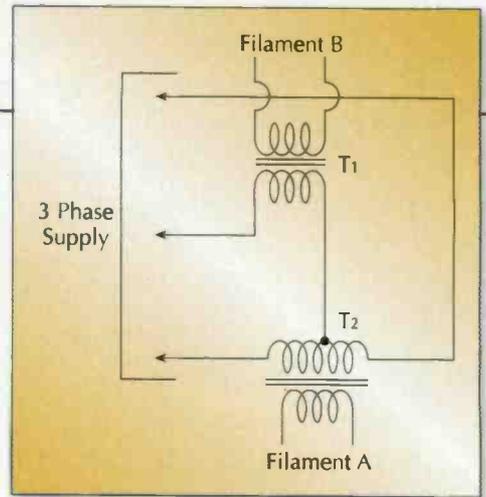


Figure 3. A Scott connection has similarities to a wye.



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Positive harmonic sequences cause circuit breaker tripping, and transformer and wiring overheating. Similar problems are caused by negative sequence harmonics as well as slow speeds in induction motors resulting in overheating and excessive power consumption. When overheating problems are encountered, and especially when motor speeds are slow, it is worth checking for harmonic invasion.

Apart from some solid-state power supplies, electronic ballasts can also produce harmonics. Equipment using power in square pulses is usually more prone to developing harmonics. In some cases harmonic problems have been found to occur with four-wire wye connected systems. If harmonic interference is suspected a scope will usually trace the problem.

Just as in the case of a single-phase power supply, power factor correction has to be applied to each phase in a three-phase system. The need for power factor correction is quite simple to understand when we examine a typical motor circuit that consists of inductance (the motor windings) and resistance.

Under no load conditions a motor looks like a circuit with a lot of inductance and low resistance. Most of the power drawn is used to energize a magnetic system. The current used is 90° out of phase with the voltage.

Now consider true or real power. In electrical terms, this occurs when electricity is changed into some other form of energy. In the case of a motor torque is produced as well as friction losses; heat is also another transformation of electricity into energy. The only real power produced under no load conditions is that used to overcome friction and other losses. So the circuit looks like a small resistance in series with a large inductance.

E-mail Battison at [batcom@bright.net](mailto:batcom@bright.net).



## FCC hedges bet on gambling advertising

By Harry Martin

www.beradio.com

Federal laws on the advertising of lotteries and casino gambling appear to be straightforward. Title 18 U.S.C. § 1304 provides that it shall be a criminal offense to permit the broadcasting of any advertisement of "any lottery, gift enterprise or similar scheme." This prohibition is generally understood to include not only lotteries and casino gambling, but also any activity in which anything of value is given for a chance to win another thing of value.

Based on this statutory mandate, Section 73.1211 of the FCC's rules prohibits broadcasters from broadcasting any advertisement for "any lottery, gift enterprise or similar scheme," with a few important exceptions. First, the prohibition does not apply to lotteries conducted by states where the station broadcasting the advertisement is located within a state that conducts such a lottery. The rules also provide an exception for lotteries and other activities permitted by state law and conducted by non-for-profits or as an incidental promotional activity by commercial organizations. Also excepted are non-profit fishing contests. Most significantly, gaming activities conducted by Indian tribes pursuant to federal law may be advertised.

Thus, the rules on their face permit the advertising of certain casino activities (when conducted by Indian tribes) but they still prohibit the advertising of precisely the same activities (when, say, Indians aren't involved).

### Reaching conclusions

Due in part to these inconsistencies, a U.S. District Court for New Jersey concluded, in *Players International, Inc. v. U.S.*, that the federal prohibitions on the advertising of casino gambling failed to pass First Amendment scrutiny. In early 1998, the government appealed that decision to the U.S. Court of Appeals for the Third Circuit. In 1999, however, while the *Players* appeal was pending, the Supreme Court decided that advertising private casino gambling could not be prohibited in states in which such gambling is legal, whether or not Indians were involved. In light of the Supreme Court's decision, the Department of Justice (DOJ) filed to withdraw its appeal of the *Players* case and notified Congress that the DOJ would not continue to defend the constitutionality of Section 1304 as applied to truthful broadcast advertising for lawful casino gambling.

Thus, it would appear that broadcasters can air truthful advertising for lawful casino gambling, regardless of where the broadcaster is located. But in 1999 the FCC issued a Public Notice that referred to the Justice Department's actions but did not explicitly take the same position with respect to the effect of Section 73.1211 of the FCC's rules. Instead, the FCC promised that it would re-evaluate the matter following the Third Circuit's disposition of the *Players* case.

The Third Circuit dismissed the *Players* case in 2000, but

the FCC has yet to revisit the subject. Thus, broadcasters are left with the fact that the FCC has never officially disavowed its rules restricting casino advertising, even though the Justice Department expressly disavowed the underlying federal statute. This creates an odd situation in which the FCC's rules on their face expressly prohibit conduct which the DOJ has concluded is perfectly legal, and the DOJ's position is bolstered by no less an authority than a Supreme Court's ruling. And the FCC's own 1999 public notice might reasonably be read as the Commission's effort to publicly disavow its rule (even if the notice in fact stopped short of doing precisely that). That conclusion could reasonably be drawn from the fact that the FCC has not enforced the rule since that public notice.

But the fact remains that the FCC, whether through bureaucratic inertia or otherwise, has left the rule on the books. As a practical matter, lawyers are reluctant to counsel their clients to ignore rules that are still included in the FCC rule book. But if there were ever any inclination to provide such counsel, this would certainly be an obvious place for it. The combination of factors at work here strongly indicates that this rule is a dead letter, unlikely to be enforced again.

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

### Dateline:

July 10 is the deadline for radio stations in all states to place their quarterly lists of issues and programs in their public files for the period April 1 to June 30, 2006.

Aug. 1 is the due date for biennial ownership reports for radio stations in Illinois and Wisconsin.

Aug. 1 is the deadline for radio stations in the following states to place their annual EEO public file reports in their public files and place them on their websites: California, Illinois, North Carolina, South Carolina and Wisconsin.

# Radio automation



By Jeff Smith, CEA CBNT

**I**t doesn't seem that long ago that hard drive automation systems for radio were more of a novelty than a necessity. The days of cart machines and even CD players are beginning to seem numbered. In today's world of voice tracking, satellite programming, data streaming and even 5.1 HD Radio a good flexible automation system is a must for broadcasters.

Computer-based automation systems of today have had to answer the question of "how flexible and scalable" they are. To that end, most operate using off-the-shelf computer hardware and most use Microsoft Windows operating systems. While some still use Linux or Unix, the number of these systems seems to grow smaller every year. The other technology

that has allowed automation systems to meet more demands is the growth of high speed LANs and WANs. Hard drive size, speed and cost have also allowed automation companies to offer more options as the price of storage has gone down.

Most manufacturers of automation systems today offer the same basic set of features or functions. They all play back audio that is fed to the system via a log of some type. They all have hot keys for instant playback of items and they all offer some type of production interface, be it proprietary or a way to interface with an existing product. In addition to the basic features required, many systems offer options and features to fit the needs of your unique situation.



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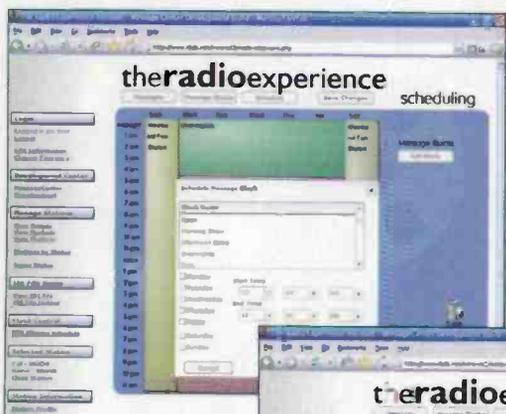
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# Radio automation



Manipulating program service data for RBDS, HD Radio or a website is a recent requirement for an automation system. More complex data is handled through a separate system.

When you shop for a new automation system, one of the best things you can do is talk to other broadcasters. Everyone will have different experiences and no two will be the same, so speak to as many people as possible. Talk to engineers about the ease of the installation and the reliability of the system. Talk to jocks and production people about the user

interface and how easy or difficult it was to learn the system. Talk to traffic and program directors about how the system interfaces with traffic and programming software.

When you narrow your decision down to a few vendors ask for demos. Make sure the system has all the features you need now and the ability to grow with your needs. The automation marketplace is competitive today, so vendors should be willing to go the extra mile to meet your needs.

If you are changing automation systems, look for companies that will offer on-site training. No matter how many problems you had with your old system, you will encounter some resistance to change and having someone there to hold people's hands can help.

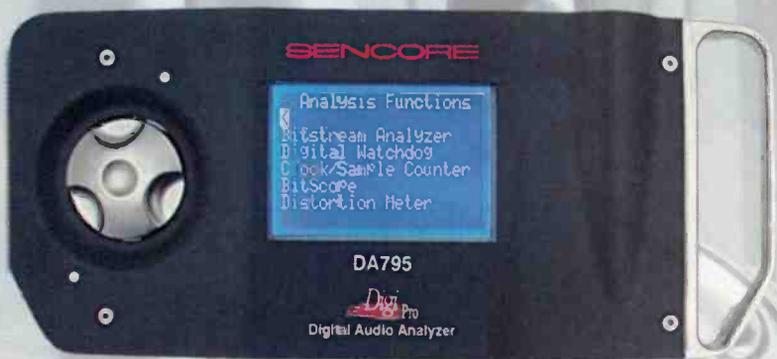


## Data streams

One of the features that broadcasters have been demanding from system providers is a way to feed a data stream from the automation computer by means of RS-232 serial or IP. Many broadcasters use this data stream to simply provide song title and artist information to a "now playing" feature on a website or to RBDS or HD Radio encoders. There is, however, more that can be accomplished with this data stream.

Some automation companies have developed ways to run not only title and artist, but also information like traffic conditions or weather. Even different ad campaigns can run on the RBDS/HD Radio display whenever a certain commercial is played. Another use of this

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Steve Herbert, CBRE  
Chief Engineer,  
KCRW/KCRU/KCXY/KCRI  
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# Radio automation

technology is to help promote station concerts or events whenever a certain artist plays. Some automation companies have even launched secure websites that allow a user to configure these different campaigns. These functions are tied to the automation system's function of storing and playing audio files, but the process of streaming the additional data is going to be handled through another system.

## Remote capabilities

The ability to remotely voice track has become a necessity for broadcasters today. This feature has become popular in the past few years with the easy availability of high-speed Internet connections and the need or desire

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

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[www.arbor-audio.com](http://www.arbor-audio.com)

### Arrakis Systems

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### Crystal Computer

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

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### Dalet Digital Media Systems

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

### dcstools.com

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# Radio automation

of stations to use talent from outside the market. The majority of automation companies can accomplish the remote uploading of voice tracks but many also offer the ability to share any audio or data file. This is a useful feature that allows stations to have an audio piece produced in one location and send it to other locations and have it integrated seamlessly into the automation system.

In addition to routing audio around to remote locations, another remote feature offered by some system providers is remote control. This allows a user from a remote site to connect and control the on-air system. This is a great feature for remotes or even to allow a PD to access the system from home, as opposed to driving to the station to make changes as needed. Another benefit of remote access is to allow the station engineer to get into the system to make fixes or offer help without having to drive in after hours. Some automation companies even offer secure Web access to view the status of the system.



Voice tracking, in-studio or via the Internet, is a widely used function of automation systems.

## HD Radio capabilities

The ability of an automation system to fully utilize the features of HD Radio is another must for broadcasters today. This includes features such as playing uncompressed audio and offering data

## Resource Guide

### Mediatron

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www.mediatron.com

### Micropower

800-870-0033  
www.powergold.com

### Netia Digital Audio

866-638-4222  
www.netia.net

### OMT Technologies

888-665-0501  
www.omt.net

### On Air Digital USA

972-481-8700  
www.onairusa.com

### Open Radio Software

310-839-9225  
www.openradiosoftware.com

### Pristine Systems

310-831-2234  
www.pristinesys.com

### Prophet Systems Innovations

877-774-1010  
www.prophetsys.com

### RCS

914-428-4600  
www.rcsworks.com

### Register Data Systems

800-521-5222  
www.registerdata.com

### Smarts Broadcast Systems

800-747-6278  
www.smartsbroadcast.com

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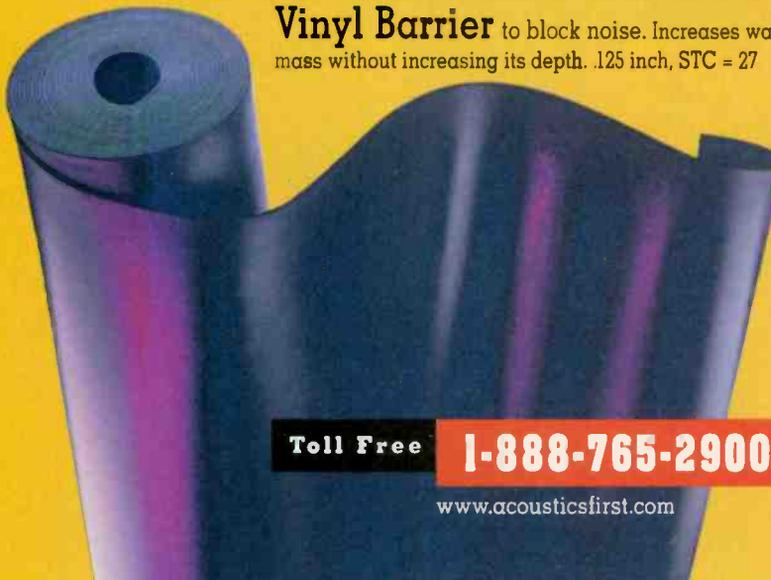


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streams. One of the new features being developed by automation and sound card companies is the ability to broadcast using 5.1 and 7.1 surround formats. When looking at this feature, larger hard drives are required because surround recordings are larger because audio is uncompressed linear with interleaved WAV streams. Appropriate 5.1 or 7.1 monitors and processors are required in addition to a HD Radio transmitter. The 5.1 standard, and even the 7.1 standard, is receiving a lot of press lately and is currently a big push for the larger automation companies.

Multiple streams are also a feature being used by more and more HD Radio broadcasters today. Some automation companies are developing the ability to play multiple different audio streams from one computer. Some already have the capability. This feature offers a great cost savings to the broadcaster but also means if that one computer goes down, so do all of your HD Radio channels.

### Redundancy and backup

The thought of having all of a station's audio on one computer can seem scary to many people. Many automation companies also allow for redundancy in their systems. Redundancy provides for a spare to be online and accessible immediately and automatically in the event of a failure on the main system. This can be accomplished in a few different ways, but the end result is the same—in the event of a failure your station is still on the air.

Off site backups and redundancy are also a nice feature to look for with an automation system. The idea of an off-site backup, which is a copy of all of your systems data at another location, is becoming a requirement within a station's disaster recovery plan. The ability to broadcast from the transmitter site or any other backup location is a great safety feature in the event of STL failure or worst case scenario—an evacuation of the main studio facility. Having the ability to store and playback all your commercials, music and imaging from another location will keep you on the air without missing a beat.

### Sarbanes-Oxley compliance

The Sarbanes-Oxley Act of 2002 has forced public broadcasters, and even some private broadcasters, to prove that their documentation of what really played is accurate and tamper-proof. To help meet this compliance, several automation providers have released versions of software that ensure the accuracy of air logs and also ensure that they have not been vandalized.

This feature may not be a requirement for all broadcasters but is a nice feature to assure advertisers and the accountants that what is shown on the aired logs is what actually happened on air.

### IP audio

The idea of digital audio has been around for years now. Many stations today use some digital audio or may be entirely digital using AES-3 audio. The idea of IP audio, for broadcasters, however, is relatively new and automation companies are starting to jump on board. The three big standards



With the multicast capability of HD Radio, creating multiple program streams from a single workstation becomes important.

of IP audio used for broadcast studios today are Cobranet, Axia and Ethersound. These IP audio technologies eliminate the need for the traditional audio card and instead transmit audio over a standard Ethernet connection. The Cobranet and Ethersound systems use a sound card replacement and the Axia system uses a standard 100/1000Mb Ethernet card. These systems may see future growth as engineering and IT blend together more.

*Smith is the director of broadcast systems, Nassau Broadcasting Partners, Princeton, NJ.*

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The human element  
came first when  
WKLU rebuilt.

**M**any studio rebuilds in medium and large markets are attributed to the consolidation of stations within a facility, so when a stand-alone station completely rebuilds its transmitter and studio facilities it is an undertaking to watch. This is the case with WKLU, which is owned by Indy Radio and licensed to Brownsburg, IN, a small town just west of Indianapolis.

The station signed on the air in 1991 as a drop-in signal, but it never really made much of an impact on the Indianapolis market. Before being sold to Indy Radio, it delivered a deep-cut classic rock format. When the station was purchased by Indy Radio in 2005, the new owner, Russ Oasis, put his devotion to radio into the station and rebuilt the studio and transmitter sites to better serve Indiana's capital city.

When it was purchased, the studios were in a house that at one time was a pet store. The facility was built on a limited budget and maintained on an even more limited budget. The studios were cramped and used lots of consumer equipment to supplement the well-worn broadcast equipment. None of the old equipment was used in the new facility.

The plan was to build a facility that would stand out. Oasis wanted the best possible facility; no cutting corners, no just-good-enough approach. The end goal was to build the station to be a showplace for visitors and a stage for the announcers to perform on proudly.

### Where to begin

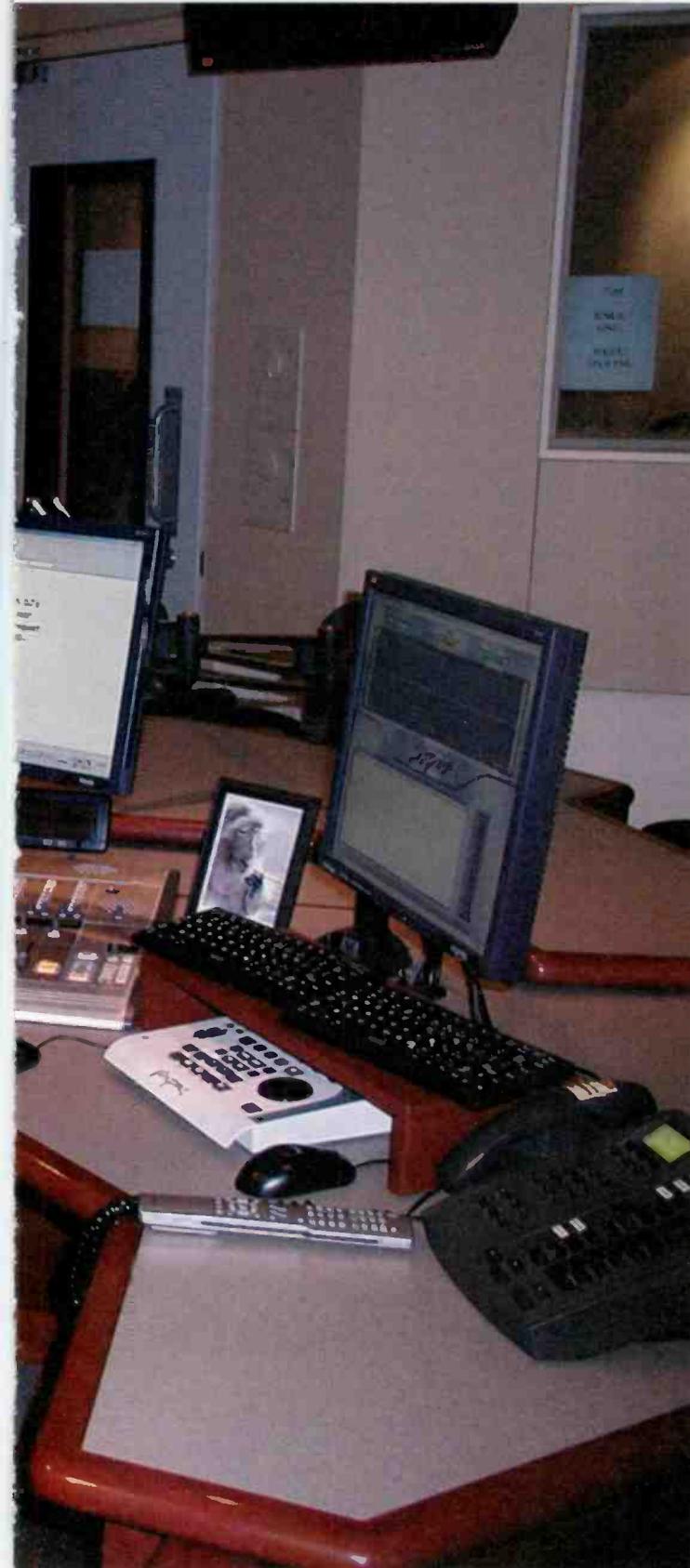
The first step was designing a facility that was warm and inviting. This goal was obviously achieved when you enter the offices and see the lobby. While facility showcase articles in *Radio* magazine focus on the technical operation of the facility, the lobby is worth mentioning because it sets the tone to visitors when they arrive. The lobby isn't a sterile room that feels like a dentist's office. It looks more like a ski lodge than a business, especially with the large stone fireplace. This attention to creature comfort is carried throughout the facility.

To design the facility, Oasis hired Roy Pressman, an engineer he had worked with in Miami, FL. Pressman has designed many facilities and now operates his own system integration company and equipment dealership. Pressman was instructed to build it right, build it well, build it for people and build it to be the best that it can be.

The first step was locating a building for the studios. At the same time, work had begun to relocate the transmitter site to put a stronger signal over the Indianapolis metro. After looking at several office locations, a building on the north side of Indianapolis was chosen. The two-story building was for sale, and Oasis bought it with plans to build the radio station on the second floor and to lease the space on the first floor to a tenant.

One advantage to the building is that it housed another radio station several years ago. That station built the monopole tower adjacent to the building and provided a suitable spot for the station's antennas.

Another business occupied the building between the first radio station moving out and WKLU moving in, so there was no existing broadcast infrastructure in place. Also, the tower was



# Built for SUCCESS

in good shape, but the transmission lines had to be replaced.

Pressman's facility design called for double-layer drywall construction to minimize sound leakage between the studios. He also specified acoustic doors, which are heavy. The additional weight for the studios is considerably more than a traditional office space, so the second floor structure had to be reinforced to accommodate the load. Reinforcing members were welded to the floor supports.

Pressman sketched a basic plan of the facility then worked with a local architect to draw the final plans. Pressman also designed the studio furniture, which was built by Harris. There are three studios; are all basically the same. The room dimensions of the three are slightly different, but from an equipment standpoint, the air studio and production 1 are identical. Production 2 has the same basic room layout but not as many audio sources. Any can be used for on-air or production, although the air studio is slightly larger than the other two studios. A second station could be operated from the facility.

The furniture allows flexibility for any format, whether it was music- or talk-based. The large rooms are also designed for live radio with a full air staff 24 hours a day. WKLU does not voice track any of its programming.

## Backup for the backup

The three studios are indicative of the attention given to redundancy. Two studios would normally be enough to handle the on-air and production needs, but the third studio provides an extra layer. Equipment redundancy provides for instant backup if it is ever needed.

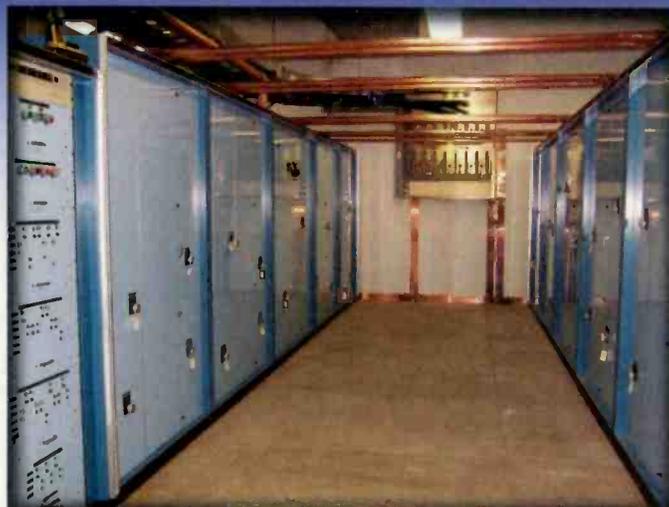
One example of this is the complement of Scott Studios SS32 systems. There are two SS32 systems in the air studio and production one. Except for production two having only one SS32 system, each studio is similar in its equipment complement.

It seems that every new facility struggles with finding the perfect balance in the HVAC system that is shared between studios. To eliminate this problem and to eliminate a possible single point of failure, each studio has its own HVAC system. The systems also have humidity-controlled HVAC to maintain a constant 40 percent relative humidity regardless of the temperature. This maintains human comfort and prevents static build-up.



Photo by Monica Lephart

The monopole tower was already built at the site, saving the station from having to erect one.



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Another view of the air studio. The two production rooms have nearly identical layouts.

Building power has two layers of backup. A 100kW generator fed by a high-pressure natural gas feed can support the facility indefinitely if necessary. To cover the switching time from commercial power to generator, a Liebert UPS carries the load during the three-second switch. The UPS will support the facility for 30 minutes in case of a generator failure. This 30-minute buffer also allows the station to gracefully shut systems down instead of watching them crash when the power disappears.

The audio network is built on a Harris Vistamax router. The RMX Digital consoles are connected to the router, but they are also wired so that they can be used on the air directly if necessary. Bypassing the Vistamax means that some resources will not be available, but the station will still be on the air with most of its audio sources.

Dual Moseley Starlink STLs provide a main and standby link, and the Telos Zephyr Xstream can also be used as a third STL path if necessary.

## Fine touches

There are several finer details that add to the facility's ease of operation. The LED signs next to the console meter display is one these details. Instead of placing large signs across the room, Pressman installed smaller signs that are directly in the announcer's field of view. One sign is fed by the Sage Endec. The other sign is fed by a Sine Systems MBC-1, which provides notifications for the profanity delay, a studio being switched on the air, a generator failure and other important events.

There is a plasma screen in the lobby behind the receptionist that normally shows station information and the station logo. When the announcer turns the mic on, an in-studio camera is activated. The camera pans and zooms to focus on the host position and is switched to feed the lobby screen. When the mic is turned off, the

## Equipment list

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CBT Systems on-air lights  
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Crown K1 amp  
ESE ES-104A time server  
Eventide BD500, Eclipse  
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HHB Burnit Plus  
Human Scale M7 computer monitor arms  
Inovonics 531  
JBL 4412A  
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Moseley Lanlink 900, Starlink SLQ9003Q  
Neumann BCM 104  
O.C. White mic booms  
RDL FP-BUC2, combing amps  
Scott Studio SS32  
Sennheiser MD421  
Sine Systems MBC-1  
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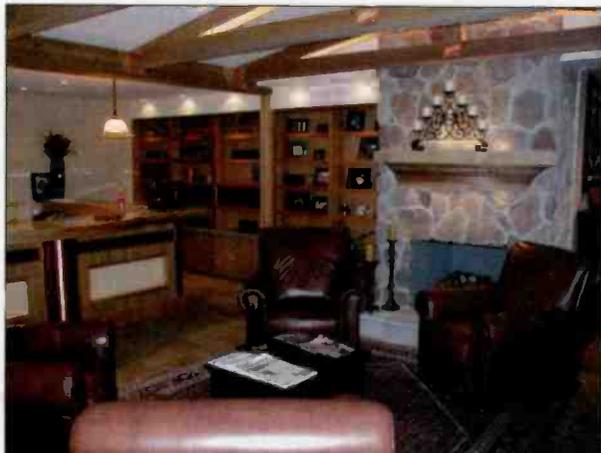
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camera returns to its original position. The pan and zoom action is to eliminate the paranoia of always being on camera.

The attention to detail was even applied to the microphones and mic processors. Everyone has his own favorite equipment choices, and Oasis and Pressman had their preferences. Regardless, they took the time to assemble several mics and several mic processors and



The lobby is warm and inviting; like entering someone's living room. This is part of the philosophy of building the facility for human comfort.

tray a variety of combinations. Oasis favors the Sennheiser MD-421 as an announcer mic. After side-by-side mic processor comparisons, the Aphex 230 was chosen. As a final step, the Neumann BCM 104 was tried with the 230, and the final element was decided. The Neumann mics are used in the host positions, and the Sennheisers are used on all the guest positions.

A Telos Profiler was installed to log the station. To allow announcers a way to listen to their shows in their cars, each studio has a cassette deck wired as a skimmer. Then they quickly realized that auto cassette decks are no longer common, so the HHB Burnit Plus CD recorders were installed as another skimmer.

With the studios complete, WKLU is turning its attention on the final upgrade to the transmitter site. The station will begin HD Radio transmissions in May, and it has already begun developing its HD2 and HD3 signals. When the HD Radio signal is activated, WKLU will stream all three signals online using Barix Instreamer encoders. This will allow the station to begin building a listener base online while the HD Radio receiver base grows. 

*Thanks to Roy Pressman for providing technical details of the facility.*

# Facility

## CBT Classic On-air Light



This stylish on-air light is crafted with a traditional sand casting method to create the buffed aluminum housing that features a multi-layered plexiglass lens. The result is an eye-catching, recognizable look. The light easily installs on a standard two-gang j-box, and optional legends and a flasher module are available. It can be powered from a 120Vac, 24Vac/dc or 12Vac/dc supply. Additionally, CBT offers a full studio and control room on-air lighting control system that interfaces to a switcher or a console to interpret a variety of on-air status and tally indicators. The optional legends "recording," "standby," "silence," "applause," "now showing" and "now playing" are available.

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## TASCAM CD-RW900



The new TASCAM CD-RW900 adds a list of eagerly-requested features to the most popular CD recorder available to radio stations. Building on the success of the CD-RW750, the CD-RW900 adds MP3 playback with ID3 tags (and directory navigation), pitch and key control, a keyboard input (for adding CD text) and more to an already packed feature set. It fits into two rack spaces and features unbalanced RCA inputs and outputs as well as S/PDIF digital ins and outs via optical and coaxial connectors. Using TASCAM CD recorders is simple, which is why they're the first choice for radio stations, cable and TV operations and more.

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# Focus

## the technology behind WKLU

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Incorporating all the necessary features at a very affordable price, the Inovonics 531 is the undisputed value leader in an FM modulation monitor. Dependable off-air monitoring measures the important parameters of a station's signal as well as other stations in the market. High-resolution bargraph displays are easy to read, and a floating dot program peak marker eliminates any ambiguity in the total-modulation measurement. Off-air readings are qualified by Inovonics' exclusive multipath indicator, which also aids in antenna alignment. The unit includes a built-in preselector for precise off-air measurements, and seven station presets may be recalled by remote control. The bright, accurate bargraph metering displays total modulation, stereo program audio, subcarrier injection, incidental AM noise, signal strength and multipath. There is also an alarm tally outputs for remote fault indicators.

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### Harris PR&E RMXdigital

The latest generation of the Vistamax network-enabled radio broadcast consoles, the RMXdigital is a cost-effective, compact design built upon the philosophy and value of its big brother, the BMXdigital.

While the RMXdigital is an excellent choice for stand-alone console applications, the built-in Vistamax audio/logic router allows users to take advantage of networked power on their own time frame. The Vistamax network shares audio resources across the facility without the need for time-consuming and costly wiring. The RMXdigital provides flexible operation and a quick, simple and cost-effective installation. The all-digital design offers four program buses with digital and analog outputs; up to four simultaneous telco/codec inputs with automatic on-line/off-line switching; 44.1kHz or 48kHz sampling rate; and console session set-up with preset recall.



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800-622-0022

### AudioScience ASI6044

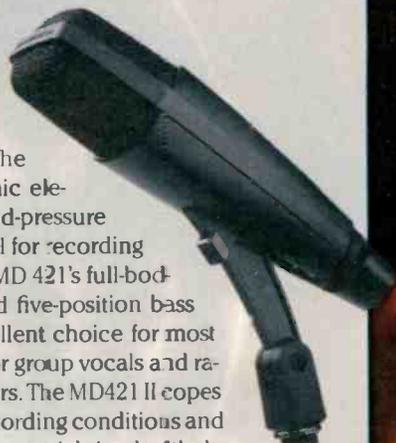
The ASI6044 features four balanced stereo outputs, four balanced stereo inputs, four record streams and four or nine playstreams. As well as MP3, other format choices include MPEG Layer 2 and linear PCM. The analog circuitry uses 24-bit over-sampling converters to deliver more than 100dB of dynamic range with THD+N better than 0.002 percent. This audio adapter supports AudioScience's MRX and TSX technology. MRX enables playback, recording and digital mixing of multiple audio streams of any sample rate to a 1Hz precision. TSX time scaling can be used on any of the audio playback streams to expand or compress audio in real-time by up to 20 percent, while preserving pitch and clarity. SoundGuard transient voltage suppression protects against lightning and other high voltage surges on all I/O connections.



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# Were you born in a barn? Actually, yes.

By Jeff Smith, CEA CBNT

**W**hen most people think of a radio station in suburban Frederick, MD, the last thing they think of is a barn. But a barn is exactly what Nassau Broadcasting Partners inherited when it purchased Key 103.1 WAFY in April 2005. This facility had been a working farm until it was converted into an industrial area in the mid-1980s, and the barn became a radio facility in 1995. When Nassau first acquired Key, the barn was a basic stand-alone FM facility. There was a control room, a production room and a small news booth; in addition there was a sales area, conference room and several offices. It wasn't too long after the purchase of this facility that the engineering department was asked to develop a plan to modernize the facility and to make it the IT hub for Nassau's Maryland and Reading, PA, properties.

# Insight to IBOC

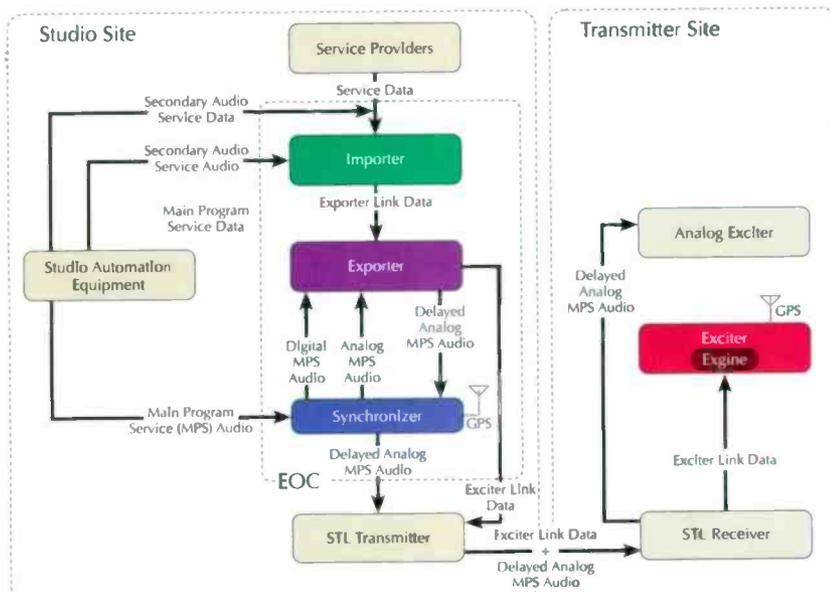
May 2006

Part of the *Radio* magazine DAB Answer Series

## The HD Radio System

By Jeff Detweiler

If you are a relative newcomer to Ibiquity's HD Radio technology, it is easy to become overwhelmed by the alien hardware topology and a long list of acronyms used to describe multicast program channels and operating modes. One area sure to challenge all but the most progressive broadcaster is the available options for implementing HD Radio exciter technology.



A block diagram of the HD Radio transmission system.

To fully appreciate the benefits of each implementation, a thorough understanding of the technology is necessary. In the latter days of the Ibiquity commercial exciter development effort, a two-box approach consisting of the Generation-II exciter and the Exciter Auxiliary Service Unit (EASU) was conceived to deliver the first commercial platforms.

The Gen II was a far cry from its predecessor, the Gen I, having moved from a PC104-based platform using 14 Analog Devices SHARC processors, to a more conventional Intel Pentium IV PC architecture. The Gen II exciter consists of a motherboard with integrated video/LAN, 3GHz Intel Pentium processor, memory, touch-screen, video controller, AES audio cards, digital up-converter (DUC), RF up-converter (RFU), Station Interface Card (SIC), hard drive, CD drive, Linux operating system and the manufacturer-integrated version of the Ibiquity Reference System Software (IRSS). The EASU, which is also called the synchronizer, contains a GPS receiver/10MHz time base, word-clock generator, rate converter and audio bypass switching for maintenance. The Gen II platform accomplished the digital signals MPS audio bit-reduction and the multiplexing of the Program Service Data (PSD) to the MPS air interface. For the next four years the Gen II platform became the workhorse of HD Radio's rollout.

## Better Receiver reception

By Chriss Scherer, editor

In February, NPR Labs, the research project arm of NPR, studied the reports of reception difficulties with the Boston Acoustics Receptor HD Radio receiver. The research was initiated after reports that HD Radio reception inside homes and office buildings was less than satisfactory with some listeners. The complaints noted that hybrid analog/digital reception was adequate, but that digital reception had drop outs or was even nonexistent.



The Boston Acoustics Receptor HD

To investigate the matter, NPR Labs first measured the sensitivity of the radio itself and found it to be good. Because of this, NPR Labs turned to the antenna that is included with the radio as the source of the poor performance. The included antenna is an 18" long wire.

NPR Labs obtained active (amplified) and passive FM receive antennas for evaluation with HD Radio signals. These included a folded dipole, a compact amplified FM-only antenna, a compact amplified FM and AM antenna and a rabbit-ear FM antenna.

*continued on page 3*

### Inside

- The Engineering Co-op ..... 4
- The return on investment ... 6

A special supplement to

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# HD Radio system

Once MPS was established, broadcasters became intrigued with HD Radio's ability to deliver multiple, independent, program streams, over the same digital signal as Supplemental Program Services (SPS), which is now commonly referred to as multicast. SPS development was placed on a fast track and the importer platform was born.

With this background we can step through the HD Radio signal chain.

## Importer

The importer contains the hardware and software necessary to deliver Advanced Application Services (AAS). Data service providers use an Application Programming Interface (API) to pass service data to the importer over the service link. The importer establishes session connections between multiple service providers. Once a session is established, service providers can pass service data over the importer-to-exporter link (I2E), which, in turn, will be broadcast over the air to HD Radio digital receivers. In addition to the AAS from data service providers, the importer also accepts SPS and PSD. The importer multiplexes all of the service provider data, multicast audio and data streams into a full-duplex TCP/IP or bi-directional User Datagram Protocol (UDP) output.

Conceptually, the importer is intended to be one component of a four-element platform. It was a technical response to a signal distribution challenge. For a radio station to convey linear 20kHz audio from the studio to the transmitter would require 1.4112Mb/s for each stereo channel. If broadcasters were expected to connect multiple stereo audio channels to the transmitter site for MPS and SPS, it makes sense to do so employing the HDC bit-reduced audio for transport efficiency. Accomplishing this requires bit reducing the MPS and SPS audio and PSD at the studio end of the system and conveying a single multiplexed data stream to a HD Radio exciter at the transmitter site. Around the same time, broadcasters began inquiring about an embedded system for the transmission end of the system to reduce complexity at the transmitter site. What emerged became known as the exciter engine, or engine.

## Engine

The engine subsystem accepts the exporter-to-engine link (E2X) data from the exciter's host processor and performs the Orthogonal Frequency Division Multiplexing (OFDM) modulation for the digital portion of the HD Radio waveform. The Engine element is comprised of a Texas Instruments C64XX processor, SDRAM and Flash memory and enables the Layer 1 modulation to be executed on the Digital Signal Processor (DSP). The engine element may be added to many manufacturers digital implementations of their

## Better Receptor reception

*continued from page 1*

While a detailed report of the test will be released later this year, NPR Labs released its preliminary findings to help stations and consumers improve their HD Radio reception. Preliminary testing shows an advantage to using passive antennas, such as a folded dipole or rabbit-ear design, over low-cost active antennas.

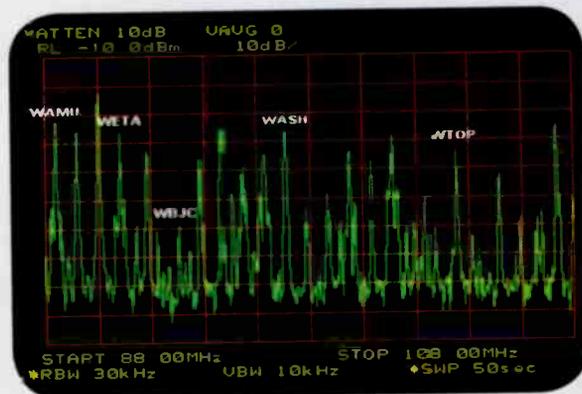


Figure 1. Measured spectrum with a folded dipole antenna.

Figures 1 and 2 show the performance of 75Ω folded dipole antenna and an active FM-only antenna. The figures show the spectrum measured from 88MHz to 108MHz at the NPR headquarters in Washington, DC. Five stations are shown on the spectrum plots: WAMU 88.5MHz Washington, DC (transmitter is in Arlington, VA), WETA 90.9MHz Washington, DC, WBJC 91.5MHz Baltimore, WASH 97.1MHz Washington, and WTOP 103.5MHz Washington.

The folded dipole results show that most FM station signals range between a signal level of 30dBm and 50dBm measured at spectrum analyzer input. WBJC in Baltimore has a weaker signal measured at 69dBm. The noise floor is below 30dBm.

The gain control of the active FM-only antenna was adjusted so that the level of FM signals near



Figure 2. Measured spectrum with an active FM antenna.

*continued on page 6*

### Image credits:

Page 1 - HD Radio diagram courtesy of Ibiqity Digital.  
Page 3 - Spectrum displays courtesy of NPR Labs.

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

Insight to IBOC - a supplement to Radio magazine, May 2006, © 2006 Prism Business Media. All rights reserved.

## Open Mic

### Success through cooperation

At the end of January, the HD Digital Radio Alliance formed the Engineering Cooperative to assist the engineering community within the group's partners to share technical information and provide guidance on technical issues. Gary Kline, corporate director of engineering for Cumulus, leads this group.

Now that a few months have passed, we asked Kline to provide an update on the activities of the Engineering Cooperative.

**Radio:** *The Engineering Cooperative of the HD Digital Radio Alliance recently provided input that modified the original station roll-out schedule. What factors were considered in making the recommended changes?*

**GK:** We were asked to examine all HD Radio conversions scheduled for future dates in each of our respective companies. The goal was to decide if any dates could be moved to an earlier position in the schedule. For example, if a certain market was scheduled for October 2006, we were asked if it could be moved to perhaps June 2006. The idea was to help the alliance realign its roll-out schedule



to coincide with market size so that larger markets could be launched sooner.

The main factors considered were technical obstacles and budgets. Specifically, we considered several questions: Was equipment already on order? Could equipment be swapped with another market? Were there any issues with leases, power, HVAC? Was sufficient labor in place to handle the work? Could any of these concerns be handled sooner rather than later? Was budget allocated for the market?

As a result of this effort, several markets were moved to earlier positions on the schedule. In some cases, no changes were made.

**Radio:** *How was the information gathered and shared among the group?*

**GK:** The directors of engineering of each alliance company participated via conference call and then e-mail to provide data on which stations in a market could move up in the schedule. All of this data was aggregated by the alliance management team and then a list was issued with adjusted roll-out dates. The entire process worked well from start to finish, and the Engineering Cooperative proved to be a great resource in researching the needed information efficiently.

**Radio:** *What is the primary activity of the cooperative right now?*

**GK:** Currently, the cooperative is in an information-sharing mode. We continue to share documents and notes about installations, equipment and ongoing research. ▲

# HD Radio system

analog exciter offering an integrated solution for low level analog and digital signal generation. In this distributed architecture, the HD Radio data stream is fed to the engine over a simplex UDP Ethernet connection.

## Exporter

To generate the multiplex over the E2X requires a new element in the system topology. The exporter answered this need by accepting the MPS AES audio and PSD from the automation server at the studio end as well as the multiplexed SPS audio, SPS PSD and advanced application service data from the importer. The exporter may be visualized as the final multiplexer of MPS and all Advanced Application Service (AAS) data prior to developing the simplex UDP stream to the STL. An exporter is essentially a Gen II exciter without the RFU and DUC sub-assemblies. In fact, some manufacturers allow maximization of the original equipment investment by providing an upgrade path from existing exciter to exporter.

The exporter contains the hardware and software necessary to generate the MPS and the Station Information Service (SIS). The MPS provides the main program audio and PSD broadcast over the air to HD Radio receivers. The SIS provides the station information (call sign, absolute time and position correlated to GPS).

The exporter accepts digital MPS audio over its audio interface, bit reduces (i.e. compresses) the audio and outputs the bit-reduced audio to the engine over the simplex E2X. The exporter will also accept analog MPS audio over its audio interface and applies pre-programmed delay to it. This audio is broadcast as the backup channel for hybrid configuration. The delay compensates for the digital system latency allowing receivers to blend between the digital and analog program without a shift in time. In the FM system, the delayed analog MPS audio is returned to the synchronizer, which in turn is fed into the STL, and is stereo multiplexed and modulated by the analog exciter at the transmitter site.

## Synchronizer

The synchronizer accepts MPS audio (a.k.a the studio feed) and rate converts it to the proper system clock. It outputs two copies of the MPS audio to the exporter: digital MPS audio and analog MPS audio where the digital MPS audio will be bit-reduced and modulated in the digital portion of the waveform and the analog MPS audio will be modulated in the analog portion of the HD Radio waveform. In many applications, there are two audio processors between the synchronizer and the exporter. Dual input and output audio processors may also be used for independent audio channel processing of the two streams.

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# HD Radio system

The synchronizer provides the master system clock used by the exporter. This master clock is also synchronized to the exciter's clock by use of the GPS unit. The synchronizer derives the master clock from an onboard GPS unit's 10MHz output signal. This clock is used to rate convert the studio audio by use of the onboard rate converter unit via 44.1kHz word clock. The synchronizer is also used to bypass (or redirect) the analog MPS audio from being passed through the exporter in the event the exporter is removed for maintenance.

Like many systems, HD Radio has evolved from its original concept of delivering a single digital channel to become a content rich medium, offering more advanced application services. As this new digital paradigm emerges, the significance of importer/exporter/exciter link efficiency is paramount. ▲

*Detweiler is the director of broadcast technology of Ibiquity Digital.*

## Better Receptor reception

*continued from page 3*

the middle of the band were about equal to the levels measured with the folded dipole, although the response of the antenna is not flat across the band. The lower channels are at least 10dB lower with the active antenna.

NPR Labs found that while the upper channels have a higher signal level, the noise floor is also increased. For example, the WTOP signal is about 20dB higher than it was with the folded dipole, but the 30dB increase in the noise floor actually decreases the WTOP S/N ratio by about 10dB. The S/N ratio for the lower channel stations is even worse. Similar results were found for other active antennas that sell for less than \$70.

NPR Labs has recommended two passive antennas that provide improved reception on the Receptor. They are the C. Crane FM Reflect Antenna, which costs \$24.95, and the Radio Shack BudgetTV Antenna Model 151874, which costs \$9.99.

A result of the NPR Labs test is that Boston Acoustics is now including a dipole antenna with the radio. ▲

*Source: NPR Labs IBOC Field Service Bulletin No. 02.20060216, Feb. 16, 2006*

## Sample and Hold

### Projected profits from HD Radio

As the HD Radio roll-out progresses, many broadcasters and consumers question the business model that makes converting to HD Radio a worthwhile investment. The common argument is that just because it's digital doesn't mean that a station will be able to charge more for advertising.

While this basic idea is true, there are other elements to HD Radio that could bring additional revenue

2008 Revenue Source	Forecast Revenue (\$million)
Multicasting	610.80
Subscription-based model	0.02
Sponsored "Now" station	152.02
Datacasting	42.35
<b>Total HD Radio Revenue</b>	<b>805.19</b>
Total Radio Revenue	22,269.22

to a station. In January, Kagan Research announced its projections for HD Radio station revenue in the year 2008. These figures are based on four additional services that stations could offer.

- Multicasting. The added HD2, HD3 and other program streams can generate revenue in the same way that existing analog streams have through traditional advertising sales.

- Advertising-supported "now" channels. These would also be placed on

- Datacasting. Revenue is expected to come mostly from leasing the space to a third party.

- Fee-based radio. This follows a model like that for satellite radio and other subscription services.

One hypothetical model for a station to allocate its 150kb/s spectrum for the multiple services is as follows: 55kb/s for an HD1 channel, 55kb/s for an HD2 channel, 12kb/s for a "now" channel, 8kb/s for datacasting and 2kb/s for a subscription-based local traffic report channel. This allows an additional 18kb/s for another use or to be reallocated into the example list.

By 2008, Kagan Research forecasts that terrestrial radio broadcasters will earn \$805.2 million (4 percent) of their total revenue from HD Radio. The table shows the projected revenues from these services. ▲

*Source: Kagan Broadcast Investor: Deals and Finance, January 2006*



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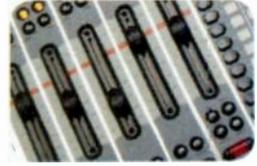
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Minnesota Public Radio

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— Jorge Garza, Chief Engineer  
Univision Radio, McAllen, Texas

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— Rudy Agus, Chief Engineer, Hi-Favor Broadcasting  
Los Angeles, California

"The announcers tell us how much they love working with the Axia consoles... It's great to be able to setup and save multiple configurations that can be recalled at a moment's notice. I don't know why we hadn't gone this route earlier. Where we're installing new equipment, we're onboard with Axia."



— Owen Martin, Director of Engineering,  
Newcap Radio, Alberta, Canada

"The jocks took to the new Axia consoles like fish to water. Show Profiles are their favorite part, because they can all have custom board setups. Since the first studio was installed, we've added a new production and interview studio, and we plan on building three more studios. It'll be all Axia, all the way to the transmitter."



— Marc Johnson, Chief Engineer, WEGL-FM  
Auburn University, Auburn, Alabama



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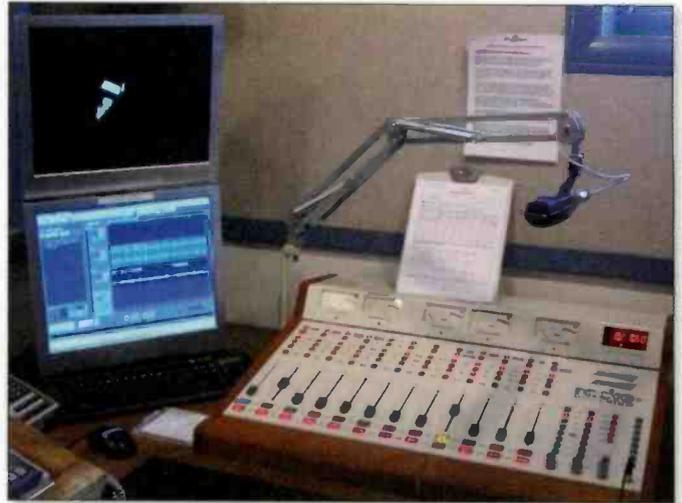
# WAFY: Born in a barn

One of the first things to do was find a place to create a rack room in the barn. We opted to convert the existing conference room into the rack room for several reasons. The first was its size; it was large enough to accommodate the several racks necessary for this project. Second, the room was located next to the original silo that was being used for the WAFY's STL antennas.

The conference room was gutted and two



The grain silo isn't used to store grain anymore, but the natural height of the structure has another practical use for the station.



The interior space wasn't remodeled, but much of the equipment was replaced when Nassau took over the station.

Panasonic Ductless Mini Split ac units were added to the room to provide the cooling needed for the soon-to-be-installed servers and broadcast gear. We installed five Middle Atlantic 40RU 32" deep racks. Three of these were dedicated to server equipment and the other two to broadcast equipment, and each rack had an APC 2200 rackmount UPS installed for power protection and backup.

The next hurdle to overcome was how to run cable to this room. It was difficult due to the timber-frame construction of the building; some beams were as much as 10" thick. We opted to use Radio Systems Studio Hub equipment to interconnect the studios to the

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Dan Houg, *Engineer, KAXE*  
Grand Rapids Minnesota



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# Logitek

Console Router Systems



# WAFY: Born in a barn

rack room. This allowed us to use far less cable to each room and still have plenty of connectivity. We have used Studio Hub in the past with great success and it again worked perfectly for us here. We ran three runs of 50-pair CAT-5e cable to each room, which in turn gave us the ability to connect a Studio Hub 16-channel hub in each room.



The air studio fits a great deal of functionality into a small space.

With the rack room progressing nicely, it allowed the staff to turn some attention to the studios. The facility had been built around an older DOS-based Scott Studios system and the production rooms still were using some circa 1974 Gates consoles. This would no longer meet the needs of the programming department so we began by installing a new Scott Studios SS32 system. This is the standard automation system for Nassau and has always provided us with great reliability and flexibility. The Scott Studios install was a breeze using the Studio Hub version of the audio card break-out box. This allowed us to quickly and easily interconnect audio from the rack room, where the Scott computers were located. We were able to run all the Scott audio channels as well as the Avocent KVM extender cable over the Studio Hub. In addition to the new automation, we also installed new Radio Systems Millennium consoles in the production rooms. The consoles that we chose to use were the R-6 and R-12 with some options and upgrades. We took advantage of the Line Selector module to allow for an eight-channel remote line selector on each console. We have also developed, with significant help from Radio Systems, a new type of phone mix-minus on the Millennium consoles. This option allows an operator to use an offline mix to feed the phone hybrid, which in our case is the Comrex Stac system. The user can simply put the phone channel in cue and send any channel pre-fader to the hybrid by simply pressing the "TEL" bus button on the channel. Once again, we made short work of the studio equipment wiring thanks to the

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# WAFY: Born in a barn

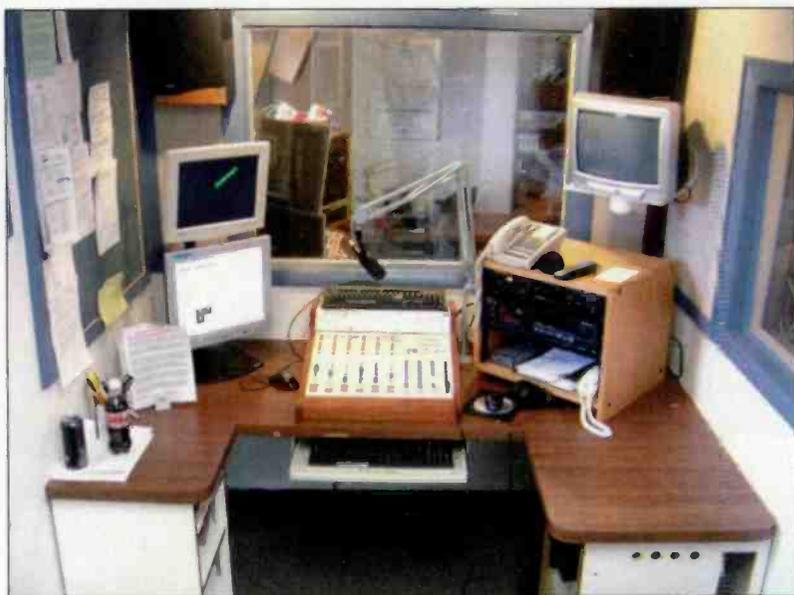
Studio Hub connectors, pre-wire kits and interconnect hubs.

In addition to upgrading the studios, the STL system was also upgraded. With all the digital and IP-enabled devices used at transmitter sites today, Nassau opted to use a Moseley 9003Q four-channel STL with the Moseley Lanlink 900 option. The Lanlink allows for bidirectional IP connectivity over a standard one-way STL link. It allowed us to use IP-enabled equipment from Bird and Burk at the transmitter site without the expense and headaches of trying to get DSL or a cable modem on top of a mountain.

With the studios and STL taking shape, Nassau's IT team began to focus on the office network and company WAN to Frederick, MD. This facility was going to be an IT hub for Hagerstown, MD, and Reading so they began by ordering multiple T1s for the location. The



The Frederick facility also serves as the Nassau IT hub for this station and the Reading, PA, station.



The furniture was not part of the facility upgrade this time around. While it shows signs of use, it is still structurally sound.

T1 lines would be bonded together to allow for the bandwidth needed. This facility holds the Visual Traffic and Exchange servers for the entire Nassau Maryland/Pennsylvania region so another major concern was redundancy in connectivity and power. The IT engineers for Nassau use Dell and Cisco products and Frederick was no exception. Cisco 1760 modular router and Cisco 515UL PIX firewalls were used for the connectivity infrastructure. Dell servers and Dell Gigabit switches were used to provide the entire back office network. This setup allows Nassau maximum network security, as well as maximum flexibility within the ever-changing company.

In addition to all the studio and network construction, the building was also being repainted and recarpeted. If that was not enough, a new roof was attached, the entire sales area was gutted and new modular furniture was installed. Once the sales office was completed, all new Dell workstation computers were installed for each sales person. Each sales person also has access to Dell color and Dell black and white printers.

The entire project was completed over the course of about six months. In that time the entire facility needed to continue broadcasting so that the listeners and clients would have no idea of the chaos. The entire project was managed by Nassau Broadcasting's

Director of Engineering for Maryland Mick Rapeer, with the assistance of Senior VP of Engineering and Technology Tony Gervasi. Also involved with the project were myself, Director of Information Technology Jeff Horvath and Maryland Staff Engineer Bill McCarrey.

Since the completion of this facility the staff has truly come to enjoy it. The radio and IT infrastructures that were provided have helped everyone to better do their jobs and have helped WAFY become the number one station in the market in all of its key demographics.

*Smith is director of broadcast systems, Nassau Broadcasting, Princeton, NJ.*

## Equipment list

- APC 2200 rackmount UPS
- Avocent KVM extender
- Burk ARC-16
- Comrex Stac
- Middle Atlantic 40RU 32" deep racks
- Moseley 9003Q
- Moseley Lanlink 900
- Radio Systems Millenium consoles, R-6 and R-12
- Radio Systems Studio Hub BOB
- Radio Systems Studio Hub
- Scot: Studios SS32

# Facility Focus

## the technology behind WAFY

### Radio Systems Studio Hub+

StudioHub+, the complete CAT-5 facility wiring solution from Radio Systems, is the wiring backbone chosen by Nassau in Frederick, MD. 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 system also uses DC-Link, a remote power system that is carried on extra CAT-5 pairs 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 or GPI signals, StudioHub+ is your time saving HD radio ready, innovative wiring solution.



[www.studiohub.com](http://www.studiohub.com)  
856-467-8000

### Comrex STAC

The Comrex Studio Telephone Access Center (STAC) puts you in control of your talk shows, call-ins and phoners with great sound, ease of operation and scalable configuration.



It incorporates a pair of high-performance digital hybrids with automatic audio level control.

A single control surface is included for basic operation, but up to four control surfaces may be used. Call screening and control are available from any networked computer using a standard Web browser. An Auto Attendant automatically answers incoming callers with a custom message and puts them on hold. The STAC6 is configured for six lines and can be expanded in the field to a STAC12 for 12 phone lines. The STAC also received a *Radio* magazine Pick Hit award in 2004.

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

### Radio Systems B.O.B.



Radio Systems and AudioScience have partnered to create the new StudioHub+ B.O.B. break-out-box for the ASI6000, 5000 and 4000 series multi-channel PCI audio cards. Cables are included to allow the use of the B.O.B. with the cards analog or digital inputs and outputs. The rack mount units allow users convenient and dependable access to all channels of sound card analog and digital I/O, as well as clocking and sync signals. One multi-pin connector connects the B.O.B. to the audio card. A single B.O.B. can be used for access to all the sound card digital I/O or as many as eight analog channels.

[www.radiosystems.com](http://www.radiosystems.com)  
856-467-8000

### Radio Systems Millenium Digital



Based on the original Millenium console, Millenium Digital consoles are a recent addition to the popular Radio Systems line. The Millenium Digital is available in 6-, 12- and 18-channel configurations. More than 1,500 Millenium consoles are in use at small and large broadcast facilities throughout the U.S., New Zealand and Africa. All previous Radio Systems RS and Millenium series consoles are fully upgradeable to Millenium Digital functionality, which provides analog or digital inputs on every channel with 32-bit resolution and sample-rate conversion. All outputs are available in analog or AES/EBU digital format. Additional features include 10 extra auxiliary output buses, up to 10 fully programmable mix-minus outputs and a serial RS-232 interface. At NAB2006, Radio Systems announced a partnership with Axia to include Axia Livewire connectivity for the Millenium line.

[www.radiosystems.com](http://www.radiosystems.com)  
856-467-8000



## Day Sequerra M2.0

By Doug Irwin

Perhaps I'm just an old dog, but while learning the new tricks of HD Radio the one thing that always seems to be missing is a high quality instrument for listening to the demodulated digital signal. We've been forced to make use of the currently available HD Radio receivers, and although they're OK to listen to, I never really expected the greatest sound out of an inexpensive consumer-grade radio. Adding HD2 just made the situation more complicated.

updates via flash programming memory.

The most striking visual feature of the unit itself is the blue LED bar graph used to display the demodulated HD levels. It's unlike anything I've seen before, and it's a cool feature to go along with new broadcast technology. The unit also includes a vacuum-fluorescent display that provides tuner status, frequency and all the HD Program Specific Data (PSD) information—station name, title, artist, album, genre, program type and comments—for the HD Radio MPS and SPS.

The digital audio output is derived using a low-jitter D/A



### Performance at a glance

- Synthesized, push-button tuning
- High-level or antenna-level RF inputs
- Balanced, line level outputs (Phoenix connectors)
- HD Radio to analog time-alignment monitor
- Transformer-isolated S/PDIF digital output
- Bright LED bar graph metering

When I was offered the opportunity to look at the Day Sequerra M2.0 modulation monitor I eagerly took it.

The mod monitor is a 2RU, full-featured receiver that provides LED bar graph metering for analog, HD Radio and multicast modulation. The unit includes balanced, line level outputs, a S/PDIF digital out and a front-panel headphone jack. These are all features that those of us who grew up with analog radio became accustomed to (and I kind of felt lost without).

The unit is designed and constructed in a way that will keep it from becoming obsolete any time soon: the receiver, the audio section, the CPU and even the power supply are modular. The firmware

converter with an inherent THD of less than 0.005 percent. The channel separation for the demodulated digital output is rated at greater than 90dB.

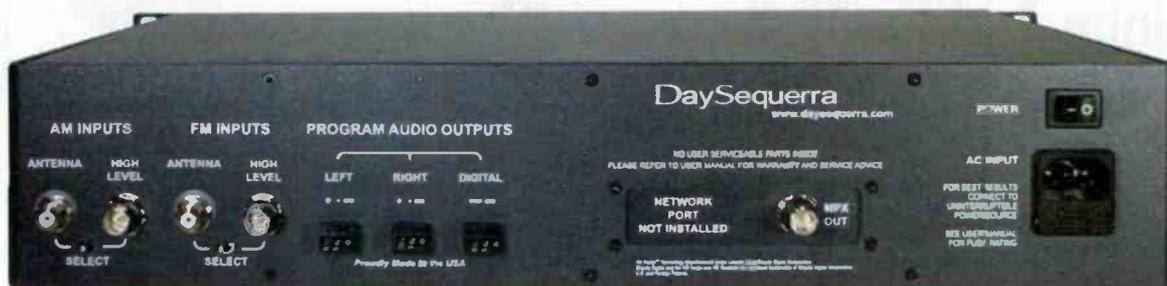
### Flexible design

A couple of options are available for the M2.0. Option M2.1 adds measurement capability in the analog domain: 19kHz pilot, 38kHz, as well as 57kHz, 67kHz and 92kHz subcarriers. There is a front-panel metering position for synchronous AM noise, along with a rear panel composite output for driving subcarrier decoders.

Option M2.2 includes the Day Sequerra Remote Dashboard software, a proprietary PC-based application, and an Ethernet interface to provide remote control monitoring for AM and FM HD Radio broadcasts and an alarm panel for HD Radio signal and data attributes.

Another option for the system is the Performance Loss Module, which has several interesting and useful features. It will generate alarms (that can be assigned to dry-contact relay closures available on rear-panel connectors) that correspond to loss of common HD Radio attributes such as MPS audio, multicast audio, analog audio, RF signal strength and loss of OFDM lock.

The unit is exceptionally easy to install and use because it's much like any other modulation meter you've seen or used. Place it in a rack, connect an antenna to it (75Ω input, type F connector) and it's ready to play. Select the desired band, then use the up and down buttons to tune up and down the dial. Once a station is tuned, the unit decodes the analog audio and displays it on the lower



LED bar graph set. If the station broadcasts in HD Radio, two things quickly happen. If a multicast is present the front panel blue LED "multicast" LED illuminates. Shortly after that, another small blue LED indicator showing "HD Locked" will illuminate, and the demodulated audio will quickly fade from the analog to the HD1. In the presence

of the multicast, press the "mode/service" button, which will switch the audio output to the HD2 stream immediately. If there is an HD3 signal, simply pressing the "up" button will cause the receiver to switch the audio output over to that. Press "down" to go back to HD2, and mode/service to go back to HD1.

Toggling the "data-display" button allows you to read all the fields that are available for PSD. This is obviously a quick way to check that your data is correct and is displaying what you want.

The best thing about the M2.0 though, is the way it sounds. Now you can really hear just how good your HDRadio audio can sound after all—you'll be pleasantly surprised. In fact you may be shocked. Being able to go back and forth easily between different HD Radio streams is educational in terms of processing—nice if you happen to be using two different processors, too. And being able to quickly study your competition's HD Radio audio—now that's what radio engineering is all about.

*Irwin is director of engineering at Clear Channel, Seattle.*

## Day Sequerra

P	856-719-9900
F	856-719-9903
W	www.daysequerra.com
E	info@daysequerra.com

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

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

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

### Product Showcase



#### Model DAI-2 Dialup Audio Interface

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- momentary and/or maintained relay outputs
- four logic inputs with programmable output
- balanced audio input and output with ALC

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## Adobe Audition 2.0

By Justin Kaiser, SBSC

I have been a user of Adobe Audition, and its predecessor, Cool Edit, since 1998 and am excited about the recent release of Audition 2.0. After hearing about the soon-to-be-released upgrade for several months, I made the decision to transition my studio in early February. Since then, it has been

software you should not have a problem with Adobe Audition 2.0. Some of the minimum requirements for installation include an Intel Pentium III, 4 or Centrino, 512MB of Ram (1GB recommended), 700MB of available hard-disk space, and a sound card with Directsound or ASIO drivers.

The computer I initially installed this upgrade on is a 2.4GHz Celeron with 512MB of Ram, and one of the first things I noticed was how slow the program loaded, saved and applied effects. Personally, I wouldn't recommend editing audio on the Celeron platform. I have since migrated to a Dual Core 3GHz system with 2GB of Ram and the performance has certainly improved. This version uses the processing power, so the heftier processor is a preferred choice.

Adobe provides documentation in a hard copy manual that is informative with examples that are explained in careful detail, along with tutorials to help you replicate the lessons in the real world. As with most Adobe products, I've found the Audition 2.0 documentation fairly complete, although not as thoughtfully laid out as I had hoped. Generally, the basic instructions appear in one part of the book while specific use of that function is detailed in another part of the book. In addition, there are video tutorials that are nicely recorded and offer a great value to any sonic sculptor.

### Get to work

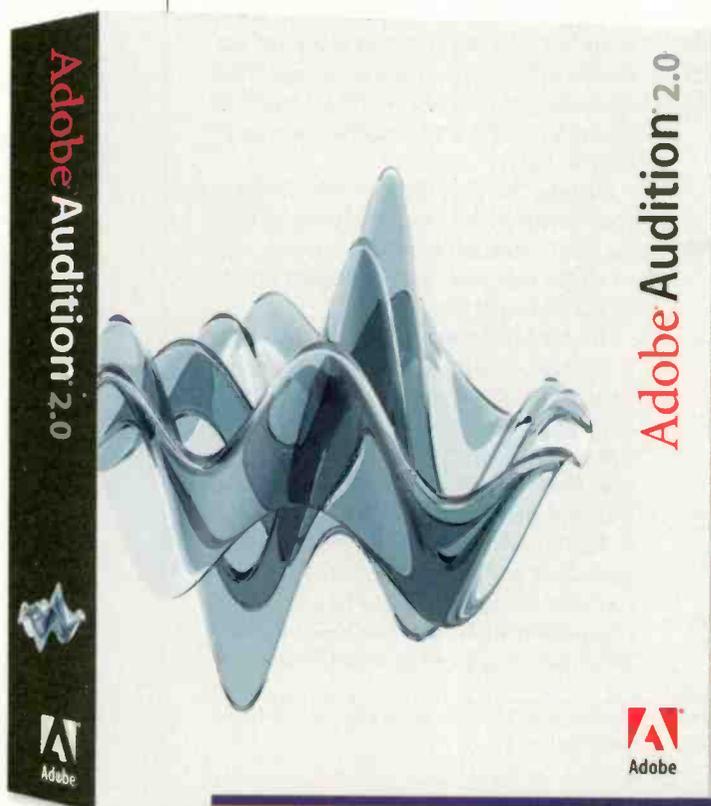
The first project that I mixed in Adobe Audition 2.0 was a local car dealer commercial. I found the learning curve fairly easy in that the majority of the general functions that I am used to are the same. As with previous versions, I can layer, envelope, adjust volume and export (formerly mix-down) the files I have created.

After using this product version for several more days, however, my feelings about this product transitioned from thinking that the majority of changes were visually cosmetic to realizing that it had undergone a ground-up re-build offering new functionality in many areas.

Once you get under the hood there is a lot more than meets the eye. For instance, one of my favorite additions is the multi-band compressor. This function

has brought a new level of professional processing to my production, which translates to new potential dollars. For the car dealer spot that I was producing, it helped me zero in on the voice-over and give it the extra punch that was needed in an already intense mix.

Even though I have had to relearn some of the functions I



### Performance at a glance

- Unlimited tracks
- ASIO support
- Audible scrubbing
- Analog-modeled multi-band compressor
- Recordable parameter automation
- Spectral frequency display tools

an interesting learning experience full of ups and downs.

Installation was simple and intuitive. If you have installed any Windows-based



The main edit window displays tracks and waveforms in a time-aligned grid.

twin monitor setup that brings Adobe Audition 2.0 to a level of luxury that must be seen to be heard. The feared and more expensive takeover by Adobe has come and gone and with it Adobe Audition 2.0 has arrived and is changing the way I listen and produce.

*Kaiser is director of operations/engineering at WGFA-AM/FM in Watseka, IL.*

had grown familiar with, such as the absence of an "obvious" mix-down facility and preferences that are now in the edit menu such as audio hardware setup and keyboard shortcuts, the learning curve was not nearly as deep as it could have been had I moved to an entirely different editing platform. In addition, mix-down functions are easy to accomplish. I have renewed inspiration to create better vocals and hotter mixes for radio and TV.

Even though I will need to upgrade my processor and add Ram to realize the full-functionality of Audition 2.0, I have become an instant fan of this product release. The view menu allows users to easily choose the standard editing window and a maximum performance editing palette spanning twin monitors with the multi-track window on the left, and channel strips, VU and effects list on the right. I feel as if I am part of a much larger facility.

I am pleased with the enhanced multi-track capabilities along with channel strips that beg the user to experiment with sound, plus a configurable master effect rack and

## Adobe Systems

**P** 408-536-6000  
**F** 408-537-6000  
**W** www.adobe.com

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- Windows 2000, XP and Linux drivers



# New Products

By Kari Taylor, senior associate editor

www.beradio.com

## Headset mic AKG

**HSC171, HSD 171, HSC 271, HSD 271:**

The HSC models combine a shock-mounted condenser mic with the K 271 circumaural or the K 171 supra-aural headphones. The HSD models include a shock-mounted dynamic mic with the same headphones. All models incorporate a swiveling mic that allows it to be placed on the left or right without modifying the headset. Intelligent muting on the 271 models automatically silences the microphone when the arm is moved up. Each model features a field-replaceable cable with mini-XLR connector, self-adjusting headbands, shock-mounted microphone capsules to minimize handling noise, closed-back earphones, velour earpads and microphone windscreen.

615-620-3800; fax 615-620-3875  
www.akgusa.com; akgusa@harman.com

## Digital on-air console Otari

**DB-32:** This console provides 24 channel faders and all the channels offer an A/B input switching function. Any of the following inputs can be assigned to A and B: eight microphone inputs, 12 stereo and four mono analog line inputs and 12 AES/EBU digital inputs. The Channel Control Unit (eight channel strips) supports hot-swapping, enabling the exchange of the units even while on the air. All of the digital inputs and outputs have sample rate converters as standard. Signal processing in the console is done at 48kHz.

800-877-0577; fax 615-255-9070  
www.otari.com; sales@otari.com

## Mixer Sonosax

**SX42:** This four-channel stereo mixer is now available with two digital modules to output four tracks on two AES/EBU lines or two S/PDIF or two optical Toslink outputs.

+41 21 651 0101; fax +41 21 651 0109  
www.sonosax.com; sonosax@sonosax.ch

## Acoustic absorbers Media Specialty Resources

**Isopanel, Rollapanel:**

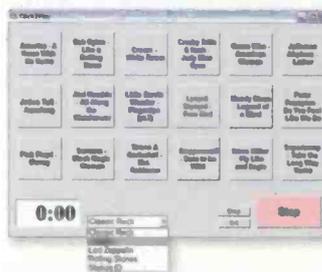
Available in several sizes, Isopanel absorbers provide sound isolation in a moveable partition. The acoustic absorbers are available in six stock fabrics with an additional 42 fabrics available at an additional cost. Also available in a variety of sizes, the Rollapanel absorbers are equipped with wheels and bases. They are useful for lowering reverberation time in multi-purpose display areas and performance spaces where permanent acoustic treatments are impractical.

800-497-2087; fax 415-454-2171

www.msr-inc.com; info@msr-inc.com



## Sound file player Fifty Thousand Watt Software



**Click2play:** This audio file playback software emulates a cart wall by displaying audio files in an on-screen button layout. The software operates in one of three playback modes.

In Single Play mode, a single can play at any

one time. In Interrupt mode, a button click can stop the currently playing sound and start a new sound. In Queue Multiple mode, multiple soundfiles can be queued for playback. The program remembers the order in which the soundfile buttons were clicked, and starts the playback of the next sound immediately following the previous sound. The software can extract song titles and artists from the soundfile names and send them to a Simplecast encoder. As many as 140 files per screen can be displayed.

763-390-4046; www.50kws.com; sales@50kws.com

## Wireless mic antenna combiner Sennheiser Electronic



**AC3000:** This wireless mic antenna combiner uses active circuitry to allow eight transmitters to be connected to one antenna. Occupying 1RU, the unit operates across the UHF range from 470MHz to 870MHz. Combining multiple RF monitoring systems through a single broadband device reduces intermodulation between transmitters and reduces cabling needs.

860-434-9190; fax 860-434-1759

www.sennheiserusa.com; lit@sennheiserusa.com

### Announcer's console Studio Technologies

**Model 212:** Adding to the features of the Model 210, the Model 212 features a frequency response from 20Hz to 18kHz from mic in to main out, 0.025 percent THD+N, a S/N ratio of 71dB and a common mode rejection ratio of 68dB at 60Hz. It features an XLR mic input, AES3-ID I/O and a 1/4" TRS headphone jack. The console is powered by 24Vdc through a coaxial powerjack. The A/D-D/A converters are 24-bit with a 100dB dynamic range. Its internal sampling rate is 48kHz and its external sampling rate is 32kHz to 96kHz.

847-676-9177; fax 847-982-0747

[www.studio-tech.com](http://www.studio-tech.com); [stisales@studio-tech.com](mailto:stisales@studio-tech.com)

### Power conditioners Furman Sound

**P-8, PL-8 Pro Series II:** These units offer ac line noise filtering and protection in a 1RU package. The P-8 is a 20A power conditioner that includes Series Multi-Stage Protection Plus filtration and protection circuitry. The PL-8 adds Furman's pull-out light tubes with long-lasting LED lamps for front rack illumination.

707-763-1010; fax 707-763-1310

[www.furmansound.com](http://www.furmansound.com); [info@furmansound.com](mailto:info@furmansound.com)

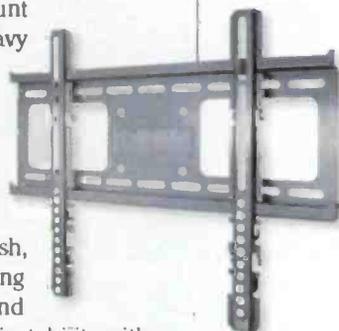


### Monitor mounts Promounts

**UF-Pro, UA-Pro 100:** This mount allows vertical and horizontal adjustment of a monitor after installation, and fits more than 95 percent of current flat plasma and LCD screens made today, including most 37" to 60" screens. The mount is manufactured from heavy gauge steel construction that supports as much as 175lbs. The UA-Pro 100 mount, for 10" to 22" LCD screens weighing up to 30lbs., offers a fully polished chrome finish, full wire management along with full flat, tilt, pivot and landscape and portrait adjustability, with a single touch. All necessary hardware is included for different wall types. Mounting hardware and theft-resistant security fasteners are included.

310-645-6400; fax 310-868-2751

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## New Products

### Active studio monitor Tannoy

**Precision D:** Precision D active models offer calibrated EQ for mid/near/close field-work in full/half/quarter and eighth space environments, mid-band and high frequency trim shelving controls, a choice of power and cabinet sizes, and analog and digital input trim facilities. Additional features include a 40mm thick contoured baffle with brushed aluminum inlay, a Dual Concentric constant directivity drive unit, a supertweeter that takes the monitor bandwidth performance to 51kHz, a S/PDIF 96kHz input with slave output to second speaker and a balanced XLR/jack combination input connector.

519-745-1158; [www.tannoy.com](http://www.tannoy.com); [inquiries@tannoy.com](mailto:inquiries@tannoy.com)



### Turnkey transmission service Propagation Systems

**Tower services:** PSI accepts responsibility for all aspects of the RF transmission plant including the commissioning of the transmitter and providing a proof of performance to the customer on completion. PSI provides multiplexers, diplexers, filters and multi-station antennas, as well as rigid and flexible transmission line.

814-472-5540; fax 814-472-5676

[www.psbroadcast.com](http://www.psbroadcast.com); [psiba@surfshop.net](mailto:psiba@surfshop.net)

### Monitoring unit RFS Broadcast

**RF system monitor:** This RF system monitor incorporates 50 configurable inputs, handles as many as 16 transmitters and offers an antenna system with four main feeders. Its primary use is for monitoring forward and reflected transmitter power, and for mimic display of U-link/motorized switch configurations. It can also analyze and store a range of collected data for as long as three years. The system measures peak or true root mean square power of complex waveforms and can compensate for the effects of temperature variations, and independently evaluate non-linear multi-channel systems.

877-737 9675; fax 203-821-3852

[www.rfsworld.com](http://www.rfsworld.com); [literature.americas@rfsworld.com](mailto:literature.americas@rfsworld.com)

### Stereo utility mixer Broadcast Tools



**Sum-4:** The mixer provides four line-level high impedance inputs, which accept a balanced or unbalanced source; stereo and monaural

balanced low-impedance outputs; individual front-panel level controls; stereo mic/link port for input expansion and removable screw terminal connectors.

360-854-9559; fax 360-854-9479

[www.broadcasttools.com](http://www.broadcasttools.com); [btu@broadcasttools.com](mailto:btu@broadcasttools.com)

## Mic mute Proco Sound

**Panic Button:** This mic switch diverts a mic's signal from output A to output B. The unit is useful for remote applications for a talent mic to momentarily feed a cue line. Phantom power from output A feeds the mic at all times, so there is no audible pop in the audio. The unit can also be used as a cough switch for output A, although the cough will be heard on output B.

800-253-7360; fax 269-388-9681  
www.procosound.com; b-evans@procosound.com

## Embedded Interface Statmon Technologies



**ECU-86:** This embedded remote control system combines 10/100baseT network connectivity with a capability of any combination of 192 total channels and connections. It includes two USB ports and one external serial device connection. The unit permits connection via WAN, LAN, Internet, Bluetooth and Wi-fi.

310-440-8053; fax 310-278-6585  
www.statmon.com; info@statmon.com

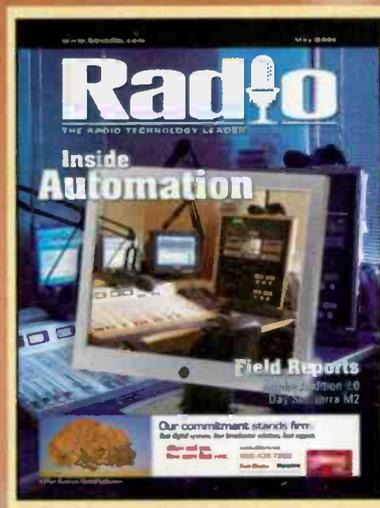
## Upgrades and Updates

**Burk Technology** is now shipping the Autopilot 3 broadcast facility control software for the Arc-16. A fully functional demo is available at the Burk website. (www.burk.com)...**Day Sequerra** has introduced a Performance Loss Module providing alarm capabilities as an option for its M2.0 and M4.0 HD Radio modulation monitors. The module generates alarms when real program silence is detected in HD Radio or analog broadcasts. (www.daysequerra.com)...**Ibiquity Digital** has certified the **Audemat-Aztec Navigator HD** mobile FM and HD Radio field strength meter. The Navigator HD can decode SPS, SIS, PSD and measure level, time and phase alignment between the analog and the digital signals. (www.audemat-aztec.com)...**Orban** has shipped the first Optimod-AM 9400 audio processors. This processor features two processing chains: one for AM analog broadcasting and one for netcasting/digital radio broadcasting. (www.orban.com)...**Axia** has been busy signing agreements with several manufacturers to include Livewire connectivity in their products. The manufacturers include Radio Systems, Netia, Broadcast Electronics, D.A.V.I.D. and IDC. (www.axiaaudio.com) ■

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

## Mixer and audio interface Alesis

**Multimix Firewire:** This series includes eight-, 12- and 16-channel analog stand-alone mixers with an integrated 24-bit Firewire interface. Each input channel on the mixer is sent into the computer while a stereo output is received from the computer for monitoring. Other features are eight high-gain mic/line (XLR and 1/4" balanced) inputs with phantom power, two stereo balanced 1/4" line inputs, aux send and stereo aux return. The mixers offer three-band EQ per channel and 24-bit, 44.1/48kHz operation with A/D-D/A conversion.

800-5-ALESIS; fax 310-255-3401; www.alesis.com; info@alesis.com

## CD/DVD duplicators Octave Systems

### Copy Master II, Copy Master II Pro 10:

The 11-drive Copy Master II provides one-to-11, one-to-9, one-to-seven, one-to-five, one-to-three and one-to-one duplication. It can burn 16x on DVD+R, DVD-R formats and CDs 48x. It duplicates standard 120mm CDs and DVDs and business-card shaped discs and mini CD/DVD formats.

The 10-drive Date Safe Copy Master II Pro 10 features stand-alone operation and a front-bay 160 hard drive that can be removed and moved to a secure location. The Pro 10 provides one-to-10, one-to-eight, one-to-six and one-to-four duplication and can duplicate DVDs 16x, 8.5GB Dual Layered DVDs up to 4x and CDs up to 48x.

408-866-8424; fax 408-866-4252; www.octave.com; info@octave.com



## Stereo audio editor Audion Laboratories



**Voxpro 4.0:** This latest version includes a 100x zoom that allows quick exact editing and markers to mark while recording or playing back. Voxpro shows a floating window with timeline position and marker titles.

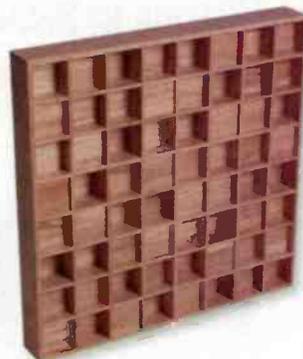
Right clicking a title allows note editing and auto play from the marker, and automatic gain control and a peak program VU meter with a 72dB range. The workstations connected to a station's LAN automatically detect each other and stay connected, allowing users to access their password-protected accounts from any Voxpro workstation. The unit can import and edit all formats including MP3. Record the host in one channel, the caller in another and play back in stereo or mono.

206-842-5202; fax 206-842-6029; www.audionlabs.com

## Diffusor Auralex Acoustics

**Space Array:** The diffusor combines hemispherical acoustical diffusion with a wood finish. Based on a quasi-random series, the 24" x 24" panels are useful for control rooms, auditoriums, performance venues, listening rooms, home theaters and worship spaces.

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## Find the mic winner

### March issue

Congratulations to

### Scott Todd

of WWTC-AM in Eagan, MN.

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The FlexPhones Master is equipped with inputs for stereo program and talkback audio. Rear panel program and talkback trimmers are provided to pre-set maximum input levels. The microphone/line level talkback input is available via a rear panel plug-in euroblock connector, while the front panel XLR connector facilitates the use of a user-provided gooseneck microphone or headset. The front panel is equipped with a level control for local headphones with both 1/4" and 1/8" stereo headphone jacks. The six front panel talkback switches allow the user to independently communicate with each AHR-1 listener and can be configured to insert talkback audio into only the left or both ears and dim either or both program channels. Any combination of switches may be pressed, while the "All-Call" interrupts all listeners. The Talkback function can be remotely controlled. Six RJ45 jacks are provided to distribute audio and power via CAT5 cable to the AHR-1's, which conform to the Studio Hub format. Low-Z balanced audio distribution is used to preclude audio degradation with long cable runs.

## AHR-1 Active Headphone Remote

The Active Headphone Remote (AHR-1) contains a stereo amplifier designed to work with any combination of high-efficiency headphones with impedances between 24 and 600 ohms. The AHR-1 is equipped with 1/8" and 1/4" headphone jacks, level control, user-configured utility momentary pushbutton and LED indicator. Two rear panel RJ45 jacks are provided for connection via CAT5 cable to the FlexPhones Master. The AHR-1 may be desktop mounted, under counter or with the optional HR-1/MP or HR-1/MP-XLR mounting plates, which may be turret or counter-top mounted.



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10 KW	2001	Henry 10,000D-95
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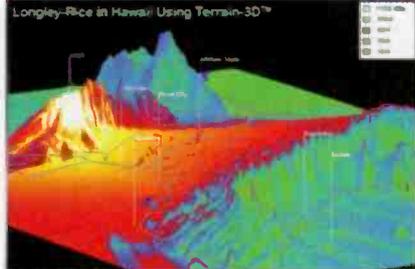


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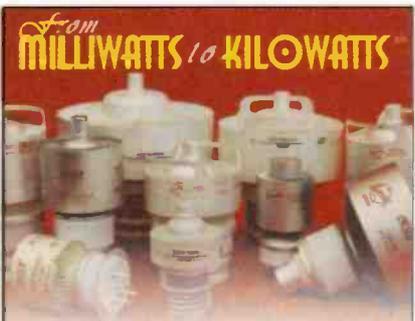


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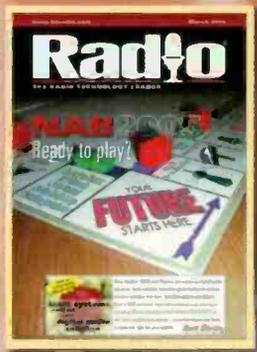


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## Contributor Pro-file

Meet the professionals who write  
for Radio magazine.

This month: Trends In Technology, page 22.



**Jeff Smith,**  
**CEA CBNT**  
**Director of**  
**Broadcast Systems**  
**Nassau Broadcast-**  
**ing Partners**  
**Princeton, NJ**

Smith began in radio as an engineer in 1991 when hard drive automation systems were still in their infancy. He began to specialize in studio facilities in the mid-1990s and became a regional engineering manager for Metro Networks. He joined Nassau Broadcasting Partners in January 1998. While with Nassau, Smith has been instrumental in the deployment of automation and studio systems at more than 54 radio stations. Smith serves on the SBE's Membership and Strategic Planning Committees.



**Written by radio professionals**  
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Klotz Digital Audio Systems	11	678-966-9900	www.klotzdigital.com
LBA Technology	57	800-522-4464	www.lbagroup.com
Logitek	41	800-231-5870	www.logitekaudio.com
MBC Consulting	60	800-219-7461	www.MBCRadio.org
Mediatouch	26	888-665-0501	www.omt.net
Mouser Electronics	56	800-346-6873	www.mouser.com
Nautel Electronics	19	902-823-2233	www.nautel.com
Omnirax	58	415-332-3392	www.omnirax.com
Propagation Systems	43	814-472-5540	www.psbroadcast.com
Radio Systems	25, 45	856-467-8000	www.radiosystems.com
RAM Broadcast Systems	40	847-487-7575	www.ramsyscom.com
Ramsey Electronics	59	800-446-2295	www.ramseyelectronics.com
Rangemaster	60	919-367-0607	www.am1000rangemaster.com
RF Parts	57	800-737-2787	www.rfparts.com
SCMS, Inc	42	800-438-6040	www.scmsinc.com
Sencore	24	800-736-2673	www.sencore.com
Sennheiser Electronics	27, 37	860-434-9190	www.sennheiserusa.com
Sine Systems	47	615-228-3500	www.sinesystems.com
Teac America	37	323-727-7617	www.tascam.com
Telos Systems	7, 17, 39	216-241-7225	www.telos-systems.com
TieLine Technology	5	888-211-6989	www.tieline.com
Transcom Corp.	56	800-441-8454	www.framatv.com
V-Soft Communications	57	800-743-3684	www.v-soft.com
Wheatstone	2, 63, 64	252-638-7000	www.wheatstone.com

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This index is a service to readers. Every effort is made to ensure accuracy, but Radio magazine cannot assume responsibility for errors or omissions.

# Sign Off

By Kari Taylor, senior associate editor



www.beradio.com

## Do you remember?



About eighteen years ago, the Orban 787A programmable mic processor was making its way into radio stations. The processor optimized the sound of a mic and could quickly recall the setups. The

787A featured a three-band parametric equalizer with a "constant Q" design and full notch filtering. The noise gate attenuated control room noise by as much as 25dB and a compressor gate prevented noise rush-ups during pauses. A de-esser controlled excessive sibilance. The processor offered 32 memory registers that stored control parameters for recall. An effects send and return with programmable return gain simplified integration of external reverb or other processors. Built-in connectors offered remote control, midi and future serial interfaces. An optional second-channel slave was available for dual-mono or stereo operation.

## Sample and Hold A Bigger Browser Share



Firefox reached 10 percent market penetration in March 2006

Microsoft Internet Explorer 6.0	82.39%
Firefox 1.5	5.92%
Firefox 1.0	3.98%
Safari 41	1.94%
Microsoft Internet Explorer 5.0	1.13%
Safari 31	1.01%
Microsoft Internet Explorer 5.5	0.88%
Netscape 7.0	0.65%
Other	2.90%

Total is more than 100 percent because of rounding errors. Other includes other versions of the listed browsers as well as Netscape, Mozilla, Opera and others.

Source: Net Applications' Browser Version Market Share for March, 2006.

## That was then



The September 1969 cover of *Broadcast Engineering* magazine depicted Radio Free Europe's (RFE) master control room, which channeled the many program inputs for transmission to countries behind the Iron Curtain. Radio Free Europe was known to most Americans as a big radio station that broadcasted to eastern Europe. It grew much like many U.S. broadcasting organizations.

In 1965, the organization built a new master control system at a low cost of \$12,000. The new system all but eliminated jack fields, which was a significant step at the time. The only jack field left was for metering all transmitter feed lines.

Four years later, RFE had grown from a single 7.5kW transmitter in a truck to a 32-transmitter system broadcasting from three sites with a total power of 2.245MW. All the systems were linked and fed from the main operations center in Munich, Germany. A separate audio feed in five languages was sent to select transmitters from Munich, making it necessary to control five separate programs in the studios at one time. The master control system provided centralized audio and switching control.

This Little Unit



# Can Do BIG Things!

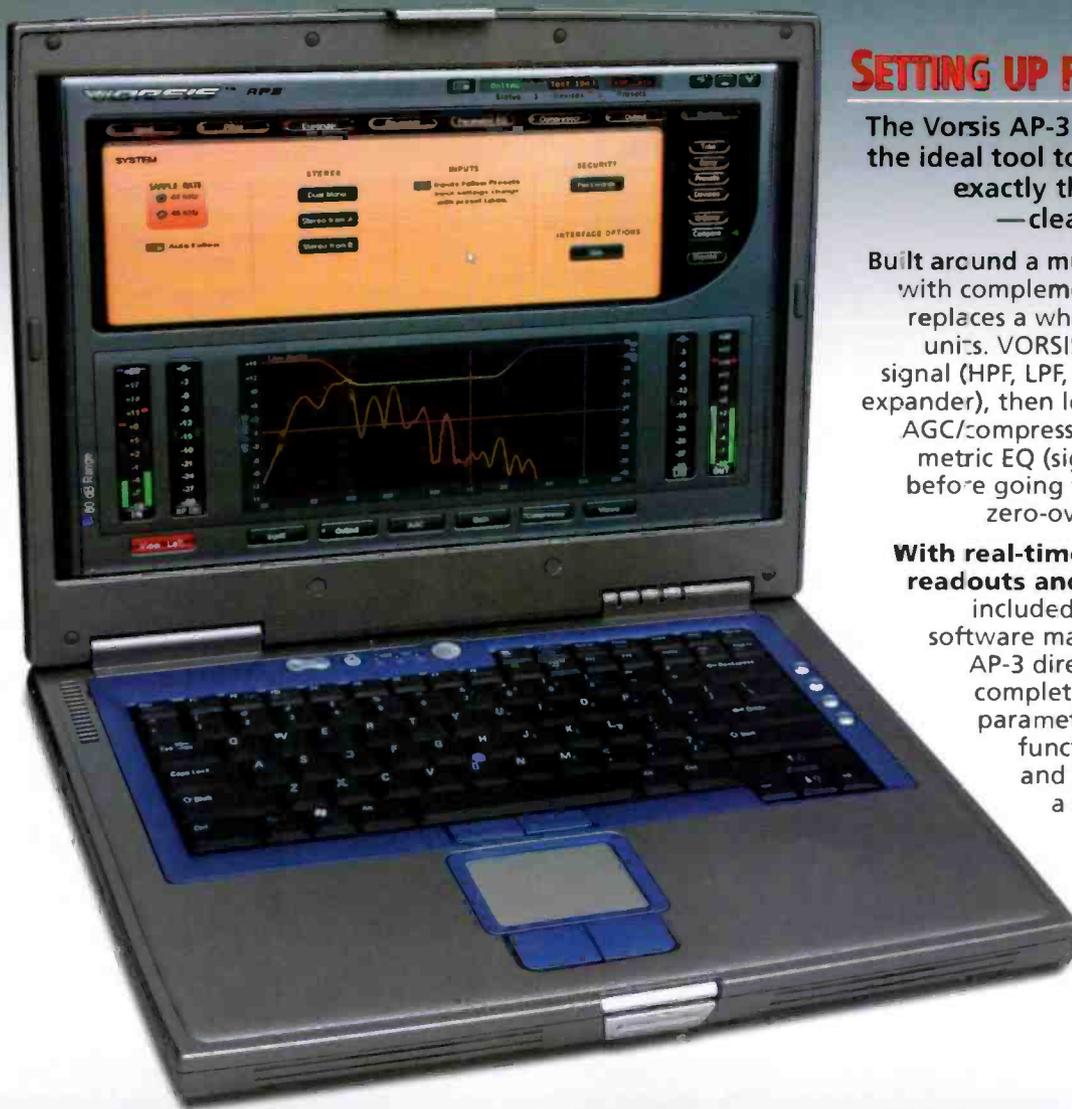
Our new AP-3 is the perfect HD Processor.

## SETTING UP FOR HD RADIO?

The VORSIS AP-3 digital processor is the ideal tool to shape your sound exactly the way you want it—cleanly and efficiently.

Built around a multi-band compressor with complementary AGC, the AP-3 replaces a whole rack of dedicated units. VORSIS pre-conditions your signal (HPF, LPF, notch filter, de-esser, expander), then let's you apply 3-band AGC/compression and 4-band parametric EQ (signal chain reversible) before going through a final stage zero-overshoot peak limiter.

With real-time spectrum density readouts and full metering, our included PC graphic interface software makes operation of the AP-3 direct and easy, offering complete control of all audio parameters, presets, monitor functions, system settings and security—all through a single RJ-45 ethernet connection that lets you control one or many AP-3 units.



**TAILOR THAT SOUND**

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NET-8 DIGITAL AUDIO NETWORK

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