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May 2008
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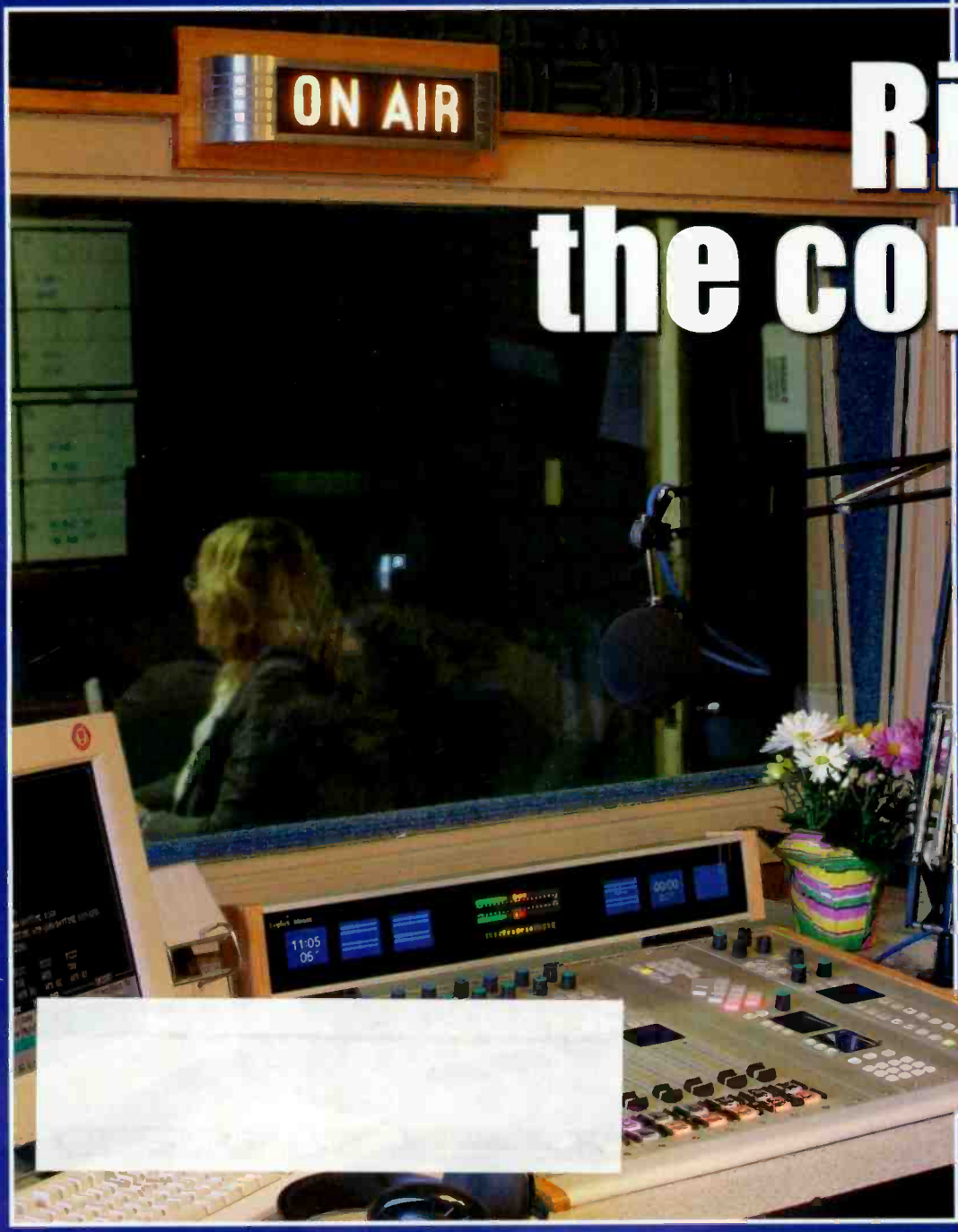

Rise of the console

New tech at the heart of the facility

RF ENGINEERING
Taming wild monitor points

FIELD REPORTS
Axia Element and Livewire, Olympus LS-10

A Penton Media Publication

Wheatstone

The Evolution Series

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Each has a powerful ½ watt stereo headphone amplifier that will cut through any crowd noise. **BluePack** and **RemoteAmp Blue** also pair to Bluetooth-equipped sound cards and music players in full-bandwidth stereo A2DP mode.

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ON THE COVER

Digital Consoles are the way of the future. Though it can be troublesome, worrisome or just a little scary to upgrade and throw out the trusty analog, the time has come. Check out the story on page 22.
Photo by Elaine Jones
Cover design by Michael J. Knust.

Wireless Broadband Internet Remotes

"The first time out with the Tieline was a brilliantly simple experience for everyone involved. For lack of a better phrase, the codec just worked."

- **Christian Vang**
  Chief Engineer
  Clear Channel St. Louis

"The codecs sounded great. My management was very, very impressed with the demos"

- **Grady Jeffreys,**
  Technical Manager,
  Mackay Communications

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- **Mike Rabey**
  Chief Engineer
  Entercom Indianapolis

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Currents Online

Selected headlines from the past month

FCC Updates Public and Broadcasting Manual

The updated manual is available for stations to download and place in their public files.

FCC Announces Agenda For EAS Summit

The summit will be held on May 19, 2008, at the FCC.

Deva Broadcast Signs HD Radio License Agreement

Deva expects to begin delivering the HD Radio products at the end of the summer 2008.

NAB Announces Crystal Radio Award Winners

Since 1987, the awards have recognized radio stations for their outstanding year-round commitment to community service.

Day Sequerra and Neural Audio Partner for Hardware Solutions

Neural says that of Neural-THX surround sound technologies and signal processing for digital audio requires the company to partner with companies that can deliver the highest level of professional equipment.

NRSC Adopts Updated Digital Radio Standard

NRSC-5-B, the In-band/on-channel Digital Radio Broadcasting Standard, was adopted by the Digital Radio Broadcasting (DRB) Subcommittee and includes some editorial updates as well as a revised FM IBOC RF mask.

Nautel to Offer 'Orban Inside' Audio Processing

This capability will integrate Orban audio processing with new Nautel transmitters and use Nautel's control and display capabilities. The first product to support the embedded audio processing will be Nautel's NV40 44kW solid-state FM transmitter.

NAB, Ibiquity Push Effort on Updated HD Radio Exporter Technology

The new embedded Exporter reduces the size and manufacturing cost of the hardware to solid-state DSP components. BE, Continental, Harris and Nautel are involved in the effort.

Site Features

Radio Magazine 2008 NAB Photo Blog

If you missed the show this year, or are just missing being there, check out the *Radio* magazine Photo Blog. We snapped some great photos to show you what you missed or just help you reminisce a bit.

New Products Extra!

Hungry for more new products? We receive so many that we had to start a special e-mail newsletter to get you the newest information fast. Click on Newsletters.

Live Webinar

Designing a new facility? Planning an installation? Wednesday, May 14, *Radio* magazine will present its first live webinar. Called 33 1/3 Things You Forgot, this session will cover a simple list of 33 facts (and some details) about audio wire and cable, with a bit about connectors, tools, ties and related items.

SANITIZED FOR YOUR PROTECTION

SOME WORDS SHOULD BE OBSCENE AND NOT HEARD

Eventide Broadcast Delays are designed to keep profanity off your air, and angry listeners, embarrassed advertisers, and the FCC off your back. We invented the obscenity delay and have a solution for stations large and small that provides up to 80 seconds of the highest quality revenue and license-protecting delay.

Our new HD compatible BD600, 24-bit delay, comes standard with AES/EBU, and provides up to 80 seconds of memory — twice as much as other delays. There are fully adjustable Delay and Dump functions, and a Sneeze function which "edits" audio entering the delay, allowing the host to sneeze, cough, or make a short comment without being heard on air.

The BD600 offers two different methods of delay buildup and reduction: Eventide's catch-up and catch-down system, and an exclusive fast-entry-and-exit feature which allows starting a broadcast with the delay already built up to a safe amount and ending it with a rapid reduction of delay.

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Whatever your size, whatever your format, you can't expect to protect the integrity of your air and the foundation of your business without an Eventide Broadcast Delay in your rack.

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HD COMPATIBLE

Is it really a secret?

You and I work in radio. We know that it's a job, it's a career, and for most of us, it's a personal interest. I'll bet that you have been asked what you do for a living more than once in your life. The easy answer is to provide your job title and company. If the inquisitor gets beyond the luster that you work in radio and pries further into what you do, the answer can get more complicated.

A station chief engineer has a broad scope of responsibilities. We know that electronics, RF and IT are just part of it. Tying these skills to the management of entertainment technology makes our jobs unique.

Add to this that there is seldom a single method as to how a radio engineer obtained his knowledge and skills. It is these diverse backgrounds from which we all hail that make our industry and chosen profession that much more interesting.

When we prepare articles and material for Radio magazine and RadioMagOnline.com, one of the prime directives is to provide information that will help you, the reader, do your job better. We don't write articles and post news items because they appeal to the advertisers. We write them to appeal to you, the reader.

An important method of providing this information is by drawing on the diverse experience of our readers and contributors. Whether it's a Facility Showcase, Field Report, Tech Tip or On Location article, they all provide insight into the works of other stations. In this way, we all learn from our peers.

Most of the time, when I approach someone about sharing an experience, the person or station is more than happy and willing to contribute. You can see this in the tone of the article when you read it. That's why I like to work with someone from the station on an article. What you get is the real story that includes the information that was important to the engineer who built it, designed it or used it.

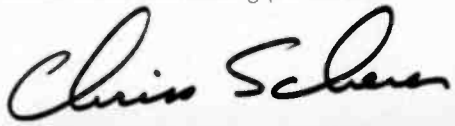
This personal insight also provides an industry forum. We have all built studios, and we all have our own ways of doing things. By reading someone else's experience, you will likely learn a new way to do something. You might even see how someone else addressed a challenge that you are facing.

There are times when I approach someone to write and I am given no for an answer. I'm not talking about time constraints. I'm talking about company policy. It's frustrating for me to see a potentially good story just waiting to be told, and then I'm told the company policy is that no one can talk to the press, and nothing about the facility can be revealed.

Maintaining control about speaking to the press is one thing. I completely understand this aspect. Successful organizations present a unified message. That's a key to success. But purposely stifling information for fear that trade secrets will be revealed is an overreaction.

Recently, I had a Facility Showcase ready to go – until the station's legal team said no way, no how. Period. This was the facility of a nationally syndicated radio show in the top market. The article described the facility and shared some insight into the challenges of building it. There were no trade secrets. No one was bashed in the article. It was like taking a station tour as part of an SBE meeting. But the legal team said no. I wonder if this same legal team denies station tour requests from the Boy Scouts.

This kind of censorship baffles me. The reality is that you could call the station engineer yourself and get the same story. There were no secrets being revealed. Instead, our industry loses the benefit of shared information among professionals.



Have you built a facility, devised a fix, bought a new piece of equipment or pulled off the impossible remote? Tell me about it so we can share your story.

What's your opinion? Send it to radio@RadioMagOnline.com

*Above: Rays broadcasters **Andy Freed** (left) and **Dave Wills** (right) interview Rays' star third base prospect **Evan Langoria** on the "The Hot Stove Radio Show."*

*Top: **Larry McCabe**, Tampa Bay Rays Senior Director of Broadcasting and **Rich Herrera**, broadcaster and Director of Radio Operations are shown on the field during spring training.*

Impossible Remote?
Nah...You've Got ACCESS!

Tampa Bay Rays' Real-World Super Hero Saves the Day!

Fans of the Tampa Bay Rays baseball team are intimately familiar with Dave Wills and Andy Freed, play-by-play announcers and hosts of "The Hot Stove Radio Show." Offering the inside track on all things Rays, the show kicked off its 2008 season with the "Countdown to Opening Day" series. While at a remote from a well-known sports bar, ACCESS showed its true worth. Two minutes before the broadcast, the ISDN line that was supposed to be used for the broadcast failed to connect. Luckily, they had the ACCESS running on Wi-Fi provided by the restaurant. The broadcast got on the air and was flawless for the entire one hour show.

ACCESS delivers mono or stereo over DSL, Cable, Wi-Fi, 3G cellular, satellite, POTS (yep, ACCESS is a full featured POTS codec and works seamlessly with Matrix, Vector and Bluebox)—plus some services you may not have even heard of. Given the challenges of the public Internet, it's no small boast to say that ACCESS will perform in real time over most available IP connections.

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Taming a wild monitor point

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

There comes a time in every AM radio engineer's life when he will be confronted by a wild monitor point. Sometimes it comes when joining a new station, or it may appear unexpectedly during a routine check. No matter how it makes its appearance it is always a big shock in an otherwise good day.

When monitor points suddenly exhibit surprisingly high field strength, one's first inclination is to look at the previous logs and ask the technical staff about the monitoring point's history. Sometimes the logs all show within limits operation. Frequently I have found, when called into a station with this problem, a fairly long succession of logs all showing this one point "out." Sometimes no one seemed to care. In some cases, the situation may appear to be that of one monitor point being out consistently without any action being taken. On one occasion I was called into a four-tower in-line array with one monitor point that had been reading high for one year.

When a monitor point reading is out of tolerance, it's time to take action and determine the cause of the problem.

First thing

The first thing to do was check and know that the antenna and transmitting system were operating precisely as licensed and then read the monitoring points preceding and following the one in trouble. These were slightly higher than the original proof readings but still within limits. This was followed by a careful check of the directional antenna operating parameters including common point impedance. These figures all turned out to be fairly correct; the antenna was apparently operating more or less in accordance with its authorized characteristics. It goes without saying that monitor point description, if available, is accurately observed.

We returned to the monitor point causing the trouble and very carefully remeasured it, paying particular care to the orientation of the field intensity meter. It indicated a direction away from the station. Following the indications of the field strength meter we came to a heavy equipment junkyard a few miles away.

The heavy metal junkyard had a number of fairly tall metallic structures and the whole area was reradiating strongly. This dump had developed after the station was built and put on the air. No one knew exactly when the disturbance to the monitor point occurred, but it seems as though someone had just lived with it until the new chief arrived.

We reran the whole radial and all the readings were close to their original values, except of course, the wild monitor point. The cure in this particular case was somewhat drastic. The owner wanted to change his coverage to take population growth into account and it was possible to file a new DA pattern and take care of the unwelcome reradiation problem. This was a somewhat expensive cure and it's not one that is usually recommended or possible.

Generally, when a reradiating structure appears locally and affects DA operation it can be taken care of by detuning the structure and or selecting a new monitor point to replace the one that was compromised. The Commission has made provision with adequate rules to ensure that new tower construction in the immediate vicinity of an AM radio station will not affect the AM operation. All applications for new radio tower construction within specified distances from existing AM station must disclose the situation and receive conditions in their construction permit, which, when complied with, prevent reradiation problems. Unfortunately some applicants for various radiating systems fail to provide the information required by the Commission and as a result the protection provisions are not enforced. Because of this omission, unexpected towers often pop up like mushrooms within critical areas of AM stations.

Examine the area

Whenever an anomaly is discovered in monitor point readings, first examine the area within a mile or so of the antenna site. However, sometimes a weather check is all that is needed. If the temperature is close to freezing or below and the ground is snow-covered don't be surprised to find that all your monitor points are high. Ground conductivity increases in cold, snowy weather. It is important to note the weather conditions on the monitor point report for protection, in case of an FCC inspection at a later date. Some consulting engineers have reportedly had a preference for conducting proofs in cold snowy weather to provide leeway in future monitor point readings.

I recall in one particular case on a higher frequency,

Insight to IBOC

May 2008 Part of the *Radio* magazine DAB Answer Series

Higher-powered Sidebands

CBS Radio tests IBOC signal building penetration

By Chriss Scherer, editor

As the HD Radio system is implemented in stations, the technology itself is in continuing development. Recently, an idea to improve the coverage of digital signals in the hybrid mode was proposed by broadcasters and endorsed by the NAB by increasing the level of the digital signal by 10dB. To determine the effectiveness of this increase, CBS conducted several tests on KROQ-FM in Los Angeles using the increased digital sideband level. The results were examined with regard to building penetration of the HD Radio signals.

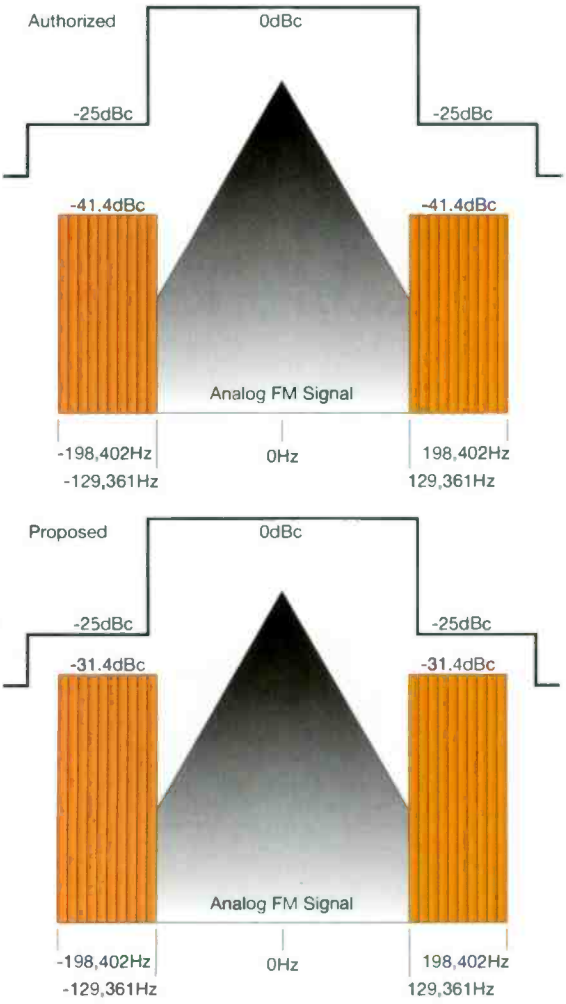


Figure 1. The comparative level difference of increased digital sidebands.

The results of the study were presented in a session at the 2008 NAB Show by Glynn Walden, senior VP of engineering for CBS Radio. The study shows the improvements of received signals on indoor receivers when the digital carriers are increased from -20dBc to -10dBc.

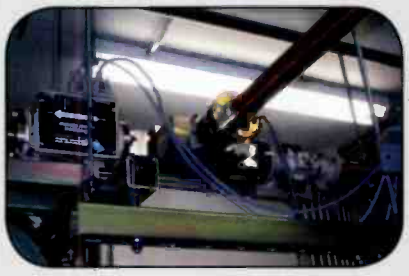
The authorized FM IBOC hybrid transmission mode places digital subcarriers on both sides of the host analog transmission. Each sideband uses 191 subcarriers at a power level of -41dBc. The total power of the 382 subcarriers is -20dBc below the total power of the analog host. Figure 1 shows the relative level of the authorized and tested digital carriers.

Top 10 Tech Tips

By Benjamin Brinitzer, CPBE

Since 2004 I have managed many different HD Radio installation projects and have had the opportunity to learn a great deal about the special considerations for different installation methods. HD Radio installations have special needs and challenges, and what follows is my Top 10 List for HD Radio installation planning and implementation. This list primarily applies to FM installations, but the top three also apply to AM.

10) *Choose the right high-level hybrid ratio* - Did you know you can save thousands of dollars in equipment and ongoing expense costs by choosing the right power split for your hybrid? 10dB is only one option, if you have at least 15



percent headroom in the analog transmitter, consider an 8dB hybrid. The 8dB split will result in 15 percent of the analog power and 85 percent of the digital power being burned in the load. This reduces the power requirement of the digital transmitter and it means that more power will be burned at greater efficiency. Therefore your power bills and installation costs will be lower.

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Inside

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A special supplement to

Radio
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Omnia 6EXi is:

AND EVERYTHING IN BETWEEN

In addition, with Omnia 6EXi's optimized parallel processing path, your HD-1 will also sound exceptional!

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IBOC Reception

Site	Height (stories)	Floor Measured
KROQ transmitter	n/a	n/a
KROQ studio/office conference room	2	1
Chubb Insurance building	31	17
Eight-unit apartment building	2	2
5670 Wilshire high-rise office building	30	2
SBS medium-rise office building	4	1
Hollywood/Highland entertainment complex	3	3
Single-family residence	1	1
32-unit apartment complex	2	2
Underground parking, Studio City Place	2	2 below ground
Underground parking, Ralph's Shopping Center	2	2 below ground

Table 1. The various sites tested. See these sites plotted on a map at RadioMagOnline.com.

The test setup

The CBS tests were carried out on KROQ-FM, which has transmitted an IBOC signal since Sept. 27, 2002. The station's analog power is 5.6kW ERP. For the tests, the station used a Harris Flexstar exciter and Z-16 Plus transmitter using common amplification for the hybrid signal. The transmitter feeds a three-bay antenna. At -20dBc, the digital signal is transmitted at 56W, while at the -10dBc level, the digital signal is transmitted at 560W. The station received FCC authorization for the experimental operation on Feb. 16, 2007.

The CBS engineering team selected 10 buildings of different construction type and usage for the tests. Table 1 shows the locations and types of buildings tested. The purpose of the test was to determine the ability of the analog and digital signals to penetrate buildings of various types, heights and sizes. The goal was to show that increasing the digital carrier level would improve building penetration, as well as provide some attenuation data for the various building types.

For the measurements, a common FM whip antenna fed a -3dB splitter to feed an Anritsu spectrum analyzer and a Boston Acoustics Recepter HD receiver.

Outside each location, visual observation on the spectrum analyzer showed the signal was subject to minimal multipath interference. This also provided the baseline reference unattenuated signal level. With the transmitter operating at the -20dBc level, the test setup was moved into the structure and a measurement was taken near a window. The test setup was then moved to an interior location of the structure to find a position where the digital signal failed. The distance from the window location was noted.

The digital transmitter signal level was then increased to -10dBc and the test setup was moved even further

Top 10 Tech Tips

continued from page 1

9) *In a space-combined system, match the gain (number of antenna bays) of the digital antenna to the main antenna* - If using a separate antenna, it is best to install one with the same gain and on the same orientation as the main antenna. The reason is that an antenna with fewer bays will have elevation nulls fall at different locations than the main, thus resulting in areas where the digital will far exceed the analog level. This may cause interference on some receivers.

8) *Provide power operation interlocks* - Interlocks are needed to maintain the injection ratio of digital carriers in space combined and split-level/high-level systems. Remember, if your analog transmitter operates at reduced power, you must adjust the digital transmitter lower to maintain the ratio. Remote controls with automated scripts are the best option here.

7) *RF isolation protection* - In high-level systems, interlocks are needed to protect the digital transmitter in the event of damage to the reject load or a change in match to the main antenna. Either of these will result in power crosstalk into the digital transmitter, which will damage the digital transmitter even if the transmitter is off. Wire an interlock that watches the VSWR of the digital and switches the analog direct to the main antenna bypassing injectors if the level exceeds a safe level.

6) *Provide plenty of sample line sections in the system* - Spectrum mask compliance is derived using directional couplers after filters in the system. Make sure you have enough slug-based line sections in the system: One on the total system output, dummy load, reject load if present, analog transmitter output and digital transmitter output.

5) *Check the power feeds* - The power load and bill will increase anywhere from 10 percent to 60 percent depending on the methods employed. Is the power service sufficient? What about the transfer switch and generator?

4) *Check the HVAC* - An HD Radio transmitter running in linear mode requires more cooling than an existing analog transmitter. If an internal reject load is used, on average this will add significant cooling needs.

3) *Diversity delay and monitoring alarms* - We must operate with our digital and analog signals synced or we stand to lose the HD Radio game. The days of monitoring the signal live in a control room are over. You must install a processed air monitor side chain with no delay. Since no one is monitoring the air signal, alarms should be installed to notify the operator of transmitter and audio chain failures.

continued on page 6

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

Open Mic: Metadata is the key

Media consumers have increased their expectations for descriptive metadata integrated with audio programming. This has been fostered by online streaming, satellite radio and portable media players.

Daniel Mansergh
Director of Engineering
KQED Public Radio
San Francisco

Radio: *How would you rate radio broadcasters' current use of metadata with HD Radio?*

DM: As an industry, we're using 20 percent of the potential for HD Radio PSD at the moment. This is based on published accounts of how metadata is being broadcast, conversations with many group and station engineers, discussions with dedicated metadata system vendors (such as BE TRE and Harris UI), and an understanding of the capabilities of current PAD systems. What I would consider to be 100 percent is having descriptive topical "what's on" or content-related promotional message displays associated with every distinct programming element (songs, breaks, morning show segments, etc). Advanced messagecasting or next-generation display features not supported by current receivers would be above and beyond this.

Radio: *Consider a station not transmitting any metadata right now. What is your suggestion of a single step that can be made to get the most result from the least effort?*

DM: The biggest bang for the buck is to get into the automation system and spend some time to scrub the existing library data from a listener perspective. For music stations, that covers the majority of their programming, and for non-music stations, they can at least have hourly program information throughout the broadcast day at minimal cost.

IBOC Reception

into the building to find the digital signal failure point. This distance from the original window position was also noted in meters. Audio and the spectrum analyzer display output were recorded for all measurements. The building attenuation was calculated by subtracting the inside measurement from the outside measurement.

The results of the tests are shown in Table 2. As expected, the -10dBc digital signal level provided better building penetration than the -20dBc signal level. In 75 percent of the sites tested, the analog signal quality was rated as noisy, poor or nonexistent. The -20dBc digital signal was nonexistent in these locations. When the digital carrier was raised to -10dBc, the digital signal could be received reliably in 75 percent of the test buildings. It was possible to receive the digital signal in selected location in the remaining 25 percent of the buildings.

Answers and questions

CBS notes that the goal of the test to provide quantitative numbers for the various signal levels was not completely met since reception of the digital signal at -20dBc was only possible in one building while reception at -10dBc was uniformly possible throughout all but two of the buildings. Despite the lack of quantitative results, the qualitative information shows that the digital signal increase resulted in robust signal reception. CBS also notes that the improvements in digital reception did not affect the quality or reception of the analog signal.

The underground garage tests were designed to evaluate reception in a structure with severe building

Site	Building type	Dist. from xmtr (km)	Predicted dBµ	Rx hgt. (m)	dBµ out	dBµ in	Bldg. Atten. (dB)	dBµ at -20dBc POF	dBµ at -10dBc POF	Analog reception	IBOC at -20dBc	IBOC at -10dBc
KROQ studios	Concrete block	20.19	63	2	65.7	47.3	18.4	–	–	Noisy	None	Solid
Chubb Insurance	Concrete and steel	14.66	67	17	70.7	58.9	11.8	–	–	Good, multipath	Spotty	Solid
Eight-unit apartments	Wood frame stucco	56.59	56	2	46.3	43.1	3.2	–	41.6	Poor	None	Spotty
Wilshire high-rise office	Concrete and steel	17.24	44	2	62	66.7	-4.7	–	44	None	None	Solid
SBS office building	Concrete and steel	17.13	64	2	61.8	33.1	28.7	–	–	None	None	Solid
Hollywood/ Highland	Concrete and steel	12.93	53	3	63.8	51	12.8	–	–	Poor	None	Solid
Single-family residence	Wood frame stucco	53.5	34	2	44.4	41.6	2.8	–	41.6	Poor	None	Spotty
32-unit apartments	Wood frame stucco	10.59	69	2	68.1	73.6	-5.5	–	–	Good	Solid	Solid
Studio City Place parking	Concrete and steel	12.37	68	2	82.6	55.7	26.9	–	39.3	POF only		
Ralph's parking	Concrete and steel	5.55	75	2	68.2	49.4	18.9	49.4	41.2	POF only		

Table 2. Collected data from the building penetration tests. Measurement heights at Wilshire and the 32-unit apartment were higher inside than outside, hence the higher insider RF level. The negative attenuation is not included in the attenuation calculations.

SixMix does real radio on your laptop!

10 inputs, built-in USB, and real radio features!

Air input for Monitor

Monitor mutes when Mic is on!

PC- Solo Monitor.. great idea!

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attenuation and obstruction. In Studio City Place parking, the -20dBc signal failed at the bottom of the ramp even though analog reception was good. At -10dBc, digital reception was possible almost throughout the garage even when analog reception was noisy.

In Ralph's Parking, the -20dBc digital signal failed about 30 feet into the building. At -10dBc, the digital signal could be received about 165 within the building. At this same point, the analog signal quality was deemed not acceptable to most listeners.

The study concludes that except for locations near the transmitter site, a digital signal at -20dBc is difficult to receive at an indoor location, while a digital signal at -10dBc yields a signal level that provides reception quality better than analog coverage. CBS notes that the power increase would help promote the widespread adoption of digital radio.

Thanks to Glynn Walden and CBS Radio for supplying the report details to prepare this article.

More Online:

See the test sites plotted on a map at RadioMagOnline.com

Top 10 Tech Tips

continued from page 3

2) *Proper monitoring and test equipment needed* - Every tube transmitter site will need access to a good spectrum analyzer meeting the specifications required for HD Radio mask monitoring. It is clear under current technology that adjustment to meet the mask is required with every tube replacement. Also very helpful is a system for monitoring diversity delay synchronization between digital and analog as well as level match. One manufacturer we know of satisfies this need very well. Your existing analog modulation monitor is not adequate and in fact will result in erroneous readings. This is a call to manufacturers to develop a spectrum analyzer at a reasonable cost for deployment.

1) *IT data delivery systems and configuration/training required* - At number one is the need to install and understand the data link for delivery to the transmitter site. If you don't know what a layer 3 switch is you should find out. If your IT infrastructure breaks, your HD Radio carriers will fail. Integral to this is the quality of the STL path. The number one issue we have faced are STL paths that need improvements. They work fine for analog, but put a digital system on the path and it fails. Take time to learn about data management. Without a good data path to the transmitter your entire HD Radio installation will fail.

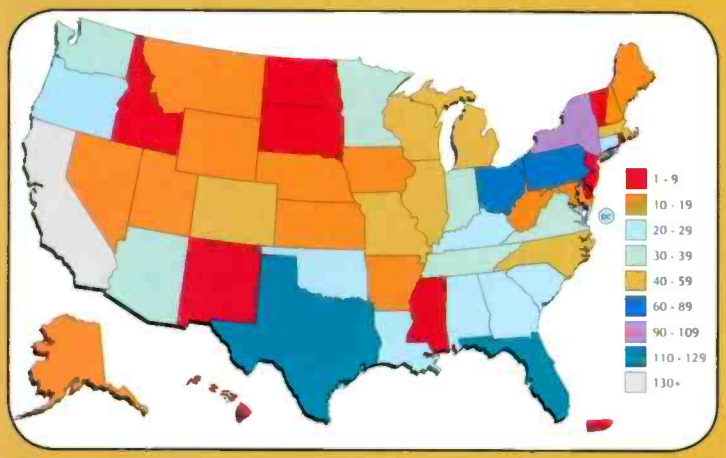
Brinitzer is regional VP engineering for Clear Channel Radio. He is based in Charlotte, NC.

Sample and Hold

Tracking the rollout

By Chriss Scherer, editor

In the Nov. 2006 issue of Insight to IBOC, we provided a nationwide overview of the HD Radio rollout. At the time, there were about 1,013 stations transmitting an HD Radio signal. In the nearly 18 months since then, approximately 600 stations have commenced HD Radio transmissions.



In Nov. 2006, four states had no HD Radio stations on the air: Hawaii, North Dakota, South Dakota and Alabama. We also had no data on Puerto Rico, so it's likely there weren't any stations on the air there. Now, every state and commonwealth has at least one HD Radio station on the air.

Also in Nov. 2006, the top four HD Radio adoption states were California with 109 stations, Texas with 74 stations, New York with 68 stations and Florida with 63 stations. Today, those ranks are almost the same with Florida and New York swapping positions. The station totals have increased to California with 162 stations, Texas with 121 stations, Florida with 112 stations and New York with 96 stations.

The steady HD Radio adoption continues, although it seems to have slowed somewhat. This can be attributed to many factors, but one likely reason is that the first stations were the simplest to upgrade or were in the largest markets where it made the most sense.

As of March 31, 2008, Ibiquity reports that there are 1,657 stations transmitting an HD Radio signal.

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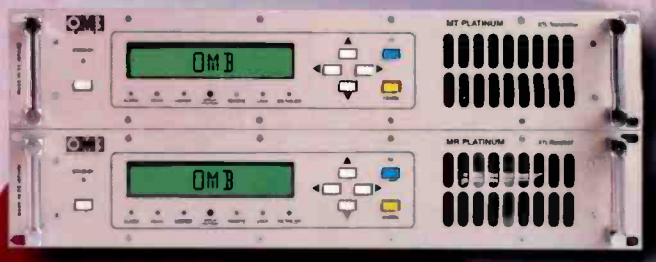

MT/MR PLATINUM >1GHz

is a high-performance Studio-to-Transmitter Link. It is made up of the 5W MT transmitter externally synthesized in 10MHz sub-bands with a step of 100KHz, and the MR double conversion receiver, that is externally synthesized, too. The MT is microprocessor controlled, and includes LCD display for the visualization of the most relevant transmission parameters (frequency (6-digit), forward and reflected power, modulation level), balanced Mono, Stereo (MPX). The MR receiver has the same visualization system as the transmitter. It includes balanced Mono and Stereo (MPX) outputs. Furthermore, the MT/MR Platinum STL includes a jumper in order to get a proper operation with digital signals.

EM 2000

is a 2000W FM transmitter made up of the EM 25 DIG exciter (or EM 20/30 exciter) and the AM 2000 FM amplifier. AM 2000 includes eight 300W high-efficiency MOSFET technology amplifying modules, fed by 2 independent switching power supplies, which are made to withstand the working conditions. The amplifiying modules work independently thanks to a power combining structure that provides high isolation between them.

EM 10000

is a 10000W FM transmitter made up of the EM 250 COMPACT DIG exciter and three control units which combine the power of six AM 2000 FM amplifiers. AM 2000 includes eight 300W high-efficiency MOSFET technology amplifying modules, fed by 2 independent switching power supplies, which are made to withstand the working conditions. The amplifiying modules works independently thanks to a power combining structure that provides high isolation between them.

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the proof of performance for the directional antenna was completed and being prepared for presentation to the FCC for license. The station's chief engineer made a quick run checking the monitor points and found one distinctly higher than in his original proof and out of limits. He checked with the field intensity meter and noted the direction of maximum signal. This did not coincide with the direction to the antenna site.

We checked in the indicated direction and found that a 100' tower for a VHF mobile phone system had been installed within the protected area around the AM antenna. A look at the application for the VHF phone system showed that its constructor had not disclosed the adjacency of the AM antenna and its location within the prohibited distance. Consequently no beforehand measurements had been made on the AM station and its pattern had been contaminated.

Discussions with the VHF mobile operator resulted in an agreement to pay the cost of detuning the 100' tower, and the extra work involved in redoing the proof of performance. In that particular case, right prevailed. Unfortunately not all random tower builders are as easy to convince.

Smaller issues

Sometimes a monitor point located on a farm will cause a short-lived problem. I recall in one case the monitor point in question was located in a reasonably clean electrical area but when field strength measurements were made some time later the point was way out. Fortunately, when the original proof was made, detailed photographs were taken of the monitor point and the cause of the anomaly was immediately clear. A metal silo, about 100' from the monitor point, was reradiating like mad.

Accurate monitor point site descriptions, when making proofs of performance, are essential. It is important to remember that 10 or 15 years after the measurements were made local characteristics may change. A measurement that might have been described as "in the center of the garage drive" might now be adjacent to a pole or other metal object with subsequent contamination.

The radio engineer's standard of reference is his field intensity meter and it is essential that this instrument be treated with due care and properly and regularly calibrated. It is not unusual to find stations with field strength meters whose last calibration was four or five years ago, although most meters are surprisingly stable and hold their calibration very well. It is also very good engineering practice to check the calibration of all field intensity meters used in the proof on all scales. All should read the same value. It goes without saying that batteries must be checked and replaced as necessary prior to making a series of readings.

E-mail Battison at batcom@ohio.net.

Diversity in broadcasting

By Harry Martin

The Commission's 40-page order in its diversity proceeding, issued March 5, covers an extraordinarily wide range of broadcast regulatory issues and involves both new rules and proposed new rules. That range includes extension of construction permit deadlines, the equity/debt plus attribution rule, and distressed station sales, among many others.

The FCC's overarching goal here is to bring more minorities and women into the broadcast ownership ranks. Historically, these groups have not been represented in those ranks in the same proportion as their numbers in the overall U.S. population. While the FCC may view it as desirable policy to try to change that, the Constitution generally prohibits race-based (and, to a lesser degree, gender-based) governmental policies except under certain limited circumstances not present here. Here are the major changes that will affect radio.

Dateline

June 2 is the deadline for submission of biennial ownership reports by radio stations in Michigan and Ohio.

On June 2 radio stations with more than 10 full-time employees located in Michigan and Ohio must electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

Also on or before June 2 radio stations licensed in the following jurisdictions must place their annual EEO Reports in their public files: Arizona, D.C., Idaho, Maryland, Michigan, New Mexico, Nevada, Ohio, Utah, Virginia, West Virginia and Wyoming.

Rule changes adopted

The new rules would provide benefits, for constitutional reasons, to "eligible entities" rather than to minorities or women *per se*. A television station is considered an eligible entity if it has annual receipts of no more than $13 million per year; the corresponding level for radio stations is $6.5 million per year.

CP extensions – The new rules provide for 18-month extensions of new station construction permit expiration time when a permit holder sells the permit to an Eligible Entity.

EDP calculations –The FCC is now relaxing the EDP (equity/debt plus) attribution rule to allow up to a 50 percent equity and/or debt interest in an eligible entity or a debt interest alone (no equity) of up to 80 percent.

Distress sale policy – The FCC is modifying its distress sale policy so a station owner facing an FCC renewal or revocation hearing can avoid the hearing by selling to an eligible entity for 75 percent of the station's appraised market value.

Non-discriminatory agreements – The FCC is now prohibiting discrimination – on the basis of race, gender or related protected categories – in the sale of commercial full-service broadcast stations and in the sale of broadcast advertising time. These rules will be enforced through imposition of new certification requirements in FCC application forms.

Rule changes proposed

Presumption of qualification as eligible entity – The FCC proposes to change the definition of eligible entities to encompass companies, consistent with a similar SBA program, owned and controlled by socially and economically disadvantaged businesses.

Modified Ownership Reports – The FCC is proposing to modify its existing ownership reporting forms to gather race and gender information.

Sharing HD FM Channels – FM licensees would be permitted to share their HD Radio channels with eligible entities. This would allow the eligible entity to rent or buy the second or third HD Radio multicast channel.

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

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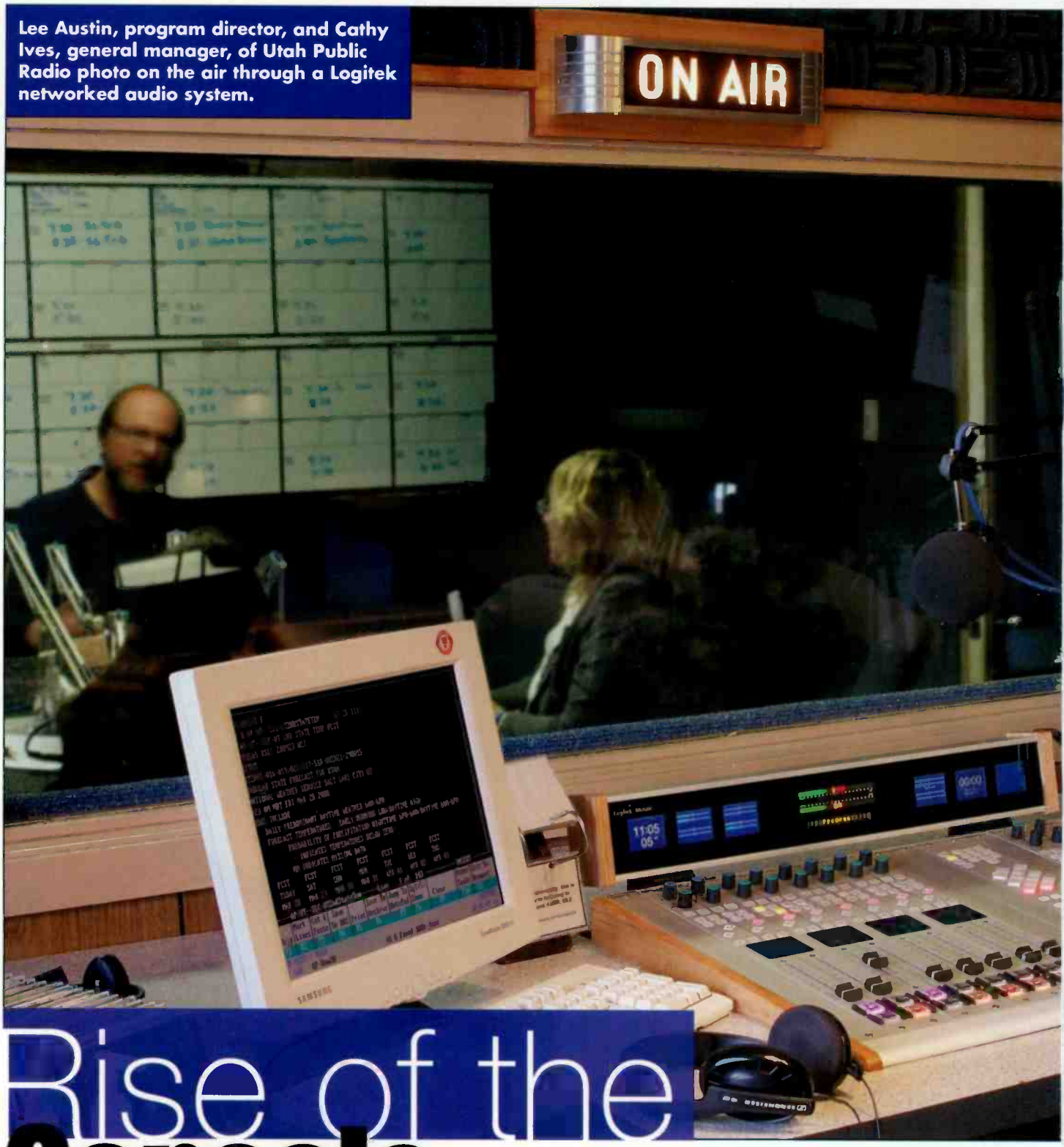

Lee Austin, program director, and Cathy Ives, general manager, of Utah Public Radio photo on the air through a Logitek networked audio system.

Rise of the Console

Improve your studio with these digital options

By Doug Irwin, CPBE AMD

So the time has come for you to come up with a plan for a new studio facility. Perhaps the station is moving; or maybe you're just planning on a rebuild of the current facility. Are you dreading the prospect? Finding ways to put it off another year? Or are you ready and anxious to dig into it? Thinking about sticking with the good-old-tired-and-true methods? You know all about analog. Why go with this fancy digital stuff, right?

Sometimes it's hard to toss out our old analog ways, to send consoles that cost a fortune (back in the day) to the storage room at the transmitter site (or wherever your equipment graveyard is) along with the 10-input-by-2-output mechanical switchers and stereo DAs and expensive analog tape decks and turntables and cart machines. (Need I go on?)

The reality is that there aren't that many analog consoles made any more, and installing them, in the old-fashioned way, just isn't that economical. And aside from spending more on the installation, you won't end up with the kind of features that so many radio stations have now. In practice you would be doing a disservice to your air staff and listeners.

So, if you are willing to entertain the idea of a digital console, you will also need to decide if you want to make use of plain old TDM or an IP-based system. I'll discuss the ways in which they are similar, and different. Hopefully at the end you'll be comfortable with the idea (just in case you aren't already).

Not a console anymore

The very first thing to realize about a digital console is that it is frequently *not* a console in the old analog sense of the word. For the most part (though there are some exceptions) the digital console is nothing but a human interface; a place from which your talent or board-op runs the show – telling the real guts of the system what to do and when. For the most part, all the same controls will be available via a GUI on a computer somewhere else. The GUI is used by someone with more training, of course, and mainly serves to configure (or program) the system.

The real guts of the system I referred to above are quite often called an engine or audio engine, and they perform the most basic functions of the system. These include providing a way for audio to get into the system, a way that sources get added to a bus, a way by which the mixing of elements into a bus can be done, and finally, a means by which the bus gets out of the console. This unit lives in the technical core of the radio station, and it will also perform the role of routing switcher, thus essentially replacing all the DAs that were needed at one point.

The digital radio studio looks and feels very much like its old analog counterpart, and has all the same functionality (even though most of the work is not done

Photo by Elaine Jones

in the studio itself). For example, the talent will still need meters, monitors, headphones and a cue speaker. There will still be devices that live in the studio with the talent/board-op, such as microphones, CD players, EAS units, skimmers and whatnot. This necessitates a means by which audio ins and outs, and remote controls where necessary, can be integrated into the audio network even though they are not physically located at the station's technical core. The manufacturers of the systems described all have that capability, of course, though there are two principal technologies used to do it (both to be addressed below).

So before we get into manufacturer specifics, let's review the major features found in digital consoles/router systems: The hub of the system (usually called the router, engine, audio engine or mainframe) performs all the mixer functions under the direction of a control surface; the router aspect of the system for the most part eliminates the need for DAs and simplifies source selection on the studio control surfaces; dynamic mix minus generation is a common feature, though not universal; routing of remote controls; the combination of control surface and scaled-down system interface (satellite) can often serve as an independent system, providing system redundancy; and the computer used to program the system can be placed on a network, which allows the administrator remote access.

Time domain multiplexing is the method by which most of the manufacturers' devices communicate amongst themselves. Physically, they are connected by either a CAT-5 cable (though not using Ethernet) or by way of fiber optic links. So even though the physical links are made of commonplace materials (like CAT-5 cables and RJ-45 connectors), the protocols for communications are proprietary. This single link (or spoke) greatly simplifies studio construction as well.

Digital console manufacturers

Wheatstone: The Bridge system has all the features I have mentioned so far. Basically there are three main elements to its system: the Bridge; a console (or control surface) and then the Satellite, which is a scaled-down version of the Bridge itself. The Satellite lives in a studio, allowing audio ins and outs, remote controls, etc. The Bridge lives in the technical core, and is the hub in a spoke-and-hub topology. Wheatstone gives the end-user many options in the specific physical means by which connections are made in and out of the Bridge; the most typical would be DB-25 connectors, but 110 ohm AES3 on RJ-45 is also an option, as well as 75Ω unbalanced AES3-ID via BNC connectors. Cage-to-cage connections can be made via CAT-5 or fiber optic jumpers. Notably, Wheatstone offers an entire family of control surfaces designed to have a particular functionality, such as an air studio (Generation 5), a production room (Generation 9) or a voice-tracking room (Generation 3).

Wheatstone Bridge

SAS: Whereas many manufacturers started off building consoles, SAS started out making routers and has subsequently added control surfaces to its list of offerings. The 32KD system is its showpiece product, and is based around the 32KD mainframe router, which is obviously the hub in the spoke-and-hub architecture. The far ends

Resource Guide

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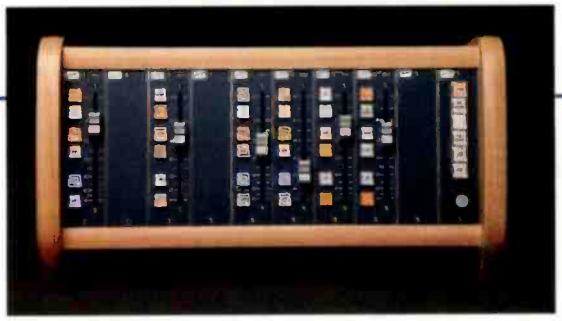
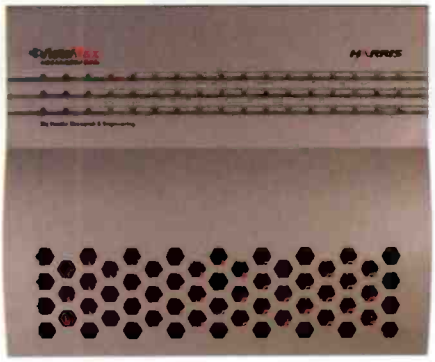


SAS Rubi-T

of the spokes consist of the combination of the Rio, which is 2RU studio unit that allows for audio ins/outs, GPIO and serial communications, and Rubicon control surface. The Rubicon is a modular system, configurable from eight to 40 modules wide, and is particularly notable for its simple layout and similarity (at least in appearance) to the classic analog consoles. A functionally scaled-back version of the Rubicon known as the Rubicon SL is available as well for less demanding applications. Finally, for the simple applications like a news or traffic position, or even a voice-tracking studio, SAS offers the Rubi-T. It is referred to as a mini-console surface, but at the same time, it has the features of most any other control surface, including input source selection, bus assignment, and full-throw length faders.

Harris: The Vistamax digital audio networking system is Harris' offering – and like SAS, Wheatstone and others – is built on the spoke-and-hub topology. Vistamax is the actual hub, and like other systems mentioned earlier, it's completely modular and scalable. The user chooses the particular modules needed based on their system design, and plugs them into the mainframe, located in the technical core of the station. The Harris solution to the far end of the spoke is different though than others, because the three consoles currently offered (RMX Digital, Stereomixer Digital, and Netwave) are truly consoles – with audio inputs and outputs, like the legacy consoles they are meant to replace. This architecture allows them to operate on a completely stand-alone basis. They can be integrated into an audio network by means of the Vistamax system should the user choose to do so; and if so, the audio resources of one console are available throughout the entire breadth of the Vistamax system.



Harris Vistamax

Logitek: Digital Audio Engine has most of the common engine features we've discussed up to this point. The mainframe is modular, like the others, but all the connections are made from the front of the unit. Logitek offers multiple control surfaces that work with the Audio Engine: The Mosaic, The Remora and the Artisan. The Mosaic is a modular system (two faders per module) that can

Logitek Artisan and Vscreen

be as wide as 32 modules and as narrow as 10. While the Audio Engine obviously handles the audio ins and outs, the remote controls for Mosaic are located on the power supply unit. Remora is a slightly smaller surface (with configurations from four to 22 faders) and has an interesting capability of being physically separated into two pieces. This control surface can also be set on top of a table; a cut-out isn't necessary. Finally, the Artisan digital: this surface can be up to 32 faders wide. One particularly notable feature of Artisan is that the channels can accommodate 5.1 surround (and of course either stereo or mono). The Vscreen software application allows the user to set up a video monitor that will serve as a metering bank; but in case that doesn't suit you, meter bridges are available as well. And finally, if you want to go beyond that, you make use of a software application for the audio engine called Vmix virtual mixer. This allows you to use a GUI for full control; no control surface is necessary at all.

Klotz Digital: As part of a networkable audio routing system, the Decennium standard console is supplied pre-configured to simplify installation and set up. The console is modular and expandable, and the configuration software allows it to be customized as needed. The Decennium audio engine includes on-bard DSP to provide voice processor, parametric six-band EQ and dynamics on each channel. Each channel strip features a rotary encoder with integrated push button and a 16-character display that can be used for source selection and channel-related parameter settings. The control surface is available in 4-, 8-, 12-, 16-, 20- and 24-fader frames.

Studer: The On Air 3000 and On Air 500 are available in consolidated frame and Modulo versions. The Modulo divides the fader and meter bridge compo-

Klotz Decennium

nents into sections that can be mounted into furniture. At the 2008 NAB Show, Studer added the On Air 2500 to the console family. The 3000 interfaces with an audio engine, called the S Core, while the 500 and 2500 can stand alone or talk to the Studer engine. The 500 is available in six- or 12-fader versions. The 2500 is available in 12-, 18- and 24-fader versions. The 3000 can be outfitted with up to 48 faders in three- or six-fader banks. In addition, the 3000 has three main stereo mix buses plus an audition facility, four stereo aux. buses, 16 mix-minus sends, configurable as auxiliary sends and three independent studio monitoring circuits. All models include dynamics and EQ.

A different approach

Up to this point, we've talked about TDM-based systems that communicate via proprietary systems. Generally speaking, these systems make use of CAT-5 cable and RJ-45 connectors (or fiber) as their means of physical connection. However, there is another way. Livewire is a protocol developed by Axia, and it makes use of Ethernet for communications between devices. The audio network is essentially identical then to an office network, using the same cable, connectors and Ethernet switches. Various devices are added to the network simply by adding them to the network via their Livewire port.

Axia offers the Element, which is the control surface portion of the Axia Livewire network. This surface can be built as small as two faders and as large as 30 faders in one surface, or up to 42 faders in a split-surface configuration. (Smartsurface is a 16-fader, low-profile control surface also offered by Axia.) The Element comes with four stereo program buses, four stereo aux buses and provides for as many mix-minus feeds as there are faders on the control surface. 5.1 mixing capability comes as a standard feature. Element (or Smartsurface) works in conjunction with the Studio mix engine; this is the part of the system that lives in the technical core of the station. By placing an Axia node (microphone, analog, digital or GPIO) in a studio, the user allows for a means by which microphones, CD players and whatnot can be interfaced with the audio network. (Some manufacturers, such as Audio Science and IDC are building Livewire

Studer On Air 2500

interfaces into new products.) System programming is done via a proprietary application known as Pathfinder PC.

Radio Systems has licensed the Livewire technology from Axia, and now makes the Millenium-D console that is truly a console in the more traditional sense. The Millenium-D comes in six-, 12- or 18-channel versions, with analog line and mic level inputs, digital inputs and outputs, plus the livewire port. A system that is made up of at least two Millenium-D consoles then makes up an audio network system. This is considerably different than the spoke-and-hub topology I've referred to so many times previously; the Radio Systems architecture could more accurately be described as peer-to-peer. Audio made available at one console would be available at the other via the Livewire connection. Like the Axia system, the audio network is expanded by the use of an appropriate Ethernet switch.

Radio Systems Millenium-D

Axia Element

But Axia doesn't have the exclusive domain over Audio over IP routing and mixing systems. N/ACIP, a standard developed by the European Broadcast Union, creates a standard for IP interoperability. At the NAB Show, SAS unveiled the Transend IP to allow the 32KD router to communicate with audio over IP networks. In addition, several companies introduced their own AoIP ideas. Wheatstone unveiled the E² routing system, and Logitek provided a preview of its AoIP engine that will be available later this year. The IP approach appears to be gaining acceptance.

Because studio moves and builds don't happen that often, it's important to future-proof the new studio facility to the maximum extent possible. Focusing on the newer technologies, and foregoing the old, is the best way to do that. The ubiquitous nature of CAT-5 cable has made the job of the studio designer and the studio builder easier. The coupling of the increased speed of a studio build with the new common feature sets of digital consoles is bound to have a beneficial effect on the station's programmers, and thus listenership.

Irwin is chief engineer of WKTU, New York

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A small market studio values big time broadcast

By Mark Bohach

When many people hear the term "small market radio" they get a mental image of old, worn-out equipment, shag carpet on the walls and rundown surroundings. WLOH in Lancaster, OH, defies this stereotype. In 2005, my wife, Arlene, and I purchased the station, which at that time, was losing money. Sales had slumped while operating expenses continued to rise. The station's equipment had not been updated in several years. Equipment on hand included analog reel decks, cart machines and a very tired early DOS-based automation system. At the tower, the 20-plus-year-old Harris MW-1A transmitter was operating, but had problems.

Arlene and I have always believed in community (small market) radio. Lancaster lies about 25 miles southeast of Columbus and has a population of 40,000 in a county of more than 120,000. The two commercial FM stations licensed to Lancaster have long since moved to Columbus leaving WLOH as the only commercial radio station serving our county.

I personally believe that regardless of a station's size, its equipment needs to kept up-to-date and installed properly. Listeners are going to compare WLOH with those big city stations in Columbus and if our audio isn't crisp and clean and our format well executed, listeners will quickly dismiss the station as unprofessional.

After studying the situation, we launched a news/talk format that reflected the conservative nature of Lancaster and Fairfield County, OH. A large part of the new format involved syndicated programming from several different providers. We also wanted a strong local news and sports presence and as many hours of local programming as possible. WLOH currently produces eight different local talk shows each week plus more than 60 local high school sporting events during the school year. WLOH is also home to Cleveland Indians Baseball, Columbus Blue Jackets Hockey and Ohio State University Sports.

Comfort & Sound

We also decided it was time to build a completely new studio facility. With less than two years left on the current building lease, we began to plan our new facilities. During this time, we replaced the transmitter with a new Broadcast Electronics AM 500A. We also installed a new Orban Optimod 9200 audio processor and a Sine Systems remote control system. We also purchased enough studio equipment to keep the station on the air until the big move.

The WLOH Control Studio is used to produce local sports and other live remote broadcasts. The On-Air Enco Workstation and other computer resources are accessed here.

In late 2006, we were approached about a potential new studio location. A local businessman owned a former model home in the fast growing commercial area of Lancaster. While the building's exterior looked like a house, it was actually a commercial structure that met all commercial building and electrical codes. The owner wanted to develop the building into an office complex but needed to sign a long-term tenant to justify his investment. With a very attractive build-to-suit agreement worked out, WLOH agreed to become the hallmark tenant in the new Gateway Commerce Center.

New facility wish list

We had specific design objectives in mind for the new studios. We wanted a facility that, while giving the appearance of state-of-the-art technology, made our many guests and visitors feel comfortable and welcome. We wanted the studios to be easily operated with minimal training yet be powerful enough to handle top quality production and fast-paced talk shows.

We first evaluated all existing studio equipment and determined what would move and what would be retired. The existing control room Modulux furniture and Arrakis console were still in very good condition and would make

Equipment List

Adobe Audition 1.5, Audition 2.0
Air Tools 6100
Aphex 320A Compellor
Arrakis 12000, 1200, Modulux
Audio Compass software
BE AM 500 A
Broadcast Tools 1x6, DSC 32, SRC 32
Comrex Matrix, Vector
Dell computers, flat-panel monitors
Denon C-635
Electro-Voice RE-20, 309A
Enco DAD Pro 32
Graham Studios Radius Line
Harris equipment racks
JBL Control One
OC White mic booms
Orban Optimod 9200
RDL RU-SM16
Sage Endec
Sine Systems ACU-1, RFC2
Starguide III
Symetrix 528E

the move. We decided to retire the production/talk studio furniture and console that had served faithfully for nearly 20 years. The same decision was made regarding the station's Marti VHF remote pickup system, which had become interference-prone and unreliable.

A major problem to overcome was how to move the station's two main satellite dishes while keeping all programming on the air. Fortunately, we had a spare dish that could be utilized during the move. We contracted with a local sign company that had the necessary cranes and equipment to move the dishes. We installed new mounting poles at the new site and on moving day, the sign company popped the dishes off their old mounts and transported them intact, keeping the elevation settings. All we needed to do was adjust the dishes to their proper azimuth settings. We had a satellite technician on hand during the move just in case something went wrong.

While construction commenced, we ordered the new equipment and studio furniture. For the new talk/production studio, I called Rod Graham at Graham Studios. I sent him a building plan showing the room dimensions and he designed a custom version of the Radius XP furniture that exactly met our needs.

For our audio storage and automation needs, we chose the Enco DAD Pro 32 system. Enco supplied all needed hardware and software. We use Enco's Gateway program to automatically back up our audio and all system files. We also use its Dropbox program to automatically transfer audio files to the DAD library. And Enco's Scheduling Wizard program automatically builds daily playlists from our Natural Log traffic system.

Our Enco manages a dozen satellite networks and their relay inputs. All network programming, including the professional and college sports broadcasts are fully automated. We also flawlessly net-catch more than 200

Comfort & Sound

recordings from satellite each week using a separate eight-channel record switcher and another 100 FTP feeds each week from various services such as Metro Traffic using its Traffic Transmitter system.

For production purposes, we purchased new computers and Adobe Audition for each studio and field recording. Audition has an excellent built-in effects package and has the ability to work in many audio formats. We extensively use Audition's CD ripping and file format conversion capabilities. Our production workstations and Enco system are networked together allowing LAN audio transfers between machines. All machines on the network have access to the Internet through a firewalled router. This allows for the safe use of utilities like Dimension Four for time sync and FTP audio downloads. Each studio workstation also has its own public IP address and runs PC anywhere Host software. This allows staff to remotely control and monitor any computer via the Internet.

With the retirement of the Marti RPU equipment, it was time to look at digital options. Because many of our remotes originate from fixed locations where POTS lines are available, WLOH opted for Comrex Matrix/Vector

The control room equipment racks contain the station's Enco workstations, and other support computers, EAS equipment, audio switchers and processing, satellite receivers and monitoring equipment.

gear for our primary system. We are also experimenting with AOIP remotes. We have used a laptop computer with a wireless Internet card with Audio Compass. Initial results have been excellent. Using a rate of 48kb/s the audio quality is as good as a POTS codec and audio latency is approximately one-half second each direction. We also have a cell phone fallback option in case we encounter problems with the digital feeds.

Other new studio equipment included a new Arrakis console. We went back to Arrakis since the console we retired, an Arrakis 10,000, had never failed in 18 years of continuous service and still sounded good when we powered it down. Other new equipment included Air Tools 6100 broadcast delay, Symetrix microphone processors, E-V microphones with shock mounts and OC White booms, JBL monitor speakers and Radio Design Labs metering. We also purchased a few pieces of good used equipment such as the Broadcast Tools and Conex switchers.

Analog to digital

While designing the new facility, we needed to make some decisions on how to best implement new digital equipment while staying on budget. The in-studio audio paths are essentially analog but we utilize our LAN to move audio throughout the facility whenever possible. We wired the facility with plenty of CAT-5E cable and have the ability to easily pull CAT-6 if needed in the future.

WLOH has a beautiful new facility that also sounds great. At our ribbon cutting and open house, nearly 200 people showed up to see the new studios. In the many comments we have received since moving in, the majority of them note how the studios are beautifully decorated. We achieved our goals of a comfortable and modern facility while staying within our budget.

The heavy brick exterior of the new studio building contributes to very quiet studios. No detail was overlooked including a newly paved parking lot and landscaping.

Bohach is co-owner and manager of WLOH, Lancaster, OH.

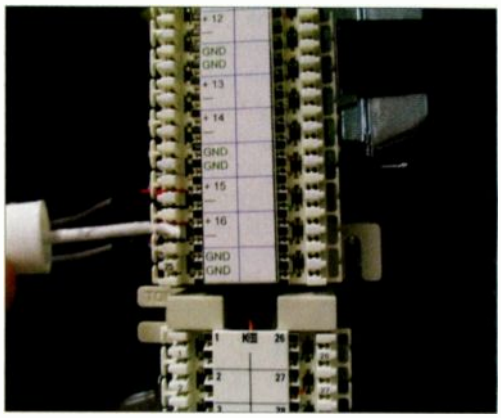
Tips, tricks, hints and more

By John Landry, CSRE

Punching in

Many new installations use 110 blocks from ADC/Krone. With one major router manufacturer wiring them with a non-standard method, it is easy to get confused when troubleshooting or adding new sources and destinations to a system already up and running.

Howard Mullinack of SAS came up with an idea: Print a new template on Avery peel-off labels and place them over the plastic panel in the center of the Krone block. While there isn't much room for a complete description, it is enough to separate the multiple grounds hidden on pairs from the active audio pairs. Mitch Glider of Westwood One came up with an improvement: Print the peel-off templates in color. Red, black and green are easier to see and distinguish. And to clarify the block layout even more, Mitch covers the original pair numbers with White-Out.



Leave the light on

This photo was submitted by a reader of a solution he saw while visiting an office. It appears that someone wanted a way to have access to the light switch, but didn't want it turned off regularly or inadvertently. A small conduit hanger was installed over the switch. The holes in the hanger line up with the holes in the switchplate. The switch can still be turned on and off, but it takes a little more effort.

Mic identity

It's amazing how expensive some things have gotten. No I am not talking about gas, or copper, but mic flags! How many of them have gotten stolen at remotes? And how many do you have lying around with old letters or logos on them that the PD won't let you use?

Well the boss (our own editor Chriss Scherer) came up with a simple quick fix. Chriss needed a mic flag in a hurry for a last-minute interview. He took an old one he had lying around and removed the extinct logo with naptha. (Mineral spirits is another good choice. I do not recommend acetone because it can destroy the plastic if too much is used.) Wash the flag thoroughly once it's clean. He then printed new logos on 2" × 4" clear address labels in a color printer and placed them onto the now "naked" mic flag. Running a blade along the bottom edge trimmed the 4" long label to the proper length. While not as durable as the quality screened or printed versions, it does the job nicely.

Stay connected

As springtime gets warmer, so will your transmitter shack. Another spring chore at the transmitter is to make sure the fans, blowers and dampers are all working properly.

One suggestion to make blower maintenance easier came from a discussion at an SBE meeting: Install quick disconnects to simplify blower removal or inspection. In some cases, the blower may be connected with wire nuts, which are also convenient, but in time the wire ends will fray.

All blowers that require regular lubrication or belt replacement should have a manual disconnect switch nearby. And OSHA requires that switch be locked out and tagged out when a person is in working on a blower. Quick disconnects are good for convenience, but there is no substitute for safety.

Landry is an audio maintenance engineer at CBS Radio/ Westwood One, New York.

Do you have a tech tip? Send it to us at radio@RadioMagOnline.com

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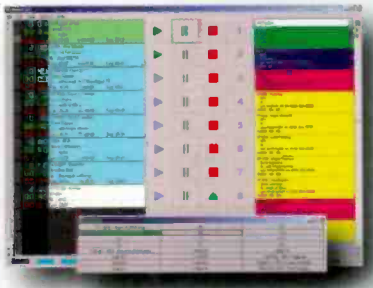
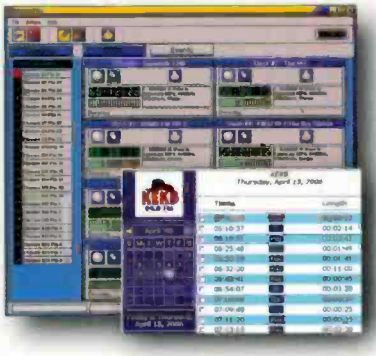


WaveCart - the original on-screen cart machine

Audio Logging



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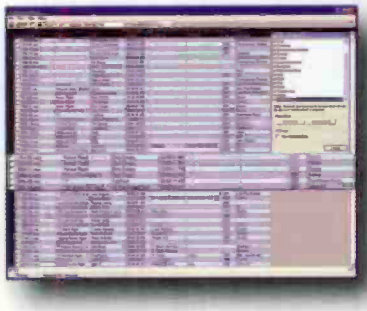

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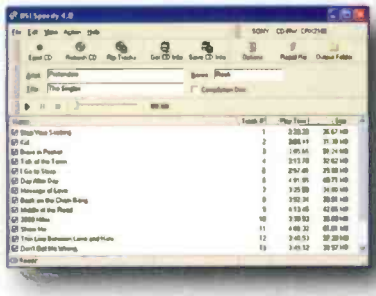

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BSI

Olympus LS-10

Rubin I. Garcia, CBT CBNT

I like to think that some of the functions of a broadcast technician are to supply options and solutions to problems. When it comes to capturing audio in the field, the Olympus LS-10 recorder is a problem solver and another option for broadcasters. Released in January 2008, the LS-10 is a must-have in any facility. Naturally, production people will love the LS-10, but how about doing a simulated live broadcast? Why not produce segments on location and send them back to the station ready to air? I believe anyone can achieve this with this recorder.

First impressions

What sets the LS-10 apart from the other recorders can be seen the moment you take it out of the box. The outer case of the Olympus LS-10 is constructed from aluminum and fits nicely in the palm of your hand. Extremely lightweight, it weighs less than 6 ounces and is comfortable to use.

The low-noise stereo microphones are angled 90 degrees apart, making it much easier for the user to record questions and responses during interviews. This makes for better stereo separation as well. Included are two windscreens that snap firmly onto each microphone. Additionally, a zippered cloth carrying case with a storage pocket is supplied for easy transport. A wrist strap is also provided.

Once powered, the LS-10 comes to life with its large, well-lit, easy-to-read, back-lit LCD screen. All the menu navigations can be accomplished with one hand since the buttons are clearly labeled and ergonomically placed. The menu is extremely user friendly, simple to navigate and self-explanatory. Set the time, date and record levels and you are literally ready to roll.

Performance at a glance

- 24-bit/96kHz recording
- Records WAV, MP3 and WMA formats
- Internal 2GB storage
- SD card slot for memory expansion
- Built-in stereo mics and speakers
- Camera tripod thread mount

Under the hood

The Olympus LS-10 offers 24-bit/96kHz linear PCM recording. You can capture studio-quality material in the palm of your hand. The USB connection cable (supplied) bridges the gap between the recorder and the production facility. The recorder runs on two AA batteries or an optional dc power supply. There is a camera tripod thread mount on the bottom. And because the unit can be mounted to directly record a performance, there is a connector for an optional infrared remote control receiver between the mics. With this, the recorder can be set up and recording started remotely.

The Olympus LS-10 also comes with Cubase LE4 software on a DVD. Cubase is a 48-track audio recording and production software with lots of plug-ins and effects. The LS-10 has a built-in reverb feature, and Cubase's VST3 effects provide even more creative tools.

There are 2GB of built-in memory as well as an expansion slot for an SD card. Three recording modes are available: PCM, MP3 and WMA. Obviously the recording time will depend on the chosen format, but more than 35 hours of audio can be recorded with the MP3 format.

Unfortunately, the LS-10 does not include XLR/TRS jacks, but there is a 3.5mm stereo microphone jack on the side. On-board, twin 16mm stereo speakers can be used to listen to recordings, or headphones can be plugged in (not included) for privacy. While we are on the subject of listening to a recording, the LS-10 can be used as an MP3 player and as an external storage device for a PC. What I'm really impressed with is that the LS-10 is compatible with Windows Media Player and Itunes.

The stereo line input jack (3.5mm) accepts a +6dBv signal. The mic input sensitivity is selectable with a side-mounted switch for high (59dBv) or low (39dBv) setting.

Road test

After playing with the LS-10 at my desk I began to think of ways I could use this device to make the station's live broadcasts easier, and improve the quality of the audio being sent over the codecs. Like most stations in larger markets, I have produced live broadcasts from various locations, including the common car dealer, cruise ships and various Caribbean Islands. Most of the time we are able to get a good quality phone line but there are times when we have had to cancel a broadcast because of a poor connection.

This is where having the Olympus LS-10 as an option – when you are miles away from the station and can't get an ISDN line or dependable phone connection – can really save a broadcast.

Initially, I decided to send the LS-10 with our promotions team to obtain audio for station promos and interviewing winners. Keep in mind most of our promotions assistants are part-time help and new to broadcasting, so I was expecting some difficulty in them learning how to use the LS-10. Surprisingly, they had no problems. Learning how to use the LS-10 was a breeze. I was told that listeners seemed more willing to talk into the LS-10 than a large microphone with a microphone flag attached to it. Some listeners were intrigued with how it worked and its features.

Olympus
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To record, press the record button once. This arms the recorder, and a lighted ring around the record button flashes red. Press record again, and the ring stays red while the unit records.

Finally, the perfect opportunity arrived to showcase the ease and multiple uses of the Olympus LS-10. Our oldies station scheduled an anniversary cruise to various islands in the Caribbean and the question arose of how a broadcast could be done from the cruise ship or any of the islands? I suggested doing a simulated live broadcast. This would be accomplished by having our on-air personalities pre-record some of their breaks with the LS-10 during the cruise, interviewing the stars performing, recording some of the experiences from each of the islands, and sending all of this back edited and ready to be aired.

Our PD loved the idea. It was an inexpensive solution and the sound quality could be controlled and edited. The client was ecstatic because every experience was captured. The on-air personalities were able to enjoy all the amenities without physical limitations (wires). The gods of Olympus have finally given the gift of the LS-10 to broadcasters.

Garcia is a broadcast technician at Lincoln Financial Media, Miami, FL.

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Axia
Element and Livewire

By Chris Karb, PE

The Axia Audio system is a versatile and powerful studio audio system. Axia uses its Livewire protocol to encode audio into Ethernet packets, then mixes and routes them with Linux-based mix engines and standard Ethernet switches.

The system uses hardware interfaces called nodes to encode/decode audio to the IP stream. These nodes accept and deliver analog and AES3 audio inputs and outputs. Audio is encoded at 48kHz, 24-bit, giving a signal-to-noise ratio better than 102dB analog in to analog out and 138dB digital in to digital out. Contact closures (inputs and outputs) are handled by GPIO (general purpose input/output) nodes. Computer audio is encoded using a special Axia Audio driver application that encodes the audio into the Livewire IP stream. No sound cards are needed on audio servers or PCs.

The nodes connect to an Ethernet switch (edge switch), to which the control surface and mix engine also connect. CAT-6 is needed for the gigabit connection to the mix engines and the uplink to the core switch, which comprise the central part of the system. Nodes connect to the edge switches with CAT-5 cable. Each of the eight input and output channels in each node create a 4MB Livewire stream so 100Mb ports are more than enough for the nodes.

Our system pairs each studio with a production room and an edge switch, and the five edge switches (we have 11 studios) are connected to the core. We use another switch in the rack room to handle the nodes for our 50 satellite channels, codecs and such. Each PC driver also connects to its respective switch for the control room in which it is located.

A Windows server runs the Pathfinder PC audio/GPIO router that controls audio and contact closure routing for the entire facility. We run a hot standby with automatic fail over. Pathfinder is configured to accept closures from our five stations' automation systems, two digital recorders, 13 satellite receivers, EAS decoders/encoders and so forth. The closures can be configured to route audio from to a live board, satellite channel, backup studio or any source directly to air, or anything else likely to be needed, such as on-air lights. A clever software bridge designed by Software Authority interprets contact closures in and out of the automation server via IP to the Pathfinder server, replicating the analog hardware source switch normally associated with automation systems. It works flawlessly, and saves a tremendous amount of wiring and equipment. The router is completely configurable, can send e-mail notifications, execute stacked events on time or contact closure, just about anything one would want a router to do.

Stay connected

Connection to the outside world is easy using the Radio Systems Studio Hub+ RJ-45 dongles. The nodes use RJ-45 connectors for audio. The mic node has XLR connectors as well. We picked the connector we needed (XLR, 1/4", 1/8" mini, RCA, etc.) and the proper length of shielded jumper and connected it. No punchblocks, no cross-connects needed. No soldering, either. The equipment design is rugged, and we have experienced no mechanical failures in 18 months of operation in any of our 11 studios.

From the operator standpoint, the control surfaces work just like a traditional mixing console, except that the metering, clock and timer are viewed on a monitor. It took no time for the staff to get used to that.

Metering is provided for four stereo program channels. We assign one to the on-air program feed, another to the record bus, the third to codecs and the fourth to the phone recorder. Every channel generates its own mix-minus, which makes multiple

Performance at a glance

- Digital mixing and routing system
- Uses standard Ethernet switches for routing
- Web-browser configuration
- Cabling via CAT-5 or CAT-6
- Requires no sound cards
- More than 10,000 audio channels

phone and codec hook-ups a snap. There are an additional 48 mix channels in each mix engine that do not appear on the control surface but can be used to sum automation channels, and switch satellite and other sources. We use automation control closures to turn those channels on and off, and the associated contact closures are routed to the audio server to start breaks and play liners.

The complete configurability of the system is dizzying at first, but the Web-browser interfaces are easy to understand. Because every source is available to every channel, one has to use care in configuring what is accessible in each channel to just those that the operator is likely to need. Our facility has almost 1,000 audio sources in use. The system is capable of handling more than 10,000 channels.

Axia Audio

P 216-241-7225

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Changing channel assignments involves the push of a button on the channel strip and then selecting the new source with a rotary control on the monitoring panel. The push of a second button calls compression and equalization if enabled on the source for that particular channel. All standard compression, expansion, gating and equalization parameters are included, and software buttons allow for quick dial-in. The sound is much better than any of our traditional mic processors.

Determining the overall system organization at the very beginning is extremely important. All networked equipment is assigned a fixed IP address, so it is important to group studios, analog nodes, GPIO nodes, PC drivers and switches into address sections with plenty of spare addresses so that expanding the system does not result in an address that's out of order. That leads to confusion in a large system in a hurry. A spreadsheet is provided to help with the organization and the Axia folks are pleased to assist and recommend.

Something special

Our system used several innovations that had not been tried before, such as mixing and switching audio sources with the virtual mix busses, and the IP bridge to the PathfinderPC router from the Automation servers. This required the commitment of Axia and RCS Automation to help get everything working properly.

Factory personnel were on-site to perform the initial control set-up and switch configuration, and get the Pathfinder router running. It is always a good idea to have the factory people get the system going for you, especially if your system is large. They can do it faster and show you what you need to know in a hurry. Any difficulties will be dealt with in a flash, and you'll have contact people who know your setup. It really helped us.

It took several weeks of steady clacking to configure our system, assigning source names, choosing channel source availability and source parameters, setting up contact closure assignments from the satellite channels and so forth. It is different to be sure, but our engineers quickly became familiar with it. The laptop is the new "greenie".

Since installation we have had two memory chips in the control surfaces fail, (none resulting in an off-air emergency) and one case of overloaded mix engine due to the busyness of our 24-channel talk studio with six processed mic channels running at once. The memory chips were quickly replaced and the overloaded processor issue was solved by switching the talk mix engines to dual-core processors, which are now standard on all engines. Axia's tech support is extremely good, which is vital when dealing with new technology.

The Livewire audio system includes a wide range of nodes and interfaces.

Our system has been very reliable and versatile. It is easy to troubleshoot and quick to reconfigure for special needs. Upon launching the first station to air, we noticed an immediate extension in frequency response on both low and high end as well as an improvement in depth and clarity, with the same audio chain we had been using before. The board ops and DJs love it. We would not build another cluster without an Axia system.

Karb is director of engineering and IT for Clear Channel Asheville, NC.

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Broadcast Electronics
The Radio Experience

By Jim Roberts

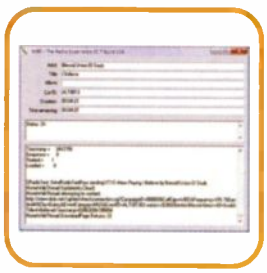
People talk about datacasting like it's something out of the future, but if you have a digital studio and are broadcasting an HD Radio signal, you are already datacasting. Datacasting, or messagecasting as we call it at BE, is simply the broadcasting of data, whether it's audio or a text message in the form of data.

Messages can be delivered via HD Radio as part of the digital broadcast for readout on HD Radio tuners, or generated on the analog FM signal by using an RBDS encoder for readout on radios with RBDS. Either way, you'll find all sorts of information to messagecast for profit or promotion or simply for listener enjoyment.

Simple artist and title information is how most stations start, but messagecasting can be much more. The ability to incorporate station promotions, advertiser messages and the like is transforming messagecasting from a simple way to send data embedded in automation files into something that will add a new dimension to how we do business.

Program Source

Datacasting Software



Encoding

Transport/Transmission

More than song title/artist

Song artist and title information is interesting and may have some value to the listener, but displaying simple artist/title information for three minutes straight as a song plays isn't the optimal use of the technology.

A lot of BE customers are rotating artist/title data with messages promoting advertisers or their stations. They're promoting advertisers and pushing upcoming contests or cross-promoting other dayparts. It's an approach called interleaving, and it's something good messagecasting software can do today.

Interleaving call letters and slogans with song information reinforces your brand, which can be handy when your listeners write in their diaries about their favorite stations. Messages can be configured to recycle listeners from one daypart to another, increasing TSL.

There's also the ability to tie text messages to specific on-air commercials, one easy way for advertisers to take advantage of messagecasting. The Radio Experience (TRE) makes it possible to display short messages as audio commercials run, possibly phone numbers, addresses or tag lines of advertisers. Moreover, messages can be associated with any audio, not just commercials. Clients can sponsor any programming on the station, from sports and news to contests and syndicated programming.

TRE messagecasting software allows the user to schedule the promotional messages being sent. The software has scheduling tools that allow users to set up blocks of messages (similar to rotating carts) and change the messages hour-to-hour. TRE online tools allow instant updates, to keep up with current contests and winners.

What's more, new opportunities are already being developed that take advantage of HD Radio technology. For example, instant traffic updates are being delivered in many large urban areas today. TRE software can bring in all sorts of data and present it in connection with audio, creating sponsorship and revenue opportunities.

Behind messagecasting

Digital automation systems take a lot of the work out of messagecasting, because so much information can be stored in a digital file. In fact, practically all automation systems store information with each cut of audio.

Remember carts? Every cart has at least one slightly greasy file-folder label attached that describes what's on the cart: the artist/voice talent, information about start and end dates, and any other information the production department thinks is important. It's not surprising that this convention of storing data with each cut followed to the digital automation systems that replaced most of our cart machines. Instead of a file-folder label, each digital cut has a virtual label (information stuck on a cart is stored digitally). Because this data is specifically related to the audio on the cart, or the program, this is the data we refer to as PAD, or program associated data.

Other data can be sent to listeners as well. In the studio of most stations are notecards with concert dates, ticket information, facts about a particular band or song, or possibly a contest to win the CD, song download or concert tickets. Messages directly related to the cut on the air are called near-PAD. These messages are usually not stored in the automation system with the cut, but in a separate database managed by BE's TRE messagecasting software.

Then there's non-PAD, or those messages not directly related to programming on the air. Think of these as the other set of liner cards next to the jock notes related to particular songs. These cards have messages like sports scores, stock tickers, weather information and traffic updates. They can also include station promotional messages like liners and promos. Like near-PAD, these messages are not usually stored in the automation system with the cut, but can be stored in a separate database managed by TRE software.

Near- and non-PAD have commercial applications as well. All the adjacencies, tags and sponsorships we've done for years on the air can be messagecast. We've managed this data in our analog world for years, storing data on file-folder labels and notecards, and delivering it during segues and coming in and out of breaks. These opportunities to talk about our station and communicate valuable information have been limited to times when the jock can open the mic. With messagecasting, we manage the same information digitally, but we have the opportunity to share it with our listeners all the time.

Messages to the listener

Most automation systems can export PAD, so all that is left is selecting messagecasting software to read that program associated data, integrate the near- and non-PAD messaging content, format it for the HD Radio or RBDS equipment, and then inject the formatted data stream into the air chain. Some key components are needed to start messagecasting.

Source: Generally, a program source refers to a digital automation system, although other sources are possible, such as the Broadcast Electronics CD Live software that generates PAD from a CD player using Internet lookups. There are three basic methods digital automation systems use to output "now playing" information: Serial using a COM port, TCP/IP using an Ethernet connection, and with a file that is updated by the software with each new event. Each automation system is different, so check with the manufacturer to determine your system's specific capabilities.

Messagecasting, TRE: The second basic component is messagecasting software such as BE's TRE Message Manager. Messagecasting software will accept incoming PAD from an automation system, manage near- and non-PAD and format the data for encoding. TRE has scheduling software that links audio and message events together. For example, a text message promoting a concert can be linked to an artist name, so that whenever TRE sees a song playing on the air from that particular artist, it knows to schedule the text at the same time.

A screen shot from BE's latest TRE system, released at the 2008 NAB Show, showing text messages linked to audio events.

Encoder: The third basic component will be an RBDS encoder or the HD Radio software. An RBDS encoder receives the output from the messagecasting software via a serial or IP connection and sends the encoded data stream to the exciter through a BNC connection. The RBDS encoder also inserts other bits of data defined by the RBDS standard into the encoded stream, such as the station call letters and station format.

The encoding process for HD Radio is handled by an HD Radio importer, which includes Ibiquity encoding software.

Transport/transmission: The last element is equipment capable of managing the transport and transmission of the encoded data. For RBDS, the encoded data is an analog/serial stream and can be transported from studio to transmitter using STLs with data transport capability. For HD Radio, the STL must have IP transport capability if the data is encoded at the studio site. Alternately, the pre-encoded data can be sent to the transmitter site as a serial stream, and encoded for HD Radio at the transmitter site.

Jim Roberts is the datacasting product manager for Broadcast Electronics, Quincy, IL.

NEW PRODUCTS

by Erin Shipps, associate editor

Studio monitors
Mackie

HRmk2: The THX-approved HR824mk2 and HR624mk2 monitors replace their predecessors, the HR824 and HR624, and boast a wide range of technological features. Crafted from a single piece of cast aluminum, the HRmk2's new Zero Edge Baffle minimizes diffraction for a crystal clear mix image, while its Optimized Waveguide delivers wide, even dispersion as well as full, articulate mids. Coupled with the passive radiator, the new baffle design also ensures tight, articulate bass extension. And with a real wood enclosure, the HRmk2s perform with maximum detail, clarity and warmth. The HR624mk2 features a 6.7" low-distortion LF transducer and a 1" titanium dome tweeter. The HR824mk2 has an 8.75" low-distortion LF woofer and a 1" titanium dome tweeter.

800-898-3211; www.mackie.com
productinfo@mackie.com

Digital two-track recorder
Dynasonics

PDR-1: Complete with four microphones consisting of two internal and two lapel mics with sensitivity adjustment, a set of ear buds and USB cable, the PDR-1 comes housed in a sturdy chassis. It records regular audio at 16-bit 44.1kHz, and MP3s at 128kb/s. At 1kHz, the signal-to-noise ratio is 55dB and frequency response is 20Hz to 20kHz. The PDR-1 has two 1/4" mono jacks, one 1/8" stereo line out jack, two 1/4" line in/guitar mono jacks with volume controls, USB Port, a 1"x2" LCD display and hold button. It is factory stocked with 128MB of Flash memory, expandable up to 4GB for a total of almost seven hours maximum recording time in stereo at full bandwidth, has built in monitor speakers, and includes a power adaptor.

800-343-0353; www.kaysound.com

Multi-channel headphone amp
SM Pro Audio

HP6E: The HP6E is a flexible and reliable six-channel headphone amplifier housed in a sturdy 1RU metal chassis. The HP6E boasts a variety of improvements over the original HP6 including improved frequency response, additional power, digital control of input selection, and a fifth mix input. Built-in flash memory has also been added to allow for last state memory recall of the input selection for each channel. The HP6E's flexible design allows any of the four available audio input source signals to be routed to any of the six Class A headphone amps provided on the HP6E. An additional fifth stereo signal can also be mixed into each individual headphone channel.

+61 3 9555 8081; www.smproaudio.com; sales@smproaudio.com

Audio to bare wire adapters
Har-Ken Specialties

HK-101, HK-103, HK-132, HK-104/102, HK-118: The HK-101 adapter provides binding posts for the connection of bare ended wires. The binding posts are also spaced to accommodate the use of a double plug test fixture. The normal connections are red post to pin 2 of the XLR and black to pin 3. The HK-103 and HK-119 (narrow profile) adapters provide binding posts for the connection of bare ended wires. The binding posts are also spaced to accommodate the use of a double plug test fixture. The third metal push post is connected to pin 1 (GND). The HK-104 adapter consists of a standard the pin XLR connector with a three-position terminal strip. The HK-104 also provides for connections of audio input or output circuits to existing Telco pairs or other non-terminated audio pairs. The HK-118 adapter provides for the quick connect/disconnect of bare ended wires in a miniature form. This mini-barrier will accommodate wire from 16 to 24 gauge.

610-384-2161; www.harkenspecialties.com; info@harkenspecialties.com

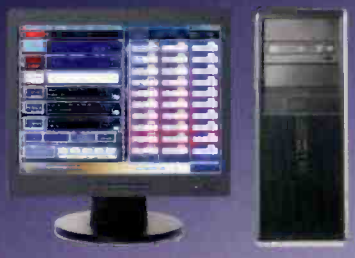
NEW NEW

Digilink automation from ARRAKIS

If you thought that you couldn't afford new Automation,

then you should think again !

The BEST Automation system for Radio costs only a few dollars per month... COMPLETE !!!



NEW **Xtreme-PC**

$50/month

(PC required)

NEW **Xtreme-ARC**

$75/month

(PC & ARC-10 console required)

Xtreme-Bridge

$100/month

(PC required. Bridge included)

NEW... Xtreme-PC is software for off-the-shelf Windows PCs that is ideal for hard disk audio, live or automated, broadcast or internet Radio. The NEW... Xtreme-ARC software turns the ARC-10 console (which has a built in USB audio channel with logic) into an integrated console-PC workstation. Turn the console channel on-off to start-stop the PC play list and record directly from the console to the PC over digital USB. And for those stations using multiple sources & satellite networks, the Xtreme-Bridge uses Arrakis 'Bridge' hardware to control up to 16 sources plus logic. Best of all, each of the three models includes the product plus training, support, & upgrades for less than the monthly cost of most cell phone programs. Go to the Arrakis website for more information about these exciting products and order today !!!

www.arrakis-systems.com/zrrx-1.html

970-461-0730

HJ Series connectors
ERI-Electronics Research

Heliax: Electronics Research has expanded its line of Heliax to rigid coaxial line connectors to include connectors for 3" cable to 3 1/8" rigid line and 1 5/8" cable to 1 5/8" rigid line. E-connectors' flanges allow direct connection to rigid transmission line, television and FM antenna inputs, and transmitter outputs. All connectors are available in both gas pass and gas barrier versions, as well as male and female configurations. The new Heliax connectors are available in 10 models.

812-925-6000; www.ERIinc.com
sales@ERIinc.com

Engineering software
Fifty Thousand Watt Software

Voice from the Past: Voice from the Past comes in two programs, VP-Record and VP-Retrieve. VP-Record is designed for simplicity. The user supplies an audio source and designates a sound file folder. VP-Record continuously records all audio in full CD-quality. The recording is done in 1-minute sound files so that, in the event of a hardware or power failure, no more than 60-seconds of recorded material is lost. VP-Retrieve can retrieve the recorded audio from anywhere on the network. A typical station might have one seat of VP-Record and five seats of VP-Retrieve. The VP-Retrieve program has a user interface that makes it easy to designate a time period to retrieve, and then controls that make it easy to audition the retrieved audio so that it can be correctly trimmed at the start and the end of the desired event. The retrieved audio is exported to a single continuous WAV file. Voice from the Past can save up to three weeks of audio. The program automatically deletes sound files older than the designated save time. The main screen continuously reports the amount of remaining disk space. Voice from the Past is particularly well suited for recording live radio shows for rebroadcast. It removes the need to set up to record a show. The show can simply be retrieved at any time in the following few weeks. Voice from the Past runs under Windows.

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

Studio monitors
Samson Technologies

Media One: Available in three configurations, Media One Active Monitors offer full-range sound. Each model is equipped with a 25mm high frequency tweeter and passive crossovers utilizing a multi-pole design for a linear response. The Media One 3A has a 3" woofer with 15W of Class A/B internal power. The 4A offers a 4" woofer with 20W of internal power and the 5A sports a 5" woofer with 20W of internal power. The result is a compact cabinet that delivers solid bass response and extended highs. Each pair of Media One monitors has a front control panel with volume control, headphone output and an auxiliary input for connecting a second signal source such as an MP3 player.

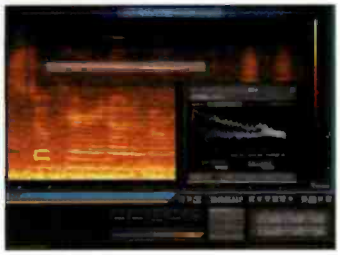
631-784-2200; www.samsontech.com; info@samsontech.com

Live two-way broadcasting
Technica del Arte

Luci Live Two: With Luci Live Two, users can broadcast to any professional IP-codec and play pre-recorded material while broadcasting. The unit features RTP or UDP low-delay streaming, shoutcast or icecast compatibility, recording while broadcasting, realtime MPEG conversion to MP2 and 48kHz sample rate, 32 to 256kb/s.

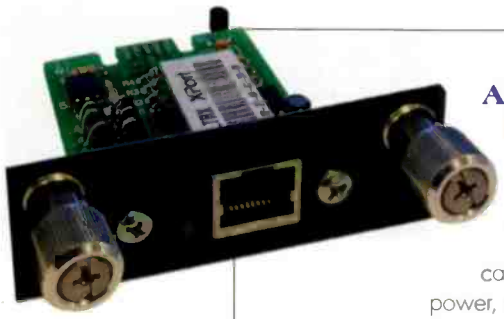
+31 43 32 19 499
www.technicadelarte.com
sales@technicadelarte.com

Audio editors plug-in suite
Izotope



RX Plug-ins: Izotope RX audio restoration plug-ins feature the essential tools for cleaning and restoring audio. Available for VST, Audio Unit, MAS, Pro Tools (RTAS, Audio Suite), and DirectX, the plug-ins are now included with the stand-alone version. Current RX customers will be able to download the update free of charge. RX removes hiss and buzz, eliminates clicks and crackles, and repairs overload distortion in audio. New intelligent Spectral Repair algorithms can even analyze and fill gaps in audio files to restore previously unusable recordings.

www.izotope.com
izotope@izotope.com



AC power management
Panamax

M7500CRD-IP: The M7500CRD-IP is a card for remote control of the MAX 7500-PRO power management system. Featuring remote diagnostics and e-mail alerts, the M7500CRD-IP reduces the need for installers to drive to an end user's location for routine maintenance and re-setting. Utilizing the card, users have control of the MAX 7500-Pro's individual outlet banks, featuring power, trigger and delay settings. Remote diagnostics check the unit status and incoming line voltages, while e-mail alerts for over- and under-voltages help users anticipate or prevent service calls. The IP card features an easy, plug-and-play installation interface and spring-loaded screws to secure the card to the rear of the MAX 7500-Pro. An included LAN port is compatible with BaseT 10/100.

800-472-5555
www.panamax.com
custrelations@panamax.com

Hand-held test set
Aeroflex

3500 Radio Test Set: This RF spectrum analyzer option for the 3500 hand-held 1GHz Radio Test Set allows users to see the signals they are receiving. In addition, the 3500 will have P25 parametric test capabilities by summer 2008, making it even more versatile. Using an advanced Fast Fourier Transform (FFT) algorithm, the 3500 spectrum analyzer option provides an almost instantaneous display of the RF frequency spectrum. It has the ability to measure signal levels down to -136dBm, providing advanced signal analysis in a lightweight platform, weighing less than 8.5lbs. Operation of the 3500 spectrum analyzer includes span ranges of 10kHz to 5MHz and an effective resolution bandwidth as small as 19Hz. Marker functions are available for the user to measure power in a specified bandwidth.

1-800-843-1553
www.aeroflex.com
info-test@aeroflex.com

UPGRADES and UPDATES

Telos Systems is now shipping the Zephyr/IP, an IP codec optimized for operation over the public Internet and mobile phone data services. Zephyr/IP utilizes ACT (Agile Connection Technology), which combines loss detection and concealment with dynamic buffering and auto-varying bit-rate functions to continuously adapt to network conditions, minimizing the effects of packet loss, varying bandwidth and jitter that occur on real-world networks. Z/IP also works directly with high-speed mobile phone data networks. **(www.telos-systems.com)** ... **Enco Systems** will add support for Itunes Tagging for HD Radio to its DAD Digital Audio Delivery system. Enco notes that the update will be made available to DAD users at no additional cost or monthly service charge. **(www.enco.com)** ... **Broadcast Electronics** has added new features and upgrades for its text automation system. The Radio Experience can now provide opportunistic insertion of text ads plus online text plug-ins from weather, sports and other information providers. **(www.bdcast.com)** ... **RCS** has empowered Nexgen Digital automation with Google's Ad Sense for Audio program, providing stations access to advertisers who are new to radio marketing. **(www.rcsworks.com)** ... **Day Sequerra** has added new features to its soon-to-ship M3 model. Each of the three tuners included with the unit will include the ability to display the Apple UFID Buy Button data. Day Sequerra is first to include Buy Button diagnostics in its line of professional HD Radio modulation monitors and tuners. **(www.daysequerra.com)** ■

Loudspeakers
Tapco

Series 69: Designed by Loud's touring sound veterans, Tapco's Series 69 Loudspeakers deliver professional quality at an affordable price. For maximum portability, they are made as compact as possible without sacrificing performance or efficiency. Series 69 Loudspeakers feature premium drivers, PVC vinyl-covered wood enclosures, custom-molded thermoplastic edge bumpers, and bigger sound than any big-name speaker in its class. The Series 69 Passive Loudspeaker family includes the 6912, a 12" two-way system; the 6915, a 15" two-way system; the 6925, a dual 15" two-way system, and the 6918s 18" passive subwoofer.

425-487-4333; www.tapcoworld.com
sales@tapcoworld.com

Portable codec
Mayah Communications

Sporty: The Sporty Portable Reporter Codec can transmit from anywhere to anywhere, while simultaneously recording to USB sticks or SD cards. Built to the same demanding standards as the Flashman II, Sporty is a robust, portable studio with two new, state-of-the-art audio formats. Sporty is able to automatically recognize and connect to almost any audio codec and format available. Sporty is also the ideal unit for live reporting; pairing ease-of-use with enormous flexibility, it is able to master many different and difficult interview and reporting situations.

+49 811 55 16 0; www.mayah.com
info@mayah.com

Audio connectors
Neutrik

Combo A Series: This newly developed receptacle accepts both XLR and 1/4" phone plug connectors, offering users both cost and space savings. Based on the A-Series panel cut-out, the smallest available panel mount XLR, it features high packing density and excellent space savings. The new A-Series combo is available in two versions: as a 6-pole vertical receptacle and a horizontal PCB mount receptacle, without switching contacts.

732-901-9488; www.neutrik.com
info@neutrikusa.com

Promotional item launcher
Air Cannons

Guitar Air Cannon: Air Cannons are in action just about every night in arenas and stadiums around the nation and around the world. One recent development provided by Air Cannons is the added convenience of shrink-wrapping the t-shirts so it's more convenient for the shooter to fire more shirts in a shorter amount of time. The company also offer new products that can be shot into the crowd. Air Cannons are used as a marketing tool at events to excite the crowd, but also to brand the event holders, sports team or their sponsors. Besides shooting t-shirts, the air cannons can also shoot other items that include coupons or other branding materials.

www.aircannonsinc.com

Compact subwoofer
Adam Professional Audio

Sub7: The Sub 7, a new compact subwoofer designed to complement the A5. Despite its small footprint, it is capable of extending the frequency reproduction of the A5 down to 30Hz. Multiple inputs (both XLR and RCA) and controls that allow the system to be fine-tuned to any listening environment make the Sub 7 the ideal partner for the A5. A wireless remote control for adjusting the volume and crossover frequency from the listening position is also provided.

818-991-3800; www.adam-audio.com
usa@adam-audio.com

Foam inserts
Middle Atlantic Products

Customizable Foam Inserts: These customizable foam inserts provide storage for accessories and delicate pieces of equipment. The inserts are quickly and easily modified to hold anything tightly in place, while providing the added convenience of being able to store them in a single location. The inserts fit any Middle Atlantic Products drawer, and are sized to occupy 2RU, 3RU or 4RU.

973-839-1011; www.middleatlantic.com
sales@middleatlantic.com

Website services
Vision Enhanced Studios

Website services: Vision Enhanced Studios, a creative firm specializing in rich interactive media content, is using next generation technology to help radio stations build brand awareness and brand loyalty. Rich interactive media, also known as multimedia, refers to an electronically delivered combination of media that includes video, still images, audio and text created in such a way that it can be accessed interactively on the Internet. For radio stations, this translates into sophisticated websites that attract and engage audiences online, thereby expanding brand personality further into a visual presence and further into the online lives of listeners.

336-852-8614; www.visionenhanced.com

Audio streaming over IP
Mediatron

Streamcube: Streamcube is able to transmit audio signals economically via IP-based networks such as LAN, WAN and Internet (DSL) and over long distances to several receivers or to a Shoutcast/Icecast Server. The Streamcube series consists of Encoder (Audio-to-Ethernet) and Decoder (Ethernet-to-Audio) and is suitable likewise for permanent and temporary installation. The encoded audio signal can either be transmitted within a building complex via CAT-5 Ethernet LAN-cable and standard network switches to one or more devices from the Streamcube DEC series or to PCs. The bitrate and sampling-frequency are adjustable for different sound qualities (MP3) in mono or stereo. The controlling and administration of the Streamcube works with a Web browser-based application via PC, PDA or another Web-based device.

+49 89-3715645-0; www.mediatron.com
info@mediatron.com

Small console
Soundcraft USA

GB2R: The Soundcraft GB2R is a 19-inch rack-mountable mixer designed specifically for smaller installations or small portable PA systems. Available in two variants, the GB2R offers either 16 mono inputs to a stereo mix output, or a 12.2 version with 12 mono inputs, two full-featured stereo inputs and two group buses, each model having six auxiliary sends. The Soundcraft GB2R inherits both the GB30 mic preamplifier and GB30 equalizer designs from the larger GB4 and GB8. For ease of installation, the connector section is contained in a rotatable pod, allowing cable access from the top of the mixer if sat on a tabletop or from the rear when mounted in a 19-inch rack. The rack ears can also be removed. On the stereo inputs of the 12.2 model, connectors are provided for both mic and line inputs. Two stereo returns and a two-track input are provided, which means that the GB2R-12.2 model can offer up to 26 inputs to mix in a mixer just 19 inches wide. Every input has a pre/post switchable direct output for recording or effects sends, while an internal universal voltage PSU avoids external power supply connections.

818-920-3212; www.soundcraft.com
soundcraft-usa@harman.com

Mini RBDS/RDS encoder
Deva Broadcast

Smart Gen Mini: Smart Gen Mini Encoder is the quick and inexpensive way to have an RDS/RBDS presence. USB connectivity makes it easy to program the non-volatile memory using any PC and the supplied Windows software. After programming, the unit may be disconnected and re-installed at the transmitter site. Though it is not capable of dynamic messaging with song titles, Smart Gen Mini will identify a station by format, display a station's street name, and continuously transmit any station promo or advertising message to listeners.

+359 56 820027; www.devabroadcast.com
sales@devabroadcast.com

Music library
Music 2 Hues

Funk Guitar and Base: If you are looking for some funky guitar and bass grooves, then this collection has it all. You'll find everything from retro to cutting edge funk here. Soulful guitar playing takes center stage, along with some pop and slap bass playing and funky organ riffs.

888-821-7515; www.Music2Hues.com

Dynamic noise suppressor
Cedar

DNS1500: The DNS1500 updates the style, design and performance of the DNS1000. With an improved chassis and updated processors, it couples the perfect ergonomics of the DNS1000 with improved 2-channel performance and up to 100kHz capabilities for increased compatibility in today's audio environments.

207-773-2424
www.independentaudio.com
info@independentaudio.com

Wireless intercom
Intracom Systems

VCOM: This next generation wireless intercom brings the power and functionality of Intracom's VCOM Software Intercom System for PCs to the palm of your hand. As with the PC system, the wireless, handheld version supports virtually an unlimited number of channels configurable for point-to-points, group calls and party lines. As many as 200 users are supported and can talk hands-free privately or in full duplex conference. The wireless system easily interfaces with other communication systems, does not have frequency constraints, and runs on readily available Wi-fi and/or data-cellular-enabled handhelds running Windows Mobile 5.0 and higher. Based on a dedicated-server, multiple-client architecture, the software can be used as a stand-alone wireless intercom system or in conjunction with IntraCom's VCOM Software Intercom System for PCs. The VCOM Wireless Intercom Control Panel GUI enables non-blocking, point-and-click control to establish talk and/or listen voice paths. Multiple group and individual voice paths can be established simultaneously and multiple conferences can be accommodated in any complexity. All basic paths are established in advance and are always on for instant (multiple) channel access for talking and monitoring.

518-827-8502; www.intracomsystem.com
info@intracomsystem.com

Firewire Audio Snake accessory
I/One Connects

3U XLR panel: The 3RU panel has XLR connectors for 16 analog inputs and 16 outputs, plus four stereo digital in and four out (AES-S/PDIF); eight channels of ADAT in and out remain on the 1U main unit for a total of 32 in and out. Any input can be routed to any output of any other unit connected up to 1,640 feet away over fiber optic cabling. I/ONE Firewire Snakes carry up to 96 audio channels with word clock and control, bi-directionally in one cable.

817-371-7033; www.ioneconnects.com

Advertising delivery system
Yangaroo

Agentless Ad Delivery: Agentless Ad Delivery increases portability and expedites access to DMDS by allowing for radio ad spots and traffic details to be downloaded from any Internet-connected PC or Mac, anywhere in the world. Agentless Ad Delivery builds on the inherent portability of the DMDS technology, which ensures security by linking a password to a specific person and not a computer or IP address. Clients can now securely download files using DMDS without the need to download and install the DMDS agent software.

905.763.3553; www.musicrypt.com

Locking USB connector
Sealevel

SeaDAC Lite: SeaDAC Lite modules are perfect for a wide variety of applications including process control, facility management, security and broadcast automation. The optically isolated inputs protect the host computer from damaging voltage transients and ground loops commonly found in industrial and OEM applications. The 8111's SPST Reed relays are rated to 500mA, and the 8112 uses high-current SPDT Form C relays to switch up to 6A loads. To simplify installation and troubleshooting, status LEDs display I/O activity and USB connection information. All SeaDAC Lite modules are powered by the USB connection to the host computer. SeaDAC Lite modules are housed in rugged plastic enclosures ideal for mounting on walls, under counters or inside equipment panels.

864-843-4343; www.sealevel.com
sales@sealevel.com

Traversal server
Comrex

BRIC TS: Bric TS is designed to make Access IP connections simple. Users can log in to the Bric TS server using a standard Web browser and create an account. A User Group is created and Access units are added to the account. After the account has been configured, Access units will automatically synchronize with Bric TS. A Buddy List is added to each Access unit's address book, which shows all users in the specified group as well as each codec's connection status and IP address. Connection between Access units is a simple point and click regardless of each unit's IP address and location behind firewalls or routers.

800-237-1776; www.comrex.com
info@comrex.com

Microphone
Neumann

TLM 103 D: When used in conjunction with digital workstations, digital Solution-D microphone technology makes life easier for users. The integrated, fast peak limiter guarantees optimal recording levels at all times. Likewise, the Neumann A/D converter built into the microphone eliminates the necessity of tedious experimentation with external converters and preamps. The TLM 103 D is available in a choice of satin nickel or matte black finish, with a SG 1 swivel mount.

860-434-5220
www.neumannusa.com
neumlit@neumannusa.com

HD Radio Series
Noisecom

DSG9000: The DSG9000 series instruments are HD Radio signal sources designed to play pre-recorded vector files that replicate various HD Radio service modes and channel configurations. The series has two models, one with all vectors for receiver design, and the other with two production-level vectors for rapid testing. Every DSG9000 includes a removable HDD for vector file storage and DVD drive to install future updates. The signal vectors are certified by the Ibiquity Digital.

973-386-9696; www.noisecom.com; info@noisecom.com

Radio to DVB encoder
You/Com Audiocommunicatie

MXTS: The MXTS is a high quality audio encoder for cable, terrestrial and satellite audio distribution as well as STL-applications. The output, whether it is ASI, E1 or IP, is a DVB-compliant multiplex for up to 19 channels. RDS support per channel to feed FM transmitters and cable head ends is one of its strong features. The IP input module for MXTS will support the contribution of audio signals over IP. This input module is capable of receiving signals from a broad range of encoders. This could be MPEG2Layer2, MP3, WMA and AAC as well as Internet radio streams.

+31 15 262 5955; youcom.nl

Better marketing of HD Radio

I just bought my first HD radio. Circuit City seems to be closing out the HD radios. I got a display Boston Acoustics Receptor HD for $34. Only a couple other models were left on the shelf.

First impressions: It's deaf. I'm 8.9 miles from the Miami tower, 100kW stations. The included wire antenna needs to be in just the right spot to get anything. When I hold it just right, it sounds great. With just one speaker, there's no real difference between analog and digital other than the additional programming. The bass response is very good for such a small unit. According to the radio, my favorite Clear Channel Rock station isn't digital yet. But for $34 its audio beats the hell out of my old clock radio.

If anyone wants to know why HD Radio isn't selling, check out this page you can get to from the Boston Acoustics and Ibiquity sites: www.hdradio.com/find_an_hd_digital_radio_station.php

Click on Florida (or any state). Format: AC? Just how many normal people know what AC is? CHR? AAA? The American Automobile Association has a format now? Is that traffic reports?

But not one abbreviation in the owners column. As if the public is going to be looking for a Clear Channel station before they look for a Classical station. Is there really no one looking at HD Radio from the consumer's position? Or was this whole HD Radio thing just to please station owners? The FCC?

I can't figure out how these are even sorted. Market, then what? Clearly it's not set up for someone looking for a particular type of music in his market. How many people in Cocoa know they need to look under Melbourne to see their stations? How about a clickable map just like the first page?

The promos on the air are about as bad: cute commercials about a car radio not wanting its owner to upgrade to HD Radio. But no mention of what's there to get other than general types of programming followed by 'blah, blah, blah.' Yeah, that sells it. By the end of the commercial, I'm siding with the old radio.

By now there should be a whole lot of 'only on HD Radio' type teases. "Right now on WXYX-HD2, hear ..." Did XM and Sirius get to where they are today with "more of the same, just digital"? Doesn't anyone want to do a cross-promo for his own station?

Is there no one in radio that knows how to sell audio programming to listeners any more? I don't claim to know how either, but I'm smart enough to know that this sure isn't the right way.

Ray Vaughn
Miami, FL

The ups and downs

I don't know whether to laugh or cry regarding the headlong rush into technology for technology's sake. The articles in the April issue, *Managing Technology* and *Facility Showcase* both tout transitioning to digital studio and delivery. But wait, the article *Digital Audio Primer* warns of mysterious pops and drops, and the increasing amount and complexity of equipment and thus the increasing cost of the equipment and cost of the test equipment to keep it running right.

The voice is analog and the ear is analog. Properly set up FM sounds excellent. Digital AM just trashes the dial. And the consumers aren't buying the technology anyway. Complicated and expensive or simple and cheap? An easy decision, unless your product – the actual radio content – is plastic, repetitive, boring and so on, so the public isn't listening, and management cuts costs to bankruptcy while debasing the product even more. So consultants have sold the notion that "platforms" – Wi-fi, HD Radio – will fix it.

In all the years we've been on the planet, life hasn't really changed all that much. It's still about your work, wife, kids, health, love, loss, life and death. We just have more stuff now. Radio in the 30s, 40s and 50s was about a connection between the folks in the studio and the listener. Today, it's fake. The conglomerates have assured that by making everything so structured. The DJ isn't riding along with you as a companion. It just isn't there. All the techie stuff can't – here's the key – make it interesting. Computers can't do that. Hiring the best people you can and then letting them use their brains and do their job, can. What part of this can't the industry "leaders" grasp?

WAGS radio is "Live radio, real people in real time" playing music from CD, LP, 45, and yes some 78s, following a guideline that allows the emotion of the music and DJ to keep us a leader in discovery of both old and new music.

Jim Jenkins
owner/general manager
WAGS Radio
Bishopville, SC

Chriss Scherer replies:

I agree with you that there is no substitute for quality programming. I also agree that many stations have lost the community ties that built radio into what it is now. Read the Facility Showcase in this issue on

page 36 and you'll meet one owner who understands the need to be a part of the community.

You can argue that all the new technology is tech simply for tech's sake. Times change. Listeners change and grow up. For good or bad, radio broadcasting has to keep up with technology or decide to be left behind.

Traveling road show

Hello Chriss,

I saw your editorial in the April issue of *Radio* magazine. It is most unfortunate that they can't move the NAB Show around the country. It is prohibitively expensive for us on the East Coast to travel to Las Vegas to go to the show, and these bad economic times cause station managers to regard the NAB Show as a frivolous expense. Add to that the hassle of dealing with the rent-a-cops and TSA goons at the airport and you get the picture. I have been to the NAB Radio Show – but only when it was held in Philadelphia, which is about two hours by car from where I am based. In the 36 years that I have worked in broadcasting, I have *never* been sent to the main NAB Show in Vegas. The only time I did go there was when I worked for Modulation Sciences for a couple of years. But I could not enjoy the show then, as I was stuck in a booth hawking TV equipment! I will probably go to my grave without ever being able to see the NAB Show in Las Vegas.

Name withheld

Chriss Scherer replies:

I understand the real costs of attending any convention. It's also true that Las Vegas is not the uber-cheap destination that it was 20 years ago. Still, if it's important to you to attend, there are ways to get there. I have a colleague who pays his own way to attend every year. He values the experience enough to make the personal commitment. He also prefers traveling this way because then he only has to answer to his own time.

When I was working at stations (before working for Radio magazine full time), I was able to attend the convention by contributing to the magazine or working with a manufacturer. There are limited possibilities to this approach, but there are ways to make it happen. It might take some creativity.

NAB photo

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THE RADIO TECHNOLOGY LEADER

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Contributor Pro-file

Meet the professionals who write for *Radio* magazine.
This month:
Facility Showcase, page 30.

Mark Bohach
Co-owner
WLOH Lancaster, OH

Bohach graduated in 1982 from Hocking College in Nelsonville, OH, with an AAS degree in broadcast engineering. Since then, he has been continuously involved in radio. He has held engineering positions at WOUB-AM/FM/TV in Athens, OH; WCOL/WXGT in Columbus, OH; WLOH/WHOK in Lancaster and for Salem Communications in Cincinnati, Columbus and Detroit.

In 1992, Bohach and his wife Arlene purchased their first radio station, WWBK-FM, in Fredericktown, OH. In 1995 they added WBZW-FM Loudonville. They sold these stations in 1998. They have owned WLOH in Lancaster twice.

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THE RADIO TECHNOLOGY LEADER

Written by radio professionals
Written for radio professionals

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by Erin Shipps, associate editor

Do you remember?

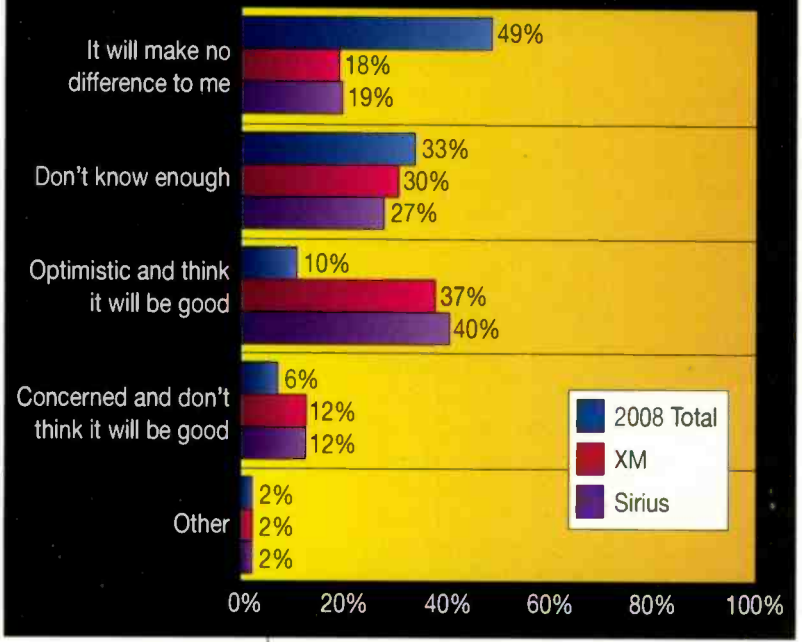
We recognize that remotes are a significant part of radio broadcast. In light of this, here is an ad from *Broadcast Engineering's* January 1969 issue for the Shure SM60 omnidirectional dynamic microphone. The ad says the mic features an effective built-in wind and pop filter to protect against the undesirable effects of close-talking. It also claimed you could "drop it on its nose without damage to the internal structure." And check out the model SM51 lapel mic at the bottom, which was specifically designed for radio, TV and motion pictures.

Do you have interesting radio ads from the past? Tell us about it at radio@RadioMagOnline.com.

Sample and Hold

Feelings on Proposed XM/Sirius Merger

Jacobs Media recently released its Tech Survey IV for 2008. Within the survey is a lot of talk about the XM/Sirius merger, which was approved by the Department of Justice just a short time ago. The survey said, "While details of how the proposed merger may impact pricing and packaging are still to be determined, most non-subscribers (the types of people that XM and Sirius are targeting) don't feel it will have any sway to motivate them to sign up." So how do these non-subscribers feel about the possible merger?



Source: Jacobs Media, Tech Survey IV, 2008

That was then

J.R. Reid sent these photos that his daughter found of him, taken in 1964. J.R. was a DJ at WUSJ-1340 AM in Lockport, NY. The studio featured an RCA 77DX microphone, Gates 16" turntables, an RCA turntable for playing electrical transcriptions, a General Electric board and ITC cart machines in the rack. J.R. also had many home studios over the years, as seen in the second photo.

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