

Radio

THE RADIO TECHNOLOGY LEADER

November 2009
RadioMagOnline.com



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new news

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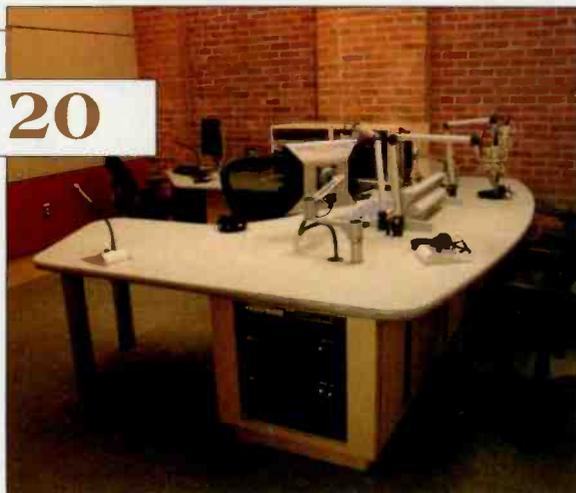


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ON THE COVER

When WFCR decided to base its news staff in its major coverage city, it discovered more than news in the beautiful century-old brick and post-and-beam facility.

Cover design by Michael J. Knust.



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Currents Online

Selected headlines from the past month.

FCC Updates ECFS

The 2.0 upgrade adds many new features, including Section 508 compliance and the ability for users to file multiple documents to multiple rulemakings in a single submission.

Don Markley Dies ➔

Donald L. Markley, founder of D.L. Markley Consulting Engineers died Oct. 22, 2009. He was 73. Markley was an occasional contributor to *Radio* magazine and a regular contributor to *Broadcast Engineering* magazine.



Society of Broadcast Engineers Appoints 2010 Committee Chairs

The appointments took effect during the 2009 SBE National Meeting in Verona, NY.

Jim Godfrey Joins Jampro and Comrex Sales Staffs

He will focus on sales in Latin America for both companies.

Monroe Electronics and Digital Alert Systems Merge

Under the terms of the merger, DAS will become a wholly owned subsidiary of Monroe.

Thorsteinson to Retire from Harris

Tim Thorsteinson became the president of Harris in 2006, joining Harris in 2005 when Harris acquired Leitch.

It's not Dyslexia, RTNDA becomes RTDNA

The group's new name is the Radio Television Digital News Association.

Find the mic and win!

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Podcast: John Battison on the SBE

John Battison recalls the early days of founding the Society of Broadcast Engineers.

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Web links to the advertisers in the November issue.

Industry Events

The *Radio* magazine Industry Events section lists upcoming conventions and conferences.

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Changing of the guard

When you think of AM RF systems, the names of a few individuals come to mind. Over the past few years, Ben Dawson and Ron Rackley have been holding the exalted AM guru post with their visible appearances at NAB convention presentations. Carl Smith is of course another name associated with AM. But as a *Radio* magazine reader there's one name you know that is held in high regard when it comes to AM: John Battison. I'm proud to say that he is a significant contributor to *Radio* magazine; you regularly see his column here.

John's career in radio is long and varied. And while I noted his experience with AM, he is just as knowledgeable in FM and TV. His work with RF has taken him around the world, and he epitomizes the title of his RF Engineering column with his knowledge of transmission systems.

John's involvement with *Radio* magazine begins with his work on *Broadcast Engineering* magazine. While *Radio* magazine on its own has been around since 1994, its roots begin in 1959 when *Broadcast Engineering* covered radio and TV. Not long after *Broadcast Engineering* was founded, John was writing for it.

In December 1961, he became consulting editor and penned an editorial outlining the need for a new technical society that would serve the interests of the station engineer. That suggestion took root, and by 1964, John had built the foundations and became the first president of that new society: The Society of Broadcast Engineers.

And while John's RF work is extensive, he has many other interests. He was an RAF pilot in WWII. He is an ordained minister. He loves cats.

In the years of reading his columns before I joined *Radio* magazine in 1997, and then working with him since becoming the editor, I have learned a great deal from him. I'm the first to admit I got into radio because of my interest in audio. I picked up RF along the way, and I certainly have gained a great deal of understanding from John.

Several years ago, John retired from his regular consulting work. He retained a few clients, and

he continued writing for *Radio* magazine. What saddens me is that John has told me the time has come for him to surrender his regular column post. He has put in nearly 50 years of writing for *Broadcast Engineering* and *Radio* magazines. I'd say that's a pretty good run.

I don't plan to let him just disappear, however. While he may not write a regular column, I will tap his knowledge as a technical resource in the future. You may still see his byline on occasion for special features. So rather than saying John is signing off, let's just say he is going to reduced power for post-sunset operation.

John's last regular column appears in this issue.

Because John has touched so many people in radio, we have created a blog for your comments at RadioMagOnline.com and a discussion thread on Facebook. Please post any comments for John that you would like to share.

Also, look to Sign Off for more of John's accomplishments and history with *Radio* magazine.

The RF Engineering column will continue, and another RF expert takes over the reins from John: Jeremy Ruck. Jeremy has many years of RF experience working with Don Markley (yet another legendary name in RF). Jeremy has written for *Radio* magazine in the past, so it's my pleasure to bring him on to the regular roster.

Chris Scherer



Webinar: IP Audio in the Studio
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The phasor

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

Over the nearly 80 years that have passed since the first AM DA was built in this country, the state of the art has progressed slowly but steadily. The FCC's engineering department coped well with the new challenge, and through necessity developed a set of engineering rules establishing a method of proving that the completed antenna systems produced radiation patterns similar to the proposals made in the original Forms 301.

Providing the information the Commission required became an expensive proposition and quite possibly resulted in a few less-directional stations being constructed. As the proposed operations tended to become more exotic, a lot of thought was expended on developing a more convenient method of proving a directional antenna pattern. In 2008 the industry's efforts were rewarded and the FCC approved the new

simplified directional antenna proof of performance program. Gone now are the mandated expensive, time-consuming and occasionally dubious, lengthy radial runs. In their place is what has become almost a computerized proof. The new DA proof of performance requirements have already been broadly described and discussed; however, the new reduced actual field measurements still entail a minimum amount of actual measurement. These measurements, plus a number of very accurate system measurements, combine together to prove the working directional antenna system's compliance with Form 301.



Heart of the antenna system

The phasor is basically the heart of the AM directional antenna system. This unit, together with other circuit items such as antenna tuning units (ATU), accurately calibrated instrumentation and accurately cut lengths of coaxial cable forms the brain and heart of the DA. Over the past 60 or so years I have come across many different phasors, some were beautiful precision works of art, others were good, solidly constructed work horses and one or two were unbelievable. But they all worked – according to the licenses on

the station walls. It seems that with the greater emphasis being placed on the actual system's measured values of individual units ease and accuracy of measurement should have high consideration in phasor design.

The purpose of the phasor is to direct RF of the required phase and magnitude from the transmitter to the individual towers in the antenna array. This is accomplished by feeding the signal into a power dividing and phasing network system whose name was well known by radio engineers long before "Beam me up, Scotty" was a popular phrase, and with a very different connotation!

We have all encountered conditions at transmitters where one had to be a contortionist to access the desired measurement points. Often it was necessary to disconnect components and devices in order to insert a measuring instrument. Examination of the new rules seems to imply that repeatable readings are an even more precise requirement of an acceptable system. For example, in some critical cases it might be necessary to record the actual positions of the OIB leads and also whether the short or long clip lead was used so as to be sure of repeating the measurements under the same conditions. This sort of statement may seem like splitting hairs but my interpretation of the new rules seems to call for much greater care in making and recording circuit and component values than has sometimes been required in the past.

Perhaps some modifications in facilitating easier measurement of circuit values might be worth considering by phasor manufacturers. The placement of such things as jacks for inserting inline operating bridges and similar devices does not always make for easy accomplishment. Some engineers find that a permanent inline bridge mounted at the phasor input common point is very convenient. It certainly is, but it confines bridge use to that one circuit. To facilitate OIB flexibility it might be worthwhile locating a common point input jack on the front panel of the phasor with adjacent provision for supporting the bridge during measurements. Such an arrangement would require a removable insulated cover at the access jack for the OIB clips, but it would obviate the need to disconnect the input cable, which sometimes is necessary when measuring common point impedance.

Inside job

Most engineers have had to open the back of the phasor and connect an OIB to a jack in an individual tower cable. This generally requires opening a phasor door or even occasionally removing a piece of the cabinet. It is not uncommon to find a slight change in the measured circuit values when the cabinet door is closed or the piece of cabinet replaced. I have also noticed this occurs occasionally when opening or closing ATU cabinets in the field. In view of the reliance placed on circuit values and measurements in the new computerized directional antenna proof of performance this may be a point worth considering by equipment manufacturers.

One of the *bete noires* of many station engineers (myself included) is the tapped inductor. This is a useful device, but in my opinion, in many cases its time has passed. For one thing, positive identification of critical tap positions is comparatively difficult to determine. Nail polish is still good, provided it doesn't unwittingly interfere with clip connection. But every time it is changed the flexible lead can also move and change reactance values. The actual tap changing also requires transmitter shutdown and reentry into the phasor or ATU. After this has occurred several times while trying to find the correct tap position, a good-enough position may be accepted through laziness or sheer fatigue.

The use of continuously adjustable inductances is preferred. Not only is correct tuning usually achieved more quickly, but precision adjustments can be made very easily via smooth turning panel mounted control knobs. There is no need to open cabinet doors or remove cabinet panels. Excessive transmitter ons and offs are avoided leading to longer component life and generally improved operational economy. Although continuously variable inductors are more expensive than tapped coils, the additional cost is worth it overall.

Even the lonely ATU inductor in a doghouse or all-weather field mounting would benefit from a change to a continuously variable coil. The time may be ripe now for phasor and ATU designers and manufacturers to look at operational flexibility in the design of such equipment. Maybe the upcoming generation of radio engineers will encounter a new ease of measurement as a facet of the Commission's new directional antenna proof rules.

E-mail Battison at batcom@verizon.net.

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Engineers propose abandonment of "ratchet" rule

By Harry Martin

Ron Rackley and Ben Dawson have filed a petition for rule making on behalf of their firms (du Treil, Lundin & Rackley, and Hatfield & Dawson) proposing a significant change in the AM allotment rules – specifically to footnote 1 of Section 73.182(q). Initial comments were due on the proposal on October 9.

The following simple example taken from the Rackley-Dawson petition illustrates how the ratchet rule currently operates: Station A is a 5.0kW station on 1000kHz with a quarterwave nondirectional antenna and a nighttime interference-free level of 3.0mV/m and Station B is a 5.0kW co-channel station located some distance away that has a nighttime interference-free RSS of 13.0mV/m including a single limit from Station A of 8.3mV/m. The Station B antenna was designed to have a null in its vertical radiation pattern protecting Station A, but Station A was there first and does not protect Station B. Both stations have 5mS/m ground

the nighttime interference-free RSS at Station B will decrease from 13.0mV/m to 12.5mV/m.

Ratchet rule

The ratchet rule was adopted in the early 1990s as part of an effort to reduce interference in the AM band. Unlike FM and TV, at night AM signals bounce off the ionosphere and come back to earth far away from the transmitter. This leads to serious nighttime interference problems, because the bounce (also known as the skip effect) tends to be somewhat unpredictable. (In fact, the calculations are possible only statistically.) To deal with those problems, the Commission over the years devised a complicated set of standards designed to limit, but not absolutely prevent, the nighttime interference stations could expect to encounter.

The ratchet rule was intended to induce reduction of interference by making reductions in a Class A or B station's contribution to potential nighttime interference a condition to changes in that station's facilities.

The Rackley-Dawson petition illustrates how the rule, in practice, tends to discourage service improvements even when such improvements would greatly outweigh any advantage gained through supposed reductions in nighttime interference. In this connection the engineers point out that the stations most likely to be constrained by the ratchet rule tend to be older ones that cause relatively little nighttime interference, while the stations to which interference would be reduced are newer stations that agreed to accept the existing levels of interference when they were authorized. It appears from the petition that elimination of the ratchet rule would provide meaningful relief for a significant number of AM stations.

Depending on the response to the first round of comments received in October, the FCC may decide to embody this proposal in a formal rule making proceeding. While radio is not a priority for the current Commission, this type of technical proposal, because it does not have any political implications, could well get the agency's ultimate blessing. 

Martin is a member of Fletcher, Heald & Hildreth, PLC, Arlington, VA. E-mail: martin@fhhlaw.com

Dateline

The FCC has indefinitely suspended the previously-announced Nov. 1 deadline for submission of biennial ownership reports for *commercial* radio stations in *all* states and territories. Licensees will have a minimum of 30 days to prepare and file their reports once OMB approves the new Form 323.

For *noncommercial* radio stations in Alabama, Connecticut, Georgia, Massachusetts, Maine, New Hampshire, Vermont and Rhode Island, their biennial ownership report deadline is Dec. 1.

Dec. 1 is the deadline for radio stations in Connecticut, Massachusetts, Maine, New Hampshire, Vermont and Rhode Island to electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

Dec. 1 is the deadline for radio stations licensed in the following states to place their annual EEO Reports in their public files: Alabama, Connecticut, Georgia, Massachusetts, Maine, New Hampshire, Vermont and Rhode Island.

conductivity within their coverage areas. If Station A makes a transmitter site change subject to the "ratchet clause" [i.e., Section 73.182(q), footnote 1] and is required to reduce its interference contribution by 10 percent, the single limit from station A will decrease from 8.3mV/m to 7.5mV/m and

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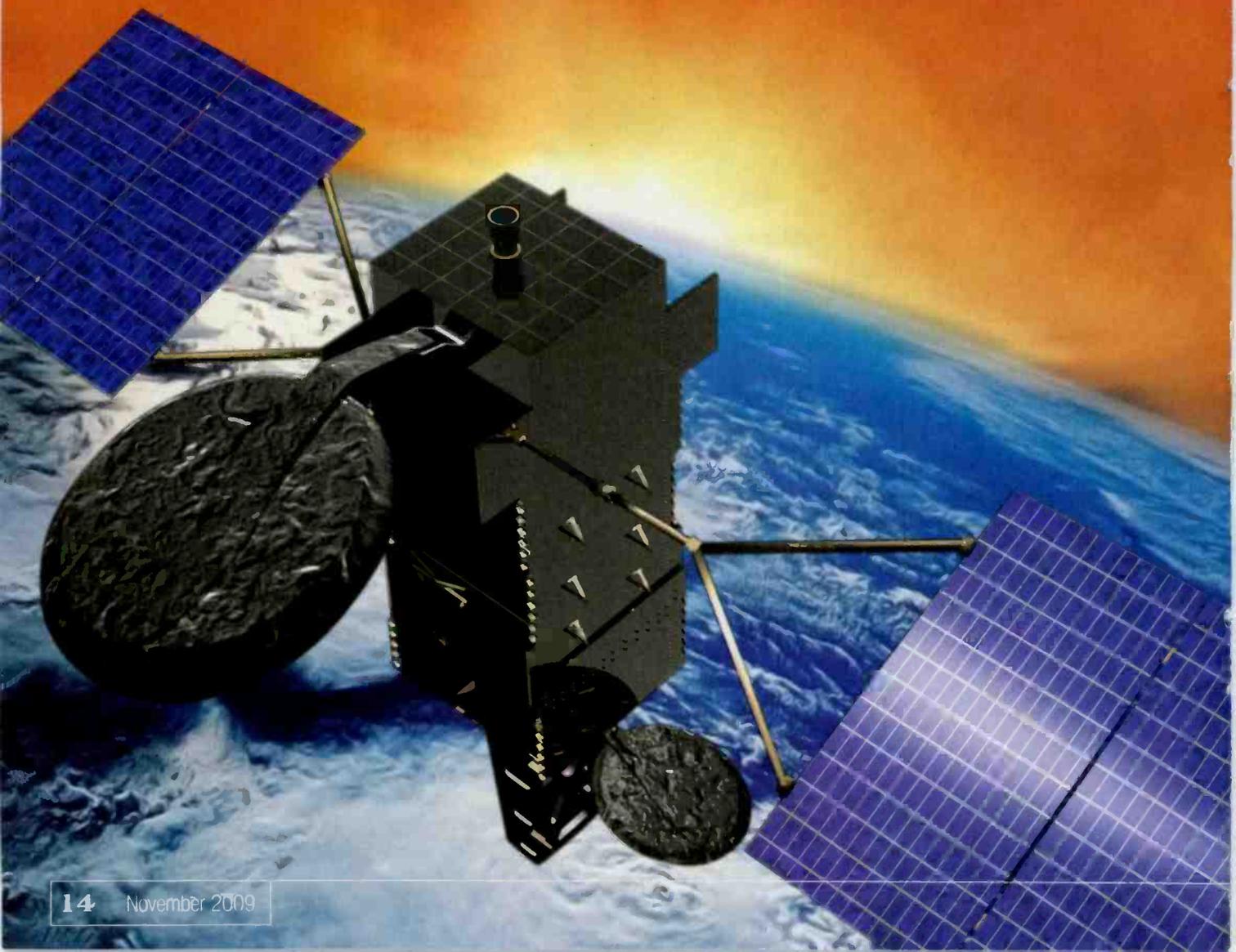
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WISE RECEIVER

More than just audio sources,
satellite receivers are smarter now.

By Conrad Trautmann, CPBE

The top questions radio station engineers ask about the radio networks satellite delivery systems are, "Why are there so many different manufacturers of receivers? Wasn't it better when the major networks used the same receiver? Now I have a rack full of receivers that all work differently from each other and they take up more space."

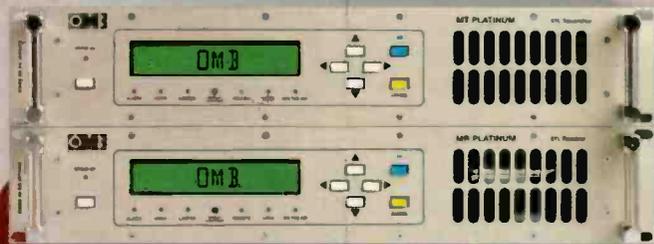




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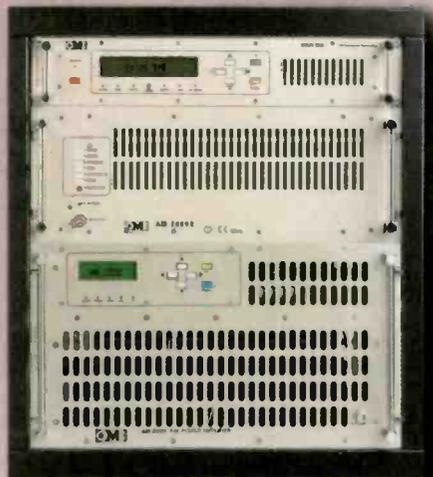
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EM 2000

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 amplifying 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 amplifying modules work independently thanks to a power combining structure that provides high isolation between them.

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A big reason is the introduction of store and forward technology a few years back that requires a closed loop network in order to work properly. Store and forward allows the radio networks to do what the advertising world commonly calls copy splitting. The network uploads the commercials in advance to the satellite receiver in a digital file format and they reside on the receiver's hard drive or flash RAM card and wait for a command to play. At the appropriate time during a commercial break, the head-end sends the command (or trigger) and the spot plays from the satellite receiver instead of streaming from the network head-end. Consider the possibilities. In a network with 2,000 satellite receivers, 2,000 different ads could play out of each of those receivers at the same moment. In reality, that's a highly unlikely scenario, but it is possible. The technology gives the networks the ability to be more geographically targeted for their advertisers by offering the ability to regionalize ad campaigns.

Store and forward depends on the receiver always being tuned to its home network so those file transfers make it to the receiver. They are uploaded via a data channel reserved for those file transfers. When this was deployed by Premiere and ABC on the Starguide III system using the EDAS card, a challenge both networks faced was stations tuning away from their carrier to pick up a program on a competing network. While the receiver was tuned away the spots wouldn't be transferred to the receiver and they wouldn't play.

Back to the original question; "Why different systems?" There are definitely other factors that entered into the selection of a manufacturer by the networks including price,

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long term support, system design and features. However, because of store and forward, there is a strong desire for each network to maintain a secure system to make sure their receivers always remain tuned to their home network in order to facilitate successful file transfers. As described above, a common platform actually created more problems for the networks. Even if all of the networks

had selected the same manufacturer to replace Starguide, stations would have still needed a receiver for each network in order to maintain that closed system approach.

Looking at the playing field today, Jones Radio Network, now owned by Dial Global, the BBC and EMF chose Wegener as their new platform. National Public Radio and Westwood One selected International Datacasting (IDC). ABC, who is now owned by Citadel Media and Premiere Radio Networks who is owned by Clear Channel both selected X-Digital (XDS).

The current generation of satellite receivers offer many new features. Some are shown in the sidebar. Let's explore more in depth what these devices can do.

• *Channel changing.* It's now possible on these systems to make maximum use of the audio cards. Before, with the Starguide platform if your station took more than one show from a network at different times during the day, you either needed to have someone change the channel manually, automate the



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X-Digital XDS-Pro



IDC SFX 3100

The major networks now use one of three receivers

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WISE RECEIVER

channel change using some type of serial command from an automation system or third-party device, or use more than one output card from the receiver and tie up multiple inputs on the router or console.

Now, it's possible to pre-program channel changes on a schedule so all of the programs come out of the same audio card on the receiver (provided the shows don't run concurrently). All of the programming uses only one audio card, which makes station engineers happy because they only need one input to their equipment for multiple programs from the same network. Engineers are

also happy that they can automate this and not depend on human interaction to make the switches. As a result of this efficiency, manufacturers were able to design the receivers with fewer audio cards. Most networks have either two or four audio cards available on their receivers. Some networks provide direct control of this function while others provide this as a service through the network uplink.

Also gone from most networks is the old left-channel/right-channel audio split to carry two mono programs on a single stereo feed. A program is now on its own channel, no longer sharing one half of a stereo pair.

- *Time shifting.* Many people refer to this as Tivo-type function because it works in a similar fashion. It's possible on most of the systems to save a program on the receiver's hard drive or flash memory as it's playing live and play it out at a later time. This eliminates the need

A URL You Should Know

www.ses-worldskies.com

SES Americom, formally GE Americom is now known as SES World Skies. This Web address has a number of important tools you should know about. The radio network community all use the AMC-8 satellite, which is important to know when using these tools.

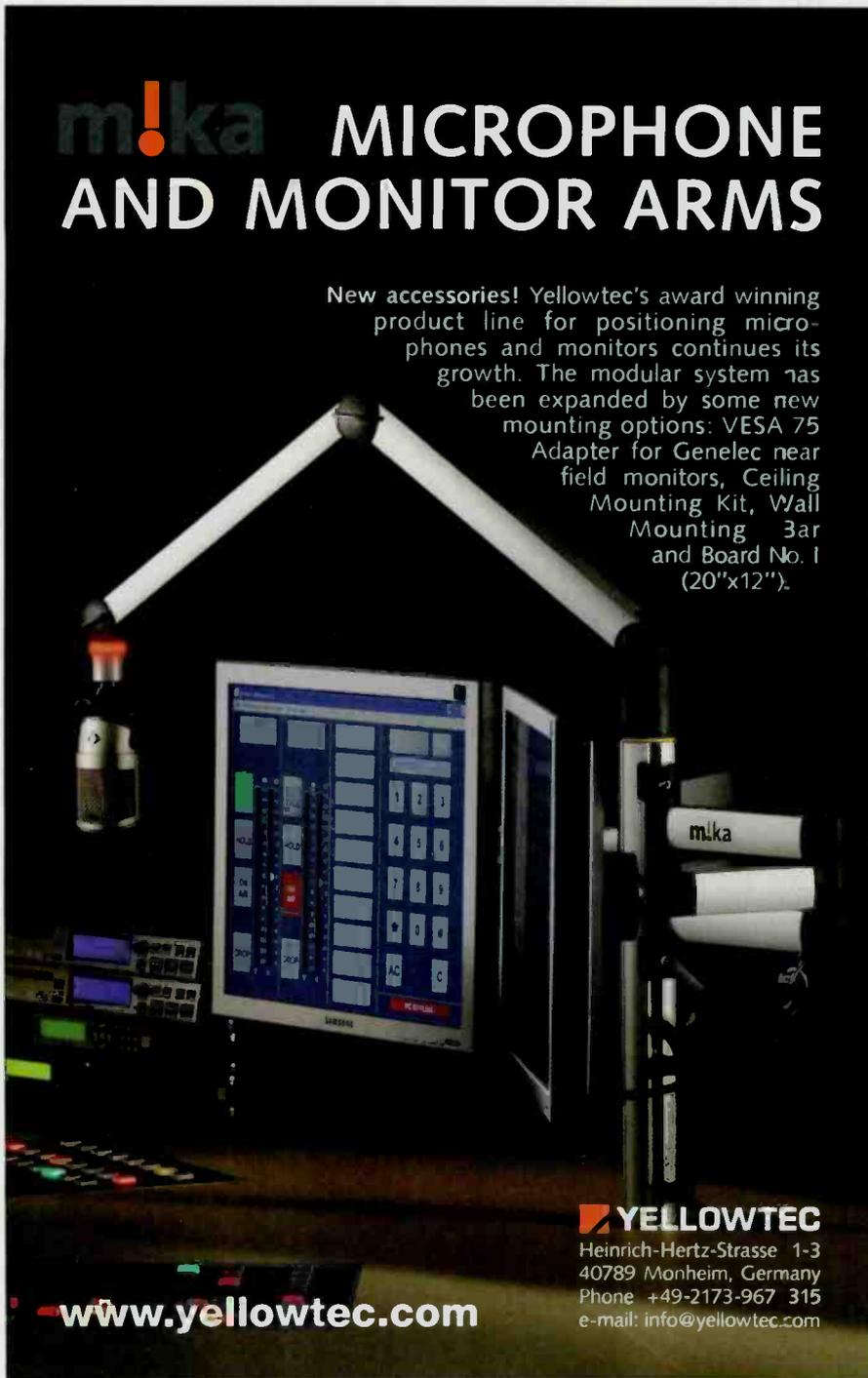
First is pointing data. You can enter your latitude and longitude to find out the elevation and azimuth settings for your dish.

Next are the center-of-the-box charts. Satellites fly within a virtual box in the sky. It's important for best reception that you tune your downlink dish at the time that the satellite is in the center of that box. This way as it flies around within the box it your antenna is peaked for the best reception possible.

Finally there is the sun outage calculator. Sun outages can occur when the sun lines up directly behind the satellite. The radiation from the sun interferes with the satellite reception and can cause an outage. The calculator uses your latitude and longitude information to determine exactly when you might experience this type of outage.

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for the station to tie up their automation system to do those recordings and playbacks freeing up resources.

- **Logging.** A great troubleshooting tool, most receivers now have logging built in, which is accessible via a Web interface. If you experience a loss of audio, you can check to see what the receiver signal strength was at the time. Or if you miss a relay closure, you can determine if the receiver actually received the trigger to help determine the cause of the problem. This allows the station to investigate issues directly without the need to contact the network's headend.

- **Web interface.** Virtually all of the receivers have a way to reach a dashboard via the Web that allows you to view system receive parameters and make system configuration changes. In some cases you can program your channel time shifting for channel changes from here, in others you may need to go to an Internet Web interface for that. Some networks allow access to their audio files stored on the hard drive through the Web interface, FTP, windows share or other methods as well.

- **Audio quality improvements.** The new fleet of receivers from all of the manufacturers have improved audio quality. There have been many advances in DSP power and the quality of linear analog audio ICs since the design of older systems.

The new receiver platforms, being software based allow the use of higher reduction audio algorithms such as MP3, AAC and others. In any case, engineers have noticed and reported improvement in quality when swapping from the legacy systems to the newer ones.

- **Program associated data.** With the wide use of RBDS and HD Radio, delivering PAD took on a new sense of urgency. Most of the networks have the ability now to deliver title and artist info to the back of the receiver for use to feed those systems.

- **Automation.** Some networks offer the ability to program your own triggers on the system. Rather than depend on a network trigger at the time you want, you have the ability to program a one-time trigger or recurring trigger to close a relay when you need to. A common use of this is a top of the hour trigger, which many stations like in order to synchronize their automation systems to the network.

- **More relays available.** On some of the legacy systems, in some cases the maximum number of relays available per program was two. Now that's climbed to a minimum of four and in many cases 16 relays per channel is a standard.

- **Software upgradeable.** All of the current generation of receivers are able to be upgraded over the air with new software. The predominant platform is a specialized

Linux kernel that allows a tremendous degree of flexibility. This isn't new, since Starguide also had the capability, but these newer receivers have much more upgrade flexibility than the older systems.

The latest generation of satellite receivers are clearly the most advanced that we've seen so far. The fact that there are competing systems is probably a benefit for the stations since competition will drive company research and development, leading to new features. 

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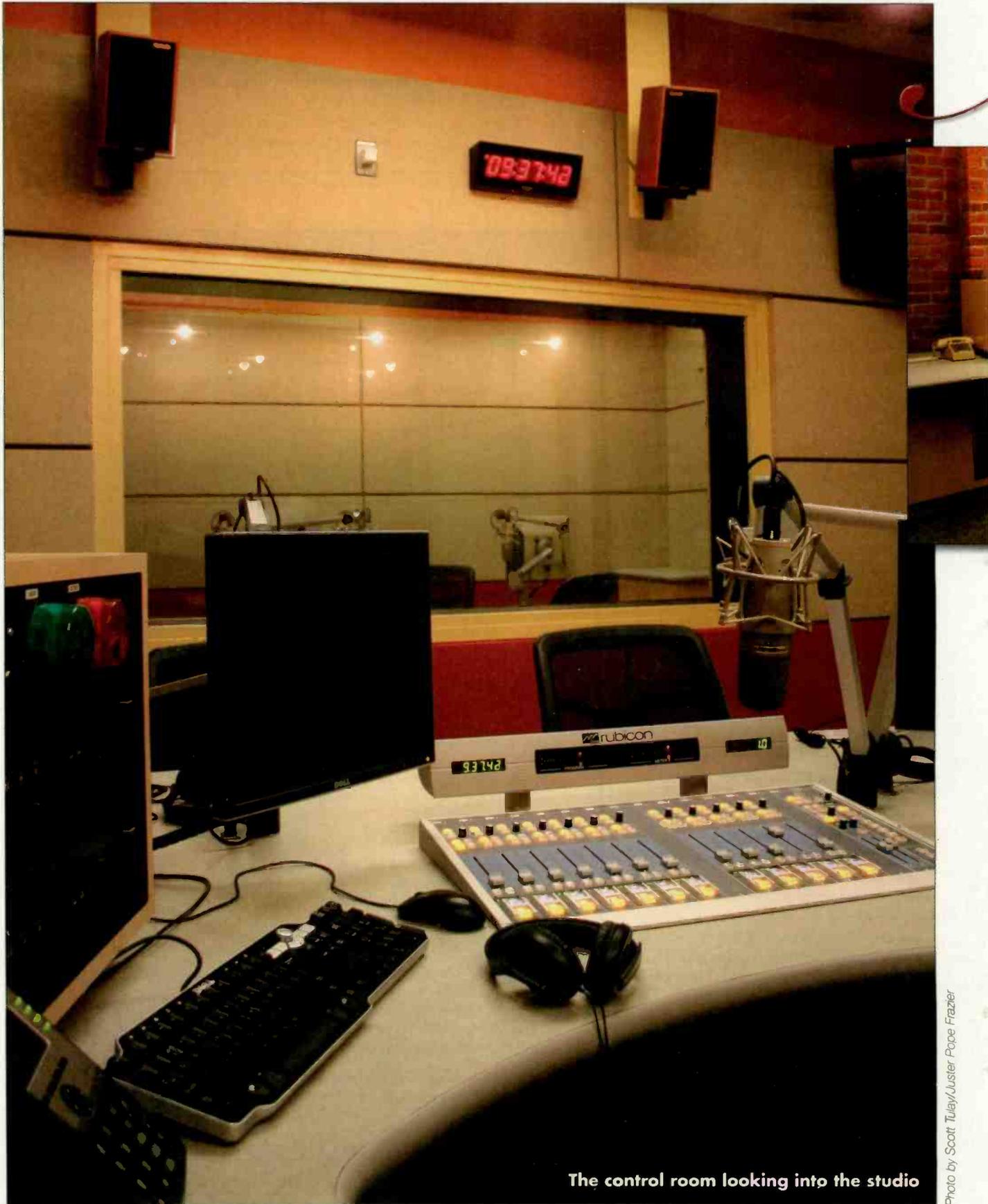
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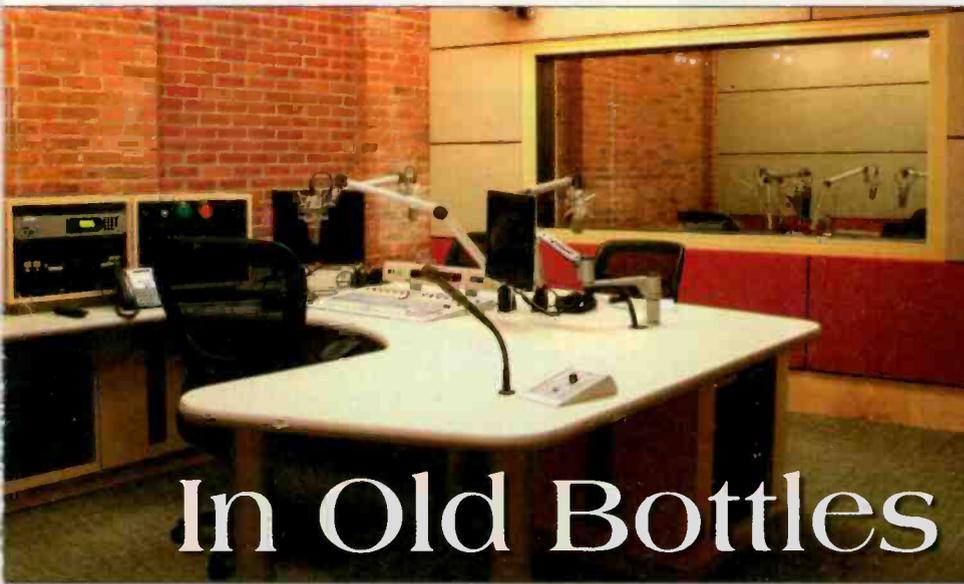
FACILITY SHOWCASE



The control room looking into the studio

Photo by Scott Tutley/Juster Pope Frazier

New Wine



In Old Bottles

WFRC exposes more than news in its new studio

By Richard Malawista

Old brick walls and century-old post-and-beam construction are not the first things that come to mind for a state-of-the-art radio studio, but for public radio station WFRC's newsroom, it was all about the character.

WFRC's home studio on the Amherst campus of its licensee, the University of Massachusetts, is set among the rolling green hills and small college towns of Western Massachusetts. It is literally and figuratively far away from the largest city in its coverage area, Springfield. The station decided to enhance its reporting from Springfield by basing part of its news staff right in the city.

The concept

The facility would need a single control room, a studio for four people, and an office for two reporters and two interns. Space was leased from Springfield's public television station, WGBY, which occupies an old warehouse renovated 30 years ago.

Beyond functionality, the WFRC space also needed an identity that would distinguish it from the television offices that surround

it. This would help convey the message that the radio station is now physically, as well as in its programming, a part of the Springfield community.

The 1,145-square-foot space is rectangular in shape, allowing the main working space to be only 15' wide – not bad but somewhat limiting the options for room layout. A suspended ceiling had been hung 7' above the floor to accommodate existing ductwork, even though the full ceiling height of the old warehouse was almost 10'.

In addition, an interstate highway runs past the building on one side and a railroad track on another. And the studio was to be built within an office area of the television station, with the potential for noise to pass from office to radio studio and vice versa.

On the technical side, the facility had to be usable for live programming and pre-recorded news pieces. This could include discussion and call-in shows, and the local versions of national news programs like NPR's *All Things Considered* and *Morning Edition*. The control room had to support every level of news production from a single reporter recording a voice track to a fully-staffed call-in program.

Photo by Scott Tulay/Justin Pope-Frazier

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New Wine In Old Bottles

Photo by Scott Tulay/Juster Pope Frazier



The studio looking into the control room

Design solutions

Although WGBY had done a very good job of preserving the look and feel of the old warehouse when it renovated the building, the particular space designated for WFCR had been subdivided into many small offices with ordinary walls and that low ceiling. Architect Kevin Chrobak, principal architect of Juster

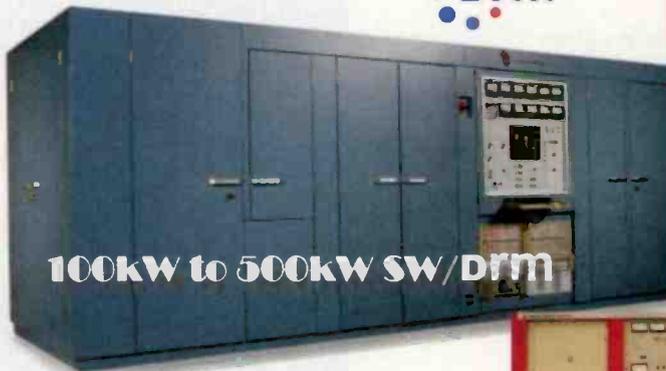
Pope Frazier, immediately saw that reclaiming the old posts and beams, brick wall and high ceilings would give character and warmth to a modern radio facility. The existing television offices had to be completely demolished and something new created that would blend the old and the new.

Chrobak lined up the office, studio and control room in a row, with a corridor running along one side to connect them. The low HVAC ductwork was re-routed away from the studio and control room to run over the



The studio with control room through the window

Photo courtesy Studio Technology



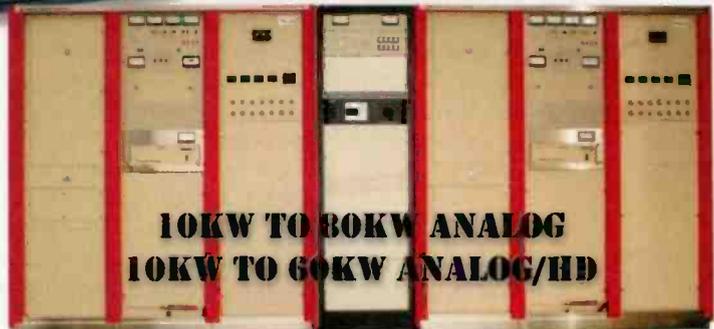
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corridor, so the broadcast rooms could open up to the full height available.

The studio and control room have a raised floor sitting on small blocks of fiberglass isolators. Double walls provide acoustic isolation, with the side corridor serving as an additional buffer. Acoustic panels were applied to all new walls in the studio and control room. The acoustical ceiling has extra sound-absorbing fiberglass backing each panel.

The old posts and beams were left partially exposed to preserve the historical qualities of the building. Instead of burying the posts within new walls, the wallboard was placed between them so the posts are visible between the acoustic panels. Instead of burying the beams behind an acoustical ceiling, the ceiling was hung between the beams, leaving four inches of the old hand-hewn wood exposed.

The brick wall running along one side of the space was once an exterior wall of the old warehouse, but had become an interior wall when a television studio was built on the other side. Demolition of the television offices revealed that the wall's window openings had been filled with unpainted cement block. This was carefully pulled out and the gaps filled with new brick treated to blend with the old.

Equipment

In selecting equipment and furniture for the Springfield studio, WFCR was thinking ahead to the eventual upgrad-

ing of its main studio in Amherst. The control board system, microphones, CD players and studio furniture chosen for Springfield will later be used in Amherst.

The control boards will be the biggest change, taking WFCR from the traditional architecture of stand-alone boards with audio running through their modules to a digital audio engine system. The flexibility this gives will be most valuable in the multi-control room setting of the main studio, but for consistency the same brand was installed first in the single control room of Springfield.

WFCR uses Neumann U-87 microphones in the main studio, but needed something less expensive for the Springfield studio. After careful auditioning – because the microphone has more to do with what listeners hear than most other elements of the project do – the station chose one that is much less expensive than a U-87, but good enough to use beside them – the Shure KSM44.

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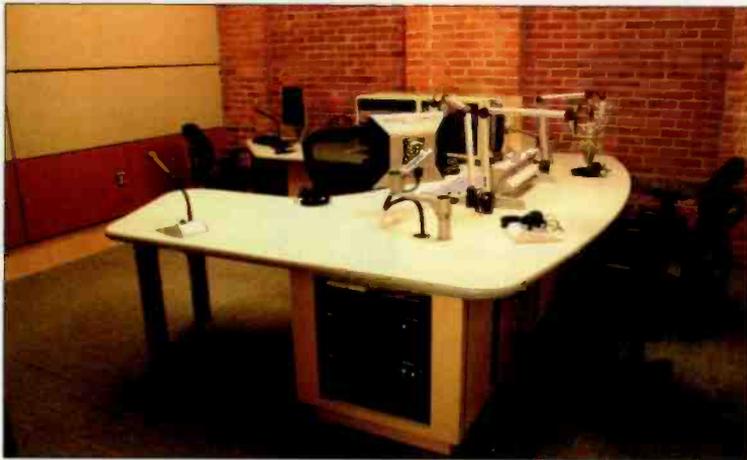


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New Wine In Old Bottles

Photo courtesy Studio Technology



The control room with guests on the right and call-screener station on the far left.

Connection to the main studio

Technical integration of WFCR's two studios is critical. Springfield reporters have to use the station's news wire and production software, file stories and get e-mail. A two-way audio link is needed to produce live programs, so that if the local broadcast of NPR's *Morning Edition* is to originate from Springfield, the raw satellite feed can be sent down on one channel and the finished program sent back to Amherst.



Photo by Scott Tulay/Juster Pope Frazier

The office with two reporters in front and intern workspaces beyond.

At this off-campus site, the Springfield studio needed its own telephone and Internet connections. DSL lines leased from a local ISP support a VoIP phone system and the Internet connections. Reporters can access WFCR's computer system for ordinary purposes like e-mail, but



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a direct connection to the News Boss server proved problematic through the relatively slow DSL lines.

At this writing, WFCR is experimenting with two possible solutions: one creates an internal News Boss website that acts as a transfer point for data moving between the two facilities, and the other uses importers at both ends of the link to pull in data from the other end. To send live program audio back and forth, WFCR will install a point-to-point IP audio link through the DSL circuit.

Taking a tour

Visitors enter through the office, whose facade of maple-framed glass and maple-veneered walls make the visual statement the station sought. The office contains work spaces for reporters and interns and a small alcove that doubles as a meeting space and green room. From the office, visitors enter the corridor that connects to the broadcast rooms, and rises four inches to meet the raised floor.

The studio is 12' by 15', with one angled wall to break up standing waves. A custom designed desk places the program host on one side facing the control room and three guests sitting along a curve on the other. The table sits at an angle so the host has good sightlines into the control room between seated guests.

The control room at the end of the corridor is 20' by 15', on the other side of the angled wall. Custom designed furniture places the board operator facing two

guest positions across the counter and the studio beyond, with a director's station behind the operator on the right and the call screener behind on the left.

Putting it into action

The work progressed quickly. Architect Kevin Chrobak had his first look at the space in December 2007, plans were completed by early spring, and the contractor began work in July. Named for major supporters of WFCR, the Peggy and David Starr Broadcast Center was dedicated in January 2009.

Reporting and programming from Springfield has developed step by step. News reports filed by resident reporters, interviews with Springfield-area guests and live call-in programs are putting the bureau to good use.

WFCR's Sustaining Success Capital Campaign, which supported the creation of the Springfield studio, now turns its attention to improving the station's main studio. The experience and knowledge gained in developing the Springfield studio will contribute greatly to the next project's success.

Malawista is assistant station manager of WFCR. He managed the Springfield studio project along with chief engineer Chuck Dube, CBRE.

Project Team

Kevin Chrobak, principal architect,
Juster Pope Frazier
Laurie Frazer, interior designer,
Cobalt Design Studio
L. N. Berneche, contractor
Chuck Dube, CBRE, chief engineer, WFCR
Richard Malawista, assistant station
manager, WFCR

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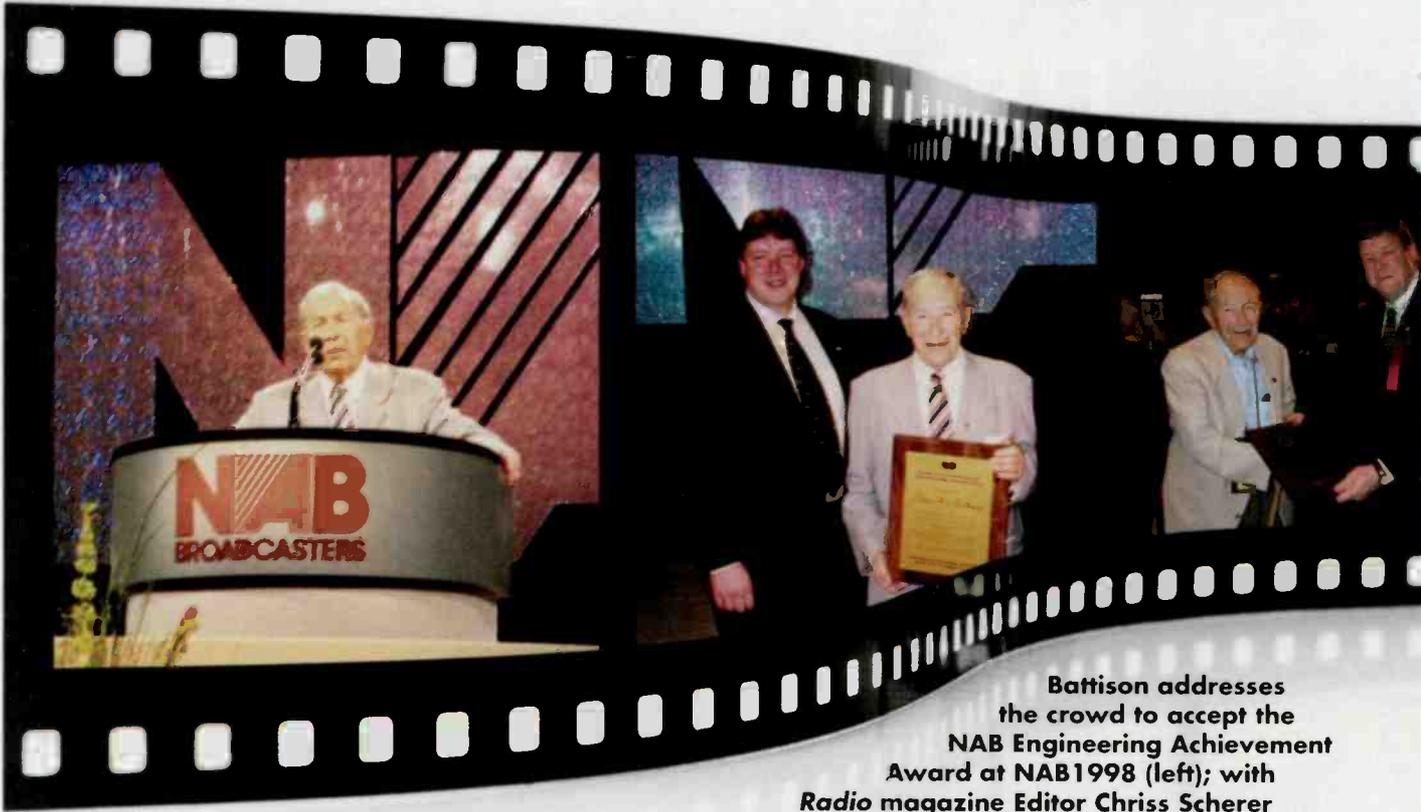
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Broadcast History

Through John Battison's Eyes



Battison addresses the crowd to accept the NAB Engineering Achievement Award at NAB1998 (left); with Radio magazine Editor Chris Scherer after accepting the NAB award (center); and accepting the Society of Broadcast Engineers Lifetime Achievement Award at NAB2006 (right).

In 1998, John Battison was awarded NAB's Engineer of the Year Award for radio. To know John is to know the history of our industry, and to hear him speak is an education in itself. The acceptance speech he delivered to accept the NAB award outlines part of John's amazing career and illustrates perfectly to the industry's relative newcomers just how far we've come. A transcript follows.

In addition, in 2006, John was awarded the Society of Broadcast Engineers Lifetime Achievement Award. John is the founder of the SBE.

Good afternoon NAB, fellow engineers, ladies and gentlemen. Thank you National Association of Broadcasters and my sponsor for this honor. I'm very proud to receive it. I finally retired this spring, and it's 1000dB nicer than a gold watch.

Looking back over 52 years of broadcast engineering, I want to thank all the people who have helped me. Among these are Frank Marx, who hired me in the ABC Engineering Department, and especially Carl Smith, who has been a very good friend for most of my engineering life, as well as a fine employer.

Television came to life when ABC received its TV CPs, and we had to find a TV studio site in New York. We decided on the old riding stables just off Central Park. Then we had to get rid of the birds and the horse's souvenirs.

We had hoped to put the WJZ-TV transmitter on the RCA building. In the interim, we put it on the Pierre Hotel and got a horrendous ghost on Westchester County.

I met most of the famous engineers who made US radio

what it is today, and many of the pioneer radio inventors including Lee de Forest and Major Armstrong, the inventor of FM. I built an Armstrong Super Regenerative receiver in the 1920s, so of course I already knew his name. When I met him, he was "Major FM."

As time passed, AM became "ancient modulation" and FM became the "forgotten medium." Eventually, FM took hold and we engineers pretty well filled up the New England area with FM stations.

In 1961, in a *Broadcast Engineering* magazine editorial, I urged the creation of a broadcast engineering society. I received lots of support. In 1963, I personally wrote to every radio and TV chief engineer – about 6,000 letters – proposing that we start one.

In 1964, NAB gave us space in the Chicago Convention; about 100 engineers turned up. I was made steering committee chairman, and the Society of Broadcast Engineers was formed. We published a quarterly SBE journal with a lot of member input. We had great industry support and led off with a greeting from the FCC chairman.

In 1965, I was elected president. We had about 400 members and eight chapters around the country. I handed [the reigns] over to Charlie Hallinan as president

in 1966, and the SBE never looked back.

Also in the sixties we had the "10% Rule," which allowed us to build new AMs - provided there was not more than 10% interference! Finally, the FCC imposed an AM freeze to undo the mess that AM was in.

Then there was a burst of activity from the daytimers, and Ray Livesy headed up another attack on the FCC to liberalize night operation. This resulted in some strange night powers ranging from about six Watts to several hundred. Many small towns received some level of new, local night radio service.

Sometime during this period, AM stereo came - and went - mainly through FCC vacillation. By the way, I liked Leonard Kahn's system best.

The US participated in the Region Two World Administrative Radio Conference in Buenos Aires in 1980, and I was honored to be a member of the FCC/Industry team. We went down to the conference with strict orders from the FCC to plug for nine kc AM separation.

The reason given was compliance with the official Region Two channel spacing and to make room for more AM stations. Another argument was to avoid one kc heterodynes from increasingly powerful AM stations in Europe and the emerging nations. Actually, there were very few "whistles."

After being in Buenos Aires for about four days, we had succeeded in persuading many other delegations from the Americas that the change was good. Then we suddenly received orders from the FCC to forget nine kc separation! With rather red faces, we had to change horses in midstream and persuade them to switch back to 10kc.

The FCC introduced the "standard" antenna pattern. It replaced the old MEOV that was the consulting engineers lifeboat when a pattern wouldn't come in.

The end of the eighties saw LPTV come into bloom and CPs were issued by the hundreds - but not all were built.

By this time, engineers in radio stations were a thing of the past. "Five-week wonder" First Class Licenses made DJs into engineers, and remote control took over many of the operations. Automated transmitter operation and reduced FCC logging requirements were introduced, and only high-power and directional AMs had to make log readings every three hours.

I wonder how many remember the days of logging transmitter readings every half hour? Or logging base currents daily? It's quite different today.

So different, in fact, that we don't need licensed operators any more. Unfortunately, the pirate broadcasters think they don't need licenses either!

The AM band has been expanded to 1710 kc and a few new stations and a few new stations are on the air.

We've advanced from the Conelrad system, through EBS to EAS. This still has problems, but no doubt, eventually, it will work as planned.

Perhaps the greatest change has been the introduction of a piece of rare metal contaminated with an exotic oxide - I'm referring, of course, to the transistor. This little device has changed radio engineering. First came transistor radios plugged into the world's ears. Then came its big brother - the transmitting transistor. Transmitter manufacturers switched from tubes to transistors as fast as new methods of RF power generation were developed.

The old, single-modulated channel, Class A, triode AM transmitter has developed into multi-channel units like its FM brother. Satellites are offering direct multi program sources and the days of the crystal receiver and headphones are numbered!

When the digital revolution hit radio, its amazing versatility spawned new transmission methods. Almost every day we hear of new ones.

Spread spectrum, once top secret, has given us legally unlicensed STL operation with low power and low costs.

I haven't even touched on Eureka, DAB, RBDS, cell phones, PCS, GPS, wireless services and the dozens of things still to come.

Radio engineering's advances from 1945 through 1998 have been fantastic. Someone will say, "He's forgotten - whatever." I apologize. Too many things have happened to cover them all.

Speaking as an RF engineer, I still maintain: "Audio is something that messes up a nice, clean carrier."

NAB, fellow engineers and ladies and gentlemen - I thank you. 



A podcast of John's SBE acceptance speech discussing the roots of the SBE is posted at RadioMagOnline.com.

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By Chriss Scherer, editor, and John Landry

EAS check-up

Regular maintenance and inspection should be a part of any maintenance routine, but it's often easy to shift into a deal-with-it-when-it-breaks routine. One piece of equipment that can be left untouched for some time is the station's EAS encoder/decoder.

Bad weather and emergencies can happen at any time, so it's important that the EAS units are always functioning.

In addition, the wall wart power supply is known to deliver just enough power to the unit. Over time, the supply may be insufficient to power the unit reliably, especially if the internal printer is used. Many engineers replace the supply with one of a higher current rating.

Daryl Parker of TFT has also provided some notes for the TFT 911 EAS encoder/decoder.

1. Update the firmware if necessary. It should be V.87.2.EN or V.82.1SP
2. Replace the lithium battery if it has not been replaced in the last 6 years.
3. Replace the battery in the digital voice recorder if it has not been replaced in the last 8 years.

4. Check the Vcc voltage at U19 pin 32 or at the front side of R101, a 1 ohm, 1/2W resistor near the junction of U17 and U19, and adjust VR1 on the switching power supply as necessary to maintain a supply voltage of +5.0/-5.1 Vdc.

5. Ensure the ac transformer is plugged into a 60Hz reference. The internal clock is referenced to this source.

Do you have another brand of EAS unit and have some tips to share on keeping it operating at its best? Perhaps you have additional tips for the Sage and TFT units. Tell us about them.



Phil Johnson, chairman of the LECC in Seattle, recently shared his thoughts on maintenance steps for the Sage Endec.

1. Replace the clock battery once a year. It uses a CR2330 button cell.
2. Check the unit's time and date and correct it as needed. Johnson suggests checking the time accuracy once each month.
3. Set Daylight Saving Enable to NO. While the unit can adjust for Daylight Saving Time, EPROM versions 6.2 and earlier have the old Daylight Saving dates imbedded in them.
4. Manually set the UTC offset to account for the change in Daylight Saving Time.



USB audio interfaces

Professional quality audio cards are expensive and many times you have no choice but to make do with the built-in sound interface from standard PC. One example is the Henry Engineering USB Matchbox II, a generic, stable USB interface with stereo professional level XLR inputs, outputs and even a headphone monitor. Windows PnP recognizes it and it provides error-free great sound for almost the same price as the old analog Matchbox. And the extra added bonus of a



headphone is perfect for TFT editing. Several manufacturers provide similar interfaces, including Yellowtec, Tascam, Digigram, Musicam, SBS and Edirol. Some are extremely portable and can be tossed in a laptop bag.

We need your tips!

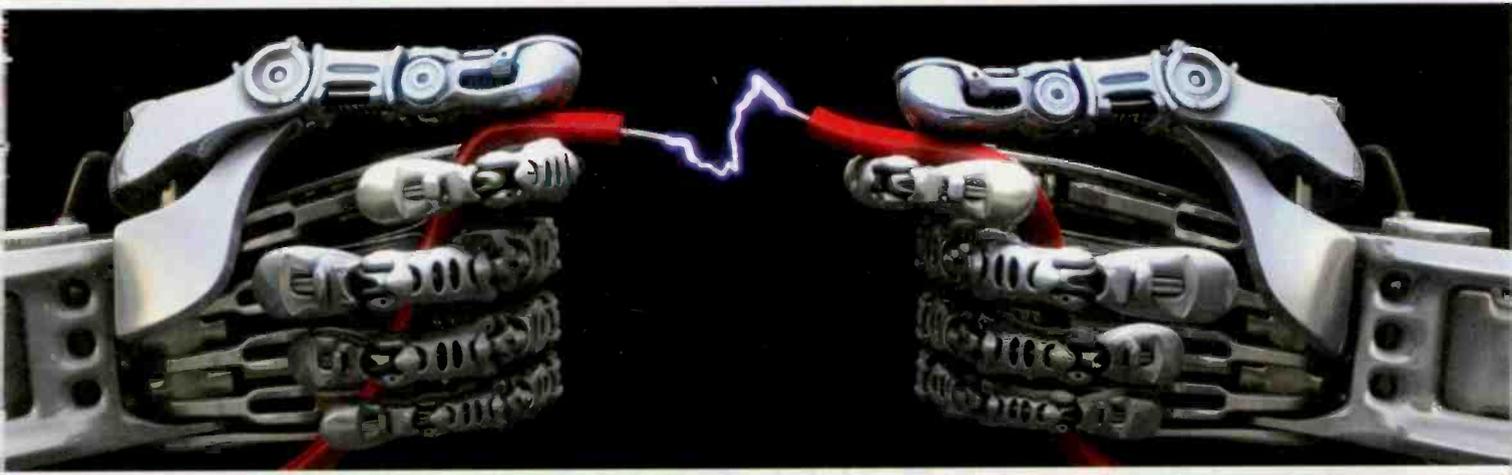
Ideas submitted to Tech Tips may be suitable to earn SBE recertification credits.

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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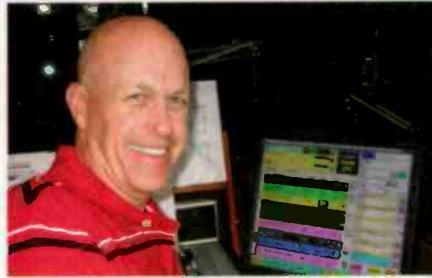


Not since Axia audio-over-IP was introduced to the broadcast industry have we at BGS been so excited! It is with great enthusiasm we'd like to invite you to take a look at the new Op-X Radio Automation delivery system for any single or multi-station cluster. Op-X works seamlessly with Axia IP-Audio networks or as a stand-alone system.



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~ Jim Franklin, Program Director
WVBO, Appleton/Oshkosh - Wisconsin



"Op-X is very functional and easy to use. One of the best features is the log merge. On our old system it took minutes and with Op-X it takes only seconds"

~ John O'Dea, Operations Manager
WNNK-FM, Harrisburg - PA



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~ Leslie Whittle, Program Director
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Zoom H4n

by Chris Wygal, CBRE

In an era when our world is computer-based and everything needs to be finished yesterday, we'll invite any opportunity to make our jobs faster and easier. The Zoom H4n is a perfect solution when top-level audio must be captured quickly. With every on-board tool needed in today's competitive and high-impact ENG or production environment it is more than capable.

During a recent interview I was asked to record the interviewer and his guest as they strolled around the airplanes at an aviation mechanics training facility. So I took the H4n on its maiden flight. There was nothing intricate about recording the interview material; I simply brought along my favorite condenser shotgun mic and plugged it into one of the two XLR jacks on the bottom. Luckily, the H4n provides

When the recording was ready for production, one track was the interview material from my shotgun mic, and two tracks were from the built-in stereo mics. Simply dumping the files from the recorder to a folder on my PC via USB was a snap. The file folder configuration is easy to navigate when moving, editing, playing back or deleting files if necessary. With the USB connection in mind (cable included), the H4n can also be used as a USB interface for PC (XP) or Mac (OS X) and it can also make a handy SD card reader. It uses an SD card as the storage format. A 4GB card, for example, will record 68 hours of stereo audio.

Performance at a glance

1/4"/XLR combo jack inputs with phantom power

3.5mm input

High-quality X-Y built-in stereo mic configuration

Quick recording setup

USB interface

Includes 1GB SD card

File editing and multitrack capabilities

Includes Cubase LE4 editing software

Records MP3 and WAV files

Powered by two AA batteries

24V and 48V phantom power. I wanted to also capture the ambient noises of machinery and tools used during the interview. Typically, I would have plugged another shotgun mic into another channel on the recorder. However, I wanted a lively, stereo recording of the room noises. Good nat sound was a priority on this project.

Atop the device is a built-in X-Y mic configuration. The mics are switchable between 90- and 120-degree directivity patterns (by rotating the mic elements), which make the reproduction of ambient source sound remarkable. A very accurate stereo image is reproduced without the threat of off-axis anomalies such as phase and delay problems found in typical V-shaped miking techniques. Since the mics are mounted directly to the body, I was careful to handle the unit so as to not record handling noise on the two tracks. The H4n includes a 3.5mm headphone output, so monitoring the handheld shotgun mic and the stereo mic pair was easy.

The warehouse

In an interview session much like the aforementioned, I recorded another interview with the same shotgun mic, headphones and recorder. The session took place in a warehouse where noisy packaging equipment, large metal doors and forklifts were actively making ambient noise. I wanted to capture natural sound on this project as well and we set aside time to do so. I closely followed the forklifts, stood next to the doors while they opened and shut, and hovered nearby while workers boxed items. All of these sources were piercing and loud and would typically be cause for nervously checking recording levels for peaks and distortion. I applied Limit3 (Studio) and the H4n handled high SPLs and general conversation on the shotgun mic perfectly. Low-cut settings ranging from 80Hz to 237Hz are available for each input and five other compression settings and limiters are available for vocal and instrument recording as needed.

Recently, I placed the H4n in front of a guitarist and vocalist each at separate times. From 6' away, the stereo reproduction of the guitar was accurate and especially transparent. The recording of the vocalist was accurate as well. One may assume that an expensive microphone should be used with the H4n, but the built-in stereo X-Y configuration mounted on the unit is deathly accurate.

Zoom

P 631-784-2200

W www.samsontech.com

E info@samsontech.com

All in one

The Zoom H4n comes with a 152-page manual covering endless applica-

tions explaining where and how the unit can be used, especially for musicians who need metronome, chromatic tuners, simultaneous multitrack recording and playback and track bouncing. A resourceful producer may find a need for these musical features. However, for now we'll focus on the absolutely necessary functions. A 3.5mm jack is located on the back for an external stereo mic. On the bottom of the unit are two XLR and 1/4" combo jacks for mics and instruments plus the jack for the supplied power supply. The left panel facilitates a wired remote control (not included) 3.5mm headphone and/or stereo line output, output volume control, USB jack and power switch. The right panel includes a slot for the SD card, record level control, menu button and the menu toggle dial. The front panel is home to the LCD menu screen, transport buttons, input select buttons and four buttons that double as track select or menu navigation buttons. The H4n is highly menu driven. Within minutes however, the user finds the menu and its submenus easy to navigate.

The recorder operates in stereo, four-channel (4CH) and multitrack (MTR) modes. In stereo mode, the built-in stereo mics, an external stereo mic or the XLR/1/4" combo inputs are recorded to two tracks. In four-channel mode, four tracks of any combination are recorded. In multitrack mode, the H4n acts as a multitrack recorder, using a built-in menu-driven mixer with pan, level and other common mixing capabilities stored with the multitrack files in the folder archive. Available recording formats range from 48kb/s to 320kb/s or VBR MP3 files to 96kHz/24-bit WAV files in stereo mode. It will record at

resolutions up to 48kHz/24-bit in four-channel mode. Of course, it will make mono recordings as well.

The H4n uses two AA-batteries. The battery compartment is on the back and inside the compartment is a stamina switch. Stamina mode tells the device to conserve battery power by using the orange backlight and other display and recording features more economically. The unit is packaged with a microphone stand adapter, wind screen for the built-in mics, a 1GB SD card, USB cable, ac adapter and a clear carrying case. A Cubase LE4 DVD comes standard as well so editing can happen immediately on a PC or Mac. Information about how to create surround recordings using the H4n and other Zoom products is also available online.

Wygul is the programmer, engineer and Web designer for Liberty University in Lynchburg, VA.

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

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

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



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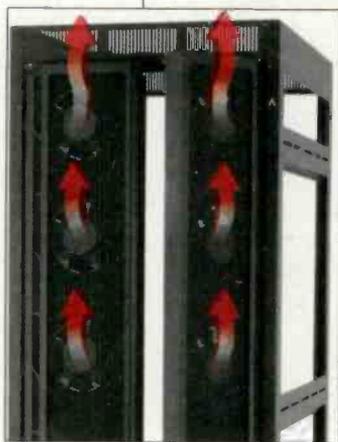
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NEW PRODUCTS

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by Erin Shipps, associate editor

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IP codec Tieline Technology

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Model 828M: The Model 828M features two MADI outputs as well as pass-through for digital audio at 96kHz sample rate via SMUX protocol. It is a point-to-point 64-channel bi-directional

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NEW PRODUCTS



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[in-ti-grey'-shuhn] - noun

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photo by Chriss Scherer

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Find the mic winner September issue

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of KRVS-FM, Lafayette, LA.

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UPGRADES and UPDATES

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 ...**Audio Precision** has introduced the BW52 high-bandwidth option to extend the APx's FFT capability to 1 megahertz, with 24-bit amplitude resolution and 2Hz frequency resolution. The option is for the APx525 family of audio analyzers. (www.ap.com)
 ...**Comrex** has released 2.7 firmware for its line of Access IP codecs. Enhancements include HTTP streaming, added support for 3G wireless devices, and N/ACIP compatibility with other IP codec brands. (www.comrex.com)
 ...**HNB** has updated the firmware for the CDR-882 dual CD recorder. (www.hnb.co.uk)

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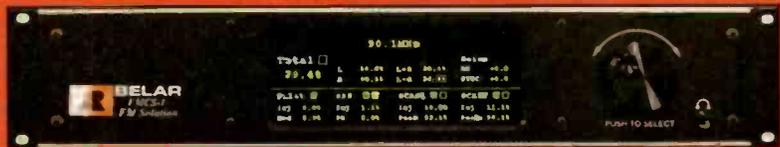
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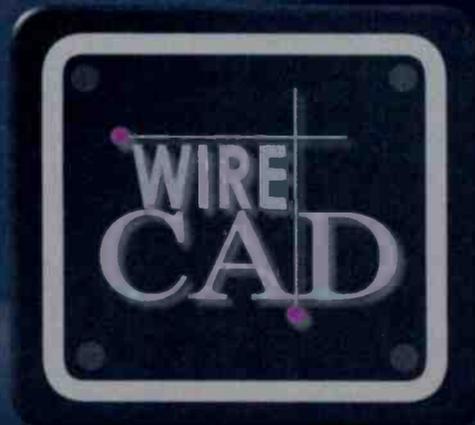
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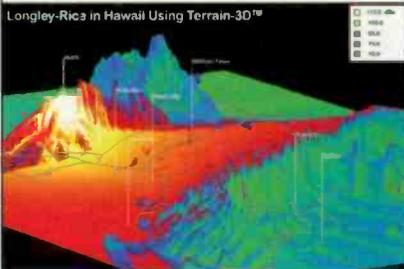
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Trends in Technology, page 14

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is certified by the
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also as chairman and treasurer of
NYC Chapter 15. He has close to
10 years of experience working for
radio networks and prior to that spent
roughly 20 years as chief engineer/
IT manager of some well-known radio
stations including WBAB, WBLI and
WALK on Long Island; WSYR, Y94FM
and B104.7 in Syracuse, NY; and
WEBE 108 in Fairfield County, CT.



Written by radio professionals
Written for radio professionals

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by Erin Shipp, associate editor

Do you remember?

In 1986 John Battison wrote an article called "Making History" in which he made predictions about the future of broadcast radio. Here are his predictions, followed by comments from Editor Chriss Scherer on the actual state of these topics now.

1986 - Cellular telephones are obviously going to play an increasingly large part in our lives and in the development of personal portable telephones. These phones have been available for years, and many engineers have had 2-meter rigs in their cars for some time. However, cellular radio will make phones far more efficient and attractive to the general public.

2009 - They're not just phones anymore: They are media players, cameras, Internet browsers and broadcast receivers.

of increased revenue for an astute operator.

2009 - SCAs have changed little since then, although digital methods (including FM Extra) have given some stations new uses. Multicast capability on FM HD Radio is today's modern equivalent to the 1980s SCA.

1986 - Radio control: Children are now playing with radio-controlled airplanes, and I recently saw an ad for a radio-controlled submarine. UHF propagation is so much better understood than it was 30 years ago, and is being used in ways undreamed of in 1950. Unfortunately, the mobile radio interests are dreaming of unused UHF channels for communication purposes. This is something that all UHF operators should watch closely.

2009 - Everyone wants a piece of the spectrum used by broadcasters. TV stations are fighting the white spaces and 2GHz encroachers, while terrestrial radio is struggling with low-power services.

1986 - Digital: The catchword today is digital, and everyone is climbing on the band-wagon. Digital techniques certainly offer freedom from noise and allow international compatibility. As the industry develops additional standards, further use of the technology will take place. Computers are almost commonplace today. We have passed the era when people saw the computer as a *vade mecum*, or a universal panacea, and purchased thousands in high hopes of gaining a third hand. However, as the wild enthusiasm levels off, computers are becoming more and more a part of our daily lives. Self-repairing and operating equipment and robots are also on the horizon.

2009 - Digital is still the catch word, but we know how to use it better. The enthusiasm over computers hasn't really waned, but it has matured. No one can imagine life without the Internet today. Self-repairing equipment? In some ways, yes. Robots? Not yet.

And what are Battison's thoughts on today's industry? He writes, "In the field of transmission we have a number of dubious designs and devices including the unpopular IBOC. Dissident engineers are demanding the end of AM broadcasting, which has been considerably weakened by excessive interference due to laxity on the part of the FCC in enforcing non-radio sourced anti-interference rules [very foolish because with AM all you need for reception is headphones, a semiconductor a capacitor and a little wire. Other systems require more complicated receiving devices.]"

Here's to the next 20, 40, 100 years.



1986 - Stereo broadcasting: We've heard quad stereo and I, for one, have been unimpressed by it. Now we have stereo AM. That technology seems a little more impressive, but I can't help wondering how far it will go in the future. Will it really do that much to boost sagging AM radio ratings?

2009 - We know that AM stereo never really took off. And except for a few market-leading stations, AM ratings continue to fall.

1986 - Subcarriers: SCAs are old hat by now. The only recent change is that the commission has now increased the number of channels that may be carried on an FM carrier. Similar control systems can be carried on AM. AM still cannot do as much as FM in the way of providing ancillary services on a carrier, but AM-SCA can certainly provide a means



How many articles has Battison written for us? Find out at RadioMagOnline.com

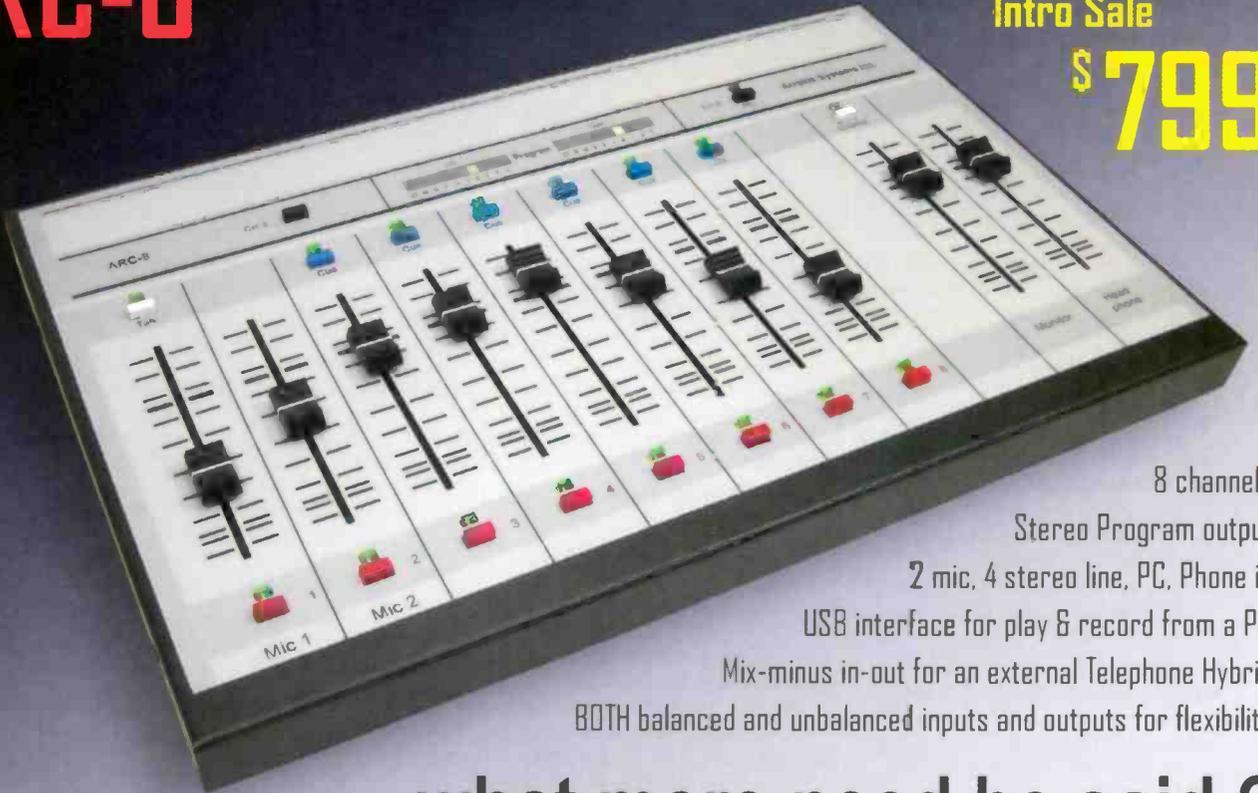
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7. Wheatstone is local. WheatNet-IP and the E-Series, just like ALL Wheatstone products, are designed, engineered and built from start to finish in our New Bern NC USA facility. Everyone who works on our products is 100% knowledgeable and immediately available. You can relax – like the famous insurance company, you actually ARE in good hands.

With WheatNet-IP, we think we've done our homework. In fact, we know we have. And we're happy to say that we've got the best product on the market. To learn more, and there's a LOT more, get us on the phone or visit us on the web. We'll be happy to meet with you and get you everything you need.



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