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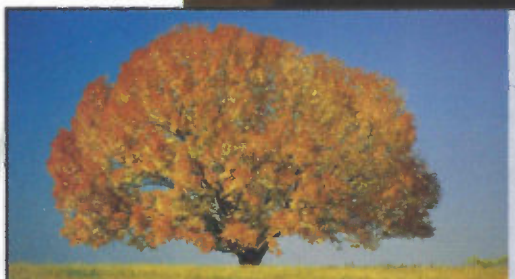

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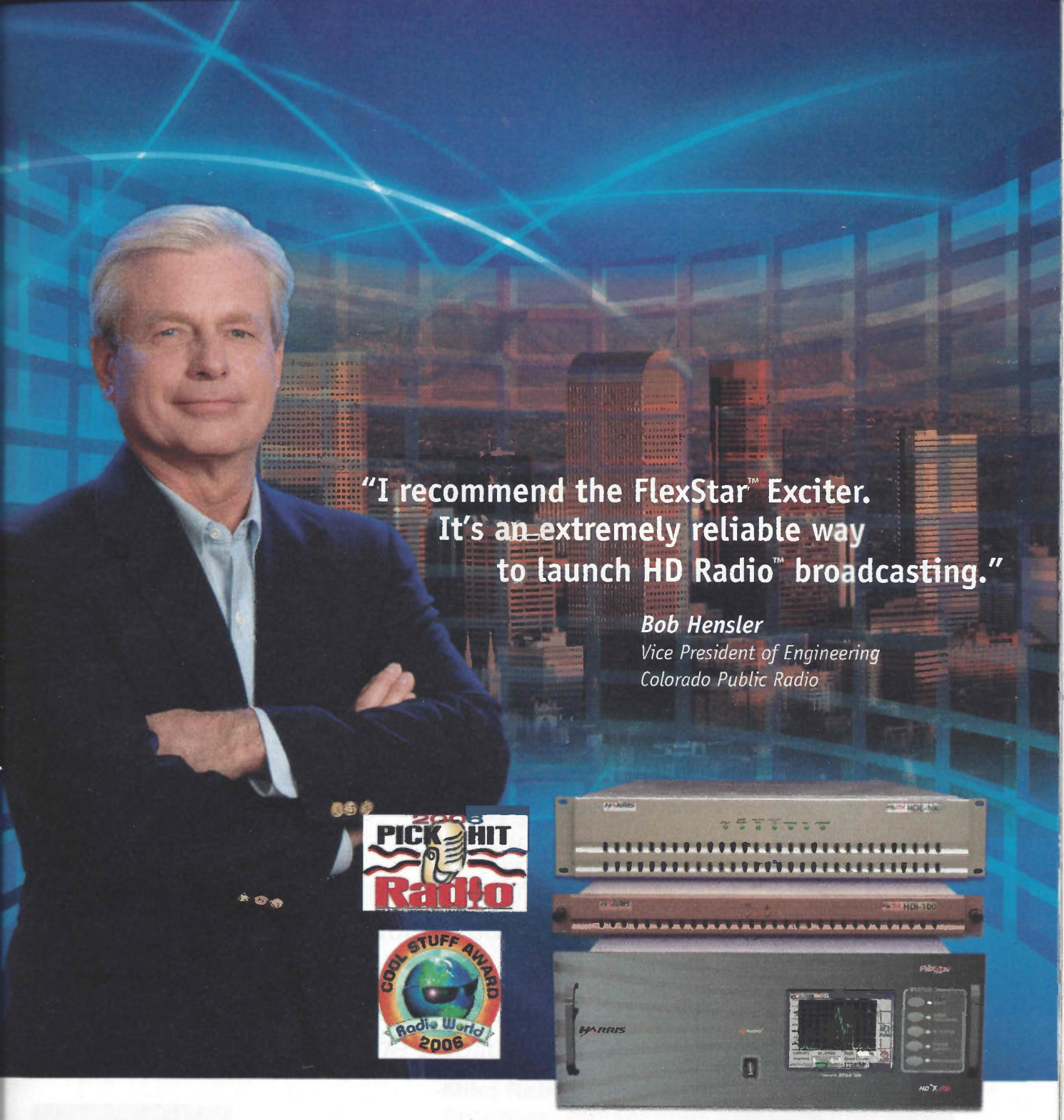

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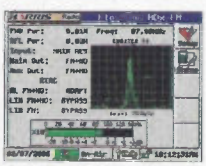

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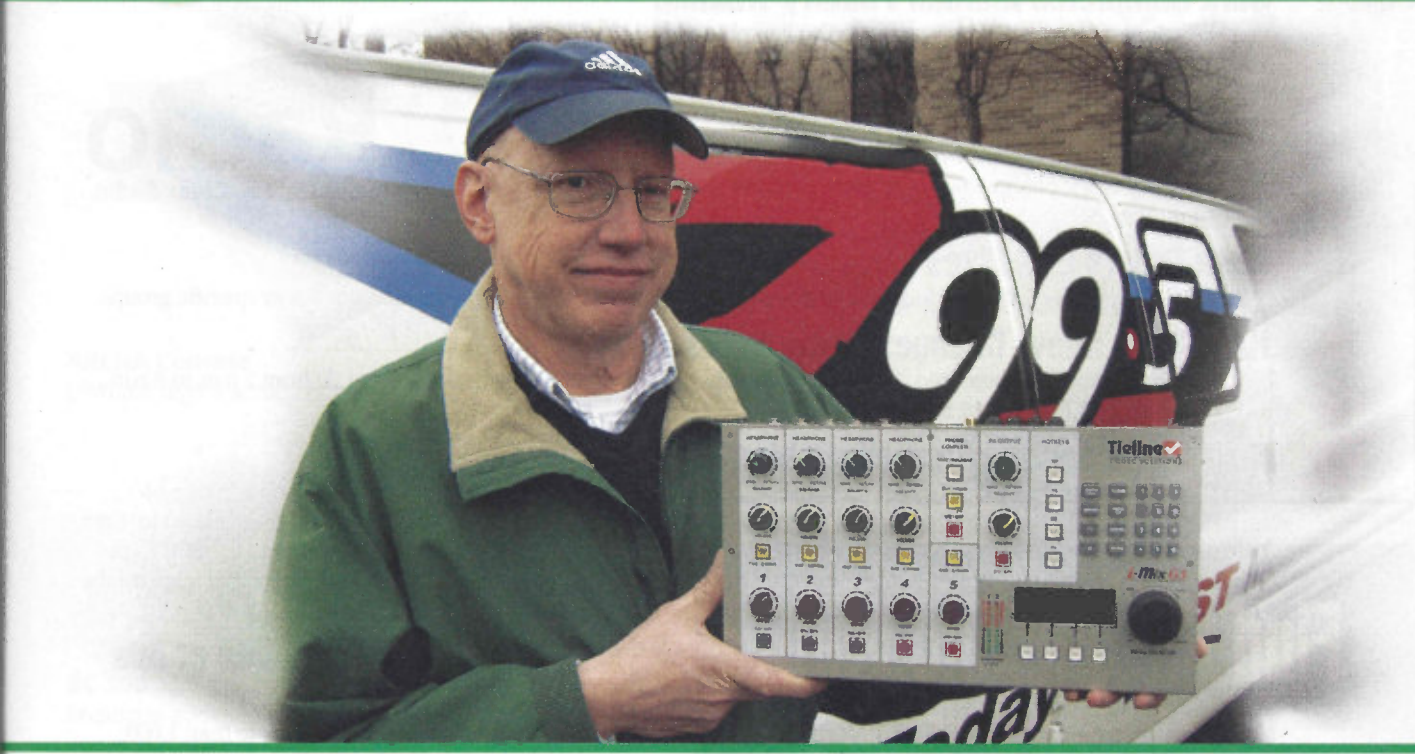
Today's wiring needs have changed because digital signals are more like RF than they are like dc. Photo of Lightner Electronics wiring installation by Chriss Scherer. Cover design by Michael J. Knust.

Remote Broadcasting over the Internet



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Currents Online

Selected headlines from the past month.

Burk Completes Another Factory Training

The class covered the company's entire line of broadcast facility control systems.

Civil Emergency Message Accidentally Sent to California Counties

The alert was carried by most of the participating radio, TV and cable TV companies in the Santa Barbara and Ventura counties.

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Bush Orders EAS Fixes

Bush wants the EAS to include cell phones, PDAs and pagers targeted to geographic areas or specific groups.

NAB Radio Show Changes Show Hours Again

Now the NAB has increased the hours on the opening day of the convention to Sept. 20 from 2 p.m. to 8 p.m., and Sept. 21 from 9 a.m. to 5 p.m.

New Voice Against Centralized Media Ownership Emerges

The StopBigMedia.com Coalition is an alliance of several groups that have joined to pursue a goal to "fight runaway media consolidation and urge the FCC to put the public interest before the self-interest of large media corporations."

Study: Radio Chops a Minute of Ads off Each Hour

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Site Features

Recognizing Innovation

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Industry Links

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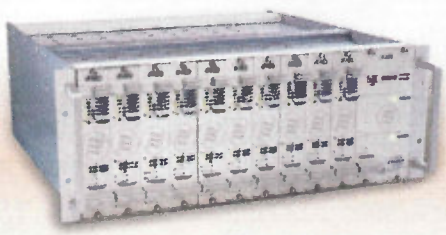

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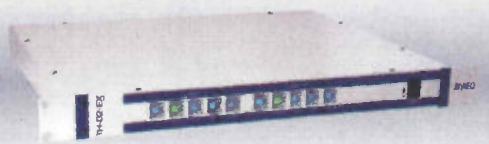

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Micromanaging the FCC

Summer is here, and our elected congressmen are working hard to improve everything that we do. The latest evidence of this is the telecommunications bill that is working its way through the Senate. The Senate Commerce, Science and Transportation Committee has made its changes and sent the work back to the full body for review. The House has already passed a bill with its version of updates for communications reform.

The Senate Committee considered several amendments to the bill and acted on three that are of interest to radio broadcasters: no provision for net neutrality; a provision to enable an audio flag in digital broadcasting; and removal of third-adjacent interference rules to allow more LPFM stations.

The net neutrality issue covers a broad range of interests that are not restricted to radio broadcasting. In general, the issue is currently an academic debate that seeks to ensure a level playing field for all content providers. It sounds benign, but it could present problems in time.

The audio flag element charges the FCC to create a review board to decide what an audio flag would constitute and how it would be implemented and managed. The audio flag—a broad term that covers content rights—is a long way from becoming a reality.

I'm all for protecting copyrighted content to allow the copyright owners to maintain appropriate control and receive their due benefits, but unfortunately some groups will push it too far. The issue could balloon and become too restrictive, effectively killing any digital transmission technology because of the restrictions in digital storage and transmission.

The item that really concerns me deals with third-adjacent channel interference protection to FM stations. The Senate bill is far from being a final bill awaiting a Presidential signature, but this item uses a technical means to address a social concern.

The proponents of low-power FM (LPFM) have long cried that there are too few voices on the airwaves. LPFM advocates believe that the answer is to open the spectrum and let everyone have a radio station. Doing so will provide the diversity of voices that the LPFM movement seeks. Unfortunately, the argument that we need diversity of voices will probably push the amendment all the way through, regardless of any other technical issue.

Don't misunderstand me. I support diversity in the content available over the airwaves, but I also support the continued development of a digital transmission standard. To force diversity by changing the RF landscape could cause more problems than it solves and further hinder a digital radio transition. I said this several years ago when FCC Chairman Kennard began the LPFM process.

That said, perhaps allowing more LPFM stations isn't a long-term problem at all. Maybe we should let the band become flooded with LPFM stations. Frankly, most will run out of something to say within weeks, or they will realize that filling a program stream 24/7 is a great deal of work. Once the LPFM stations turn to satellite feeds or brokered programming, they should surrender their licenses.

The other possibility is that IBOC will become the standard and all the LPFMs will need to upgrade their facilities to be heard. Most will probably not be able to afford the equipment or the licensing. Problem solved.

Are the third-adjacent channel protections really necessary? Probably not, but Congress needs to let the FCC do its job based on the overall plan that it (hopefully) has in place. Let the House and Senate raise their concerns, but let the FCC conduct its own business.

Chriss Scherer, editor
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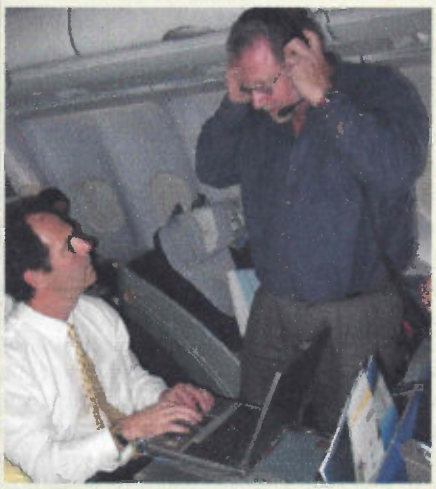

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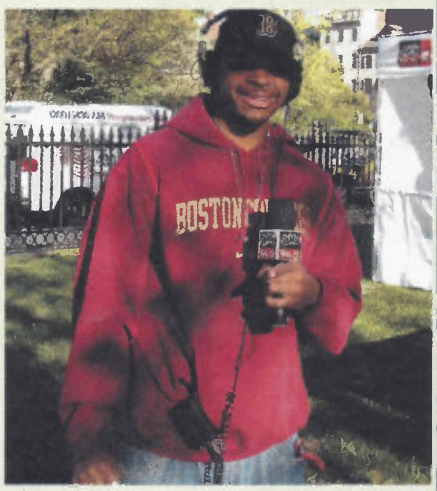

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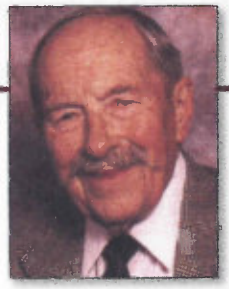

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Tower inspection and climbing

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

It appears to me that tower climbing devotees and station engineers who do such things are people who delight in looking down on the world. I think such activities were more prevalent many years ago than they are today. In those happier, pre-OSHA, pre-EPA days there were more engineers who delighted in finding out how tower systems work and examining them from a bird's eye point of view. Today there seems to be less interest in doing things than in operating them. This is possibly because equipment is more reliable now. Also, there is a trend toward black boxes that are returned to the manufacturer rather than being opened and repaired at the station.

photo by Tracey Liston

A qualified tower climber relies on his experience as much as his equipment.

It was not at all unusual to visit a station and find one of the operating engineers halfway up a tower changing a light bulb or merely enjoying the view. I rarely saw anyone using a safety harness, nor were there many nice, convenient one-man elevators. In those days it was also not unusual to recognize an old-timer by the number of RF burns on his hands. Nowadays we switch off all the transmitters feeding into the tower, or reduce power to a safe power level before approaching a nonionizing radiating device.

Management has learned to forbid station personnel from performing dangerous feats such as tower climbing because of insurance and worker's compensation issues. This is, in fact, a wise proscription for station managers to include in station operating rules and job descriptions.

Experience counts

If a station employs an experienced and capable engineer who is also an experienced climber with a serviceable, approved safety harness, the temptation to use this person's abilities can be extremely strong, especially for such simple things as changing a beacon or side obstruction bulb. At the same time this knowledgeable person can inspect the tower and look for developing problems, especially if additional antennas are mounted on the tower. In this way, the manager gets a much bigger bang for his buck than paying a qualified tower climber to merely change the lamps. But the decision to invoke all these engineering extras must be based on such matters as insurance coverage liability and ability of the climber.

Whenever an experienced tower climber, who is also a good RF engineer, becomes available take advantage of his expertise. That is provided he has suitable, safe and approved tower climbing equipment and the insurance policy covers such activities.

It is unfortunate that the last link in the chain between the microphone and the listener is the station's antenna system. Almost invariably no one looks at antenna systems until something goes wrong, or monitors say something is wrong, and something really is wrong. The wise engineer/manager should take every opportunity to examine the last link in the chain whenever an opportunity arises.

A good combination tower climber/engineer can start by examining the base insulator for cracks, or RF discharge tracks across it or failed copper strapping between the tower base and ground. The copper tubing connections between the doghouse insulator and the tower base with its tower lighting power line inside is a frequent source of trouble. Ideally RF leads should be well braised to a tower leg and nut and bolt connections should be examined with a critical eye.

If the tower is lit at night, the ac power cable passing through the center of the RF loop should be examined for damage and potential unwanted connections. Grounding connections to conduit going up the tower should be carefully checked. This is especially important when folded unipole radiators seem to be proliferating and an ungrounded neutral can cause all kinds of trouble producing unexpected impedance changes.

Resist temptation

Apart from tower maintenance and emergency work, tower inspections are probably the main reason for engineers to climb a tower. Tower inspections will not be worth much if they are not made by someone who

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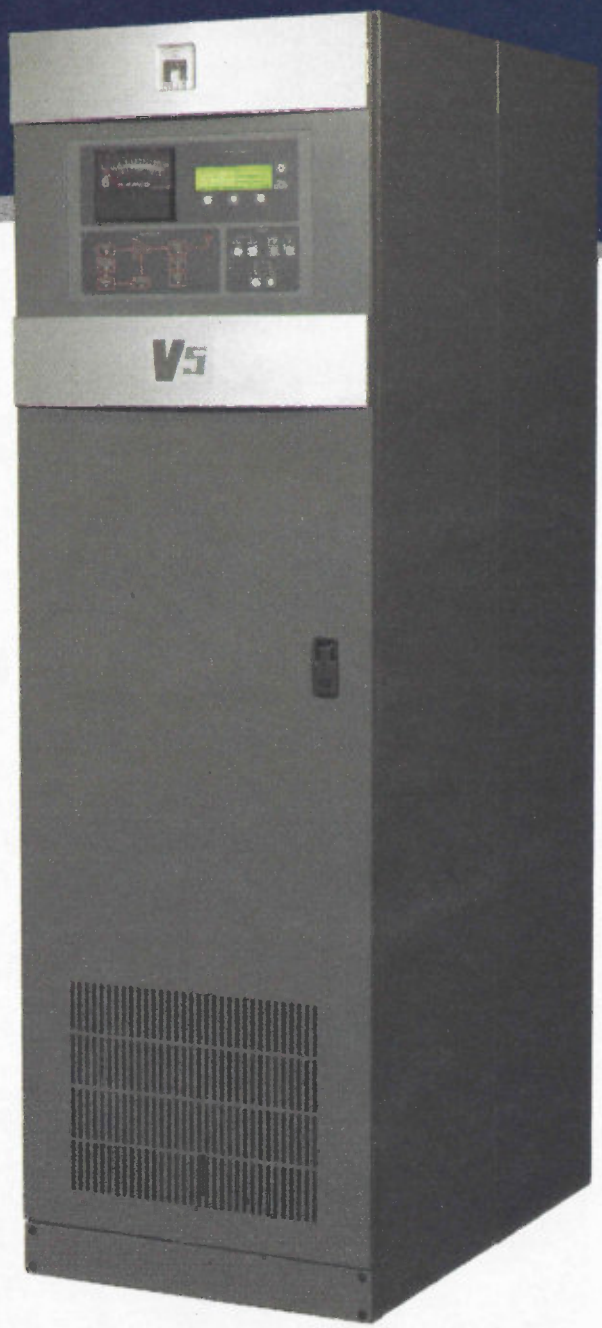

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knows what he's doing and what he is looking for. Bell Tower offers an excellent free handbook on tower inspection and towers in general. It can be downloaded at www.belltowercorp.com.

Vertical radiators generally arrive in specified lengths for assembly at the transmitter site and are bolted together. These joints in the tower can become a source of trouble if rust gets in or couplings and bolts loosen. Skin effect must always be taken into account when handling RF and the higher the frequency the greater the effect. Anyone climbing a tower must be sure to examine tower section continuity.

Similar conditions apply to drop, or skirt, wires on folded unipole antennas. At the point on the tower where the supporting arms and tuning short connection are located the tower must be absolutely free of paint or rust. The wire from the skirt should ideally be welded to the tower, but in fact it is usually bolted. This can be a cause of noise or impedance problems, as can the other end of the connection that taps onto the skirt by means of a wire connector. Shaking the tower or the skirt assembly can indicate a dirty connection.

Specify that all section-to-section joints have a welded continuity strap or something similar across the butt ends of the adjoining sections. If this is done, and maintained by inspection, as time passes one troublesome problem source will be eliminated.

With the increasing use of fiber cables for tower guys as insulators or for full tower guying there is a decrease in guy greasing activity. It's been a long time since I've heard anyone talk about needing to grease guy wires. It was always a spectacle to see a man sliding down a guy in a sort of bosun's chair contraption.

Guys and guy cable fittings are often ignored until a tower falls or begins to lean or guys flap in a strong wind. Regular checking with a tensionometer is advisable regardless of tower size. Surprising slackness can often be encountered without much warning.

It pays to be sure that the guy anchors really are anchors, and not just dead weights on the bottom of a guy. Metal anchors and concrete footings have a bad habit of rusting or crumbling or a combination of rust and chemical/electrolytic action that doesn't always show on the upper surfaces. In soil that has a heavy chemical content use sacrificial anodes to protect guy anchors.

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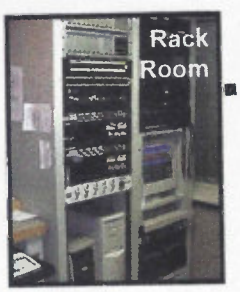

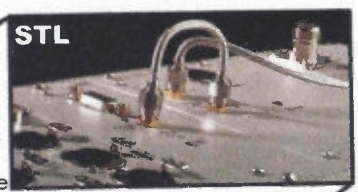

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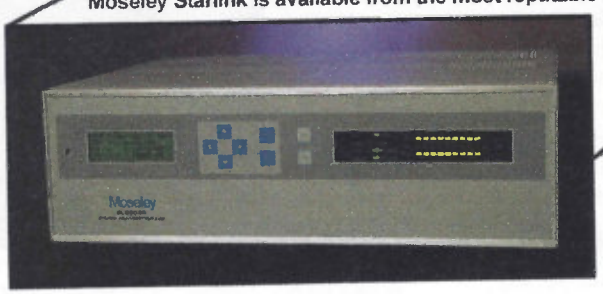

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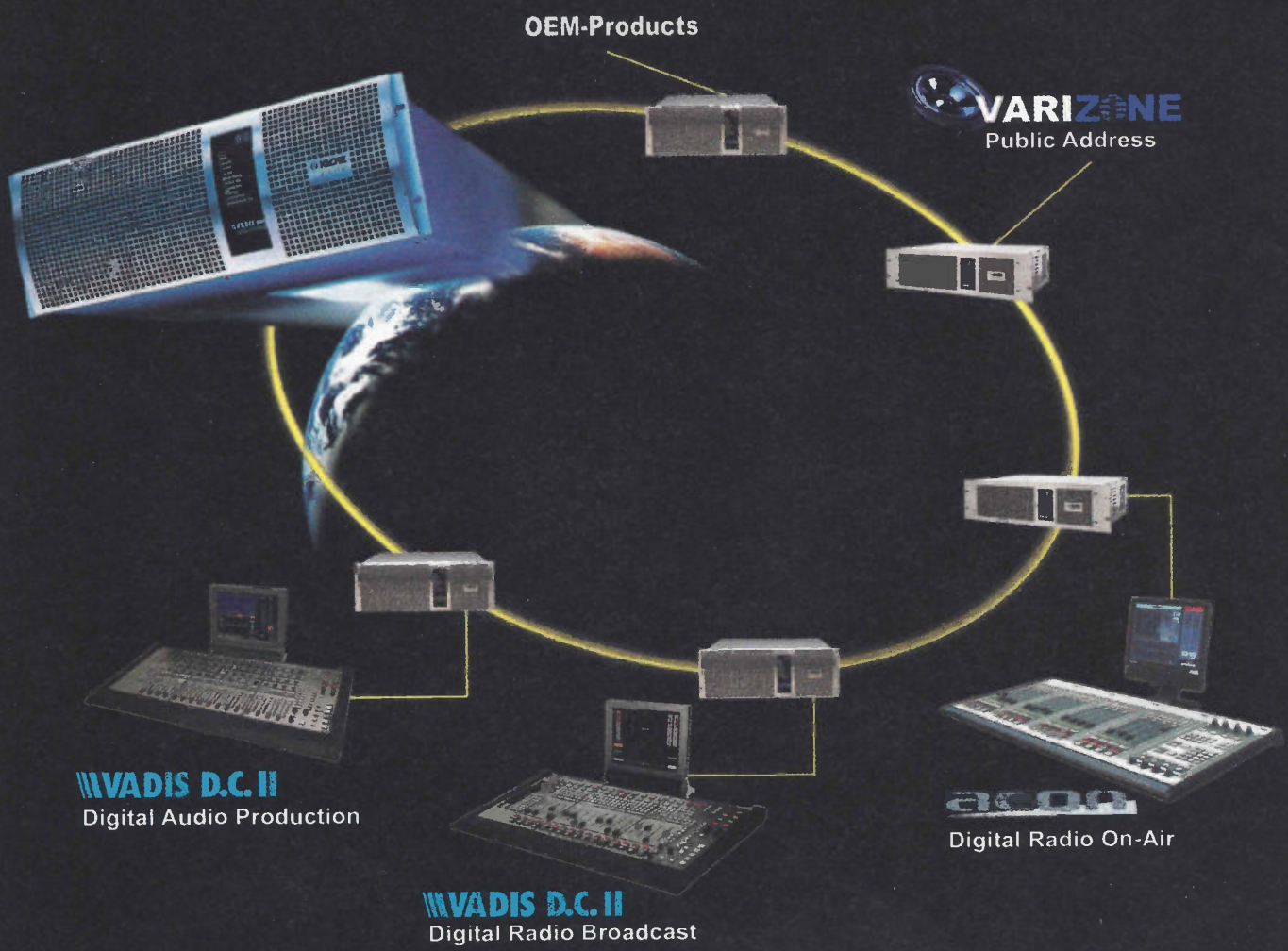

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Translator program origination

By Harry Martin

In an era when established over-the-air radio stations are facing competition from Internet streaming, podcasts, satellite radio, low-power FM and multicast programming, at least one radio station owner wants the FCC to allow a new mode of competition. A broadcast company headquartered in Illinois has filed a petition with the FCC seeking rule amendments to allow FM translator stations to originate local programming.

The petitioner already operates a commercial full-power FM station in its community. Last year this broadcaster acquired a construction permit to build an FM translator that would serve the same community. In its petition for rulemaking, filed with the FCC in April, the petitioner argues that the FCC's rules should be changed to allow all FM translator stations to originate local programming instead of just rebroadcasting a signal from another station. Given the opportunity, the petitioner says it would use its translator to broadcast its own counsel meetings or additional high school sporting events.

The point to ponder

The argument in favor of a rule change is the FCC's long-standing goal of promoting localism in broadcasting. The current rules merely protect incumbent FM radio stations from competition, according to the petitioner. The petition also points to the FCC's rewrite of the TV translator rules in 1982, which allowed the owners of TV translators to convert to LPTV and broadcast original programming on their stations.

What is not clear in the petition, however, is whether anything significant to the translator service has changed since 1990—the last time the FCC substantially revised its FM translator rules. In 1990, the FCC decided that it was in the public interest to protect current FM radio stations from unwarranted competition from translator operations. Recognizing the principle that commercial stations can stay on the air and serve the public only if they are profitable businesses, the FCC concluded that competition for advertising dollars from translator stations could undermine the economics of existing stations. This principle has been reiterated more recently in the fight between terrestrial radio broadcasters and satellite radio operators over whether satellite radio should be permitted to provide local content such as traffic and weather reports. The principle was also upheld in the FCC's decision to allow only non-commercial operation of low-power FM stations.

The outlook appears bleak for this proposal. As recently as March 2005 the Commission seemed determined to maintain the FM translator service's position as low man on the radio service totem pole, particularly relative to LPFM. The freeze on FM translator applications that was imposed at that point, and which by its own express terms was supposed to last only six months, remains in effect more than a year later. The clear implication there is that the FCC does not feel motivated to advance the FM translator service for the time being.

Even if the Commission were open to removing programming restrictions on FM translators, opponents from the LPFM universe would likely join full-service licensees in the opposition, or at least seek technical parity with the translator service. Existing radio stations, which fought to keep the LPFM noncommercial and limited in power, are likely to fight hard to prevent competition and possible interference from a raft of new low-power stations originating local programming and selling commercials. In spite of the obvious negatives, the Commission has invited public comment on the proposal.

Ownership rules update

The FCC has been working on a new notice of rulemaking to address the court remand, in 2004, of its omnibus media ownership rulemaking. While the radio multiple ownership rules are in effect, the rewrite will affect radio/TV and radio/newspaper cross-ownership. Now that Commissioner Robert McDowell, a Republican, has joined the agency, Chairman Martin has a 3-2 majority. As a result, it is expected the new notice proposing significant deregulation will be issued this summer or fall.

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.

Dateline:

Aug. 1 is the deadline for stations in Illinois and Wisconsin to file their biennial ownership reports.

Aug. 1 is the date on which stations in North Carolina, South Carolina, Illinois, Wisconsin and California must place their annual EEO reports in their public files and post them on their websites.

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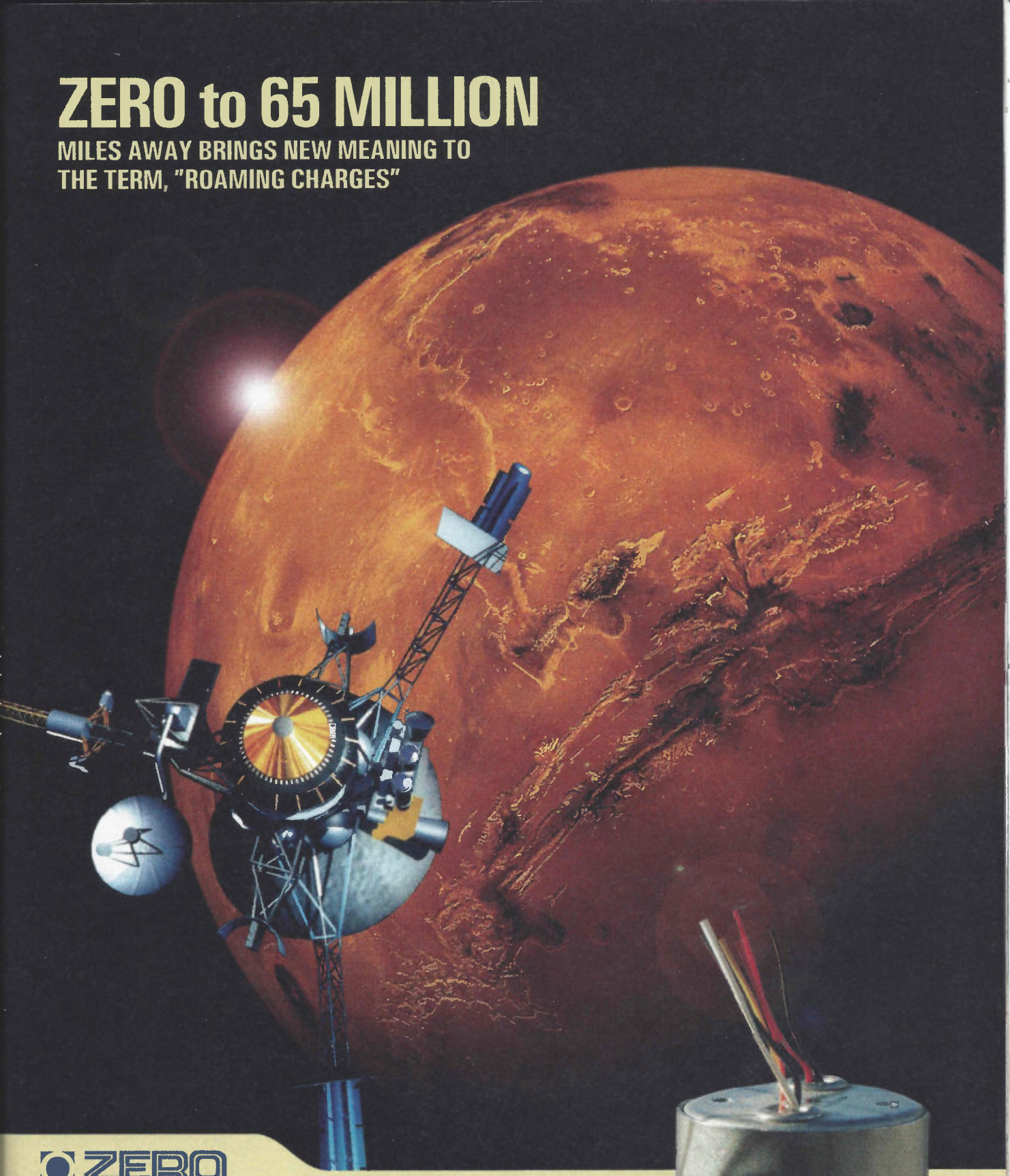

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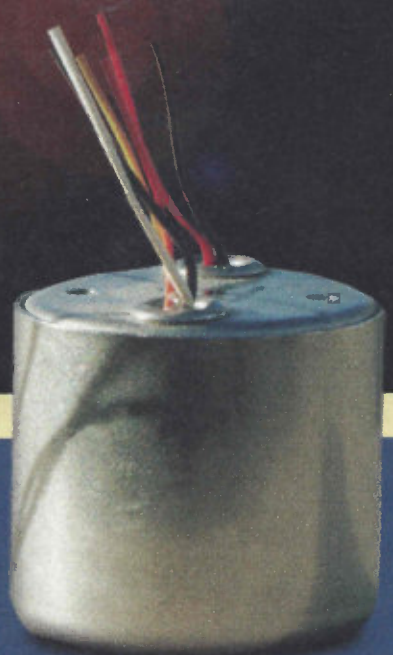

Wired for sound and data and more

By Doug Irwin

I've spent some time in transmitter sites and I always have to shake my head whenever I find old audio cables running around. Typically they are packed with cloth, have a braided shield, thick insulation and, of course, only one pair of wires.

Thankfully wire and cable technology has come a long way since then, reflecting changes in the systems to which they become a part. Back in the day, at an AM transmitter site, most audio runs (if not all) had transformers on the source and destination. Balance and noise rejection were pretty easy, even in the presence of high-powered transmitters.

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Wired

Somewhere along the line, single-pair cables with foil shields were introduced, such as the Belden 9451. These were certainly much easier to install than the old braided-shield cable. Another option was multiple pairs of the same type inside one fat cable. While these fat cables certainly saved time during the installation, they had the same issues as the single-pair cables: relatively high capacitance (34pF/foot at 1kHz). The cable was also relatively expensive; plenum rated even more so. Conduit runs had to be made large enough to accommodate multiple runs of the same type.

When the AES3 standard debuted, we had to start using cable with lower capacitance per foot, and due to the nature of the AES data stream, it

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Resource Guide

Manufacturers of wire, cable, accessories and connectors

3M
www.3m.com
888-3M HELPS

Alpha Wire Company
www.alphawire.com
800-52-ALPHA

Altinex
www.altinex.com
800-ALTINEX

Amphenol
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Audio Accessories
www.patchbays.com
603-446-3335

Belden Wire & Cable
www.belden.com
800-BELDEN1

Bomar Interconnect Products
www.bomarinterconnect.com
973-347-4040

BTX
www.btx.com
800-666-0996

Canare
www.canare.com
818-365-2446

Clark Wire & Cable
www.clarkwc.com
800-222-5348

Energy Transformation Systems
www.etslan.com
510-656-2012

Ensemble Designs
www.ensembledesigns.com
530-478-1830

Gepco International
www.gepco.com
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Heil Sound
www.heilsound.com
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"Tomorrow arrived today!"

"I've built many, many studios all across the Midwest over the years, but our Knoxville Logitek installation was the cleanest, neatest and most advanced layout you can imagine! Almost everything is located in a centralized controlled-environment rack area. The control surface, mics, phone stuff and CD player backups are about the only things left in the studio outside of all the computer controls. The majority of the audio chain takes place within about five feet inside of one equipment rack for each station.

"My biggest problem today isn't how to set up for daily on-air operations, it's how to sell off all the old equipment like distribution amps that I don't need anymore. The Logitek system makes audio 'patching' just as easy as plugging in patch cables for everything. You don't even have to change the type of cable if you change from analog to digital—just re-plug a jumper into an appropriate engine input!

"I'd always dreamed of a studio that worked better for the jock, looked more like what the public thinks a radio star 'cockpit' should look like and yet was easy to take care of. The Logitek system made it possible to build it."

Mark Lucas, *Chief Engineer*
Journal Broadcast Group, Knoxville TN

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Wired

became necessary to consider the characteristic impedance of the pairs themselves because they effectively became transmission lines. The AES3 standard is 110Ω, ±20 percent, for a balanced pair.

Fortunately for all of us, Ethernet came along with the CAT-5 and later the CAT-5e specifications. CAT-5e has a characteristic impedance of 100 (±15) ohms. Capacitance is specified at no higher than 17pF per foot. These characteristics made it acceptable for use in carrying AES3 signals around the studio facility.

Now in the construction of a broadcast studio, you have the option of using cheap and readily available CAT-5e, CAT-6 or even CAT-7 wiring to handle everything that runs around the facility—whether it is dc, serial data,

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Resource Guide

Krone
www.kroneamericas.com
303-790-2619

Lemo
www.lemo.ch
800-444-5366

Liberty Wire and Cable
www.libertycable.com
800-530-8998

Mogami America
www.mogamicable.com
800-800-6608

Mohawk
www.mohawk-cdt.com
800-422-9961

Monster Cable
www.monstercable.com
415-840-2000

Nemal Electronics
www.nemal.com
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www.neutrik.com
732-901-9488

Pomona Electronics
www.pomonaelectronics.com
800-490-2361

Ram Systems and Communications
www.ramsyscom.com
800-779-7575

Redco Audio
www.redco.com
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Switchcraft
www.switchcraft.com
773-792-2700

Techflex
www.techflex.com
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Times Microwave Systems
www.timesmicrowave.com
800-TMS-COAX

West Penn Wire
www.westpenn-cdt.com
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800-733-9473

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"WIP Sports Radio it is an aggressive, male-oriented station. Things move fast here and we're constantly moving between remotes and guests in the studios. StudioHub makes it easy for us to do this because it's simply pulling one CAT-5 connector out and plugging it in someplace else."

"Back in the old days it was solder fumes going up your nose, punching and crimping all day on your knees and lying on your back. It used to kill me, working on these projects, and I did a lot of them over 30 years. I just hated to do them."

"The whole (StudioHub) idea of CAT-5 twisted pair audio sounded like a match to me and it works great. It's really easy to use. We've put away the soldering irons and the punch tools. It's made our jobs a lot easier."

"This is a great innovative product. The past was so arduous and so laborious. It took forever to build studios and of course management never understood that. Now, with StudioHub we just get it done."

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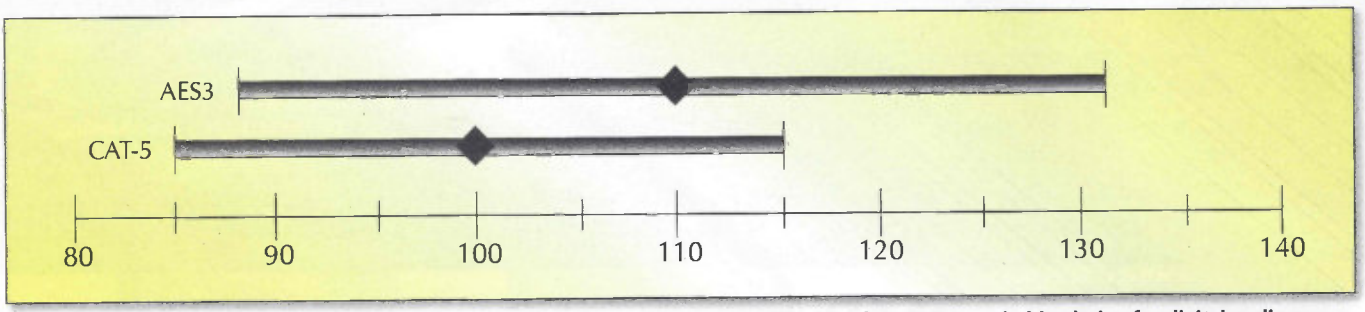
audio, AES3 signals or video. Oh yes—you can still use it for Ethernet, of course. Because there are so many applications for it, there are many companies that make it, thus driving down the cost. Because the twist of the wires is fine, and the balance in the pairs is designed to be good (keeping noise from being induced in the pairs themselves, and likewise, keeping the pairs from inducing noise in other nearby pairs) they can be tightly packed together and individual shields around the pairs are not necessary. This shrinks the cable because more pairs can be squeezed in a small diameter. The lack of shielding of individual pairs makes the installation substantially easier as well. This is the way the telephone company had done it for years, but far better.

CAT-rated cables

Belden Wire and Cable offers CAT-5e (7988R (for riser) and 7988P (for plenum)) and CAT-6 cable (7989R and 7989P) that can be used for carrying RGB or VGA signals because of its inherent low-skew 9ns for the CAT-5 and 10ns for the CAT-6. Belden also makes what it calls super-rugged CAT-5e patch cords. These cables can actually be tied in a knot and still pass CAT-5e data. Belden 1034A is the single-jacket, and 1035A is the dual-jacket for even more ruggedness.

Gepco International has its own version of ruggedized CAT-5e cable known as CT504HDX. This cable also is made with a dual-jacket, solid conductors and an extended bandwidth of 350MHz. The cable includes an inner belt that maintains the pair spacing and the



The AES3 and CAT-5 standards overlap in the characteristic impedance ratings, which makes CAT-5 a suitable choice for digital audio use.

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electrical specifications while being bent or flexed. Gepco also makes a hybrid cable (RGB6c5) that contains coax (3GHz of bandwidth) and CAT-5e cables (350MHz bandwidth) in one jacket.

Clark Wire and Cable can provide Supercat, which is an outdoor CAT-5e cable suitable for direct burial, installation inside ducts or even lashed to aerial supports. The cable is fully flooded inside an abrasion-resistant and UV-resistant black polyethylene jacket. Optionally, this cable comes as STP with aluminum or steel shielding. Clark also provides CAT-7 cable with four shielded twisted pairs. This cable has a bandwidth of 600MHz and comes in plenum and non-plenum versions.

3M makes a CAT-7 cable called Volition. According to 3M this cable has reduced the pair twist on all four pairs, thus reducing the skew and making it perfect for gigabit Ethernet applications.

ETS makes a line of baluns (which are just transformers) to use CAT-5e and CAT-6 for various applications such as composite video and stereo audio (PV901) or passing RGB video (PV890). The company also makes balun/wall-plate combinations for simplified installation.

The Studio Hub wiring system from Radio Systems uses CAT-5 wiring as its backbone. The system uses a variety of connector panels and interfaces to route audio and data.

Obviously, there are other wire and cable applications in a studio facility as well. You can't do everything on UTP yet. For example, you will probably still need some version of microphone cable. There are plenty of fancy new types in that category as well.

Mic cables and more

Gepco International manufactures a version of mic cable called X-band. The cable is constructed with video-grade foam dielectric that specifically reduces the capacitance and provides an increased bandwidth. Conductors are finely stranded, oxygen-free copper. It also comes in multiple colors.

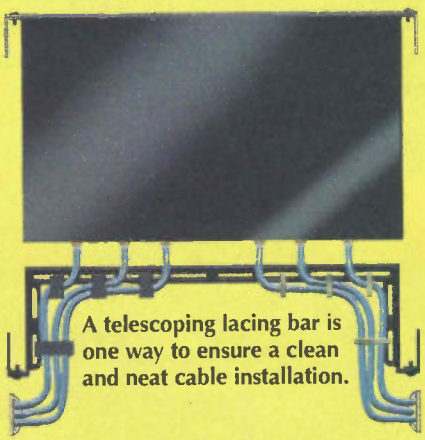
Belden has its own new type of mic cable that actually began as AES3 patch cable material. Because of its construction it too has low capacitance. The Belden part number is 1800F.

Mogami offers a new mic cable called Polar Flex. It uses the same internal 105-strand conductors as the company's standard 2791 stage cable, but with a different outer jacket that allows it to

Cable management for the modern radio station

By Dave Amoscato

The proliferation of audio over digital cable has made the transportation of audio as well as voice, data, and control easier and more effective. However, these cables have also brought new industry standards and techniques that ensure proper installation in every instance.



A telescoping lacing bar is one way to ensure a clean and neat cable installation.

When addressing cable management, integrators and engineers should always consult a manufacturer's specifications before installing, as the bend radius associated with individual cables tends to vary by manufacturer. Coax cables, if used, should never be kinked, although they are more tolerant of tighter bends than high-speed data cables. Twisted pair cable, while not completely eliminated from radio facilities, typically has a standardized bend radius of 1.5" (3" diameter).

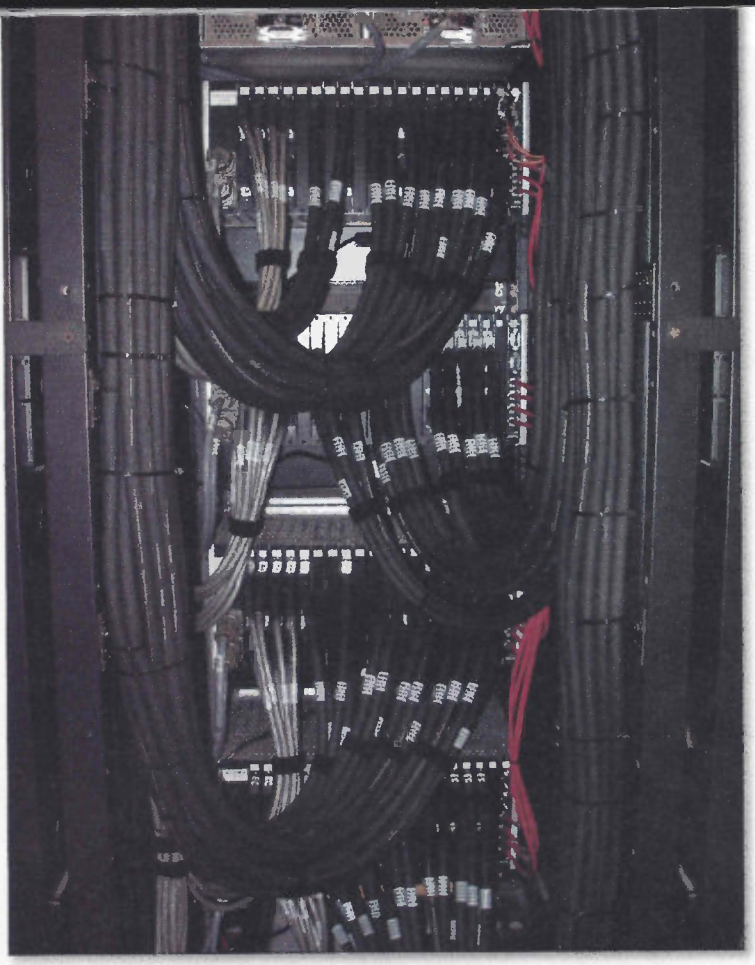
Before cables can be effectively dressed internally, cable entry should be priority one. When running cable into an enclosure from the top of the rack, choose an enclosure with a wide-open top or a removable service panel to accommodate a cable drop from the plenum to maintain a proper bend radius. Enclosures with an upformed base provide additional interior room at the bottom of the enclosure for cable management and coiling of unused wire. When used in conjunction with a riser base system, installers can pass cable runs below each enclosure or from one enclosure to another when enclosures are ganged.

Within an enclosure, vertical lacer strips should be used to ensure that power and signal cables are kept separate and that a cable's pull force never exceeds 25lbs, as excessive pull can compromise connections and alter a bend radius. When managing cables vertically, consider using Velcro cable fasteners for CAT-5e and CAT-6 cables as cinching a cable too tight can affect the cable's capacitance.

Horizontal lacer strips should also be used to provide cable strain relief and ensure the correct bend radius when crossing cables from one side of the rack to the other. Integrators should use offset lacer bars for positioning cables close to the rear of the unit for cable strain relief or when managing multiple horizontal cable bundles at different depth positions. A telescoping lacer bar system provides added flexibility and functionality, and can be installed side-to-side or front-to-back, in addition to accepting vertical lacer bars and power strips.

For technical guides and additional information on proper cable management, visit www.middleatlantic.com

Amoscato is the broadcast sales manager of Middle Atlantic Products.



While data cable has increased in common use, audio cable still sees frequent and sometimes abundant use in many facilities.

remain flexible down to -40°C. The part number is Mogami 3284.

On the opposite end of the system is speaker cable. Many of us use powered speakers but there are still many instances where heavy-duty speaker cable is needed.

Monster Cable makes many cables of this type but the CL3 plenum-rated caught my attention. It features four individually color-coded 16-gauge conductors (the familiar red, black, white and green) comprised of ultra-fine, highly pure copper strands.

Belden makes its own speaker cable, part number 5T00UP. This 10-gauge cable is UL-listed and NEC rated for in-wall use. Belden 6T00UP is the plenum rated version.

Coaxial cables

One of the most important types of cable around a radio facility is coax. Times Microwave Systems manufactures the LMR series coaxial cables. The cables come in sizes from 0.10 inch up to 1.25 inches. They are exceedingly flexible and therefore the need for jumpers (pigtails) at either end is essentially eliminated. The cable is constructed of closed-cell, dry-nitrogen-injected foam dielectric for low loss and a high velocity factor. The outer is made up of multi-laminar aluminum composite tape bonded to the dielectric, with an outer braid of tinned copper. Times makes a complete system of connectors and installation tools as well.

Belden has taken its coax technology even further with the 7800 series 50Ω cables. The loss of each of these cables is about the same as the last generation of coax, but the new generation cables are smaller. Belden makes a riser-rated version, a polyethylene jacketed outdoor version, and a hurricane version as well.

The proliferation of new communications technologies has had a tremendously positive effect on the amount and types of construction materials available for a radio studio facility. With its ease of installation and ubiquity, Ethernet cable has actually precipitated changes in technology around the broadcast studio. New and better types of coaxes for use in wireless applications are obviously available for radio station purposes as well. If you haven't built a facility in the last 10 years, it's a whole new universe out there.

Irwin is director of engineering at Clear Channel, Seattle.

From cramped classrooms

By Barry Thomas, CPBE CBNT

A 12-month span during 2005-2006 qualifies as a tumultuous year for George Evans, chief engineer for WFUV, the radio station for New York City's Fordham University. Evans and his assistant, Jim O'Hara, have had their hands full with a complete studio build, station move, a controversial and well-publicized transmitter move (How many towers get press in the *New York Times*?) and an upgrade to HD Radio. All the projects were exciting, tiring to be sure, but surprisingly and extremely successful. The studios signed on in late September 2005 after close to a year of fund-raising, planning, construction and installation. The result of a $5.5 million budget and the long, hard work is a strong and flexible radio facility that provides a productive and flexible place for work.

WFUV employs 25 to 30 people but also runs on the efforts of a full and part-time staff of around 75 student volunteers. All of those people had a hard time functioning in the original three-studio, converted-classroom facility. The new studios are located in the stately, Neogothic Keating Hall on the university campus across from the Fordham stadium, Houlihan Park. It was no surprise when the directions to the station included a walk downstairs into the basement of the beautiful structure. While I expect most college stations are relegated to the lower floors in out-of-the way places on the campus, this basement radio station was a wonderful surprise. The last thing you would expect would be light, airy facilities with skylights. The WFUV facility now includes eight studios, more offices and common spaces, a listener lounge and capabilities to support the demands of 21st-century radio.

First impression

WFUV's lobby is flanked on one side with windows into a conference room that also houses a small portion of the many awards bestowed on the station. This flexible room is encircled with power, data and telecom outlets so it also serves as the phone bank room during the station's critical fund drives.

Although the new eight-studio installation has exponentially greater production and editing capabilities than the previous facility, Evans ensured that the studios were used efficiently. To this end, most of the offices and workstations have their own editing facilities complete with a Protools editor, HHB CD burner and a Telos telephone hybrid. This allows basic ingest and simple editing to be accomplished at the desk without tying up a production studio. Two voice-over booths provide the same editing facilities but include a microphone, processing, Telos Zephyr Xstream interface and Broadcast Electronics (BE) Audiovault workstation so that the four primary studios can be free for complex work. The voice-over booths open to the newsroom with seven audio production stations, each with Protools 002 and Newsboss workstations as well as phone interfaces. The news and office workstations use the flexible analog Dixon mixers for control, while the voice-over booths and all other studios are part of the integrated SAS 32KD system with

to productive workspace

Inside Fordham University's WFUV

WFUV's Studio 1 is the main on-air studio. It's arranged in a conference table layout around SAS Rubicon console, CD players, Audiovault and Internet workstations.

Rubicon work surfaces.

All the studio spaces and voice-over booths are Wenger V-Ready booths. These were selected because of their standard construction, competitive price and flexible configuration options. It was helpful to know that the studios could be dismantled and reassembled elsewhere if necessary. Each studio features the typical track system for task lighting but also has the most important feature—bright office lights so technical service doesn't require a flashlight or bat vision.

The entire facility is built around a two-frame SAS 32KD router. This provides the greatest flexibility and simplicity for the inevitable changes. Although each studio has at least two 26-pair audio trunks, surprisingly little is connected this way, favoring the fiber and CAT-5 networking offered by the SAS system. The low profile Rubicon consoles and meter bridges also help improve sight lines and acoustics.

All Audiovault, Protools and Newsboss workstations are installed in the central technical areas providing simplicity for sound and cooling concerns. An extensive Avocent KVM system extends and connects the CPUs to their workspaces. The technical center has two rows of GKM racks tied with the overhead tray system that connects to each studio. This tray was sized to allow for easy management of the optical fiber, CAT-5 and audio trunks that interconnect the studios. Outside of the technical center the cable tray is hidden above the drop ceiling until it connects to the wiring chases in each Wenger booth. Because the station is in the basement, radio reception is almost nil so the technical center also houses WFUV's multi-stream audio monitoring/distribution system for the offices. The room also holds NPR's Content Depot

Equipment list

ADC Icon block wiring system
AKG C3000, C535EB, SE300B
Allen & Heath GL4000 mixer
ATI Bi400, DA2016-2 DA, DDA112-XLR digital DA, P1000-2 phono preamp, UB400B RCA to XLR converter
Atlas Sound PB21XEB mic stand, TE-E mic stand
Audio Precision Portable One test set
Avocent AMX5010 KVM switcher
Belden 1500A CAT-5e, 1802B two-pair shielded, 9116R 75 ohm coax
Broadcast Electronics Audiovault, Newsboss
Burk ARC-16
CBT Systems on-air light
Comrex DH20 telephone hybrid
Crown CE1000A power amp
Cyber Research GFA 1710B
Datatronics Technology Pronto EZ DA6551 CD duplicator
Denon DN-C680 CD player
Digidesign DIGI002R Protools
Dixon Systems NM-250 MKII newsroom mixer
Edcor Match Mates amplifiers
Electro-Voice RE20, RE-27 N/D
ESE ES-150 master clock system switcher, ES-243 time code DA, ES-289A/P2 NTP time server, ES-911/GPS/BLACK master clock, LX-161U/UL display, LX-5105, LX-5105/UL, LX-5112/UL, LX5118/UL clocks
Fostex 6301B3E personal monitor
Galaxy Audio Hot-Spot VC
GKM racks
HHB CDR830 CD recorder
Krone blocks
Lexicon LEXPCM81 digital effects processor
Lynx One studio interface
Mackie HR824 studio monitor
McCurdy Radio ATS-100 audio test set
Middle Atlantic rack hardware, RL10-45 & RZ10-45 racks
Moseley Lanlink, Starlink 950 MHz STL
Neuman U87Ai mic
O.C. White 51900-B mic booms
Orban Optimod 8400-FM
Panasonic SV-3700 DAT
Presonus ACP88
Raxxess HH-2 headphone hanger
Rolls RS79B tuner
Sage Endec
SAS Riolink, 32KD router, Rubicon
Sennheiser HMD25-1 headset
Shure SM-57, SM-58, Beta 58, Beta 87
Sony MDR-7506 headphones, MDS-JE480 Minidisc, PCM-R500 & PCM-R700 DAT, RDR-GX300 DVD recorder, STR-DE698 & ST-SE370 stereo tuner, TC-WE475 cassette
Stanton 681EEEMKIII cartridge, D6800EEE-III stylus
Symetrix 528E processor
Symetrix 528E voice processor, 6100 broadcast delay
Tascam 122MKIII cassette, EV-RA1000 master recorder
Technics SL 1200, SL-1210M5G turntable
Tektronix 760A audio monitor
Telos Assistant Producer, Desktop Director, Telos One digital hybrid, Telos Twox12, Zephyr Xtream
TFT 999 digital insertion unit
Ultimate Studio MS-45B2 monitor stand
Wenger V-Ready booths
Whirlwind MS-12-0-NR-050 12-channel XLR snake
Yamaha MSP3 & MSP5A monitors, SPX2000 processor

Marketing and Communications director John O. Platt prepares for his show in Studio 2.

receiver system, the WFUV.com streaming audio encoders and an HD Radio listening/evaluation post.

Studio tour

Studio 1 is the primary on-air studio with ample workspace for the announcer and three guests. The conference table setting afforded the operators with excellent sight lines and an uncluttered, excellent-sounding workspace. The studios all have LCD displays for the Audiovault, Internet, Newsboss and Protools PCs that contribute to cooler and more space-efficient work areas.

On-air/production talent Greg Jamborici collects e-mail production elements for his show in Studio 3.

Studio 2 is the technical equivalent but it's slightly smaller. It has identical furniture and equipment because it serves as the alternate studio for service to Studio 1.

Studio 3 is the primary radio production studio, similar in size to Studio 2 but with full production capabilities and an upgraded, Neuman U-87 microphone. Studio 2 and 3 face into a shared talk studio, Studio B, which is equipped with four microphone positions on a modified triangle table. This allows either studio to become the

The heart of the tech center is the blue dual-framed SAS 32KD router cabinets. In the far racks you can see some of the many BE Audiovault workstations that are extended to studios and offices by the Avocet KVM system.

Live music studio A showing the main entrance on the right and the extra large load-in door. Notice the remote-control camera near the hallway door used for the video feed to the listener lounge.

control room for programs that are being produced in studio B.

Nearby, Studio 4 features similar capabilities with Studio 3 but with a significant enhancement. To the right of the standard radio production position with the 20-fader Rubicon surface, WFUV installed an Allen-Heath GL4000 mixer and extensive outboard processing for live music. Studio 4 faces into Studio A, a 14' × 14' live music studio that is used for the extensive live music programming offered by the station. There is audio and control connectivity between Studio 4 and the performance space. Nearly three times larger than the previous performance space, the old studio required station staff to dismantle and remove the keyboards and drum

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kit on a regular basis to accommodate different performances. The constant change made it difficult to consistently mic the drums, a process that can be tedious to repeat. The new room allows the kit to be left standing and miked optimally. There is a large separate load-in entrance to the room allowing musicians to bring instruments and equipment without passing through the halls of the station but directly to a nearby loading entrance to Keating Hall. Through that entrance the large air space between the Wenger studio enclosure and the building walls can be seen. This space is not only useful for sound isolation, but also for temporary instrument case storage and a secluded location for the power amplifiers for the studio and listener lounge speakers.

Keating Hall is home to the WFUV studios.

Studio B's pie wedge table arrangement makes excellent use of space for talk programs while offering flexibility and control. The studio can be operated from Studio 2, through the left window and Studio 3, through an identical window on the right.

This studio is equipped with a variety of microphones including EV RE-20s, which are used in the broadcast studios; AKG C3000s, C535Bs and SE300Bs as well as the concert standard Shure SM58s, SM57s, Beta 57s and 87s. The drum kit was miked using tiny condensers made by nearby New Jersey manufacturer Applied Mic Technology.

Studio A has been fitted with remote-control cameras in each corner with video that feeds a large monitor in a huge, sky-lit listening and common area, complete with comfortable seating and a large plasma-screen monitor to offer listeners a view of the live musicians during their performance at WFUV. That video feed may be incorporated into the extensive Web presence of www.wfuv.com in the future.

Audio playback

Although the BE Audiovault is used as the central audio storage system, music on WFUV is still played from CD and vinyl. Each studio even has a venerable Technics 1200 turntable, and notably lacking the typical pile of things these devices usually collect on top. That commitment to conventional playback sources required planning for ample and flexible storage space for the music library. The library was carefully outfitted with a moving and configurable storage system to allow for additions and expansion. There was even enough space for a listening/quality control workstation.

WFUV's new studio project suffered typical delays and complications but after 10 months of construction, the station now has a strong facility many times larger and more flexible than before and reliability to allow Evans and O'Hara to concentrate on the next two major projects like a transmitter site move, tower deconstruction and an HD Radio upgrade. The new facility offers the station almost infinite flexibility while providing a comfortable and ergonomic space to serve as the stage for WFUV's important university and community service.

The newsroom is a collaborative workspace encircled by audio editing and news production workstations like this one. Each position has a Protools 002 system as well as the Newsboss workstation.

Thomas is president of Thomas Media Systems, Bloomfield Township, NJ.

Facility Focus
the technology behind WFUV

ESE ES-911GPS/NTP

A Global Positioning System master clock and Network Time Protocol (NTP) server, this unit displays six digits of legally traceable time as received via the internal 12-channel GPS receiver. Simultaneously, the ES-911/GPS/NTP generates several types of time code (IRIG-B, IRIG-E, NTP, ESE, RS-485 Broadcast, RS-232C Broadcast and RS-232C Query) and two 1PPS signals. The unit provides the NTP output on an Ethernet connector, automatically adjusts for Daylight Saving Time, and includes an internal 60-minute battery backup. The outdoor antenna (included) attaches with a supplied 16' cable that can be extended if necessary. Computer synchronization is maintained by using NTP client software such as Dimension 4 or Tardis. Software is also supplied to continuously update a computer's DOS or Windows clock to the GPS time available on the ASCII output.

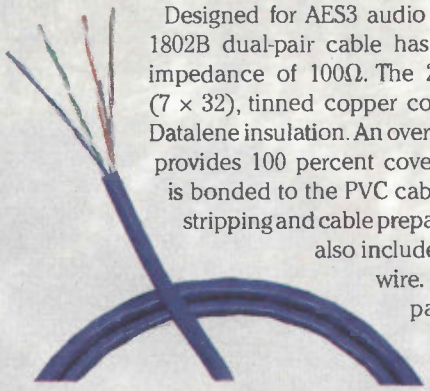
www.ese-web.com
310-322-2136

ESE 5100 Series

With three models in the series—5", 12" and 16" viewing diameters, these self-setting analog clocks operate as time code readers (slaves), stand-alone clocks or impulse clocks. They can read, decode and display time information from most any master clock or other source of time code. The second hand is completely silent and can be programmed for sweep or step mode. The initial set-up allows each clock to have the hours (and/or minutes) offset to another time zone. Each model reads ESE, ASCII, SMPTE or EBU time code. Each has a battery backup and error indicator. Options include a rack mount and a lighted dial.

www.ese-web.com
310-322-2136

Belden 1802B and 1500A



Designed for AES3 audio applications, the 1802B dual-pair cable has a characteristic impedance of 100Ω. The 24AWG, stranded (7 × 32), tinned copper conductors feature Datalene insulation. An overall Beldfoil shield provides 100 percent coverage. The shield is bonded to the PVC cable jacket for easy stripping and cable preparation. The shield also includes a 24AWG drain wire. The two cables pairs are bonded together in a zip-cord fashion.

The 1500A (pictured) is an enhanced CAT-5e-rated cable with 24AWG solid copper conductors. Individual conductors feature polyolefin insulation, and the twisted pairs are enclosed in a PVC jacket. The jacket is available in red, orange, yellow, green, white, blue or gray. The cable is also available in a plenum version with Belden number 1501A.

www.belden.com
800-BELDEN-1

ESE Time Code Readers

Consisting of 12 different models with displays ranging from 0.4" to 4", these six-digit or four-digit displays are designed to be universal time code readers. All models can auto-detect, read and display ESE, EBU or SMPTE time code. Most can also read ASCII time code. Time can be displayed in 12- or 24-hour formats. An error detection and correction feature maintains flicker-free operation in the event of poor quality or loss of time code. Several options are available with certain models to allow time offsets, rack-mount enclosures and other options. Each reader connects to a master clock via a single-pair or coax cable. Multiple units can be wired in serial, parallel or both.

www.ese-web.com
310-322-2136

www.beradio.com

Broadcast Tools SRC-8 III

by Barry Thomas, CPBE CBNT

The Broadcast Tools SCR-8 III is one of those devices that doesn't attract much attention, but once you have a use for it, it becomes one of those many critical tools for operating a radio station. Simply put, this unit is a GPI-to-serial interface. It converts eight opto-isolated inputs into a 38.4kb/s RS-232, RS-422 or RS-485 serial stream and also converts serial stream data into SPDT, 1A relay closures. If an identical unit is connected to the serial connection it's essentially a relay extender. Multiple units can be chained to offer a 32 input × 32 relay integrated control system.

Performance at a glance

- Eight opto-isolated inputs
- Eight SPDT, 1A relays
- Logic functions via microprocessor and non-volatile memory
- Front-panel input and relay status LED indicators
- Expandable to 32 inputs × 32 outputs
- Plug-in euroblock screw terminals

This device is most often used to transmit closures between remote locations. One example is a station that has satellite receivers at the transmitter site and needs a way to send automation closures to the studio. Use of a serial path via the STL, T1 or even a pair of auto-dial modems can allow stations to tie the satellite automation closures as if the receiver were sitting at the studio. Other uses abound however. The units can be configured to offer any function that needs relay control. If the device is paired with the Broadcast Tools ESS-1 those serial signals can be transmitted over IP.

The applications extend beyond using two units to relay closures between locations. Because the output is a standard serial ASCII or binary protocol, software and automation systems can be programmed to read the closures or drive the relays directly. Simple computer applications can be used to drive the equipment to switch an antenna pattern at a scheduled time, start an analog network recorder or even start the morning coffee.

The SRC-8 III is a new version of the original SRC-8, which had similar functions. The III version features front-panel indicators for the closures being sent and received. There are also LEDs to show data traffic in each direction. Both of these tools are critical during set-up and troubleshooting. The unit can be mounted in the Broadcast Tools RA-1 shelf and is sized so that three will fit in a standard 1RU space. It's also useful for wall or desktop mounting.

Opto and relay wiring is easy using the Euroblock terminals. These are the plug-in type terminals that allow the screw-down connections to remain in place if the unit needs to be removed for service. The RS-232 connection is via the DB9 connector. There's a jumper setting for the pin-out so there's no need to make a special cable to connect it or a null modem to connect them back-to-back. The RS-422 is connected on Euro screw terminals just like the optos and relays. Although the device typically comes configured for 38.4kb/s speed, there are jumpers that offer lower speeds of 2400, 4800 and 9600. Other speeds are available by special order. The unit operates on 9Vac through the ubiquitous wall-wart but this power arrangement allows a small device footprint and a UL listing. There is an available USB interface for PCs without a standard serial port.

Put into use

My earliest application of the device was to get a next event command from a remote studio to an automation system and to feed an on-air light back to the studio. This was easy to manage but during setup I noticed that the user manual (available online) had the complete ASCII and binary command reference. After a quick test using hyperterminal, I discovered how easily it could be controlled. I also discovered how the device could be used to log events as well. One of my collegues, Ron Stephan,

jotted down a quick application that we used with the device to log closure events and relay signals as they passed through network systems. Using the SRC-8 and an available PC we tracked GPI events as they were received, retransmitted and confirmed. Those results were saved in a text file that was correlated with the program schedule to help isolate an intermittent failure. This became an invaluable tool for tracking intermittent problems throughout complex systems.

My first purchase was for two units. Within weeks I started ordering more as applications presented themselves for remote control, monitoring and control extension. Every time I purchased one as a spare, I found that it was needed for an application. I think I ordered the spare unit at least four times within a few months. Once you start using this valuable tool, you'll find even more ways to use it—not just for extending closures, but for simple direct PC control. It's a powerful tool to integrate the increasingly complex and automated operation of radio stations.

Thomas is president of Thomas Media Systems, Bloomfield Township, NJ.

Broadcast Tools

P	877-250-5575
F	360-854-9479
W	www.broadcasttools.com
E	bti@broadcasttools.com

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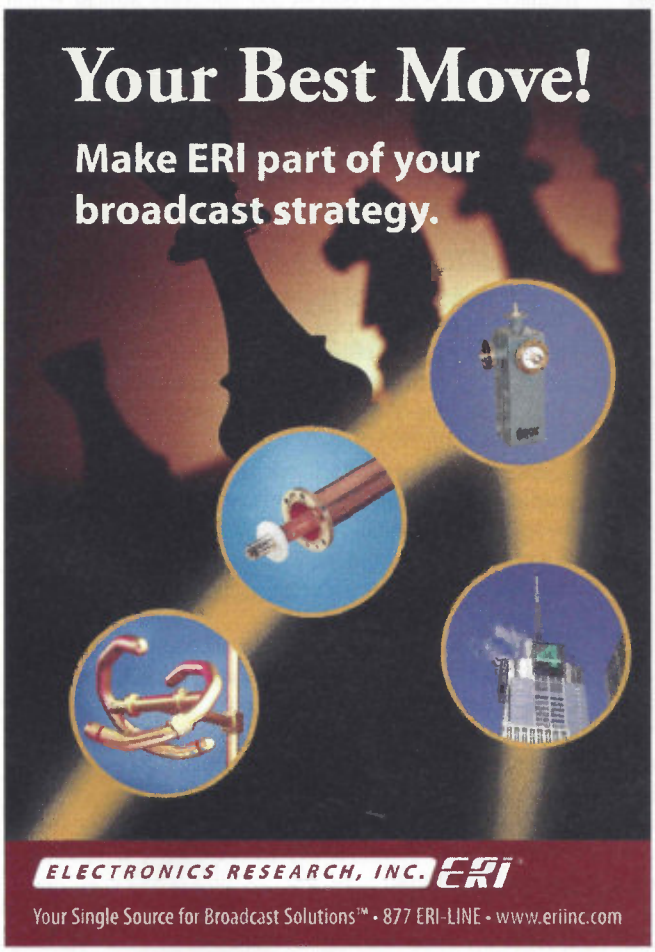
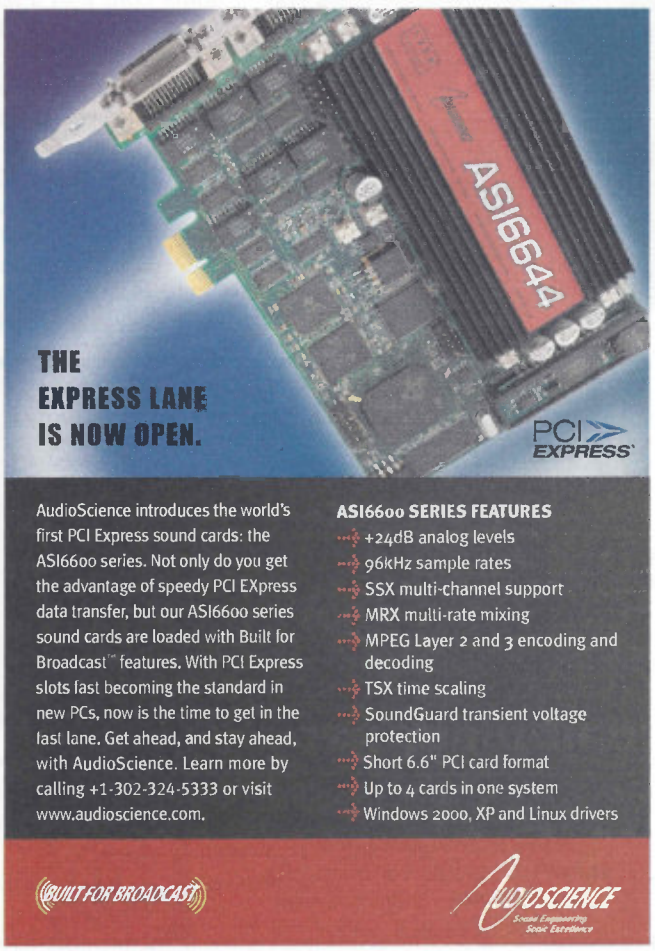




www.beradio.com

Tannoy Reveal 5A

By Jon Taylor

In the incredibly competitive market of small, active monitors, Tannoy has come up with a real gem in the Reveal 5A. These monitors pack a big punch for their small size and they look good, too. Housed in a gray enclosure with a blue painted baffle, the contoured front presents an acoustically sound structure that is pleasing to the eye. Tongue-in-groove construction is used for the front and back.

The Reveal 5A is the smallest active monitor that Tannoy makes yet it has a wide, flat frequency response that is surprisingly dynamic.

Each active monitor features its own detachable power cord with a power switch on the back. There is no digital input, just a combination analog XLR jack for balanced or unbalanced. There are no adjustments for EQ or frequency response, just a volume control on the front of each speaker and a mute. The mute button is actually the Tannoy logo. Push it and the speaker mutes and the green LED turns red. Naturally, using this as the speaker mute requires the speaker to be placed within easy reach.

The speakers are small, but the cabinets are deeper than you might expect. This is to house the power amps. The cabinets measure just less than a foot tall, just more than 7"W x 12" D. They weigh almost 17.25 lbs. Each monitor offers a 40W amp for the bass driver and a 20W amp for the treble. The bass comes from a small, long-throw 5" paper pulp cone. The highs come from a soft dome tweeter. Both are shielded.

Performance at a glance

109dB max SPL
2.7kHz crossover
Distortion <0.7 percent
70Hz to 30kHz frequency response
5" paper cone woofer, 1" soft neodymium tweeter
Balanced combined XLR/jack input
Bi-amped 40W/20W system
Shielded enclosure

Into position

The manual does not assume you know where to place the monitors, and it includes some good advice about setup. While it's full of good information, Tannoy has added enough humor to keep what could be a dry, dull manual and made it entertaining, including jokes about the existence of a manual for monitors and a note to discourage placing a potted plant on a speaker.

I placed them just above head level and only 4' apart. My studio has a shelf piece that sits about 18" above the meter bridge. It really is a perfect design for these small monitors because it places the speakers almost equal distance apart and to where I sit.

The Reveal 5A's bass ports are on the back panel so you need to place them at least 6" from a wall to eliminate an overabundance of bass from the reflected corner. If the studio is designed so that monitors cannot be placed away from the wall, Tannoy suggests plugging the ports with a foam rubber plug. This is also suggested if the 5As will be used with a separate subwoofer. The manual provides some example scenarios for positioning the monitors for the best stereo imaging.

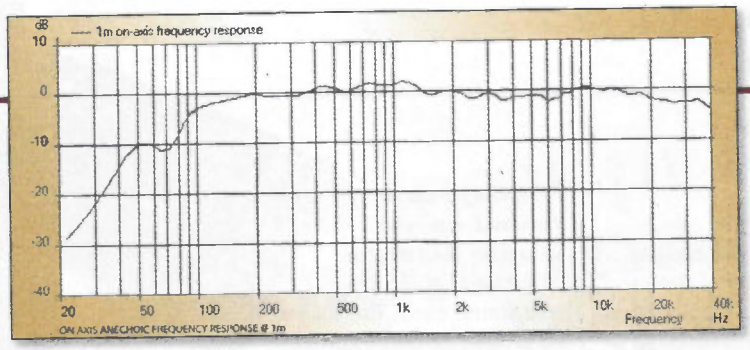
Tannoy urges against positioning the monitor horizontally. The manual explains reflections from the console and other surfaces and even describes an experiment you can do with a pink noise generator to figure out some reflection problems you may not realize you have.

Finally, Tannoy suggests checking the final placement by playing some music with a solid low end and then placing the speakers on a rubber pad or monitor-mounting surface as opposed to a countertop to hear the difference. The pad will absorb some vibration.

The final sound

I said these small speakers pack a punch because the small 5" driver is obviously in a well-made cabinet. The size of the low end is almost unimaginable, and the high end makes the hi-hat on some recordings sound almost annoyingly live. The stereo field is wide and the speakers sounded as if they were larger than my normal monitors, which have an 8" driver. The bass is simply deeper than you would expect.

Tannoy urges the user not to EQ these monitors. They are not to resemble a large monitor with a 15" cone. They



The frequency response of the monitor.

are near-field monitors after all.

Music at low levels, like the heavy piano tracks from Nora Jones, are rich and thick. Horn arrangements from Tower of Power were bright and punchy. Low volume or pretty loud, the 5As are accurate and flat. What I really like to do is listen to just dry voice. Any time you do that, you are always listening intently for quality because there is nowhere to hide tonal problems of any small hiss or noise. Plus, it's what I know best. I know how my voice sounds in my own studio monitors so it was interesting to hear how flat these monitors are. Simply, the Tannoys are true, although it was not easy to turn my own voice up to nearly 90dB to listen for distortion for a solid minute. There was none, but my brain ached from too much me.

If size is a factor, then these active monitors are the real deal. They deliver big sound in a near-field location with plenty of power. Plus, they look great and they're competitively priced. If you have a pro studio or even semi-pro, the Reveal 5A is a good investment in honest, true, flat monitoring.

Taylor is creative services director of KCFX-FM, Kansas City.

Tannoy

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New Products

By Kari Taylor, senior associate editor

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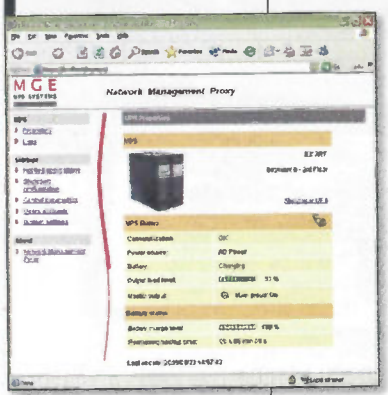
Portable recorder
Sony

PCM-D1: Designed to produce digital stereo recordings that are identical to the original master, the PCM-D1 is lightweight, free of all drive mechanisms, equipped with sensitive, built-in condenser mics and designed with circuits that process stereo sound with no extraneous noise. The unit features 96kHz/24-bit recording, 4GB internal flash memory, removable Memory Stick Pro high-speed storage and a built-in USB 2.0 port. The built-in condenser mic is in an X-Y configuration with low self-noise, high sensitivity and nearly 30kHz frequency response. It offers WAV file format capability and analog level meters with LED peak overload indicators.

800-686-SONY; fax 201-930-4752
www.sony.com/proaudio

Plug-and-play software for UPS
MGE UPS Systems



Network Management Proxy: This plug-and-play software agent allows any of its uninterruptible power supplies (UPS) to be interfaced with an Ethernet network at no extra cost. The NMP allows a UPS to be controlled over an existing network without adding a network management card. With the proxy software agent installed on a PC or server system that is connected to any MGE UPS via a USB or RS-232 port, users can monitor and manage the UPS remotely using a standard browser or a network management console. The NMP agent provides XML and SNMP protocols and can be operated in standard secure mode or in secure socket layer secure mode.

800-523-0142; fax 714-557-9788
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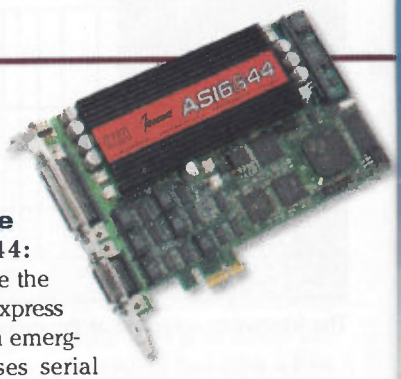
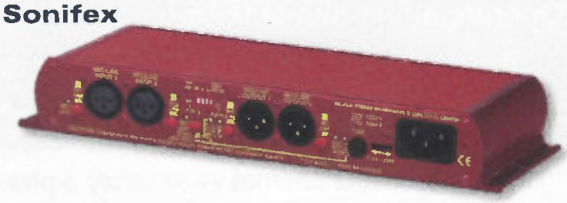
Audio Science



ASI6614, ASI6644: These sound cards use the next generation PCI Express (PCIe) bus. PCIe is an emerging interface that uses serial data interconnects that run at 2.5Gb/s. The single lane PCIe interface used in the ASI6600 series provides a peak throughput of more than 200MB/s. The sound cards offer a faster DSP, short-length PCI format, +24dBu analog levels, 96kHz sample rates and SSX multi-channel support. All the features of the ASI6000 range are also present, such as MRX multi-rate mixing, MPEG Layer II and Layer III encoding and decoding, TSX time scaling and Sound Guard transient voltage protection on all I/O. Four stereo inputs and outputs are provided on the ASI6644, while the ASI6614 features one stereo input and four stereo outputs. Hardware sample rate converters are present on all AES/EBU inputs and a dedicated AES/EBU and word clock sync input are also standard.

302-324-5333; fax 302-738-9434
www.audioscience.com; sales@audioscience.com

Microphone, limiter
Sonifex



RB-ML2: This stereo microphone and line-level limiter can operate in stereo or dual mono mode so it can be used as a stereo line limiter or dual mic limiter. Two mic/line inputs have independent gain, filtering and phantom power selection. The VCA limiter circuit can operate jointly on the signals (stereo mode) or independently (mono mode) and the characteristics of the limiter can be set via level threshold presets. The equipment offers line or mic level outputs so that it can be used in line with a mic input on a mixer or similar equipment.

207-773-2424; fax 207-773-2422
www.independentaudio.com; info@independentaudio.com

Portable Circle Surround encoder
SRS Labs

CSE-06P: This encoder engineered to prepare 5.1- or 6.0-multichannel audio for recording on two-channel recorders. The unit includes a surround headphone-monitoring mode and SRS Headphone Pro, which accurately monitors discreet 5.1-channel mixes over conventional headphones. In addition to SRS Headphone Pro mode, the unit also offers monitoring of individual channels and monitoring of the SRS Circle Surround-encoded stream.

949-442-1070; fax 949-442-1484; www.srslabs.com

a sneak peak of *Radio* magazine redesigned

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Music library
Non-Stop Music Library

Cuegle.com: This music search and download engine combines the look and feel of a physical CD collection with the search capabilities of an online library, providing access to 1,100 CDs with more than 35,000 tracks. Each MP3 track can be fully previewed and downloaded to the user's desktop, where it can then be inserted into a project. A "projects" section allows the user to keep multiple music cues in project folders specifically designated for that project. To streamline the review and approval process, clients can be sent e-mails with metadata XML files that they can then open in Cuegle for access to the full MP3 files.

801-531-0060; fax 801-531-0346
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Multicast-capable tuner
Day Sequerra

M4SE: A broadcast quality tuner available with built-in multicast

capability, the device includes synthesized, push-button tuning for AM and FM bands including multicast channels with 20 preset stations. Other features include optional proprietary Class-M audio output circuitry that delivers +4dBV on XLR connectors; transformer-isolated 110Ω XLR for AES digital audio output 5.1 surround capable; a high current Class A headphone output with recessed gain control on the front panel; and a slim-line IR remote control. The unit can add an optional satellite radio or Internet streaming audio module.

856-719-9900; fax 856-719-9903; www.daysequerra.com; info@daysequerra.com

Receiver, translator
Fanfare

TRO-1: This translator will convert any FM in-band signal, including FM analog and HD Radio, to another in-band frequency with a simple command through its RS-232 serial data I/O or front-panel control set. The unit cleans the signal of extraneous artifacts providing a better than 99 percent duplicate of the original signal. Through the use of NTP technology, extraneous noise can be removed from the modulated signal, without loss, while maintaining the integrity of the subcarriers, maximum stereo separation, full fidelity of the audio signal and complete sound stage accuracy.

716-683-5451; fax 716-683-5421
www.fanfare.com; custserv@fanfare.com

Portable digital recorders
Sound Devices

702, 703T: These two-channel recorders share the field-tested chassis design of the 722 and 744T digital recorders. The 702 and 702T (with time code) are Compact Flash-only recorders. Features include simultaneous file writing to hard drive and Compact Flash, on-board Li-ion charging and weighing less than three pounds.

608-524-0625; fax 608-524-0655
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Wireless mic transceivers
Zaxcom

TRX900, TRX990, TRX990A: The TRX900 and TRX990 provide integrated audio recording, IFB receivers and time code transmission. Users can record six hours of audio directly to a Flash card and then transfer the WAV files to a PC or Macintosh for postproduction. These transceivers feature integrated audio recording to eliminate the need for transmission between a microphone and external recording device, to provide audio unaffected by RF or EMI. RF remote control allows users to change the parameters of a microphone–such as mic gain, high-pass filter, or the selected channel–from up to 200' away. Integrated RF remote control provides audio professionals with an added measure of control over the output of their productions.

201-652-7878; fax 201-652-7776
www.zaxcom.com; info@zaxcom.com

Surround sound microphone
Holophone

H3-D: Based on the company's H2-Pro, this mic is a portable 5.1 multi-channel professional surround sound microphone. The mic provides a multi-directional pick-up pattern with 20Hz to 20kHz frequency response on five perimeter channels and a discrete LFE microphone located inside. The mic is phantom powered with an LED indicator. Attached to the mic is a 15' cable that terminates in a six-pin Neutrik XLR connector.

416-362-7790; fax 416-362-7780

Dual capsule mic
Marshall Electronics

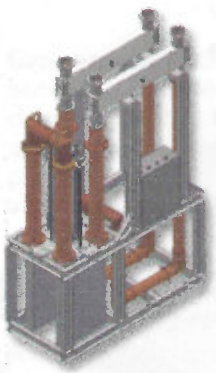
MXL V67I: This dual capsule microphone incorporates large 1" gold sputtered capsules. A red LED on both sides of the microphone indicates which side is currently active and is useful in low-light conditions. As a solid-state microphone, the device requires no external power supply. On the instrument's back side is a 6dB attenuation switch that enables the microphone to better handle high sound pressure levels, along with a low frequency roll-off switch to compensate for proximity effect or to eliminate wind noise during outdoor recording.

800-800-6608; fax 310-333-0888
www.mxlmics.com; sales@mxlmics.com

Leveler
Junger Audio Studiotechnik

Level Magic LT: Instead of front-panel hardware control for each unit, this stereo limiter uses a central GUI that can run on almost any Windows PC. It will provide the interface to several leveler units from one control point, thus eliminating the use of the front panels on individual Level Magic units.

+49 30 677 7210; fax +49 30 677 72148
www.junger-audio.com; sales@junger-audio.com



Power combiners
Myat

FM Switchless Combiner Series: Ensuring that maximum output power is available at the antenna at all times, operators can switch under full power without interrupting on-air programming. This series combines or switches two transmitter inputs into a combined output or either transmitter to either output. Switch between modes by applying a signal to the required mode. Each unit's positions are factory pre-set and performance optimized.

201-767-5380; fax 201-767-4147
www.myat.com
sales@myat.com

Headphone system
Broadcast Tools

Flexphone Master: Each of the six channels provides stereo program monitoring and selective talkback with interconnection via CAT-5 cable. The system is equipped with inputs for stereo program and talkback audio. The mic/line talkback input is available via a rear panel plug-in Euroblock connector, while the front-panel XLR connector facilitates the use of a user provided gooseneck mic or headset. The front panel is equipped with a level control for local headphones with 1/4" and 1/8" stereo headphone jacks. The talkback function can be remotely controlled. Six RJ-45 jacks are provided to distribute audio and power via CAT-5 cable.

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Monitor headphones
Audio-Technica

ATH-Pro700SV: Featuring a low-profile, closed-back dynamic (circumaural isolation) design, the headphones can handle high SPLs. These headphones are equipped with neodymium magnet systems, large-aperture drivers, CCAW voice coils, rotating earpieces and OFC oxygen-free copper cable. A coiled cable at the left earpiece terminates to a mini plug with included ¼" adapter. Other features include 3,500mW of power handling, 53mm diameter drivers and ⅛" stereo connector.

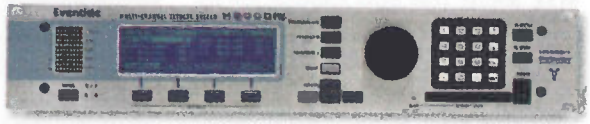
330-686-2600; fax 330-686-0719
www.audio-technica.com
sales@atus.com

Right angle cable connector
Neutrik

XX series: Available in 3-, 4-, 5-, 6- and 7-pole configurations, the connector features a rotatable insert and offers the same features found in Neutrik's other XX-series products. The series offers a female connector with cage type contacts, "solder stop" for easy soldering and additional ground contact for the best contact integrity between chassis and cable connector. The male connector comes without a locking window; more stringent housing. It is housed in a rugged diecast shell in sleek and ergonomic design.

732-901-9488; fax 732-901-9608
www.neutrik.com; info@neutrikusa.com

Multichannel effects processor
Eventide



H8000FW Ultra-Harmonizer: This processor offers nearly 1,600 presets with Firewire. The device features Monolithic Tandem, which allows both processors to operate together, facilitating large complex algorithms, including 5.1 reverb and effects or eight channels of discreet processing. The processor features eight channels of digital audio I/O via AES/EBU, ADAT, and Firewire, all 24-bit/96kHz. The H8000FW incorporates the expanded analog I/O featured in the H8000A, which consists of four channels of analog I/O with a dynamic range of >110dB. The H8000FW also includes PC and OS X graphic preset development tools.

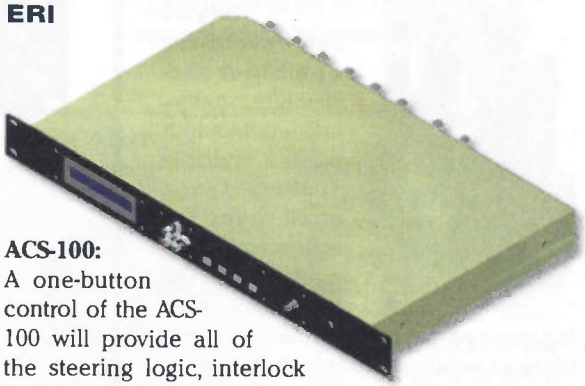
201-641-1200; fax 201-641-1640
www.eventide.com; audio@eventide.com

Analog audio meter
Dorrough Electronics

Series III: This meter features 24 bit/96kHz sample rate analog to digital (A/D) conversion and high stability reference for A/D, 0.1dB drift, zero to 40 degrees C. The digital signal processor-based design with full double precision offers 32-bit math throughout. The meter also features a three-speed phase correlator display and a natural noise floor at -88dBdFS. It provides a full duplex RS-232 communications port for changing meter operation, alarm set points and monitoring alarm activity (connect to user PC or notebook PC). It also features an extensive alarm capability: over level, under level, phase steady state tone detector and audio clipping detector.

818-998-2824; fax 818-998-1507
www.dorrough.com; dorroughel@aol.com

Antenna control system
ERI



ACS-100: A one-button control of the ACS-100 will provide all of the steering logic, interlock and status for multiple switch applications. Control one to four switches simultaneously for mode control of multiple switch installations. A LCD display shows status of events including a time/date stamp of each event. The system features front panel control of status and user programmable parameters. It provides remote interlock A and B path closures for one to four antenna switches.

812-925-6000; fax 812-925-4030; www.ERIinc.com; sales@ERIinc.com

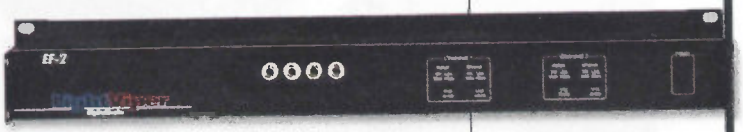
Powered speaker
Yamaha

MSR400: A two-way speaker system with a 12" cone woofer and a 2" titanium compression driver, the active electronics include a two-band equalizer and a master level control. The biamplified system delivers 300W to the woofer and 100W to the tweeter. The cabinets are made of polypropylene and include a pole mount. The input level ranges from -36dB to +4dB to accept mic or line-level signals. Three parallel-connected connectors—two balanced XLR-type connectors and one balanced phone jack—provide flexible connection options. A power indicator is provided, as well as a clip indicator to warn of possible clipping.

714-522-9000; fax 714-522-9522
www.yamaha.com/proaudio

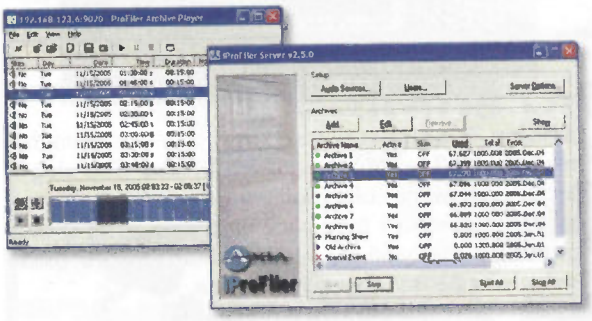
Ethernet-to-fiber converter
Fiberplex

Lightviper EF2: The 1RU converter will accept two channels of 10/100 Ethernet via two RJ-45 connector/receptacles and then convert the signals to two fiber optic transmit and receive pairs. It will operate in three configurations: standard Ethernet using transmit and receive pairs, two channels of single direction Ethernet or as a combination of both modes. The device features an internal, auto-switching ac power supply and the option of being powered by an external 9 to 18Vdc supply.



301-604-0100; fax 301-604-0773
www.fiberplex.com

Music scheduling software
RCS



Gselector: Gselector incorporates today's technology and workflow patterns to create music logs. It includes cross-channel protection to automatically identify and adjust music schedules across a group of stations so none of them play any song simultaneously. Each song's audio can be accessed and auditioned. Research score can be automatically uploaded directly to the system so the next time it schedules it takes into consideration the new test data. The system is also Web-ready so users can schedule or make programming changes over the Internet and hear the results on the air in minutes. The software was created with the .NET 2.0 platform and SQL Server 2005 technologies from Microsoft. The product is available by barter to U.S. radio stations and via other agreements internationally.

914-428-4600; fax 914-428-5922
www.rcsworks.com
info@rcsworks.com

Multi-channel audio archiving/logging
Axia Audio

Iprofiler: This logger works with Axia IP-Audio networks to capture and store as many as 16 stereo audio channels (or 32 mono channels) of time-stamped MP3 audio without audio cards. The system uses a computer's Ethernet port to record audio streams directly. The logger can be used to log on-air programming, store-and-forward network audio feeds and automatically construct air checks. This product supports MP3 compression bit rates from 8kb/s to 320kb/s. A 300GB hard drive can hold more than three years of audio. Audio segments can be automatically backed-up as they are created to a network drive or a remote FTP server. Multiple backup locations can be specified.

216-241-7225
www.axiaaudio.com; inquiry@axiaaudio.com

Product Showcase

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Digital radio FM combiner
Jampro

RCHA-323-10HD: This digital FM radio combiner provides high levels of isolation and properly sized inputs for analog and digital FM transmitters. Effective self-cooling techniques provide safe combining without the need for ac-powered cooling fans. Jampro can provide the combiner for use with station provided coax and reject load, or as a system with these components included for quick installation.

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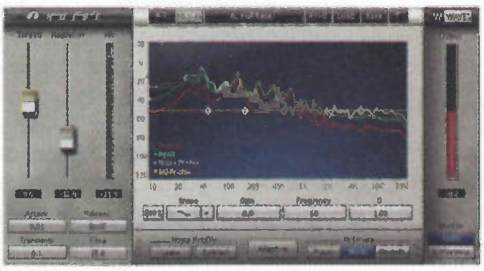
360-594-4273; fax 360-594-4271
www.edirol.com; sales@edirol.com

Management via PC
Burk Technology

Autopilot Plus: The system uses a LAN/WAN connection to bring the Arc Plus network to a computer screen. The system can connect to each network simultaneously. Use its report tools to create detailed, customized reports. Custom views add a new level of flexibility to the user interface. Place meters, status indicators and controls anywhere on the screen. Autopilot calls attention to alarm conditions. An on-screen message alert notifies users of new alarms as they happen. Features: customizable user inface for drill-down display; create, view, print detailed reports using logged data; manage unlimited Arc Plus sites via PC; multiple privilege tiers for multi-user environments and LAN/WAN and dial-up modem connectivity.

800-255-8090; fax 978-486-0081
www.burk.com; sales@burk.com

Plug-in
Waves



Z-Noise: This plug-in is based on a new algorithm that reconceptualizes the way noise is treated. The plug-in includes dynamic noise profiling, transient preservation and increased low frequency resolution. The system provides a five-band EQ interface. An "adaptive" mode reduces noise that changes over time.

865-546-6115; fax 865-546-8445
www.waves.com

Radio station and podcaster
World Vibrations

WVRS-P: The new World Vibrations Radio Station and Podcaster is a studio-quiet device about the size of a VCR that allows users to develop, manage and operate a live or automated radio station over the Internet, or over the air if properly licensed, while simultaneously producing and uploading individual podcasts. Users can capture live programming as it is broadcast for later podcasting or produce separate podcasts offline, integrating music, jingles and other material already stored on the unit while the radio station runs other content uninterrupted in automation-mode in the background. Once the podcast program is produced and edited, the system automates the creation and upload of the MP3s and XML pages needed to publish podcasts.

www.worldvibrations.com
sales@worldvibrations.com

Headphone with mic
Ultrasone

HFI-700: The DPA 4088 cardioid or DPA 4066 omni mic is joined to the headphones with an articulating mount and disconnect that allows for stable positioning and quick field changes. The 6' cable terminates to a fan out with a ¼" stereo plug for monitoring and a three-pin female XLR for the mic. Five volt to 50V phantom power is required for the mic. Custom cable length and connector termination is available. The DPA mic specs include a frequency range of ±2dB: 2-Hz-20kHz; sensitivity, nominal, ±2dB: 6mV/Pa; and a total harmonic distortion: 123dB SPL peak (<1 percent THD), 120dB SPL sine (<1 percent THD).

615-599-4719; fax 615-599-5493; www.ultrasoneusa.com

Condenser mic
Shure

KSM9: This mic offers cardioid and supercardioid polar patterns. It features a frequency response of 50Hz to 20kHz; sensitivity is typical at 1,000Hz; 1Pa=94dB SPL -51 dBV/Pa; maximum SPL at 1,000Hz and 2,500Ω loads 153dB; and a S/N ratio of 72dB. The mic is constructed of all metal die-cast.

800-25-Shure; fax 847-600-1212; www.shure.com; sales@shure.com

Low-power FM transmitter
Teracom Components

Quicksite: The Quicksite FM radio is a compact, fully equipped station containing a FM transmitter, an antenna system and all the components needed to begin broadcasting simply by plugging the unit into a standard power outlet. The standard FM radio station comes with a 100W transmitter producing 270W of ERP and a two-dipole, vertically polarized antenna system featuring omni-directional propagation with preferred direction. Various other transmitters, antennas and options are available, including a separate Yagi-Uda antenna for receiving feed signals and allowing the unit to be used as a transposer. The unit can be fed by virtually any source, and can be connected to existing antenna systems as an alternative to the integrated system.

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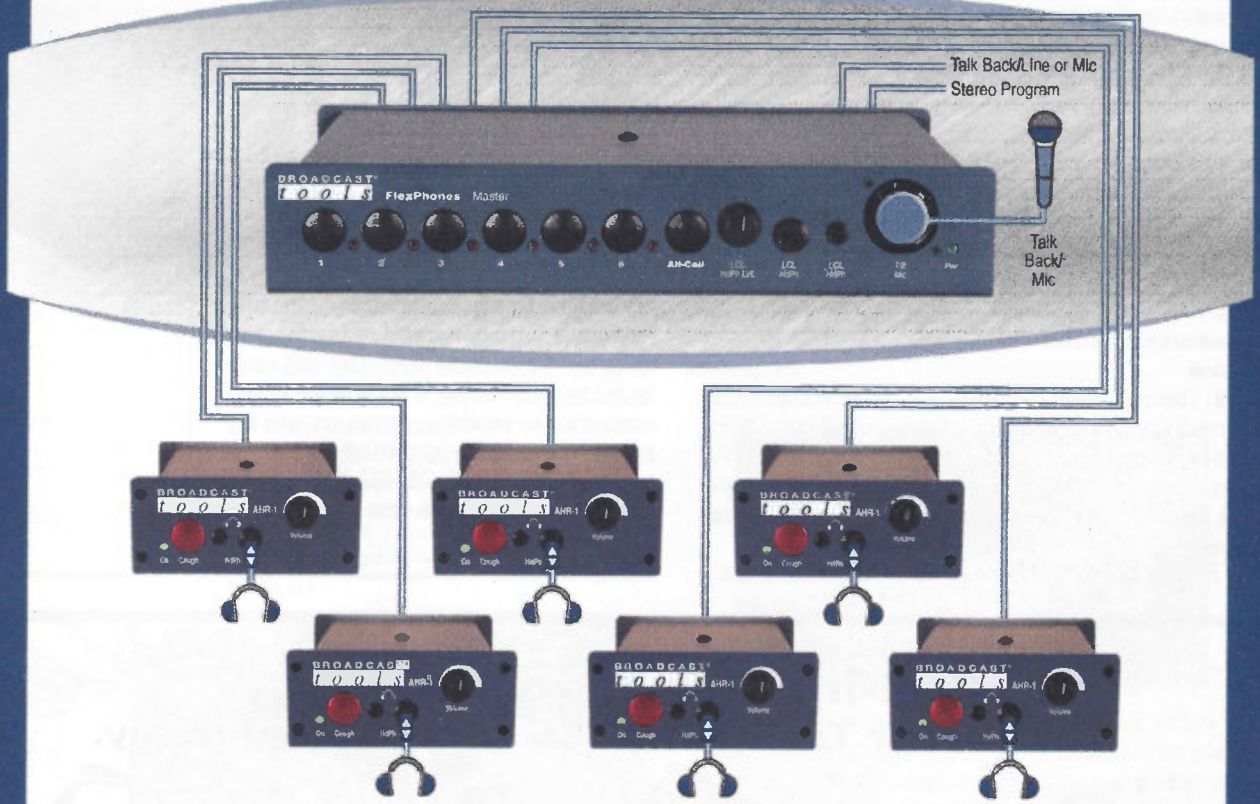

FlexPhones Master

The FlexPhones Master is a professional Broadcast/Studio six channel distributed headphone system with independent talkback capabilities. Each of the six channels provides stereo program monitoring and selective talkback with interconnection via CAT5 cable to multiple Active Headphone Remotes (AHR-1) and/or Monitor Selector Interface (MSI). Multiple masters may be cascaded to form larger systems.

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

AHR-1 Active Headphone Remote

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

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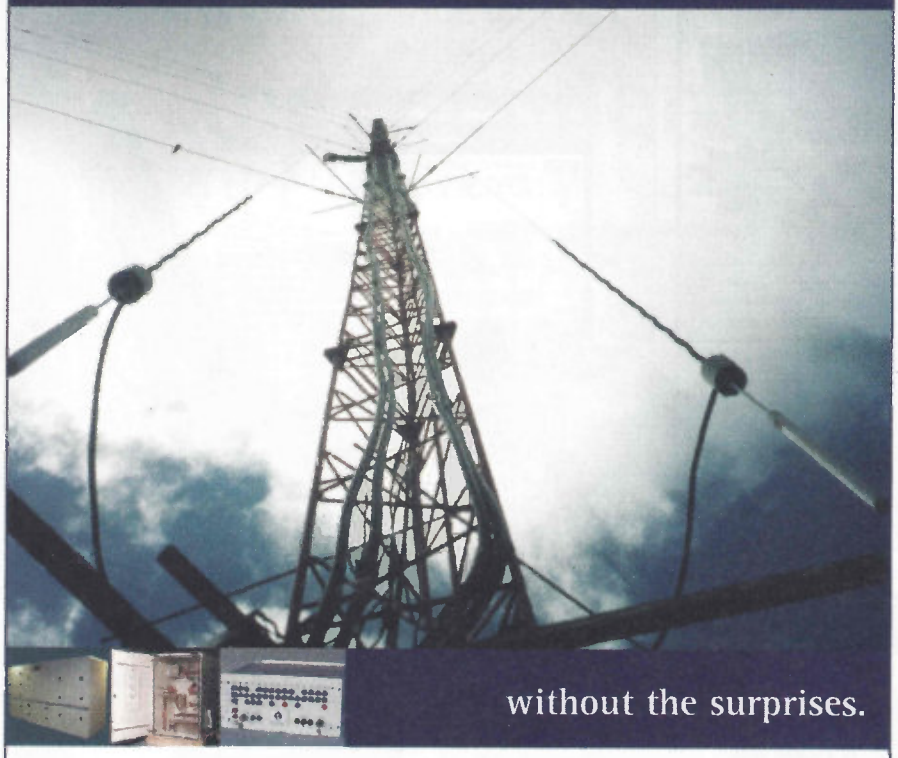
AM RF Systems...



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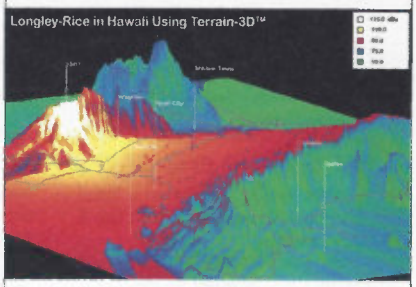

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Contributor Pro-file

Meet the professionals who write for Radio magazine.
This month: Facility Showcase, page 26.

Barry Thomas, CPBE, CBNT
Thomas Media
New York

Thomas is a radio broadcast engineer whose 27-year career has spanned the country. He is the former vice president of engineering for Westwood One in New York. Previously he worked with Premiere Radio and other networks and stations in Southern California. He is the former chief technology officer for Stratos Audio, an interactive radio company based on one of two patents he has co-authored.

He is currently national treasurer for the SBE and chairman of the society's Strategic Planning Committee.

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Written by radio professionals
Written for radio professionals

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Sign Off

By Kari Taylor, senior associate editor

www.beradio.com

Do you remember?

Turnkey facility construction can save time and effort by prewiring equipment before it is installed. The practice is common today, but the basic idea has been around for some time.

During the 1980s, Arrakis Systems manufactured the Modulink exclusively for Allied Broadcast Systems. The modular studio system shipped to end users prewired with multi-pin connector "docking modules" that linked all the units and interconnected all the equipment. Arrakis pre-assembled the furniture modules, installed the electronics and tested the entire package at its facility. Studio installation time averaged one day.

Sample and Hold

Sales Yield
2005 Top 10 Radio Owner Revenues

BIA ranks owners by total revenue. *Radio* magazine has taken this data and then divided it by the number of stations owned to provide a ranking based on individual station average performance, which shows the revenue efficiency of each owner. For comparison, we have included the BIA ranking, the owner's 2004 *Radio* magazine ranking and the average revenue per station.

Radio magazine per-station revenue rank	Company	Revenue (× $1,000)	# of stations	# of markets	Average revenue per station in 2005 (× $1,000)	2005 BIA revenue rank	2004 *Radio* magazine rank
1	Citadel/ABC	417,200	24	9	17,383	5	9
2	Emmis Communications	297,575	23	7	12,938	10	1
3	CBS Radio	2,241,650	179	41	12,523	2	3
4	Greater Media	189,100	19	6	9,953	14	4
5	Bonneville International	269,250	28	7	9,616	11	5
6	Spanish Broadcasting	188,900	20	6	9,445	15	6
7	Lincoln Financial Media	157,075	18	5	8,726	16	7
8	Cumulus Media Partners	264,175	36	10	7,338	12	10
9	Sandusky Radio	63,800	10	2	6,380	24	9
10	Cox Radio	482,975	78	19	6,192	4	4

Source: BIA Financial Network, June 2006.

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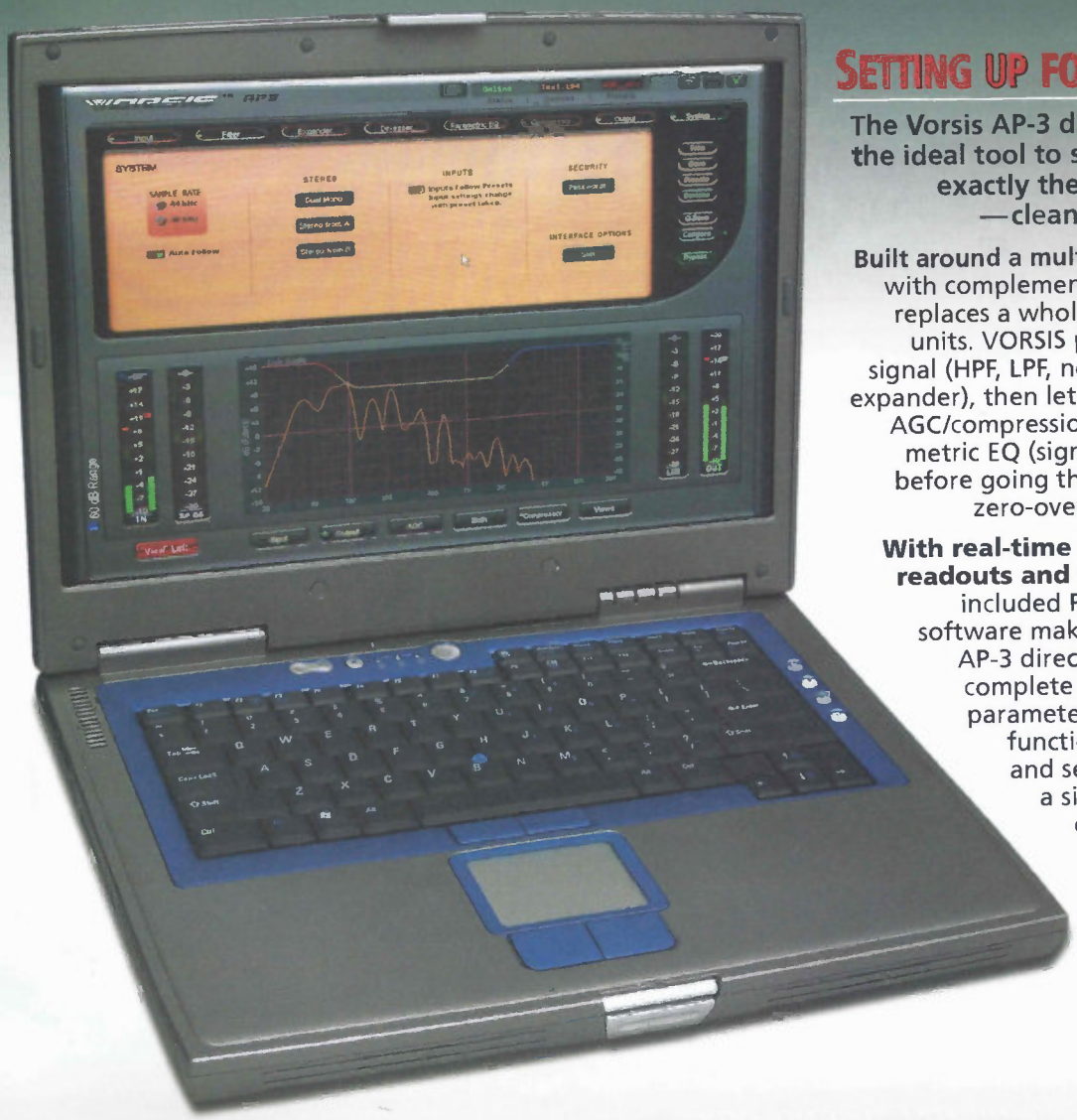

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