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**HD Radio News**

Philips' Semiconductors Division looks at fixed and programmable DSPs in car audio systems.

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**Of HAPS and Strats**

A new class of transmission systems splits the difference between terrestrial and satellite broadcasting.

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# Radio World



\$2.50

The Newspaper for Radio Managers and Engineers

May 21, 2003

**INSIDE**

**NEWS & ENGINEERING**

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**STUDIO SESSIONS**

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▼ Sound insulation: a sound investment. **Page 44**

**POWER PORTABLE**

▼ A Texas reader wins a Nagra RCX220 recorder.

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**NEWS ANALYSIS**

## FCC Tackles Contested LPFMs

*Agency Encourages Applicants to Reach Voluntary Settlements*

by Naina Narayana Chernoff

**WASHINGTON** An effort to clear out a backlog of several hundred LPFM applications is underway at the FCC.

While LPFM supporters and applicants have expressed frustration over the slow pace of approving applications, the commission has been working to conclude its decisions on outstanding non-contested applications and to begin tackling conflicting applications, which involve requests for frequencies that do not meet the spacing requirements of federal rules. These applications are mutually exclusive, or "MX" — both cannot be granted if interference is to be avoided.

The FCC planned to issue a public notice in late spring to inform applicants of their MX status and give them a deadline for working out arrangements to share air time, according to Audio

See LPFM, page 7 ▶

## COOL STUFF AWARD

2003 WINNERS INSIDE



Radio World



Design by Joaquin Arvizu

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## DIGITAL BOX

## DRM Readies For Launch

**GENEVA** Digital Radio Mondiale launches in June. A dozen broadcasters plan to air live broadcasts during the World Radiocommunication Conference in Geneva. DRM is a digital system for use on broadcasting bands below 30 MHz, using shortwave, medium-wave/AM and long-wave frequencies.

Radio Netherlands and Deutsche Welle are participating.

Said DW's Director-General, Erik Bettermann, "We congratulate DRM on the official start on June 16. ... We expect the receiver-manufacturing industry to be just as committed by developing suitable receivers."

Deutsche Welle will broadcast 12 program hours per day in German and English to target regions in Europe.

Radio Netherlands will begin its live, daily DRM broadcasts on June 16 and will air 37 program hours per week in English and Dutch to Australia, New Zealand and target regions in Europe. July 5 to 27, Radio Netherlands will broadcast "Radio Tour de France" for 4 hours per day.

## XM Turns to The PC Market

**WASHINGTON** XM Satellite Radio is introducing a satellite radio receiver for personal computers. The XM PC Receiver, or "XM PCR," targets computer users at home, work and school and

those with portable devices, without the need for an Internet connection.

XM President/CEO Hugh Panero said, "Internet streaming places a terrible burden on a computer's connections and resources." The XM PCR makes no such demands, he said.

XM said it designed the PCR so users can play games and explore the Web while listening to the radio service.

The device is available through PC Connection which also provides technical support.

The XM PCR includes a receiver, antenna, PC software CD-ROM, USB cable and audio cable. Users will be able to download subsequent versions of the XM PCR software.

XM PCR lists for \$69.95 and is available from PC Connection online.

## XM's Top Guns Increase Stock Holdings

**WASHINGTON** Nearly all of XM's top executives took their bonuses for 2002 in stock. According to a proxy statement filed with the SEC in April, President/CEO Hugh Panero earned a base salary of \$400,000 last year plus a \$300,000 bonus. For 2003, Panero's salary goes up to \$412,000.

Executive Vice President of Programming Steven Gavenas earned \$256,520 in salary and \$102,608 in a stock bonus. EVP of Engineering and Technology Stelios Patsiokas earned a base salary of \$264,708 and received a stock bonus of \$116,160, while EVP/Sales and Marketing Stephen Cook salaried at \$288,200 and received a stock bonus worth \$115,280.

XM Chairman Gary Parsons took no salary from the company, but earned an all-stock bonus worth \$500,000.

The bulk of XM's stockholders owning more than 5 percent of shares include GM, at nearly 20 percent, American Honda at just over 17 percent, Hughes Electronics at 15.5 percent and Clear Channel at more than 7 percent.

The satcaster says it has reached the half-million subscriber mark and predicts it will break even late next year.

— Leslie Stimson

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FIRST PERSON

# Embedded in a Floating City at War

by Jim Ryan

*For many Americans, the visual image of war in Iraq will be that of a jerky TV picture showing an embedded reporter bouncing along in the back of a Humvee. But not all of the war action happened in dusty towns in southern Iraq.*

*Jim Ryan is a regional correspondent for ABC News Radio and senior reporter for WBAP(AM) in Dallas-Ft. Worth. He participated in the U.S. military's embedding project and was sent to the Persian Gulf to report from an aircraft carrier. Radio World asked him to relate his experience. This is the first of a two-part article.*

In late summer 2002, trouble was brewing in Iraq and my bosses at ABC News Radio called to ask: "If the United States goes to war, would you travel to the region?"

I didn't hesitate to answer in the affirmative, little knowing that I was committing myself to months of planning, more than 20,000 miles of travel and 51 days in the Persian Gulf.

To prepare the media for "embedding," the Pentagon's grand experiment in openness, each military branch sponsored a week-long seminar at which reporters and photographers would be given just a taste of life in the military.

### The boot camp experience

My Joint Military Media Contingency Training ("boot camp," as we came to call it) was sponsored by the Air Force. As camp approached, my e-mail inbox quickly filled with notes from an Air Force public affairs officer and from one of my fellow reporters suggesting a long list of gear I would need — not only for camp, but also for the "embed" itself:

- Backpack plus side pouches (about 3,000 cu. inches of space);
- Utility belt and suspenders: load-bearing equipment for two canteens in pouches w/NBC cap for gas mask;
- Sleeping bag/pad plus bungee cords and straps to attach both to backpack;
- Waterproof bag to line backpack;
- Water/dust proof Otter Box (goes in backpack, holds MiniDisc machines and discs and anything else that's water/sand/dust sensitive). Cables and connectors can go in same part of backpack.

The list grew by the day until, on Jan. 19, I flew into Philadelphia, picked up my rental car and drove to Ft. Dix, N.J.

To those of us who were never in the military, the boot camp experience illustrated in full color and frozen feet what real recruits must face. At "in-processing" (I learned lots of official names for normal activities) I was assigned to Alpha Squad, one of five teams of journalists.

Among the topics of our classroom instruction: laws of armed conflict, basic first aid, explosive ordnance recognition and terrorism survival.

One session was even interrupted by a team of five rifle-toting, masked men who burst into the room, ordered us to put our heads down on the tables, then stole many of the credentials we'd been told to wear during our time on the base. This was our practical lesson in the ways of the terrorist.

An important goal of our version of boot camp was to teach the rules of embedding. What can and cannot be



The author is shown in the USS Constellation's temporary pressroom. That's Cool Edit Pro on his Dell Latitude laptop.

Photo by Tim Bevan

reported? What if a soldier near me is injured? Should I wear military clothing?

Answers: You may report general numbers of casualties, but leave out names before next of kin are found; do what you can to help an injured soldier, preferably by finding competent medical help on the field. Military clothing? It's up to you.

Radio, as anyone who's worked in the medium knows, has her way of doubling (sometimes tripling) her investment in time and travel. Along with attending classes, I was asked to file daily reports on my war-preparation experience. I did this using a Comrex Vector unit that rides, along with my overnight bag, in the back of the car wherever I go.

The Comrex machines (the HotLine, the Vector, the Matrix) produce near-studio audio quality over a standard telephone line. Each morning in New Jersey, I had a phone line available in a first-floor room of the dormitory where we lived. I wrote, produced and fed stories using interview audio and natural sound from the previous day's activities.

M.R.E.s (meals, ready-to-eat) are not as bad as they sound. Our rations were in thick, plastic bags the color of mud. Inside, the main course was contained in one pouch; another held a chemically reactive heating element.

Add water, insert the main-course pouch into the heater and soon the water boils and warms the meal. This must all be done outside because of the noxious fumes emitted by the heaters.

The brown bag also contained a long plastic spoon, condiments, a sealed dessert and assorted crackers and candy. Each meal was approximately 12-hundred calories and designed to feed hungry, active military personnel in the field.

Wednesday brought a twilight demonstration of firepower. On a Ft. Dix artillery range, a 13-member squad showed us a variety of soldier-carried and truck-mounted weapons, culminating in a staged enemy assault and the massive response that would follow the real thing.

In the roar of cannons and the glow of tracer rounds, the military clearly wanted to demonstrate to the media and to our

audiences back home that the as-yet-hypothetical war in Iraq was not one the United States intended to lose.

The highlight of Friday, the final day of boot camp, was a five-mile hike in

sub-freezing weather. Each reporter was required to wear a helmet and carry a 30-pound backpack along with any other gear he might need in the field.

Along the way, we encountered "wounded" soldiers, a "mine field," a "chemical weapon" attack and "snipers." In all that, we were to demonstrate the practical use of lessons we'd learned in the classroom, including the donning of a gas mask in the prescribed nine seconds.

I returned to Dallas on Saturday feeling tired, but strong and well prepared for whatever my wartime assignment might bring. Then I learned I was to be embedded at sea.

By the end of February, tensions with Iraq had escalated. Saddam Hussein was still in power and refusing to provide evidence to satisfy Washington that his nation had abandoned its chemical- and biological-weapons programs. War seemed inevitable. It was time for the world's news agencies to move personnel into the area of operations and to take the Pentagon up on its unprecedented offer of media access to armed conflict.

I arrived in Bahrain on March 28 to await my maritime orders while my colleague, longtime ABC News Radio correspondent Bob Schmidt, was dispatched to Kuwait City to begin his ground-based embed.

The four days after my arrival in the Gulf region were spent on logistics: checking batteries and equipment, meeting with the military liaisons based in Bahrain's

See EMBED, page 10 ▶

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# The Ins and Outs of 'Cool Stuff'

Congratulations to the winners of the 2003 Radio World "Cool Stuff" Award. Look for their photos and product information in this issue.

The "Cool Stuff" Award is our Emmy, our Tony, our Academy Award. Suppliers vie for this honor each year, and they celebrate in a big way when they win it.

I am asked many questions about the award.

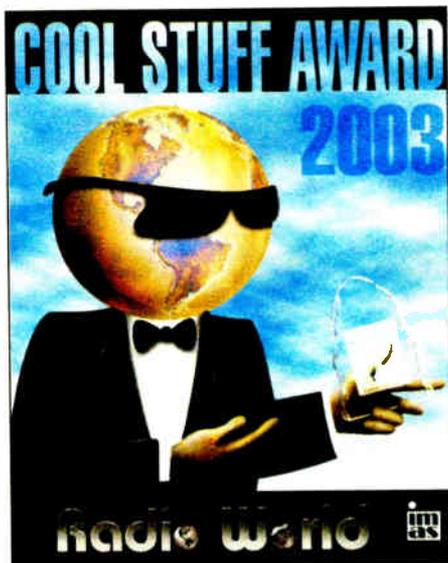
## What is it?

The Radio World "Cool Stuff" Award recognizes new and innovative products or technologies from among those on display at the NAB convention each spring that are aimed at, or suitable for, U.S. radio stations.

## What does it mean?

The "Cool Stuff" designation means a product was selected by our panel of anonymous engineers and industry experts as notable for its design, features, cost efficiency and performance in serving radio users. It means the product caused them to stop and say, "Oh, cool!" Winning companies may use the award logo in their marketing. Winners receive a trophy after the show.

Who are the judges and how are they picked?



Each year prior to the convention, I invite a small group of industry veterans to take part in the judging by walking the show floor and then meeting to discuss their nominees and vote.

Typically the judges number six to 10. All have significant experience, mostly in radio engineering but also in voice work, radio news and audio production. Some may have written for Radio World, others may not have.

These judges take part as a service to the industry and to RW;

they are not paid except for a meal and a private pat on the back.

This year, the judges have more than 200 combined years of hard-core radio experience. They include West Coast, East Coast and Midwest representation, as well as commercial and noncommercial experience, from big markets and small, with substantial SBE certifications at various levels.

Why are the judges anonymous? I bet I know who they are.

They are anonymous to protect them from pressure from suppliers, who compete vigorously for this honor.

If you think you know who they are, you might be right! Then again, you might not. Judges are instructed to visit booths without identifying themselves as such. Radio World brings a large contingent of editors, contributors, freelancers and photographers to the NAB show; only a few are judges, and not all judges wear RW badges.

## How are products nominated?

Judges nominate products and argue for their choices. Companies may ask us to make sure judges stop by, although this is not required for consideration.

## How many awards are given?

As many as the judges approve, by vote, each year.

Our company makes a new product. Why didn't it win?

In some cases, judges will find that a new product is not sufficiently differentiated from others in its class. Sometimes its price may not be reasonable, or pricing isn't determined at all, which makes it impossible to judge its value.

In some instances, judges never even see the product because the exhibitor did not display it (!) or tell us about it.

Do advertisers in Radio World have an advantage?

No. I work hard to keep the process as fair and balanced as possible. That's one reason our judges are anonymous. I

## From the Editor



Paul J. McLane

specifically encourage judges to argue for their choices based only on the merits. Over the years, winners have included both advertisers and non-advertisers.

I have studied other award programs, both in and out of our industry, and I feel confident that our judges are fair, thorough and well-informed.

Why have judges given prizes in the past to products that later never shipped?

This is rare, but it does happen. In visiting the booths, judges are instructed to ask vendors about availability and to take this into account. Occasionally a supplier may promise a product but not deliver it in a timely way after the show. There's not much the judges can do about that. But experience shows that a company that makes a habit of this quickly gets a reputation for over-promising — not only among our judges but among the industry at large. It tends to be self-correcting.

## What's new in the program this year?

To recognize innovative concepts not yet available for purchase, and to help address the question above, we've added a "Cool Concept" Award. This acknowledges that new ideas, still in the process of being developed, have an important role to play in the product development process. Two technologies were so honored this year.

Congratulations to the winners of the "Cool Stuff" Award, and my personal thanks to the judges who worked in anonymity to make them possible.

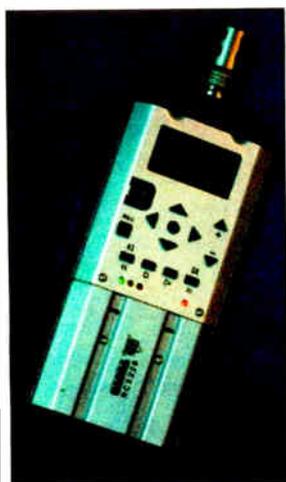


I wish I'd had one of these when I was working a radio news beat.

Our prize is a Nagra RCX220 recorder. The winner is Brian Estridge, director of broadcasting for the TCU/ESPN Regional Sports Network.

This hand-held unit has a rugged aluminum case, a screw-on electret mic and a USB port for file transfer. It can record for five hours on AA batteries but also takes rechargeables; it is fitted with a charger circuit. Audio is recorded to PCMCIA linear or Compact Flash memory cards, using MPEG 1 Layer II algorithms. A CD-ROM supplies a PC download and conversion software allowing files to be transferred to a PC. FAT 16 recording makes the cards PC-compatible, and audio files can be transferred without additional drivers.

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The screenshot displays a comprehensive monitoring interface for transmitter systems. It includes a 'Main' section with various status indicators (e.g., B1 Low Voltage, B2 Flament, AC Phase 1) and a 'Commands' section with buttons for actions like 'B1 Low Voltage On/Off', 'B1 Master On/Off', and 'Generator Start/Stop'. An 'Event Log' at the top right shows a list of system events with timestamps and descriptions.

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TECHNOLOGY

# National Amber Plan Takes Shape

by Randy J. Stine

**WASHINGTON** Proponents of the Amber Alert Plan are applauding the passage of a national plan targeting kidnapers.

Some EAS observers, meanwhile, still worry about the growing pains associated with a national Amber Plan — one they fear could be rapidly inundated and rendered useless by unproductive listings.

Officials of the National Center for Missing and Exploited Children say the recovery in March of Elizabeth Smart, the Utah girl missing for nine months, and media attention resulting from that case helped persuade Congress to pass the national alert measure in April. President Bush signed the legislation the same month.

## Protocols

Supporters of Amber — now an acronym for America's Missing: Broadcast Emergency Response — received a boost to their efforts last year when the FCC amended the Emergency Alert System to include an event code specifically for abducted children. Previously, broadcasters had activated the Amber Plan as a Civil Emergency Message, which sometimes caused confusion to both broadcasters and the public.

Some broadcasters remain skeptical about the program and how it will be interlaced within the Emergency Alert System. They say more-localized plans have a higher likelihood of success. Supporters say a national system establishes protocol to allow neighboring jurisdictions to communicate more effectively in cases of interstate abductions.



An electronic highway sign displays an Amber Alert in California.

Missing and Exploited Children.

Allen said the Amber Plan bill creates a position in the U.S. Department of Justice to oversee the communications network. The legislation allocates nearly \$25 million to provide matching grants to states and localities to assist them in implementing new technologies designed to improve dissemination of Amber Alerts.

The national Amber Alert law will require law enforcement to have sufficient evidence that a child has been abducted and is in a life-threatening situation before an alert can be issued. Most local and state Amber plans already include those criteria to prevent overuse, a NCMEC spokesman said.

The national Amber Plan needs "tight

Opinions on the success of Amber Plans vary. NCMEC claims Amber Alerts have resulted in the safe return of 64 abducted children.

"Amber Plans have done the EAS a great deal of good as the first major source of non-weather-related local, regional and even state level activations," said Richard Rudman, board secretary of the Partnership for Public Warning, a public-private partnership looking at ways to improve public warning delivery.

"Amber developers have stressed plans and systems. Some adjustments are being made, but what you fix for Amber makes EAS better, and vice-versa."

Clay Freinwald, SBE EAS committee chair, said, "Amber is a great example of what can be done with a program that has leadership on a national level. Most broadcasters support Amber because it is associated with doing the right thing."

## Rushed?

Critics of a national Amber Plan contend that sensationalized stories on child abduction recoveries make poor legislation and that Congress rushed through a national Amber Plan without considering its full impact upon the EAS system.

Bob Hensler, vice president of engineering for Colorado Public Radio, said, "The Amber Plan to me is nothing more than a feel-good ploy for politicians."

He said he was glad that CPR does not yet carry Amber alerts. "If we do, it will be because of political reasons only."

Mark Manuelian, chair of the EAS Primary Entry Point Advisory Committee, said, "A national Amber EAS Plan is a bad idea. However, a national plan of sharing information regarding abductions is a very good idea, but it needs to be done between the states at a law enforcement level."

False Amber Alerts have occurred occasionally. The reported abduction of a Maryland girl in February triggered that state's first Amber Alert. However, police later cancelled the alert saying the two-month-old girl's father fabricated the story of his baby's disappearance.

Texas launched the first Amber Alert, which it named after 9-year-old Amber Hagerman of Arlington, who was abducted and murdered in 1996. To date, 41 states have statewide programs. Another 50 local and regional jurisdiction Amber Alert Plans are in place. Bulletins are aired on radio and television outlets and on electronic highway signs.

"The bill ensures that Amber Plans become a vital law enforcement tool for every state and community, and that they are implemented in a consistent and meaningful manner," said Ernie Allen, president and CEO of the National Center for

controls" to be implemented properly, said Bill Croghan, CE for Lotus Broadcasting's Las Vegas cluster and vice chair of Nevada's EAS committee.

"If the national plan turns out to be too broad and poorly controlled, it will result in massive defections of broadcasters from the plan," Croghan said.

Broadcaster participation in the new national Amber Alert Plan will remain voluntary. The NAB has supported a national plan. States will be required to submit reports to the U.S. Department of Justice on the effectiveness and status of their Amber Plans.

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# ◆ NEWSWATCH ◆

## Powell Firm On June 2

**WASHINGTON** FCC Chairman Michael Powell is sticking to his self-imposed deadline of June 2 for releasing new media ownership rules.

In response to letters from several members of Congress who urged the agency to take more time pondering the issues, Powell said he feels "especially obligated to complete the proceeding" given Congress' prior rebuke for tardiness in the last review.

"I would highlight that the public interest is presently being ill-served by a body of rules that have been severely wounded and rendered substantially ineffective by withering judicial fire. Survival demands action," Powell wrote.

Speaking to the Newspaper Association of America later, Powell hinted that the cross-ownership ban might change. Public interest groups that oppose dropping or relaxing the ban believe there will be a rush to consolidate newspapers and TV stations if restrictions are lifted.

Without specifically mentioning the rules, Powell said some deregulatory moves are needed. "We are seeing a world emerging of spider pipes — mul-

tiples routes into the home, all connecting to the Web. We already see cable modem, DSL (digital subscriber line), power-line, 3G wireless technology, WiFi networks, satellite-broadband and fiber-to-the-home networks."

## Former Chairman Wiley: Drop 'Em

**DENVER** Richard Wiley says that when he was chairman of the FCC in 1975, he worried about newspapers dominating the TV industry. Now he supports lifting the rule that prohibits newspaper/broadcast cross-ownership in the same market.

"In the last several years, FCC decisions to retain various ownership rules have been reversed no fewer than five times due to a perceived failure to justify their continued existence," he wrote in an opinion piece in the Denver Post in April. "Judges, for example, have found the agency's prohibition on cross-owned cable/television properties to be unsustainable.

"But other voices would urge the FCC to delay its ownership review, to maintain the status quo and even to reinstate outmoded and discarded restrictions. These voices are echoes

from an era that is long past. Regulatory delay and decision-making that ignores the reality of the marketplace will neither withstand judicial review nor serve the public interest."

## NAB Says It Doesn't Want To Dump All Rules

**WASHINGTON** NAB President/CEO Eddie Fritts wants to put the record straight. He says there are some myths floating around about what NAB wants the FCC to do with ownership rules.

The association has never sought wholesale deregulation of broadcasting, he said in a speech to the Media Institute.

"There have been some overheated press accounts ... suggesting the FCC is on a mad rush to toss out all media ownership rules. I don't believe that to be the case," Fritts said.

"Instead, the commission is responding to five different appeals court decisions ordering it to better justify rules that can be justified, and to get rid of those that can't."

For radio, he said, before passage of

the 1996 Telecom Act, the industry was in "terrible financial shape." Some 60% of stations were losing money; scores went dark.

Lawmakers got it right in 1996, he said.

## Copps Calls for More Time, Again

**LOS ANGELES** FCC Commissioner Michael Copps told a University of Southern California Media Consolidation Forum that neither he nor the American people had been given a look at the media ownership program that will be voted on June 2.

"We don't have the details, or even the broad configuration, of what the new system will be," Copps said late last month.

FCC Chairman Michael Powell hoped to circulate a draft among his colleagues by May 12.

Copps called for a brief period for public comment before new rules are implemented, citing the extensive consolidation of radio that followed the 1996 Telecommunication Act.

Copps concluded by calling on the media, particularly the large networks that he said have ignored the ownership issues, to begin covering them in the remaining few weeks.

"Thus far, their refusal to cover this issue has been just dreadful."

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The upgraded SS 2.1/TERM III & BNC III switcher/routers are improved with new front panel switches. They may be used as a desktop device, and are equipped with mounting holes for wall mount installation or may be installed on the new RA-1 "Rack-Able" 1RU mounting shelf.

The new "Rack-Able" SS 4.1 III switcher replaces the popular SS 3.1 while adding a forth stereo input channel and front panel control. We've kept the best of the SS 3.1 features and added a few more.

The new Silence Monitor III improves on the features of the original SSM, with front-panel control, removable screw terminals, "Plug & Play" installation, built-in program switcher, restore timing delay, aural alarm and relays for most remote functions. Now rackable!

The new SS 8.1 II switcher replaces the popular 6x1 with the addition of two more stereo input channels and GPI, while keeping the price the same! The SS 8.1 II may be desktop, wall mounted or installed on the new "Rack-Able" mounting shelf.

The new RA-1 (1-RU rack shelf) provides mounting for three tri-rack or two half-rack "Rack-Able" configured products. The RA-1 is pre-drilled for flush and recessed product mounting. The RA-1 is furnished with filler panels and mounting hardware.

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**Product: AirCheck**

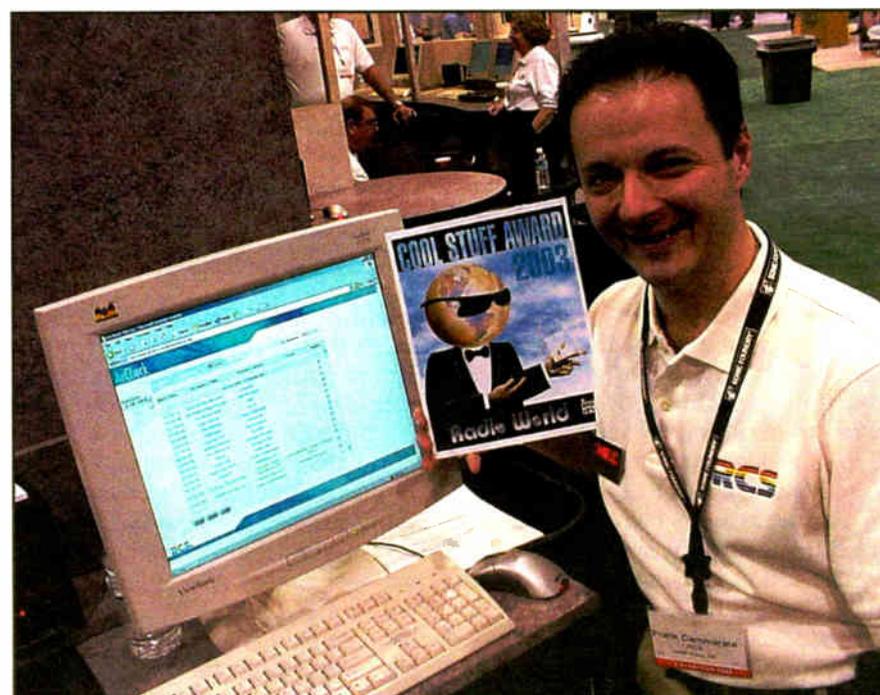
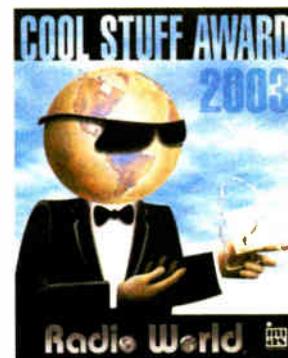
"An effective private eye for program directors and general sales managers," one judge wrote.

Using audio recognition technology, the system lets you log onto a Web site and verify commercials and songs played on your station or others in the market, sort the info in powerful ways, search by industries or advertisers, and hear the audio item if you want, all on the day the content aired.

So a sales manager can not only determine that Nissan is buying spots on other stations, but how many spots ran in a time slot and on *which* stations. She can generate lists of clients not buying your station. An AE can play commercials, as aired, by visiting the site from the client's desk. The PD can use it as a skimmer for training. The GM can hear any part of the program day from the road. The system will also appeal to ad agencies and record labels.

AirCheck is a new subsidiary of RCS. The service will be launched by market. New York was first; WOR(AM) is using it. Frank Cammarata is shown with his baby.

Info: (914) 428-4600 or visit [www.aircheck.net](http://www.aircheck.net)



Cool Stuff Photos by John Casey

## Interference Study Due Soon

Could more LPFM stations be allowed?

As the FCC's Audio Division continues to weed through LPFM applications, staffers await word on whether interference protection rules mandated by Congress are necessary.

The commission is expected to receive a long-awaited report from Mitre Corp., a nonprofit group specializing in government contracts, at the end of May. In 2001, Congress required the FCC to retain a third party to conduct a study on the third-adjacent channel protections. These are the minimum distance separations between LPFMs and full-power FMs and between LPFMs and translators operating on third-adjacent channels.

### Interference complaints?

Last August, Mitre selected a subcontractor, Comsearch, to conduct the testing and analysis at experimental stations. Comsearch measured interference from LPFM stations to existing FM stations in six locations.

The report is expected to contain an analysis of the test data and recommendations for any service rules that could be implemented to relieve interference, if there is any. As specified by Congress, Audio Division Chief Peter Doyle said, the commission would solicit public comments on the report and send the feedback to Capitol Hill. Whether the FCC ultimately will change the rule is up to legislators.

"The statute basically says that we have to come back to them if we want to change the LPFM interference standards," he said.

So far, neither the FCC nor the NAB has received complaints from full-power outlets about interference from LPFM stations. According to NAB, "only time will tell."

"As more stations come on, we'll see if there's more interference, but we're not anticipating it," said NAB spokesman Jeffrey Yorke. "The story would be completely different if Congress hadn't put up the third-adjacent channel protections."

Unknown is how many more LPFMs could be licensed if Mitre finds little or no interference. The FCC would need to study this after receiving approval from Congress.

### Contour overlap

In February, the Audio Division asked WFBP(LP) in Taylors, S.C., to go off the air because a full-power station in the same community applied to the agency to make a change that involved an overlap of contours, not due to an interference complaint. The station complied willingly, Doyle said, adding that the LPFM submitted a proposal to move to another channel in order to avoid the overlap.

According to the rules, LPFM stations are protected by holes caused by interference in a full-power station's 60 dBu contour but not in the 70 dBu contour, which is the premium contour for full-power stations. Doyle said LPFM stations have a small buffer zone when full-power stations seek a change. The division is expected to rule on the issue in the coming months.

— by Naina Narayana Chernoff

# LPFM

► Continued from page 1  
Division Chief Peter Doyle. In those situations, he believes applicants should find ways to share LPFM licenses.

Among more than 3,000 organizations that applied for frequencies in 2000-02, an estimated 140 licensed LPFM stations are on the air and about 650 applicants hold construction permits. Those groups are in various stages of the process, from building out to having a station on air and waiting to receive word from the FCC on their formal license application.

In March, the commission dismissed 481 applications for not meeting the FCC's LPFM third-adjacent-channel distance separation requirements. These are

required for LPFM frequencies next to protected FMs.

For the rest of the year, Doyle expects the division to work on the MX applications, starting with the public notice, which he hopes will launch a period of universal settlements.

### Settlements encouraged

"The rules are set up to encourage settlement agreements between competing applicants." For many groups, he said, a couple of hours of airtime may be sufficient.

In cases where competing applications cannot agree, Doyle said, the applications will be resolved through a point system. Points will be awarded based on a group's presence in the community for at least two years, a commitment to broadcast at least 12 hours per day, and a com-

mitment to provide at least eight hours of locally originated programming each day.

The applicant with the most points will be awarded a construction permit. In the case of a tie, the FCC would encourage competing applicants to share a license.

Commission rules allow all radio stations to share time with other stations. The FCC can specify the division of time in the stations' licenses, or the owners may reach a private agreement, which is then filed with the FCC and considered part of their licenses.

For Pete Tridish, a staffer at Prometheus Radio Project, a nonprofit organization that guides LPFM broadcasters through the launch process, the shared-time arrangement could mean trouble.

See LPFM, page 8 ►

# Last-minute remotes?

## No stress for John Kennedy of Entercom Boston.

The Patriots win the Superbowl! A major cause for celebration in Boston. And potentially major stress for John Kennedy, Engineering Director for Entercom Boston. With no advance warning, John had less than 24 hours to orchestrate coverage of the festivities on numerous stations — including live remotes along the Patriots' parade route. Fortunately, John knew he could count on Comrex Matrix to deliver — even last-minute. With Comrex in your toolbox, last-minute remotes are successful, not stressful.

*"We delivered multiple high-quality live remotes over ordinary phone lines and we didn't lose a minute."*

John Kennedy,  
Engineering Director,  
Entercom Boston

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# LPFM

► Continued from page 7

"It will be very difficult for some of these groups to work out deals," he said. "We are encouraging everyone to go into this in as fair-minded a manner as possible, but you know that there will be trouble sometimes when total strangers have to cooperate in everyone's best interests."

The process of deciding the fate of the stations will not be quick, Doyle said. "Since we're dealing with hundreds of groups, it will take some time," he said. "It's a question of resources."

## Some are discouraged

A lack of resources at the FCC devoted to launching LPFM has frustrated many applicants, Tridish said. But, he said, the FCC seems to be moving as fast as possible. "To be fair, they often do things they say they're going to do within months."

Some applicants with an MX status who have been waiting on word from the commission for two years have become discouraged, said Kai Aiyetoro, director of low-power FM for the National Federation of Community Broadcasters.

"Many applicants I've contacted were ready to give up," she said. "I've had to convince many of them that they have a valuable commodity." In communities where the station would serve an ethnic community, Aiyetoro said a low-power station can fulfill an important need of informing and educating listeners.

Doyle appreciates the frustration of the MX applicants but says that the situation is solvable by reaching settlements. "Getting on air is in their control," he said.

Aiyetoro believes the FCC's work will be made more difficult because circumstances with many MX applicants may have changed and the groups may not have supplied the FCC with new contact information.

"You don't know what's happened to people in the last two years," Aiyetoro said. For example, she said, the point person for one particular group has passed away.

Uncertainty involved in applying is among the factors blamed for the slow buildout for some stations. Applicants understandably are reluctant to raise funds for a station until they have a construction permit in hand; but the unpredictability of the timing of CPs forces groups to scramble to get stations on air within the 18 months allotted by the rules, said Tridish. He believes the commission should grant those groups a one-year extension, something currently prohibited.

Both Aiyetoro and Tridish believe the FCC efforts to resolve the applications quickly will also be hampered by several illegitimate applications.

Tridish said as many as 45 of the 151 applications filed by Calvary Chapel churches used templates in their applications describing their statements of purpose. His group, along with the National Lawyers Guild and the Microradio Implementation Project, submitted several objections to the FCC about Calvary Chapel's applications for LPFM frequencies in several states, alleging that the church group, which is licensed for more than 300 satellite-fed translators, used nearly identical declarations of their local mission even when located in different

cities in attempt to build local chapters of a national organization.

"It's a massive effort to game the rules and get more outlets," he said.

In responses to the informal objections, Calvary Chapel church groups said the allegations were unsubstantiated and pledged that the churches would provide local service.

## It will be very difficult for some of these groups to work out deals.

— Pete Tridish

So far, the FCC has granted 29 applications and dismissed 34 applications filed by Calvary Chapel church groups and are working through the remaining 88 applications.

Despite some problems, a broadcast source who wished to remain anonymous said the pace at which the FCC is approving LPFM applications has been steady compared to that of other services. In contrast to commercial FM stations, whose owners have been waiting for the FCC to hold an auction for new FM frequencies, the FCC has been wading through LPFM applications with careful oversight, according to this source.

Meanwhile, some LPFM applicants are dropping out. According to the NFCB, an estimated 19 LPFM construction-permit holders lost their frequencies because they didn't complete the 18-month buildout process due to finances. Tridish estimates that a typical station needs \$5,000 to \$10,000 to launch successfully as well as some professional help in setting up equipment.

Some engineering consultants have found the LPFM business to be not profitable. Though applicants have displayed a range of abilities, a majority needed schooling in radio regulation as well as help in choosing a site, selecting a frequency and filling out applications. The process of getting an LPFM on the air has been an eye-opener for many applicants, who are unaware of the responsibilities of running a radio station, these consulting engineers said.

## Powers that be

In addition, some engineers have been challenged by the tight deadlines for LPFM clients during FCC application windows. "Everything is last-minute, which can be burdensome for a consulting firm that needs to have time to check data, verify it and time to check options," one engineer said.

Tridish believes a big hindrance in getting LPFM fully off the ground is the FCC's lack of prioritization.

"The staff is doing the best job it can, but there's a lack of support and resources from the higher-ups," Tridish said.

While it's been three years since the FCC created the service, only a small number of stations have been licensed compared to the 1,000-plus stations originally hoped for by the commission. Then-Chairman William Kennard, a Democrat, pushed the idea of low-power community radio stations as a way to achieve more diversity of programming

in light of consolidation. Some low-power radio supporters fear that the current Republican majority at the FCC has a wavering commitment to LPFM. The FCC has denied any change in schedule or resources put toward low-power.

Tridish said the LPFM community would like current Chairman Michael Powell to increase the staff working on the issue.

timetable that they can not guarantee that they can keep to. But they should not be in that position. They should be able to plan their work and tell the public their timetable and know that they have the people to accomplish what they set out to."

## Full plate

Staffers at the commission, especially those within the media bureau, have been handling a host of high-profile issues including the biennial media ownership review. The FCC's Doyle concurs that this is a matter of prioritization but contends that the division has set an ambitious goal to reach initial decision on MX applications filed during the first LPFM filing window. "I expect to be fully engaged in this process during this calendar year."

The FCC also is getting closer to answering the question of whether future LPFM frequencies will be available if the third-adjacent channel protections are determined to be unnecessary. Doyle said the commission is expected to receive its report from Mitre Corp., a nonprofit group specializing in government contracts, at the end of May. ●

### Company: Wheatstone Corp.

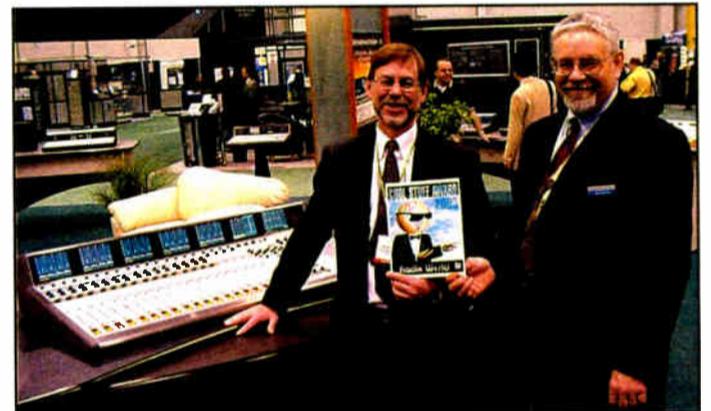
#### Product: Generation 9 Digital Control Surface

It's hard to think of any company that has invested so much into developing new console technologies in the past decade than Wheatstone. This company seems to show up with three or four new models every year.

Here's a control surface designed to integrate with the Wheatstone Bridge digital audio network router. You can handle thousands of sources and destinations; and the platform approach means 50 surfaces can be configured to share sources, destinations and control signals. Once set, the system operates independently of external computers. Installation is easy; and you'll love the futuristic color displays.

Judge: "Eye-opening affordability for high-tech audio control and routing from a blue-ribbon company." Phil Owens and Jim Peck send a shout out to Gary Snow and colleagues.

Info: (252) 638-7000 or [www.wheatstone.com](http://www.wheatstone.com)



### Company: Moseley

#### Products: LAN LINK 900 & Maxlink

Two honors for Moseley. LAN LINK 900 is an "industrial wireless" point-to-multipoint LAN Extender/IP-based facility controller. It lets broadcasters take advantage of their 950 MHz aural STL antenna infrastructure and bring LAN connectivity plus two RS-232 data circuits between a studio and multiple transmitter/studio sites. It connects remote controls and audio codecs for backup STL, and can provide audio/video connectivity. It uses 900 MHz FHSS technology for operation in the 902-928 MHz ISM band, requires no license and is capable of up to a 30-mile range and 512 kbps data rate for IP/Ethernet connections.

Maxlink can save money on phone bills by extending your infrastructure up to eight miles. This is a wireless 5.8 GHz U-NII Band Data Link, an alternative to T1/E1, DSL and cable modems. It provides twin full-duplex T1/E1 data performance without a T1 line or FCC licensing. It uses a radio/antenna combination and is suitable for short-haul data, or STL/TSL programming when used with a Moseley SL9003T1. Enrique Salgado and Dave Chancey are shown.

Info: (805) 968-9621 or [www.moseleysb.com](http://www.moseleysb.com)



# If HD Radio doesn't sound better, what's the point?

There are lots of ideas about audio processing for HD Radio. While opinions are subjective, here's one firm fact: HD Radio supports a full 20Hz - 20kHz audio bandwidth.

So why use an audio processor that doesn't?

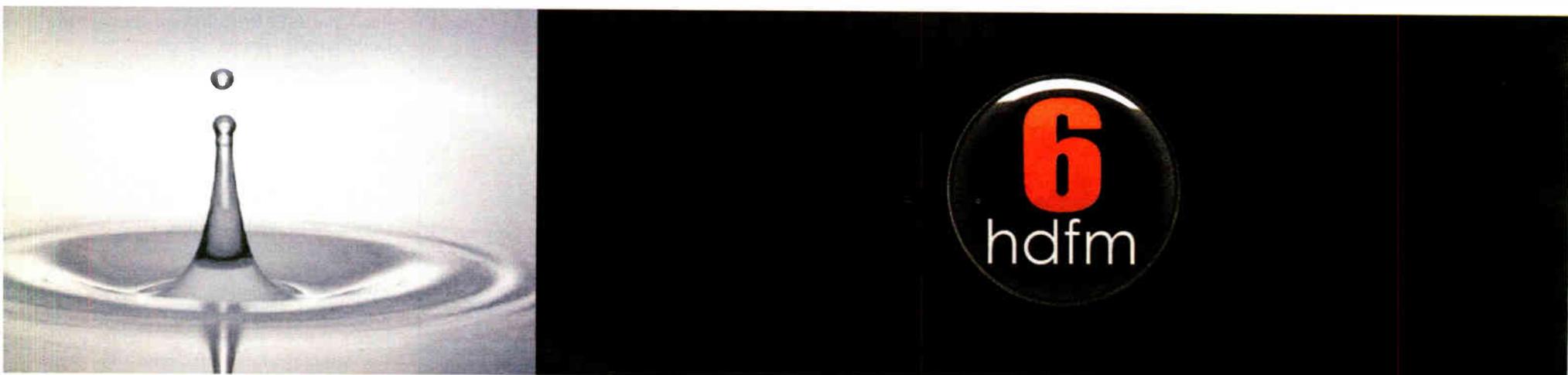
The new Omnia-6HDFM is a combo processor that serves both your analog and HD Radio signals. Its advanced dual-output design provides full-fidelity and precision look-ahead limiting for the digital signal – and everything Omnia is famous for on the analog FM side.



The AGC sections are shared so you get smooth transitions when HD Radio's blend function activates. But this powerful integrated processing package has two fully independent limiter sections, each optimized for the characteristics of the associated transmission channel.

Telos and Omnia are pioneers in coded audio. With our many years experience making bitrate-reduced channels sound good, we know how to deal with systems like HD Radio that involve both dynamics processing and bitrate reduction coding.

Benefit from our experience – and Omnia's great audience-grabbing sound, heard on more of the USA's 100 top-rated FM stations than all other processors combined.\*



[omniaaudio.com](http://omniaaudio.com)

\* Arbitron Spring 2002 survey period, 12+ Mon-Sun 6A-12P.

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World Radio History

# Embed

► Continued from page 3

Diplomat Hotel, packing and re-packing the duffel I'd brought for a ship-based embed. I also took my fully stocked backpack, should my assignment have shifted from the Navy and I would have found myself hiking across the desert instead of crawling through shipboard hatchways.

Again, radio is not forgiving when its reporters are on the road for any reason. I met my daily feed requirements, transmitting war-preparation stories by Comrex for East Coast morning drive, which came eight hours later than it did in the Gulf.

Before dawn on Ash Wednesday, March 5, I climbed aboard a turbo-prop Carrier On-Board Delivery (COD) for

the flight from Bahrain's military base to the USS Constellation. An hour later, the plane's tail hook snagged an arresting wire on the four-acre flight deck and my time on board the aircraft carrier known to her crew as "Connie" had begun.

As the rear door of the COD was lowered and I glimpsed my new home for the first time, my initial impression was of utter chaos. In the howl of propeller and jet noise, people in cranial helmets, goggles and vests fought a stiff wind and ran from place to place with apparently little direction or destination in mind.

I would later learn that each of these crewmembers had a specific job (denoted by the color of his vest) and that, what I perceived as chaos was a well-rehearsed choreography of people and machines in one of the most dangerous working environments on earth.



One of Five Tomahawk Missiles Launched From the USS Higgins on April 1

During our orientation briefing, the first wave of embedded reporters learned an important point about the program. To prevent us (or anyone on board) from compromising operational security, the Navy had instituted a system of information blackouts called River City.

When sensitive activities were taking place, a voice came over the public address speakers, advising "Set River City Two," meaning that communication with the outside world was not only prohibited, but also impossible. Somewhere on the ship, a switch was thrown and e-mail and the sailor phones went dead.

Leading up to the beginning of the war, River City was imposed randomly to keep the Iraqis off-guard, the assumption being that they were monitoring — if not the content of phone calls and e-mails — then at least electronic transmissions to and from the ship.

The next week was devoted to developing story ideas, to getting lost dozens of times in Constellation's labyrinth of corridors and to teaching myself a method of feeding radio stories that I had heard about but had never fully explored. You see, for Connie's embedded journalists (there were eventually about 25 of us), the main link with the outside world was e-mail.

A legal conference room below decks became an ad hoc newsroom, with eight personal computers tied into the ship's satellite communications structure. My mission was to figure out the best use of this system for my specialized broadcasting purposes. Here's how it worked:

Interviews, natural sound and voice tracks were recorded into a Sony MZ-B50 MiniDisc machine. This audio was fed into Cool Edit Pro software through my Dell Latitude laptop microphone jack.

Stories were mixed into large WAV files, then converted to the much more manageable MP3 format using the free Musicmatch Jukebox I had downloaded before leaving the States. The MP3 files were saved onto a 3-1/2-inch floppy disc and moved into a pressroom disc drive. E-mail notes on the stories were made and the MP3 file was inserted as an attachment and sent.

The seven-step process is the modern equivalent to rolling up a message, sticking it in a bottle and throwing it overboard in hopes of reaching the desired recipient. A few minutes after I hit "send," the desk back home would receive the e-mail, open the attachment and have a studio-quality story, from a few seconds of actuality to a five-minute feature — complete with background and lead information written in the "text" field — ready to go on the air. And generally it worked very well.

Then came April Fool's Day.

*The conclusion of this article will appear in the next issue.*

## Stepping

Many have realized the benefits of going HD Radio with BE, as orders for new equipment and system designs have poured in since last year. Entercom, Clear Channel, Greater Media, Crawford Broadcasting, Beasley Broadcast Group, WJLD-AM (first non-experimental AM station to broadcast HD Radio), and many more have chosen BE to help them prepare for the future—the HD Radio future.

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— Gary Richardson, Owner and Chief Engineer  
WJLD-AM - First non-experimental AM station to broadcast HD Radio

**"We're excited about the impact of HD on the future of Radio. BE's solutions have the flexibility to make our implementations easy and cost-effective."**

— Bob Demuth, Vice President and Chief Technology Officer  
Beasley Broadcast Group, Inc.



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**HD Radio is the Format of the Future. And the Future has Arrived.**

## 'Tomorrow Radio' Is Prepped

NPR, Harris, Kenwood Prepare for KJZZ Field Trials

by Leslie Stimson

National Public Radio is laying out a two-channel roadmap for digital receivers, one that some IBOC proponents say commercial radio may want to adopt as well.

NPR has big plans for its Tomorrow Radio project. Field tests this summer will explore the feasibility of splitting a station's digital audio stream into two channels. If successful, possibilities include TiVo-like radio capabilities in third-generation HD Radio receivers in 2005 and "conditional access," for some public radio donors, in 2006.

### Go digital

These are two of the ideas that were discussed at NPR's Public Radio Engineering Conference, just prior to NAB2003.

Tests are planned to begin in August at KJZZ(FM) in Long Beach, Calif. Ron Thompson, CE of the jazz station, said after the show that multipath in the area "drives our listeners nuts."

"We want to know if HD Radio will fix multipath problems."

He said the station is interested in implementing HD Radio aside from the Tomorrow Radio project, but is hoping the tests will crystallize for him and management what it would take for the station to go digital.

He estimates that simply upgrading the RF plant would cost around \$170,000. But the project would be more complex than that because he would want to "get the noise floor as good as it can be," for a station that hasn't seen a studio upgrade in 20 years.

The station is licensed for 8 kW but is running at 6.5 kW with an STA. The licensee is California State University at Long Beach.

Harris is providing the transmission equipment for the Tomorrow Radio tests and Kenwood USA, the American headquarters of which is in Long Beach, is providing the receiving equipment. Representatives from Harris, Kenwood and NPR visited KJZZ after the conference to determine test equipment needs.

Thompson said Harris probably would loan the station a digital transmitter for the tests. Harris may also configure a tempo-

secondary channel.

NPR Vice President of Engineering and Operations Mike Starling said Ibiqity's "open architecture audio delivery" could make possible a second channel that could be used for audio or data.

The point of having a second channel, he said, isn't the audio quality nor to save on conversion costs, but to offer listeners more programming choices, which he called "flexible slicing and dicing." That is what NPR believes will drive consumers to buy terrestrial digital radios.



Starling's 'Manager's Slide' depicts the second digital channel concept.

rary STL upgrade, Thompson said.

KJZZ personnel are discussing what they might use a second audio channel for, with blues and news as possibilities, Thompson said.

A secondary audio channel might be made possible for stations using Ibiqity's IBOC system by scaling back the regular FM data bits of 96 kbps in the main program channel. For example, a station devoting just 72 kbps to the main channel could possibly carve out 24 kbps for a secondary audio channel. The more bits taken from the main channel, the more robust the service, possibly supporting music, for the

The KJZZ trials would test the quality of the audio coverage and the options for improved error correction. Key to the tests is whether splitting the channel leaves the secondary channel signal robust enough to withstand a mobile environment.

If the answer is no, and Tomorrow Radio is destined to become a stationary product, receiver makers would still have a product to sell, several sources said.

Mike Bergman, director of R&D, Digital Broadcast for Kenwood USA, said the manufacturer has some initial thoughts on how it might incorporate a second program channel into its HD Radios.

See TOMORROW, page 14 ▶

## AM IBOC, Dual Antennas Demystified

How Do You Want Your IBOC? AM, FM, Day or Night, It's All Here

by Michael LeClair

Radio World asked several of our contributors to attend various sessions at the NAB2003 convention. Here, Michael LeClair summarizes presentations at "IBOC DAB — Ready for Prime Time" of the Broadcast Engineering Conference.

Milford Smith, vice president of engineering for Greater Media Inc., moderated the first part of the session by introducing five industry professionals presenting papers on various aspects of HD Radio implementation.

"Chipping Away at the HD Radio System" — With HD Radio being deployed in a number of top markets in the United States, interest in consumer receivers is increasing. John Gardner, worldwide marketing manager for Texas Instruments, presented an overview of the development of HD Radio tuners from the perspective of an integrated circuit manufacturer.

Gardner reviewed major subsystems of an HD Radio receiver, including the RF tuner, digital conversion of analog baseband, digital demodulation for HD Radio and conventional analog demodulation for standard AM/FM audio services. With the use of custom chips designed for HD Radio services, three integrated circuits can accommodate these major subsystems.

See IBOC, page 16 ▶

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## GUEST COMMENTARY

# The New Power of Car Radios

*A Look at the Impact of Fixed and Programmable DSPs on Automotive Audio Systems From Philips Planners*

by Thomas Chrapkiewicz and Jack Morgan

*The authors are applications manager and automotive director for North America, respectively, for Philips' Semiconductors Division.*

The applications of digital signal processing in automotive entertainment systems have a rich history, driven by the advances in the home entertainment system market. Rapid developments in compact disc and personal computer technology have fueled consumer demand for the functionality and convenience afforded by digital media and processing.

As semiconductor technologies have matured, the signal processing tasks that can be attained have increased dramatically. This has taken the radio industry from a simple audio processor to a signal processor operating in the sidebands and intermediate frequency (IF) signals of an automotive entertainment system.

In parallel with these capabilities on the receiving end, new digital broadcast media have been developed and, in turn, increased the need for digital signal processing in the receiver.

Philips develops digital signal processors for contemporary and future forms of analog and digital broadcasting.

## History of the chip

In the 1980s, automotive audio systems began to employ some form of digital signal processing. Initial implementations were simple audio signal processing functions such as concert hall emulators, which were quite a fad at the time. The speed capabilities of semiconductor technology in this era would only allow for simple audio processing.

Further, process technologies did not make it possible to combine the converter and processors on one chip. The resulting system was complex and costly.

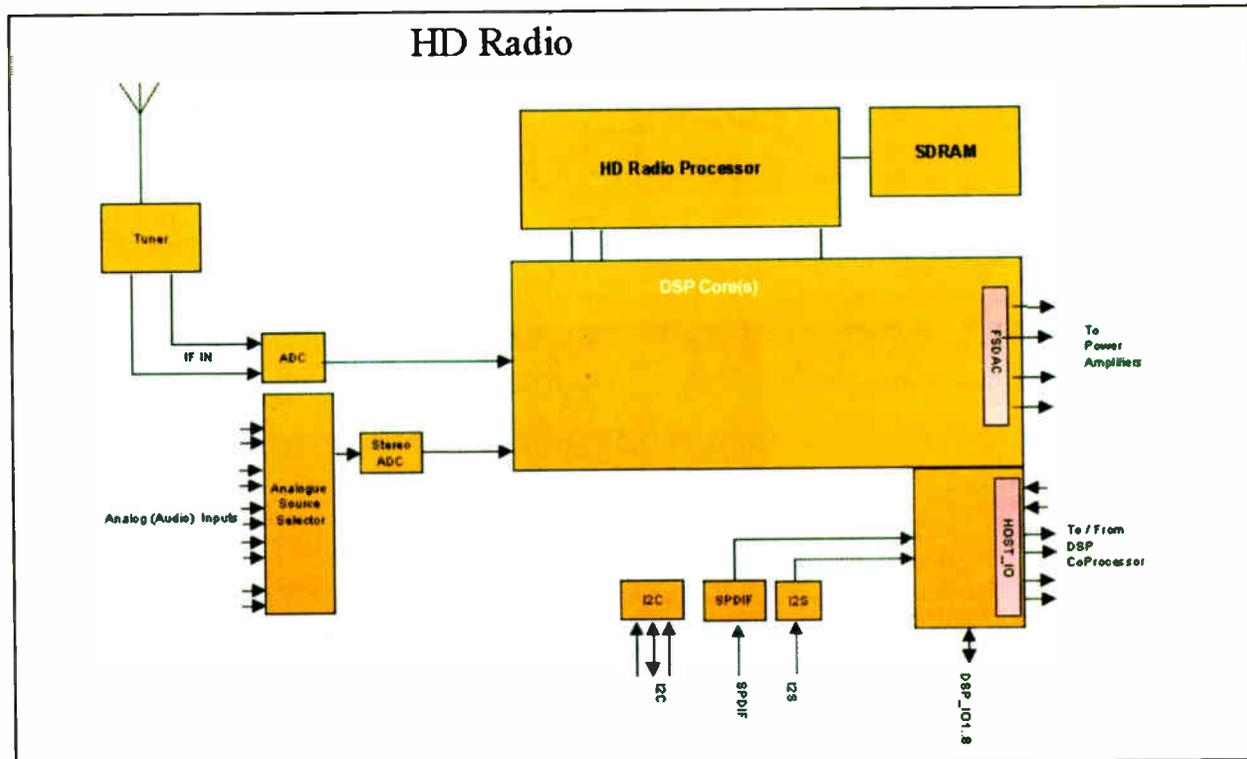
In the 1990s, semiconductor technologies had improved to the point that a single chip Car Radio Digital Signal Processor (CarDSP) could be realized. The demand for these devices was driven by the requirements of improved performance, production simplicity, improved signal processing and environmental stability. CarDSPs provided all signal conditioning and processing on a single integrated circuit.

Significantly improved capabilities of the analog-to-digital converters, the digital-to-analog converters and digital signal processors enabled the first CarDSPs in the 1990s to be implemented in the signal processing chain at the multiplex signal. These devices were required to have the signal bandwidth and dynamic range specifications to accommodate the signal requirements of the multiplex signal.

The immediate advantages of a single-chip system are reduced system cost and performance improvement. Improved weak-signal handling and processing of multi-

path events, previously processed by complex analog circuits, are now processed in the digital domain.

Further, with the multiplex signal now in the digital domain, new algorithms for battling the common problems of in-vehicle reception can be realized in a manner not possible in the analog domain. Of course, this device also is capable of performing the traditional audio signal processing functions such as volume, balance, fade, bass, treble, loudness and noise reduction functions.



Again, digital signal processing enables new audio functions such as signal compression, limiting and other functions based on time variant signal dynamics. For consumers, this means being able to listen to their favorite station with less interference and static in a wider geographical area without having to re-tune the radio.

Digital signal processing will deliver a more consistent listening experience. The additional computational horsepower also allows processing of contemporary compressed audio formats such as MP3, Microsoft Windows Media and others.

As the capabilities of the converters and signal processors increased through the early 1990s, the capability to process the IF signal of the radio system became a reality.

The radio signal received is digitized at the intermediate frequency of 10.7 MHz and all subsequent signal processing is performed in the digital domain. The most current family

of Philips' CarDSPs supports this level of functionality.

In addition to all previously performed audio and multiplex signal processing functions, signal processing can now be performed in the digital domain, much closer to the front-end of the radio receiver system. Complex interacting analog filters are now replaced by digital signal processing circuits resulting in reduced system cost and higher performance systems.

## Future analog receivers

With further advances in integrated circuit geometry and performance of CarDSPs, we may soon be digitizing the radio frequency signal directly from the airwaves. This will provide the ultimate in processing analog radio signals fully in the digital domain.

Digital radio systems are meant to optimize the reception of what are analog transmitted signals. By performing the signal processing in the digital domain,

much higher performance can be realized compared to what is attainable with analog receivers today.

The ultimate perceived performance is still limited by the analog performance of the transmitting system. With the continuing emphasis on digital systems, several digital transmission and reception systems have been introduced.

**HD Radio:** HD Radio, formerly known as in-band, on-channel digital audio broadcasting, has been introduced to transmit terrestrial AM/FM broadcast information, digitally, within the sidebands of the existing spectrum. This provides the broadcaster with an upgrade path to digital transmission. Further, a conventional radio receiver can be upgraded via the addition of an HD co-processor if the receiver is equipped with an IF CarDSP.

**Satellite Radio:** Sirius and XM satellite digital  
See PHILIPS, page 14 ▶



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**More reliable** Xport doesn't rely on the off-the-shelf modems found in other POTS codecs. Instead, we developed a custom DSP modem optimized for live audio.

**Easier and lower cost** Xport's ISDN option lets you use it as a universal field codec.

**Better sounding** Xport's *aacPlus* is the finest low-bitrate codec on Earth – and Xport is the only POTS codec to have it. You'll be stunned at how good an analog line can sound.

## Now, your POTS and ISDN remotes are more reliable, better sounding, easier, and cost less.

Today, Zephyr Xport and Xstream are *The Best Way to Hear from Anywhere.*

**More reliable** Zephyr Xstream's pure-digital ISDN connection on the studio side eliminates a lot of the analog line problems that can make a modem unstable. An Xport call is converted to digital by the nearest Telco central office, and continues through the network to your studio in digital form. Working as a tightly integrated system, Xport and Xstream extract maximum performance and reliability from real-world Telco lines.

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World Radio History

# Philips

► Continued from page 12

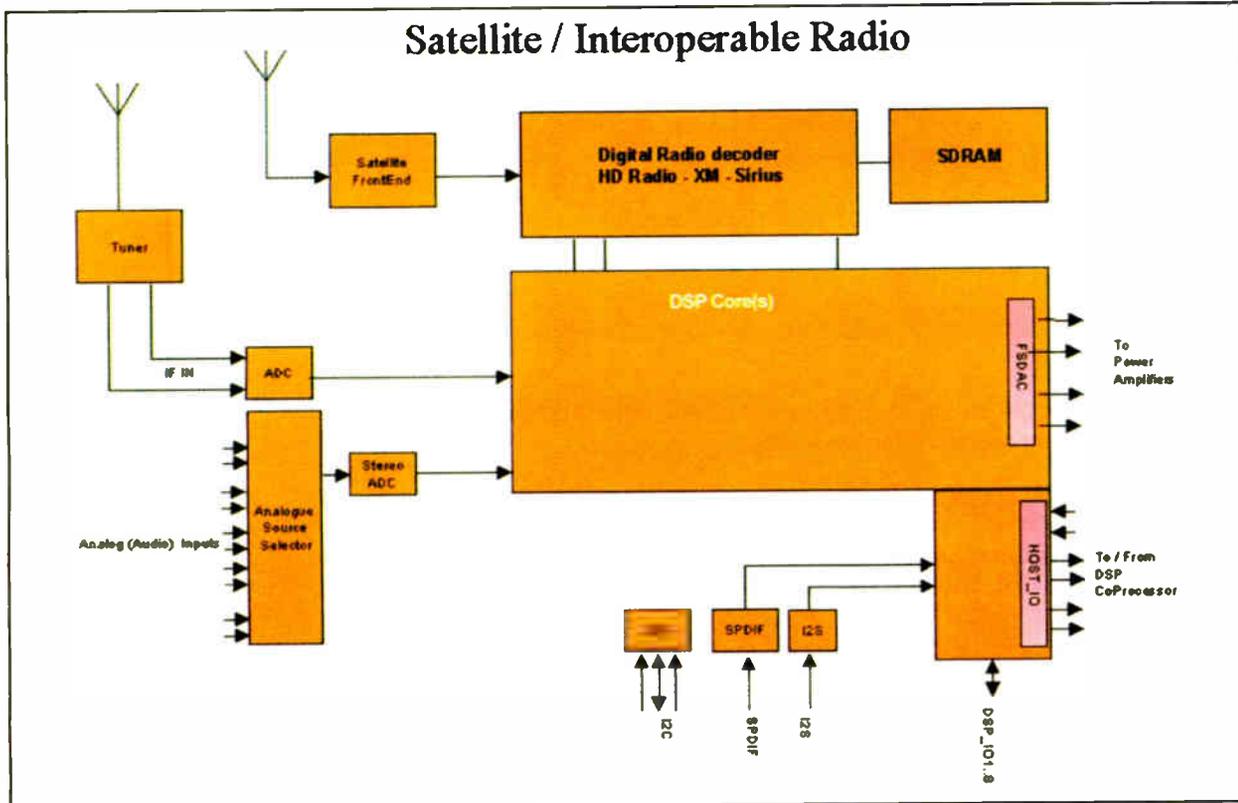
broadcast systems have been introduced in North America. These are transmitted on the S band (2.3 GHz) and require a completely new front end to an existing car audio system.

The various broadcast media described above require a wide range of signal processing capabilities. To provide the capability to receive all of these systems would result in a complex, expensive system.

With the onset of mesh network type of systems such as Flarion Technologies' flash-OFDM mobile communications network for Internet Protocol-based broadband services, automotive radios may well tap into this new web of content. These systems are claiming sustained data rates of more than 3 Mbits per second to stationary and mobile consumers.

With these data rates, consumers could potentially have access to e-mail, news, audio and video at "real time" rates. With connection to Global Positioning Systems, new markets such as location dependent special offers and other consumer enticements could be realized.

## Satellite / Interoperable Radio



By making appropriate choices in the architecture of the radio's digital signal processor and appropriate system programmability, the receiver industry would be able to realize a single system, which will be able to receive all available analog and digital broadcast media.

The benefits here are two-fold. Radio suppliers could provide a signal processor to receive all media within a particular geographical market. Further, the system could be adapted to different global markets with little impact on system cost and design. Providing this type of adaptable and interoperable platform would accelerate the implementation of digital media in the marketplace.

This provides the last mile of interface to the consumer and could have significant impact on the automotive "media" system. While the technology and market are not yet mature, the signal content is certainly in the digital domain. A system that could operate with these new digital formats is key in providing an upgrade path for automotive radios.

The media that will become available to the automotive community are changing and will continue to do so rapidly. As such, it is important that consumers, automotive suppliers and the media industry are prepared for this rapidly changing landscape. Philips continues to be involved in new consumer technologies.

Reach the authors at [jack.morgan@philips.com](mailto:jack.morgan@philips.com).  
RW welcomes other points of view.

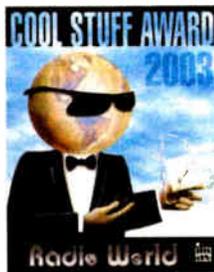
**Company: Bird Electronic Corp.**

**Product: Bird Site Analyzer SA-1700/1700-P**

It's an antenna and cable tester available with an optional digital power meter. The frequency range is 25 MHz to 1700 MHz, and the unit is pre-programmable for numerous common ranges including emergency, fire, police, VHF, UHF, GSM TxRx, WLAN, Cell TxRx and any others. The analyzer's color display allows you to detect minor problems before they become major headaches.

A judge: "It would be quite handy in a radio station for checking transmission lines and antennas for FM, VHF and UHF RPU antennas, as well as 950 STL antennas and lines. It could be called a full-time TDR and power meter always checking the line and antenna."

Info: (866) 695-4569 or [www.bird-electronic.com](http://www.bird-electronic.com)



**Company: beyerdynamic Inc.**

**Product: MCE 494 Condenser Microphone**

**Microphone**

This is a wee condenser microphone for direct connection to notebooks, mobile DAT and MD recorders. The mic is powered from the input of the device. Its cardioid polar pattern fights off feedback and unwanted background noise. A wind-screen is available optionally.

Info: (800) 293-4463 or [www.beyerdynamic.com](http://www.beyerdynamic.com)



# Tomorrow

► Continued from page 11

He said a manufacturer is not likely to remake a product line for a single feature. A new button on the radio just for a second channel is not likely, he said.

"We'd need a strong business case to justify" such a button, he said. The current buttons are used for many purposes and adding or changing a button's use is expensive, which, in turn, raises the retail cost. Instead, Kenwood is considering devoting a programmable "soft key" to the Tomorrow Radio concept. The functions of a soft key can be changed. Some Kenwood head units already have them.

As the field tests for the concept begin later this year, Bergman said, depending on station interest and test results, hardware for Tomorrow Radio might be available in the 2004-06 timeframe.

How might the product rollout go? Initial product configurations would be a so-called "black box" to upgrade an existing head unit, followed by an integrated head unit. "It's cheaper to build and install a unit with a combined box," Bergman said.

While the project is still in its infancy, those involved are developing ideas for using the second channel.

Possibilities for controlled access to secondary channels include "registered listening" for some donors. Imagine, Starling said, if during a fundraiser a program host could say, "At the \$120 level you get our pledge-free channel."

Secondary audio channels could be used for radio reading services for the blind and visually impaired, with voice-controlled access to the radios, he said.

**Carrot or stick?**

But can the average pubcaster afford to go digital, and will a second channel be the carrot NPR hopes?

NPR believes the average non-com FM can convert its plant to IBOC for about \$171,000 including the cost of a transmitter. For the 52 eligible noncom stations in Ibiqity's seed markets, the total projected costs for IBOC conversion are more than \$9 million.

Reactions from pubcasters attending the conference ranged from those gung-ho over HD Radio should the second-channel concept prove feasible, to those who find funding the digital conversion an obstacle.

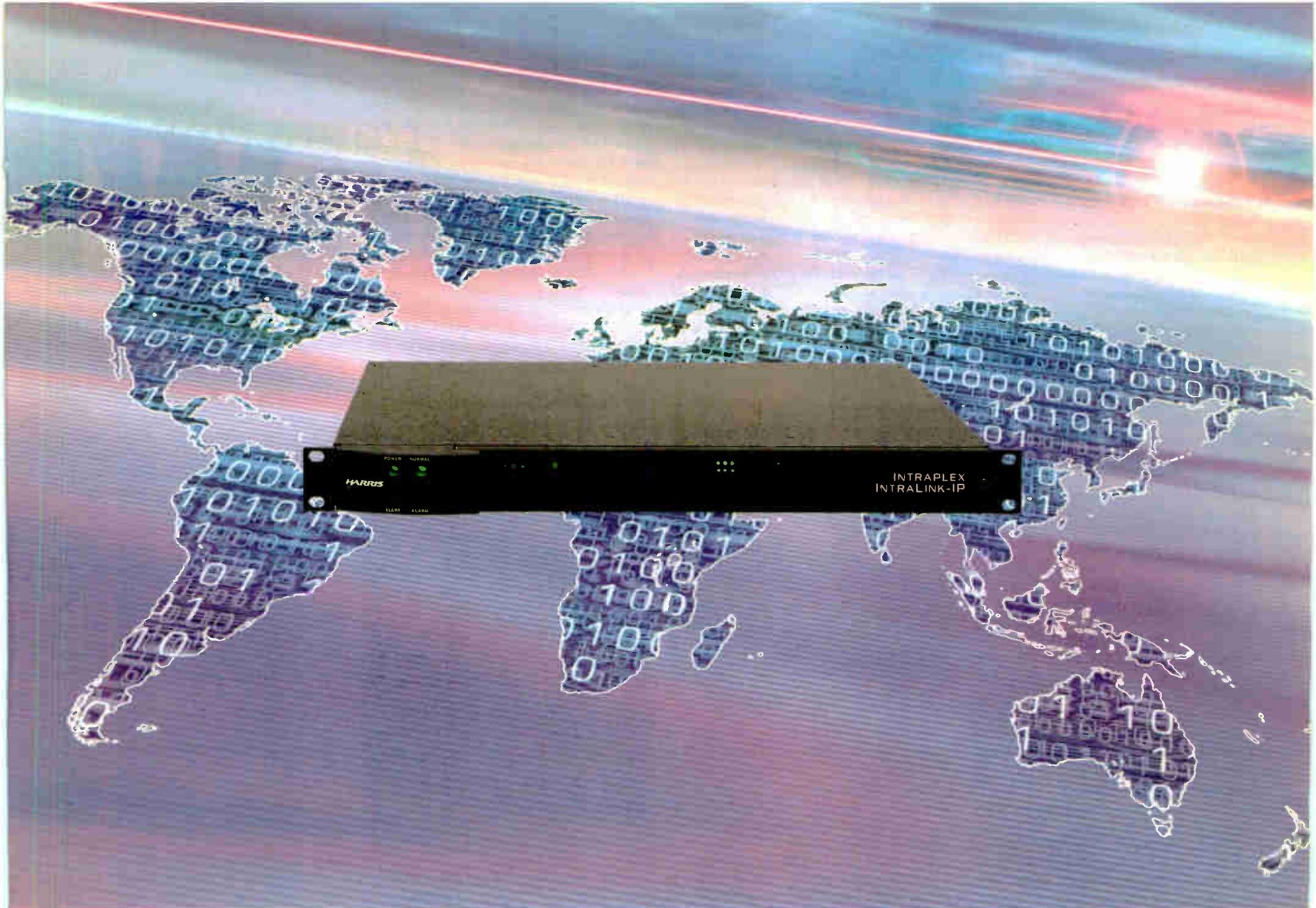
Still, others, mostly chief engineers from classical formats that use uncompressed audio, worry about compromising the audio quality of their main channel in order to have a second channel.

One unnamed chief engineer of a noncom didn't think the promise of a second channel was enough to determine if the station would go digital this year, believing NPR wants to use the second channel to air more of its talk programming. "They've been forced to say 'It's not the audio quality' to promote this."

Yet, Robert Carroll of WWNO(FM) in New Orleans said his station is going digital, he hoped by mid-June and estimates his conversion costs at more than \$100,000. He said the second channel might give his classical station the ability to air more news.

"It's *only* worth it with a second channel," said another engineer of HD Radio.

Some commercial engineers are watching to see how Tomorrow Radio unfolds. One group engineer said he didn't think commercial radio would be thrilled to see more potential stations being dropped into the FM band.



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# IBOC

► Continued from page 11

Although current-generation HD Radio tuners are designed to provide the main digital audio program material (with simple text displays) in addition to analog programs, Gardner said the basic digital signal processing core has been developed and will not need to change further. This should assist receiver development because advanced graphic features, such as program associated data, a second audio program channel and store and playback functions can be accommodated by this system as manufacturers look to develop future products.

*"Swept Frequency Techniques for Evaluating AM Antenna System Bandwidth"* — AM stations looking to deploy HD Radio must ensure that their antenna systems provide adequate bandwidth to transmit the sideband digital carriers successfully.

To illustrate his suggestions on how to speed and improve the testing process, particularly for AM directional stations, Ronald Rackley, P.E., of duTreil, Lundin and Rackley Inc. discussed how network analyzers may be used to make impedance sweeps on directional arrays.

Rackley said traditionally network analyzers have been unusable for AM antenna measurements because of interference from other AM band stations on tall towers. The interfering signals overwhelm the desired test signal and the network analyzer "kind of loses its mind," Rackley said.

By using an amplified signal generator, then attenuating the return signals from the antenna, the signals used to sweep the antenna are high enough in amplitude that the interfering radio signals do not overload the network analyzer.

Rackley designed and built his own directional coupler for use with this technique, as no commercial directional couplers are available with sufficient power handling capability in the AM band, he said.

Rackley reviewed 50 proof-of-performance reports randomly from his files to get an idea of how many of these stations would meet the current guidelines from Ibiqity Digital Corp. for antenna system bandwidth. The results indicated that approximately half of today's directional antenna systems would need some adjustment or improvements to broadcast digitally.

*"FM IBOC Transmission Using Dual-Input Antennas"* — Many engineers have expressed an interest in the use of "space combining" as an alternate method of implementing digital radio that avoids the power losses associated with both high- and low-level combining. Eric Wandel, P.E., of Electronics Research Inc. discussed the options for this technique.

Wandel clarified that the current blanket authorization from the FCC specifically requires that both the digital and analog carriers must excite all elements of the antenna. Station personnel would need to apply for a Special Temporary Authorization from the FCC in order to use a dual antenna to implement IBOC.

"We feel that the separate antenna approach is very feasible," said Wandel, "but from a regulatory perspective there is still risk," because it's unknown how the FCC will treat the dual antenna approach in its final IBOC rules.

An ad hoc committee of the NAB is trying to determine under what criteria

the commission would approve the dual antenna approach so that stations could use this technique before the agency issues final IBOC rules.

Wandel reviewed suggested criteria for blanket approval of separate antennas. Under these proposals, a separate antenna system must use an approved auxiliary antenna for the FM main signal, have a HAAT of between 70-100 percent of the main antenna and be within 3 seconds of latitude/longitude. Also, both the analog and digital must operate non-directionally.

"What really happens as a result of the testing could end up a lot different than this," Wandel cautioned.



Greater Media's Milford Smith

NAB is overseeing the testing of separate antennas under different conditions at several stations. Most critical to the successful implementation of digital radio is the matching of the radiation patterns in the horizontal plane, which maintains the amplitude ratio of the digital to the analog carriers intact. Changes in this ratio due to different antenna patterns can cause degradation to either the digital or analog service.

Regarding an interleaved antenna, in which alternate elements are radiated with analog, and then digital signals are placed on the elements in between, Wandel said, "We recommend caution on that right now," due to the effect of the interleaved antenna on the vertical plane pattern. The resulting antenna is less efficient, reducing coverage area.

Finally, Wandel discussed dual-input antennas. These can be constructed with either new or existing panel antenna systems, Wandel said. While expensive, he said, panel antennas offer a good way to implement digital operation with excellent match between the analog and digital patterns.

*"AM High-Definition Radio — Technical Issues Affecting Adoption at Night"* — Glen Clark, P.E., of Glen Clark and Associates said the main reason the FCC limited IBOC authorizations for AM to daytime is to protect analog services from adjacent-channel skywave interference caused by digital sidebands. The sidebands are more than 10 kHz away from the center frequency.

As groundwave represents the main revenue-producing signal for AM stations, interference to this service affects the ability of AM stations to continue operations during digital transition.

"This is not an easy problem to solve," said Clark, because of the legacy FCC allocation schemes in place.

To get a better understanding of the impact of this kind of interference, "We did a statistical study of the nighttime evaluations we have done for clients over the last 10 years," said Clark.

Clark evaluated the potential for nighttime interference with digital operation with this set of stations. In many cases,

based on FCC criteria, no interference was predicted and digital operation should be possible immediately, he said. In other cases, the reduction of power in one or both of the digital sidebands by 6 dB would eliminate predicted interference. In only one case would it have been impossible for the station to operate at night without causing interference.

AM directionals were included in the study.

If the results of this study are representative of the entire AM band, Clark said, of the 2,800 stations licensed to operate full-power AM at night, approximately 1,800 stations would be able to run full-power digital carriers without causing interference. An additional 873 stations would need to reduce the power in one or both of their digital sidebands, and 95 stations would not be able to operate without interference.



John Gardner of Texas Instruments

Clark believes many of these interference problems could be resolved over time by directionalization. Earlier this year, Clark filed a petition for reconsideration with the FCC arguing that there is no reason to prevent nighttime implementation of HD Radio for the majority of AM stations (RW, March 12, page 2).

*"IBOC Technical Activities Report"* — David Layer, director of advanced engineering, NAB, Science and Technology, said Ibiqity has licensed 130 stations to operate digitally, and the company predicts the number would increase to 300 by December.

The DAB Subcommittee of the National Radio Systems Committee is working to develop a final IBOC standard to submit to the FCC so that it can be incorporated into the rules. Due to the availability of test results, Layer expected the work on the FM IBOC system to be completed first, followed by a standard for AM.

Another issue being considered by the NRSC is the need for a standard for data broadcasting, and the degree to which an open standard can be created that protects Ibiqity's intellectual property.

Layer commented on the importance of the NRSC submissions to the FCC and the influence of the group on final rule-makings.

He also reviewed NAB activities; the association is also working on the IBOC rollout. An ad hoc group is working with Ibiqity to study AM IBOC nighttime performance and another group is testing the dual-antenna approach to IBOC for FM.

Clear Channel Radio Senior Vice President for Engineering Services Jeff Littlejohn moderated the second half of the all-day IBOC panel, which included eight speakers. RW covered the highlights.

*"Practical Considerations for the Implementation of AM IBOC"* — WOR(AM) claims to be the first AM station in New York to begin regular digital transmissions. Thomas Ray III, Corporate Director of Engineering for Buckley Broadcasting, shared experiences about the station's digital birth.

"If you look at the trades, the first thing you think you have to do is to gut your facility" to convert everything to digital, said Ray. To the contrary, Ray found that even his vintage studio facility, which still includes turntables, sounds "just fine" with IBOC. The transmitter and STL were left intact for digital, although Ray noted that his auxiliary transmitter probably would not pass the IBOC waveform.

In a deviation from Ibiqity recommendations, Ray said the bandwidth of the analog audio was limited to 6 kHz instead of 5 kHz to reduce the impact of IBOC on the WOR analog signal.

Regarding the antenna system, Ray said the WOR three-tower array includes filtering for two nearby AM stations. Because of this, the antenna system did not exhibit common point impedance as flat or symmetrical as recommended by Ibiqity.

In spite of this system limitation and the extended analog frequency response, digital coverage extended about 95 miles in their tests.

Ray said there were a few issues created by the 8-second delay that Ibiqity's technology adds to the audio stream to keep the digital and analog audio in sync. Network automation had to be adjusted to compensate for the delay. Listeners to sports broadcasts complained, particularly if they were in the stadium and listening to a portable radio to follow the play-by-play action.

All in all, the experience has been a good one for WOR, whose employees are proud to be one of the first facilities to deploy HD radio, he said.

"We've had a lot of positive response from listeners. They want to know where they can buy an HD radio," said Ray.

*"A Planning Guide: Determining the Best IBOC Migration Path for Your AM or FM Station"* — Keith Mullin, senior technical communicator for Harris Corp., discussed a basic foundation for IBOC planning. In order to go digital, station chief engineers will need to consider studio needs such as their audio source, wiring and processing.

Early adopters are telling Harris that STL systems need special attention.

"After the transmitter upgrade and cleaning up any antenna issues, STL chains are the second-most critical portion of the IBOC migration process," Mullin states in his paper.

Transmitter site needs include power, HVAC and grounding protection.

*"The Effects of Implementation of IBOC Transmissions on Nighttime Analog Reception"* — As part of the research on the effects of nighttime AM IBOC transmissions, Ibiqity undertook an extensive statistical study to predict potential interference for all AMs with nighttime service. Glynn Walden, vice president of broadcast engineering for Ibiqity, showcased the results.

Ibiqity wanted to nail down what kind of analog interference exists now among AMs operating at night. Every AM in the country with nighttime service was considered and all signals were calculated at 4-mile intervals (more than 37,000 geographic cells were considered) using standard FCC propagation calculations.

See IBOC, page 17 ►

# IBOC

► Continued from page 16

In conjunction with gathering this data, Ibiquity commissioned subjective radio tests with 120 untrained listeners using four kinds of radios. Testers gave numerical scores to show at what point interference made audio "unlistenable" to the average user, using a Mean Opinion Score scale to evaluate audio quality.

To replicate the effects of digital carriers, interference was tested for both program audio and full modulation white noise. Walden said co-channel interference with current analog transmissions was by far the worst problem.

"General population testing found the effects from two sources of audio extremely annoying," said Walden.

Finally, these interference ratios, developed for co-channel, first- and second-adjacent interfering signals, were overlaid on the contour coverage data obtained in the comprehensive study of AM stations. The result was a map that shows exactly how much interference AM stations now experience at night due to skywaves and groundwaves.

Ibiquity also created a map of what could be expected if all AM stations were to immediately start broadcasting IBOC transmissions at night. Walden said in most cases, results showed nighttime IBOC transmissions would not degrade analog reception by more than a small amount.

"Co-channel analog remains the largest contributor to nighttime interference, and will be so after IBOC has been implemented," said Walden.

"IBOC Space Diversity Test" — Research continues into the use of dual antennas for digital radio. Using his paper, "IBOC Space Diversity Test," J. Talmage Ball, vice president for engineering of Bonneville International, relayed the results of his investigation into the dual-antenna approach to

IBOC implementation. Ball conducted field tests at Bonneville International's KDFC(FM), a classical station in San Francisco.

"The Bay area exhibits every kind of multipath challenge to FM radio conceivable," said Ball. "What I really wanted to do was take IBOC and put it in its worst-case scenario."

Ball built and tested two IBOC transmission facilities at the same mountain site. As a control system, standard high-level combining was used over the KDFC(FM) main four-bay antenna.

A different model two-bay antenna on a separate tower was also installed using a low power amplifier for the IBOC-only signal. Performance tests were conducted, measuring first one system and then the other over the same coverage area.

Ball took continuous measurements over a series of four rough radials extending out from the mountain transmitter site, while monitoring both the analog and the digital transmissions for impairments. Ibiquity provided the monitoring equipment for the IBOC signals.

Results demonstrated that IBOC performance was similar between the high-level combined system and the separate antenna system, with the exception of a null around 5 miles from the transmitter site where the dual-antenna system did not work as well. Ball suggested that this may have been due to the different vertical plane radiation patterns developed by the two antennas which had different numbers of bays and different mounting structures.

Ball also said that with both antenna systems, the ratios between the analog and digital carriers deviated from their specified values as the routes were driven, indicating the effects of multipath interference.

In spite of this, neither antenna system caused any audible degradation to the analog performance of the main channel FM. "We could not hear the IBOC switched on and off," said Ball, "even though (in certain locations) the IBOC power ratios (were) higher than the analog."

## HD Radio Scorecard (Sorted by State)

Stations with one asterisk (\*) have special temporary authority to broadcast HD Radio. Two asterisks (\*\*) have sent notifications to the FCC and/or are confirmed on the air. Additions or changes in status since last month are in bold. Some without asterisks may be on with experimental authorization/limited testing. Others have ordered equipment or indicated a commitment to HD-R. Note, the FCC is moving to a notification-based procedure. List is partial. Are you on? E-mail us to [radioworld@imaspub.com](mailto:radioworld@imaspub.com).

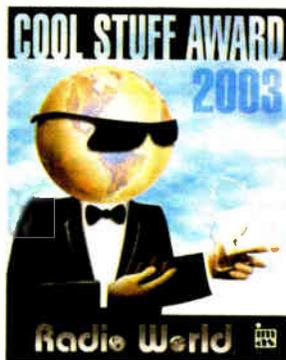
Call Letters	State	Market	Frequency	Owner
<b>AM</b>				
WJLD**	AL	Birmingham	1400	Richardson B'csting
KCBS*	CA	San Francisco	740	Infinity
KNX*	CA	Los Angeles	1070	Infinity
KTNQ	CA	Los Angeles	1020	Hispanic B'csting
KNRC	CO	Denver	1150	Newspaper Radio Corp.
WHSR	FL	W. Palm Beach	980	Beasley
WJNA*	FL	Royal Palm Beach	640	S. Florida Radio
WKAT*	FL	N. Miami	1360	Spanish Media B'csting
WQBA	FL	Miami	1140	Hispanic B'csting
WRHB*	FL	Kendall	1020	New World B'csting
WRHC	FL	Miami	1550	WRHC Management
WWFE	FL	Miami	670	Fenix
WWNN*	FL	Pompano Beach	1470	Beasley Broadcast
WSB**	GA	Atlanta	750	Cox
KMRY	IA	Cedar Rapids	1450	Sellers B'csting
WIND	IL	Chicago	560	Hispanic B'csting
WIL0**	IN	Frankfort	1570	Kasper B'csting
WOWO	IN	Ft. Wayne	1190	Federated Media
WBZ*	MA	Boston	1030	Infinity B'csting
WCHB**	MI	Detroit	1200	Radio One
WWJ*	MI	Detroit	950	Infinity B'csting
WTWZ*	MS	Clinton	1120	Wood B'csting
WCTC*	NJ	New Brunswick	1450	Sentinel Publishing
WMTR*	NJ	Morristown	1250	Sentinel Publishing
WWTR*	NJ	Bridgewater	1170	Sentinel Publishing
KXNT*	NV	N. Las Vegas	840	Infinity B'csting
WADO	NY	New York	1280	Hispanic B'csting
WOLF**	NY	Syracuse	1490	Wolf Radio
WOR**	NY	New York	710	Buckley
WRMR*	OH	Cleveland	1420	Cleveland Classical
WSAI	OH	Cincinnati	1530	Clear Channel
WPEN*	PA	Philadelphia	950	Greater Philadelphia Radio
WVDB	PA	Philadelphia	860	Beasley
KOAL*	UT	Price, Utah	750	Eastern Utah B'csting
WKDL**	VA	Alexandria	730	Mega Communications
WXGI	VA	Richmond	950	Gee Communications
WTMJ*	WI	Milwaukee	620	Journal Broadcast
<b>FM</b>				
KDFC*	CA	San Francisco	102.1	Bonneville
KFOG	CA	San Francisco	104.5	Susquehanna
KIIS	CA	Los Angeles	102.7	Clear Channel
KKBT*	CA	Los Angeles	100.3	Radio One
KKDV*	CA	San Francisco	95.7	Bonneville
KKSF	CA	San Francisco	103.7	Clear Channel
KLVE	CA	Los Angeles	107.5	Hispanic B'csting
KOIT*	CA	San Francisco	96.5	Bonneville
KOST	CA	Los Angeles	103.5	Clear Channel
KROQ**	CA	Pasadena	106.7	Infinity B'csting
KSAN	CA	San Francisco	107.7	Susquehanna
KSOL	CA	San Francisco	105.7	Hispanic B'csting
KYLD	CA	San Francisco	94.9	Clear Channel
WEDR	FL	Miami	99.1	Cox
WFLC	FL	Miami	97.3	Cox
WHQT	FL	Miami	105.1	Cox
WKIS*	FL	Boca Raton	99.9	Beasley Broadcast
WPYM	FL	Miami	93.1	Cox
WRMA*	FL	Miami	106.7	Spanish B'csting
WRTO	FL	Miami	98.3	Hispanic B'csting
WUSF**	FL	Tampa	89.7	Univ. of So Fla.
WALR	GA	Atlanta	104.1	Cox
WFOX	GA	Atlanta	97.1	Cox
WBTS	GA	Atlanta	95.5	Cox
WSB	GA	Atlanta	98.5	Cox
KZIA*	IA	Cedar Rapids	102.9	KZIA Inc.
WBEZ*	IL	Chicago	91.5	WBEZ Alliance
WDRV*	IL	Chicago	97.1	Bonneville
WNUA**	IL	Chicago	95.5	Clear Channel
WOJO	IL	Chicago	105.1	Hispanic B'csting
WPWX	IL	Chicago	92.3	Crawford B'csting
WTMX*	IL	Skokie	101.9	Bonneville
WUSN*	IL	Chicago	99.5	Infinity B'csting
WVAZ**	IL	Chicago	102.7	Clear Channel
WSHW**	IN	Frankfort	99.7	Kasper B'csting
WASE**	KY	Elizabethtown	103.5	W&B B'csting
WAAF*	MA	Worcester/Boston	107.3	Entercom
WBOS*	MA	Brookline	92.9	Greater Boston Radio
WKLB*	MA	Lowell	99.5	Greater Boston Radio
WMJX	MA	Boston	106.7	Greater Media
WQSX**	MA	Lawrence/Boston	93.7	Entercom
WROR*	MA	Framingham	105.7	Greater Washington Radio
WTKK*	MA	Boston	96.9	Greater Boston Radio
WDMK**	MI	Detroit	102.7	Radio One
WDTW	MI	Detroit	106.7	Clear Channel
WMGC**	MI	Detroit	105.1	Greater Boston Radio
WRIF	MI	Detroit	101.1	Greater Media
WCSX*	MS	Birmingham	94.7	Greater Boston Radio
WRAL**	NC	Raleigh	101.5	Capitol
WDHA	NJ	Dover	105.5	Greater Media
WJRZ	NJ	Manahawkin	100.1	Greater Media
WMGQ*	NJ	New Brunswick	98.3	Sentinel Publishing
WRAT	NJ	Pt. Pleasant	95.9	Greater Media
WCAA	NY	New York	105.9	Hispanic B'csting
WNEW*	NY	New York	102.7	Infinity B'csting
WCLV	OH	Cleveland	104.9	Cleveland Classical
WNWV*	OH	Elyria/Cleveland	107.3	Elyria-Lorian B'csting
WYGY**	OH	Cincinnati	96.5	Susquehanna
WMGK*	PA	Philadelphia	102.9	Greater Philadelphia Radio
WMMR	PA	Philadelphia	93.3	Greater Media
WMWX*	PA	Philadelphia	95.7	Greater Philadelphia Radio
WFID*	PR	Rio Piedras	95.7	Madifidie
WIVA*	PR	Aguadilla	100.3	Arso Radio Corp.
WPRM*	PR	San Juan	98.5	Arso Radio Corp.
WZAR*	PR	Ponce	101.9	Uno Radio of Ponce
KBKS*	WA	Tacoma	106.1	Infinity B'csting
KBSG	WA	Seattle	97.3	Entercom
KISW	WA	Seattle	99.9	Entercom
KMTT	WA	Seattle	103.7	Entercom
KNDD	WA	Seattle	107.7	Entercom
KQBZ	WA	Seattle	100.7	Entercom
WKWS**	WV	Charleston	96.1	W.Va. Radio Corp.
WVAF	WV	Charleston	99.9	W.Va. Radio Corp.
WVAQ**	WV	Morgantown	101.9	W.Va. Radio Corp.

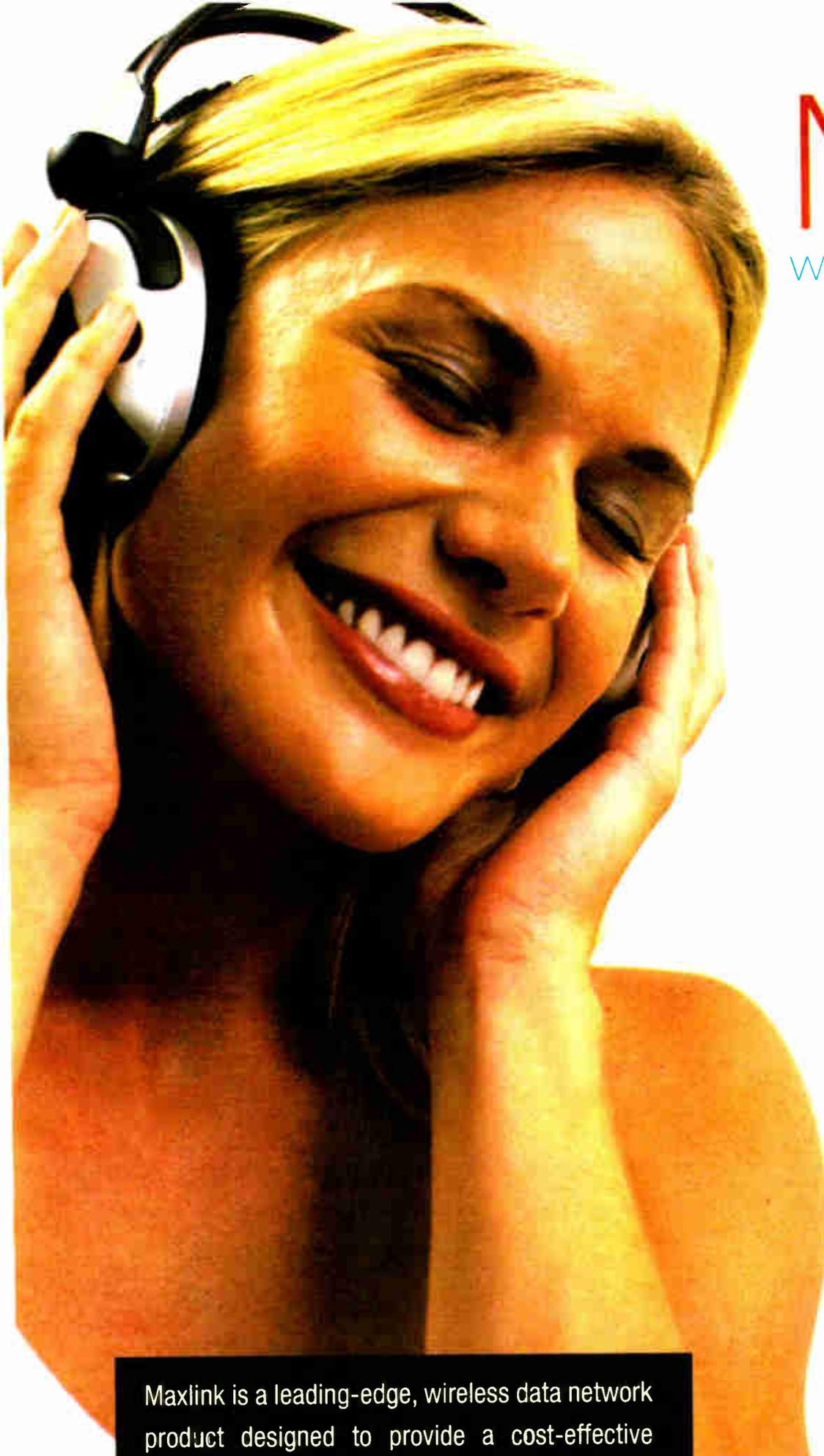
**Company: Audio-Technica**  
**Product: AT3060 Phantom-Powered Tube Microphone**

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# Maxlink

Wireless 5 GHz UNII • ISM Band Data Link

Maxlink is a leading-edge, wireless data network product designed to provide a cost-effective alternative to T1/E1, DSL and cable modems.

For broadcasters faced with costly phone bills, the Maxlink provides twin full-duplex, high-speed T1/E1 data performance. Best of all, the Maxlink doesn't tether you to a T1 line or constrain you with FCC licensing applications.

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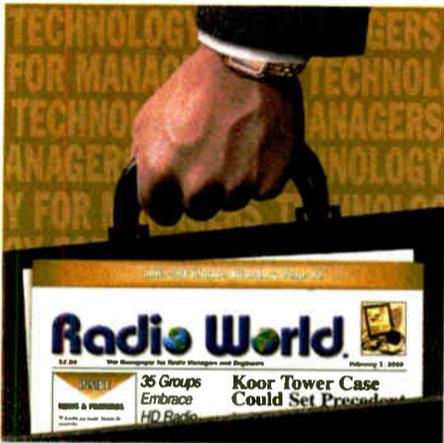
World Radio History

# Exploring XML, Open Standards

by Tom Vernon

As the digital broadcast plant continues to evolve, operations are getting more software-intensive, and the infrastructure is beginning to look more like an IP enterprise.

No single company can provide comprehensive turnkey solutions that can meet a station or group's needs. Interoperability between products from different vendors is vital to the industry's technical evolution. Thus, you'll be hearing more in the future about XML and open standards, as the transition to digital progresses.



**TECHNOLOGY FOR MANAGERS**

XML, the eXtensible Markup Language, is designed to support data definition and information processing requirements not covered by previous languages. Broadcast applications for XML include compatibility among different manufacturers' automation components and transfer of information directly from the Internet to broadcast media.

Open standards are specifications proposed by an industry manufacturer and made freely available to other companies and end users in hopes of averting the bottleneck imposed by proprietary standards. Open standards in radio currently exist for automation systems, transporting WAVE files between different systems, and for distributing live audio over Ethernet networks.

### Sharing files

Sharing audio files between different manufacturers' PC-based systems was until recently a Herculean chore requiring intensive and ongoing software engineering efforts. Although most audio systems used WAVE files and had a common subset of attributes, each vendor organized them differently.

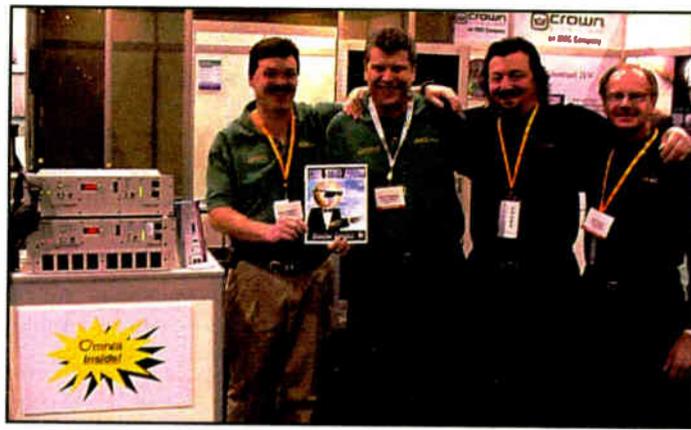
The Cart Chunk standard, introduced at NAB in 1999, proposed common labelling information which can be attached as an integral part of the WAVE file as "chunks" or integral units of data. Cart Chunk is roughly analogous to sticking a label on a cart or reel of tape to describe its contents. Although it began as an open standard, Cart Chunk was later formally ratified by the AES as Standard AES46-2002.

See XML, page 35 ▶

**Companies:** IREC/Crown Broadcast & Omnia Audio

**Product:** 'Omnia Inside' Implementation

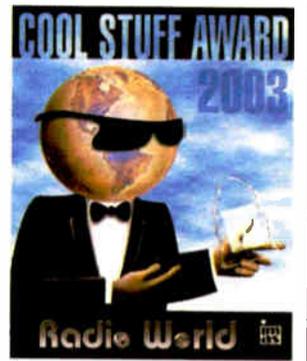
With this product, two friendly and customer-oriented companies join hands.



Now you can order a Crown transmitter with a three-band Omnia digital processing card inside to increase loudness and fringe listening. The companies say on-board processing gives technical advantages such as improved audio resulting from close coupling of processor and exciter, and the convenience of integrated remote controls for transmitter and processor.

Judges: "Low-cost, high-octane processing fuel for portable low-power FM transmission." Shown are Crown's Don Pettifor and Kent Koselke, joined by Omnia's Frank Foti and Jeff Keith.

Info: (866) 262-8919 or [www.crownbroadcast.com](http://www.crownbroadcast.com)



# Great Software from BSI

BSI produces Simian digital automation, but did you know that we have a whole family of products for Radio?

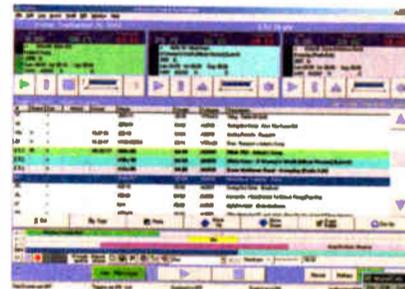
WaveCart, Stinger, Speedy, Skimmer and WebConnect can all work together to make your station function professionally and sound amazing. In addition to the software that we have created, we offer partner products like AudioScience sound cards, Natural Broadcast Systems traffic and billing software, Syntrillium's new Cool Edit Pro 2.0 and various other hardware accessories.

Any and all of our programs are available on our website for download. So install our software and play with it for as long as you want. Once you've decided that it's the software for your station, give us a call or order online.



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[www.bsiusa.com](http://www.bsiusa.com)  
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Para el español, llámeda Felipe Chavez,  
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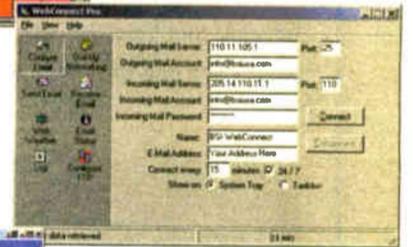
Simian digital automation  
\$1499

WaveCart digital cart machine  
\$299

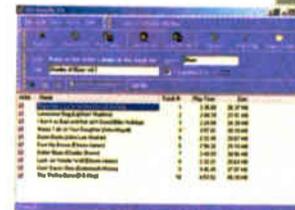


Stinger instant audio player  
\$199

WebConnect Pro email remote control  
\$299



Speedy 4.0 CD-to-PC recorder  
\$199



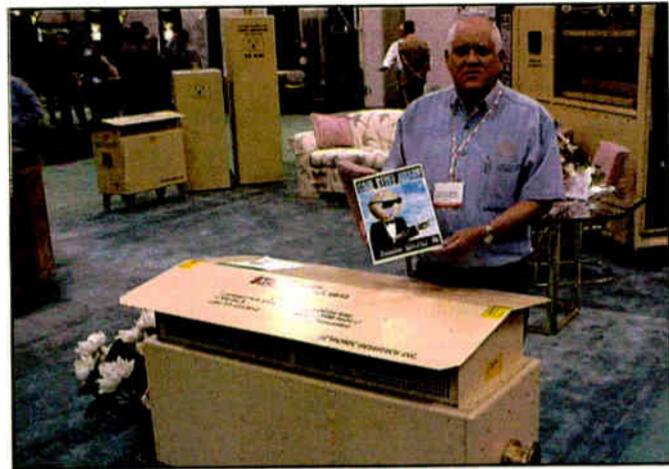
Skimmer easy audio logging  
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Thousands of users have discovered how easy and versatile BSI software really is.  
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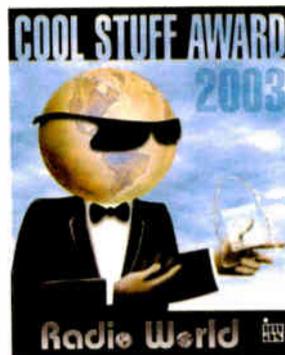
**Company: Altronic Research Inc.**  
**Product: Model 6606/12 Convection-Cooled Resistor Load**

The Omegaline Model 6606 and 6612 are convection-cooled terminators for 50-ohm coaxial transmission line systems. No AC power is required. They are suitable for IBOC applications as well as many other uses. Silver contacts on special film resistors eliminate resistor failure. Power rating (RMS, continuous duty) is 6 or 12 kW.



One judge wrote, "For years, large dummy loads have been placed outside for space and heat-load concerns. This unit brings the outside load concept to the smaller station without re-inventing the wheel." Another said, "No sense paying for more air conditioning when you can stuff waste heat outside in the doghouse." John Dyess, shown, is president of Altronic Research.

Info: (800) 482-LOAD or www.altronic.com



# Ethernet, Tomorrow Radio and Tin Cans

*Audio Forum Digs Into Questions of Algorithms, Ground Loops, Routers And Production Tricks*

by Jeff Johnson

Radio World asked several of our contributors to attend various sessions at the NAB2003 convention last month. Here, Jeff Johnson summarizes presentations at the Radio Audio Forum of the Broadcast Engineering Conference.

Andy Laird, vice president of radio engineering for Journal Broadcast Group, kicked off the Radio Audio Forum by introducing nine industry professionals presenting papers on various aspects of radio audio and engineering.

"Will IBOC/DAB/HD Radio Deliver All That's Promised?" — Simon Factor, North American sales manager for APT-Audio Processing Technology, discussed audio quality and data services that HD Radio will provide to the broadcast community.

"To deliver CD-like audio quality, we have to apply forms of audio compression at many points. Multiple passes can end up with a worse signal than analog FM broadcast," Factor said.

He pointed to two families of compression schemes, "perceptive" — also known as transform or psycho-acoustic masking, a form of Adaptive Pulse Code Modulation — and "predictive," known as Adaptive Differential Pulse Code Modulation. Examples of perceptive coding are the various flavors of MPEG; examples of predictive are apt-X and G.722.

Perceptual coding is based on aural masking (a loud sound masking a quieter sound) and temporal masking (a quiet sound following closely after a loud sound and perceptually inaudible).

Predictive coding "operates on a process of backward prediction," Factor said. "Expected signal change based on previous samples is compared with actual encountered change, and only that difference is encoded in a lesser number of bits."

Concatenation or cascading of algorithms may result in audio quality degradation. Multiple pass concatenation refers to repeated application of the same algorithm, while tandem pass concatenation refers to using different types of compression.

"Avoid dueling algorithms," Factor said. "Experiment by superimposing the 'signature masking envelope' of each algorithm to avoid 'dead spots' associated with the crossover points of those envelopes. Minimize the number of passes of the same form of compression."

"Data services are also a promise of HD Radio," said Factor. "Services such as 'SI' (Service Information) and 'PAD' (Program Associated Data) are considered

See FORUM, page 31

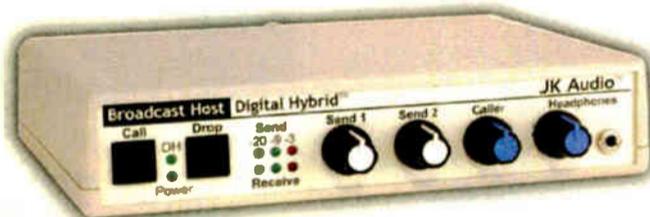
# The Perfect Hybrid

**JK Audio's Got A Digital Hybrid With Features Just Right For Your Job – Whatever Your Job Is!**

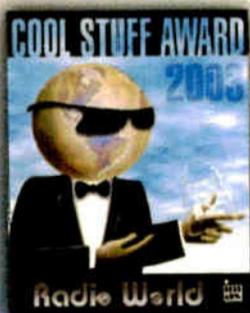
Over the years, we've heard many ideas of what the "perfect hybrid" might be. We've learned that the "perfect hybrid" is actually different things to different people, depending on its use. The good news is that it really comes down to a handful of features, combined in ways that make a lot of sense. We're happy to introduce a series of digital hybrids that hit the nails on the heads, making them perfect for their respective jobs. Check them out and let us know what you think.



**INNKEEPER 4** squeezes four independent digital hybrids in a 1U rack space. The front panel keypad, display, and handset jacks provide easy speed dialing and call setup. Maintain excellent separation between your voice and the caller. XLR output jacks contain only the caller's voice. Available July 2003



**BROADCAST HOST** turns your desktop into a professional broadcast center. Everything you need to get talk show quality phone recordings into your mixer or sound card. Send mic and line level signals into the phone line while maintaining excellent separation between your voice and the caller. Available June 2003.



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**i·Se·lect·or** (ī sə-lek'tər), n. 1. a fully branded Internet player for radio stations in the United States. 2. listeners can customize the station's format. 3. a way for stations to get back on the web legally and economically. Synonym: VALUE ADDED

# iSelector™

The screenshot shows the iSelector web player interface with the following labeled components:

- User name:** jbrown
- Activate songs/artist:** (Eye icon)
- Flavors:** Pop
- Play:** (Play button)
- Skip:** (Skip forward button)
- Volume control:** (Volume slider)
- Log off:** (Log off button)
- Click to buy CD:** (Buy CD button)
- Rest this song:** (Rest this song button)
- Play song less:** (Play song less button)
- Play song more:** (Play song more button)
- Artist website:** (Artist website button)
- Artist information:** (Artist information button)
- Bandwidth choices:** (Bandwidth choices button)
- Find Station Info:** (Find Station Info button)
- Help:** (Help button)
- Rest this artist:** (Rest this artist button)
- Add deep cuts:** (Add deep cuts button)
- Play artist more:** (Play artist more button)
- Play artist less:** (Play artist less button)
- Playlist:** (Playlist button)

**Your favorite client's ad here**

**iSelector™**  
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Sound Software

914-428-4600  
www.iselector.com

**Company: Telos Systems**

**Concept: Livewire**

You learned about it in Radio World: Livewire, an audio-over-Ethernet system, allows networking of studio audio via Ethernet cabling and switched hubs.

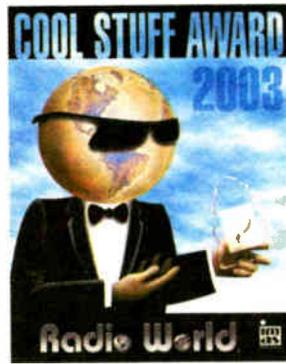


The company calls it "the world's first audio network designed specifically for broadcast studios, conveying multiple simultaneous audio and peripheral data streams over standard Ethernet hardware." A 100Base-T link can carry 50 bi-directional stereo channels of 48 kHz, 24-bit linear PCM audio; a 1000Base-T link or Gigabit fiber can carry hundreds. Benefits include low latency, much cheaper infrastructure and very possibly no more sound cards, switchers, DAs or routers. Hmmm.

You can read more about this on page 53.

A judge: "Steve Church and the gang forge a clever new paradigm for switching and routing audio using common computer-based hardware."

Info: (216) 241-7225 or [www.telos-systems.com](http://www.telos-systems.com)



# Of HAPS & Strats & Stratellites

## A New Class of Transmission Systems Splits the Difference Between Terrestrial and Satellite Broadcasting

Time was that all broadcasting was terrestrial. In fact, broadcasters didn't even know they were terrestrial, just as no one knew that WWI was WWI until later.

One could argue that AM radio (and other SW/MW/LW service) includes a skywave component, but transmission clearly is originated from the ground. FM and other VHF services are purely line-of-sight, and generally emanate from towers of 1,000 feet or less, or from mountaintop locations about an order of magnitude taller.

### The Big Picture

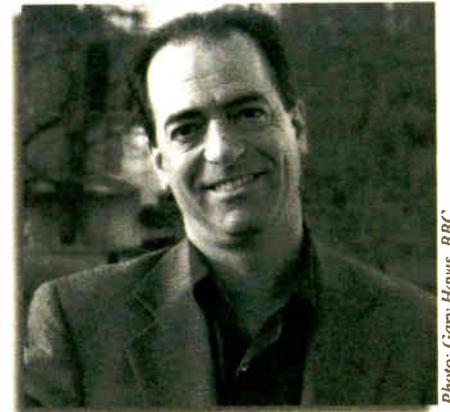


Photo: Gary Hayes, BBC

### by Skip Pizzi

Subsequently DBS satellites have emerged, which take the transmission point to a different extreme with their >20,000 mile altitude in geostationary orbit. Some systems, like Sirius Satellite Radio, use an even higher maximum altitude of >50,000 miles in their highly elliptical orbits, or HEO.

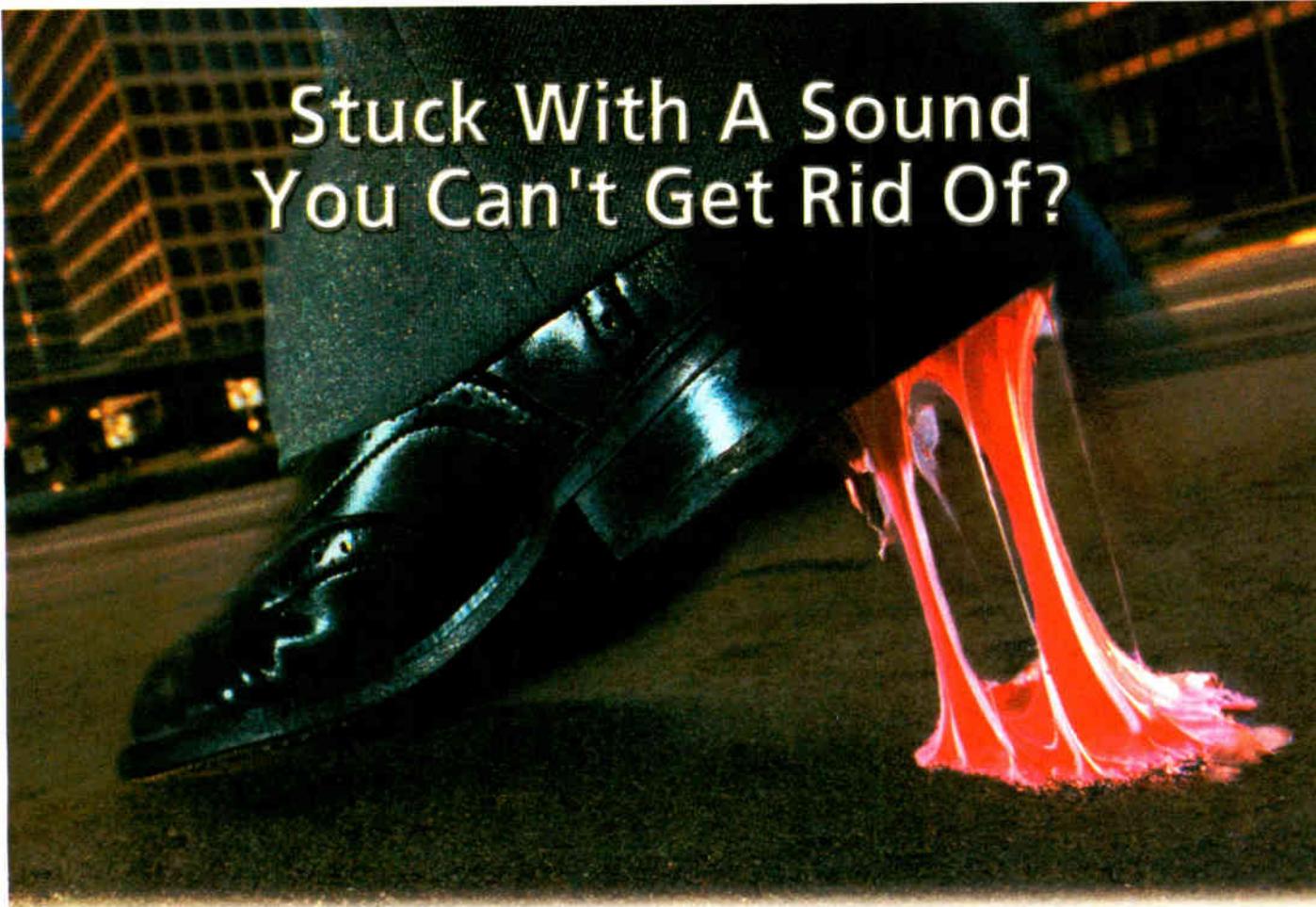
More recently, low-earth orbit, or LEO, satellites have also been introduced, with less successful market results (e.g., Iridium).

Each of these systems has its respective strengths and weaknesses, of course, essentially traceable to Heisenberg's Uncertainty Principle: the closer you are to the ground, the more you know about your immediate environs but the less you know about the surrounding areas. For some applications, access to the big picture is an advantage, while in other cases, knowing the grass roots helps.

The distance between transmitter and receiver also has an affect on power requirements and propagation transit times. The two options available generally have quite different parameters in all these respects due to their widely divergent locations.

Now some new variants have been proposed, which would provide transmission points in the heretofore-unoccupied middle zone between terrestrial and satellite broadcasting, and thereby offer some

See PIZZI, page 26 ▶



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# Workbench

Radio World, May 21, 2003

Past columns are archived at [www.rwonline.com/reference-room](http://www.rwonline.com/reference-room)

## Pole Vaulting in the Studio

by John Bisset

We highlighted a station in Thomas Jefferson's hometown of Charlottesville, Va., a while back. Eure Communications used "Jeffersonian" style columns in their studios to run wires from the console tabletop to the ceiling. A unique way to hide wires and still keep a colonial Virginia theme.

So what do you do when you have the same wiring problem in a studio used for an outrageous morning show? When you need to get cables from a talk table into



Fig. 1: The 'dancer pole' wasn't designed with radio in mind.

the ceiling, and the studio is used by "The Sports Junkies," a brass pole is the only way to do it.

Popular in Las Vegas for purposes that won't be expounded upon here, the "dancer pole" shown in Fig. 1 can be purchased in various lengths from [www.platinumstages.com](http://www.platinumstages.com).

Although the pole comes with top and bottom flanges, the staff at Infinity's WHFS(FM) in Washington used a section of 1-1/2-inch stove pipe, bought from Home Depot, with a flange, to anchor the pipe to the concrete "floor" above. A 6-inch nipple with a "T" provided passage for the wiring from the talk table into the ceiling.

The Infinity engineering staff used about a 6-foot length of stove pipe, with about 4 feet slipped inside the brass pole, to keep the pole rigid. Fig. 2 shows the flange mounted to the talk table.

\*\*\*

I think we opened the proverbial can of worms with our air staff "best of" stories. Here are a few more to make you chuckle:

Clear Channel Sacramento Chief Ross du Clair is working with an Eimac 35TG vacuum tube (yes, I said vacuum tube) on his workbench. Ross' technician-in-training comes in the shop, looks at the tube and asks, "What's that?"

Ross replies, "This is a vacuum tube. Watch this." He hooks up 5 volts to the filament, which glows dull white.

The trainee says, "Wow, look at that. They put a light bulb inside the tube so you can inspect it."

"Uh, yea, right."

Then there was the new weekend overnight jock who calls at 1:30 in the morning complaining she has to shout into the microphone to make the needles move. Ross starts with a little troubleshooting over the phone before having to roll out of a warm bed and head for the studio:



Fig. 2: The 'Sports Junkies' pole attaches to the talk table with a flange.

"Are you sure you're talking into mic one?"

"Yes."

"Is the A-B selector in the A position?"

"Yes."

"Do you have the fader all the way up?"

"Fader? What's that?"

"The thing in the middle of the module with the red square knob."

"Oh, am I supposed to push that up from the bottom?"

"Uh, yea."

Ross writes that he is the chief engineer for a four-station cluster; two AMs, two FM's. The phone rings at 3 a.m., and a voice shouts out, "We're off the air, we're off the air." Click! Ross listens to the sound of the phone being hung up at the other end. Ross mumbles into a dead phone, "Which station?"

See WORKBENCH, page 24 ▶

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No Wall-Warts!

# Workbench

▶ Continued from page 23

★ ★ ★

The fun continues from coast to coast.

Chris Waldrup now works for Sony Ericsson in the Raleigh Research Triangle Park of North Carolina. He writes about the general manager of a station who called one afternoon to complain that the AudioVault was running slow and having other problems. He wanted Chris to talk him through resetting the server. Chris asked that he put the production studio live to air and put on a CD while the rebooting was done.

The manager was instructed to go to the server rack and locate the A server, switch the A/B switch to the A position so the monitor would show the correct screen, and look for the "Start" button at the lower left of the Windows 95 Screen (this was back in 1998).

So far, so good. Chris then asked him to click it and tell him when a message box came up, then to do the same to the B server. After a minute of silence, Chris asked what was going on and was informed that the screen was black.

The servers were rack-mounted units with a power switch at the lower left corner of the box. When Chris had asked him to click the Start button, the manager thought Chris was talking about the power switch, and upon restarting the system, Scandisk had a time cleaning up all the errors. More than one CD was needed before the "Vault" could get back on line.

Like all engineers, Chris, too, was awakened early one morning by an announcer from one of the AM stations he cared for. The announcer said that when they signed on, their metering was incorrect and they thought that

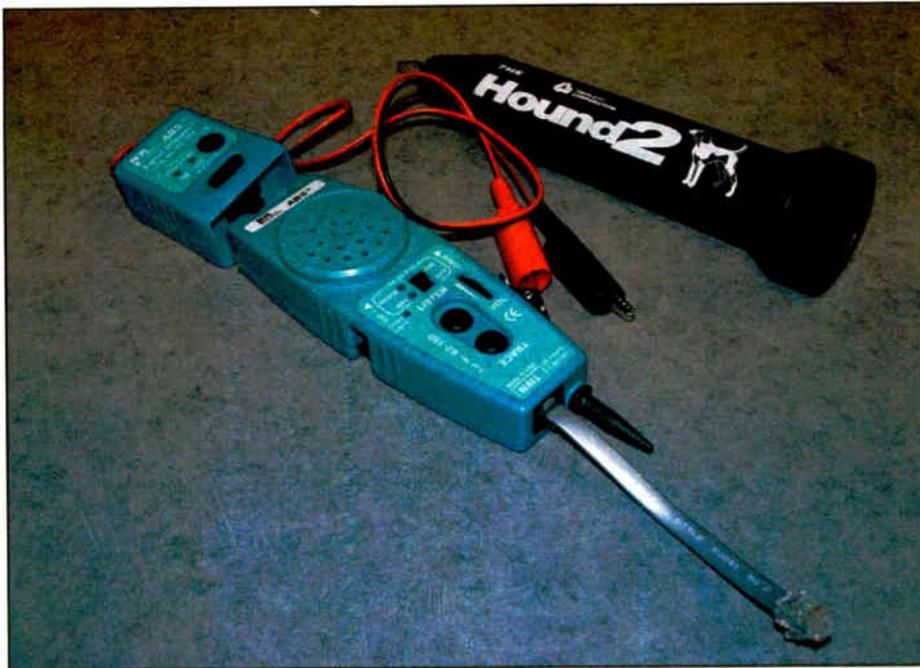


Fig. 3: Two types of signal/sensor units. The black Fox and Hound is a two-part signal generator/sniffer manufactured by Triplett. The sniffer is shown. Next to it is a Progressive Electronics device.

they were off the air. The 7-watt pre-sunrise power did not enable Chris to hear the station at his home, with all the other skywave stuff mixed in, so he started toward the transmitter.

When Chris got to the transmitter site, he found the transmitter humming along; all the readings were right. There was no audio on the local monitor speaker. Connecting a tone source (a Progressive Electronics unit that he recommends) to the transmitter caused the speaker in the transmitter room to spring to life. The STL receiver also looked OK.

Next stop was the studio, some 10 miles up the road. There, he found a dead console that had a fried power supply. The meters on the console did not work because of the bad power supply, so the fault was the console, not the remote control metering!

Chris mentioned having a portable signal generator/sniffer in your toolbox. Fig. 3 shows two types of

signal/sensor units. The black Fox and Hound is a two-part signal generator/sniffer manufactured by Triplett. The sniffer is shown in the photo.

Next to it is one of the Progressive devices. What's nice about the Progressive unit is that the two parts — signal generator and sniffer — clip together, so they don't get lost. Plus the Progressive sniffer has both a modular plug as well as sniffer tip for punch blocks.

*John Bisset has worked as a chief engineer and contract engineer for more than 30 years. He is a district sales manager for Harris Corp. Reach him at (703) 627-0233.*

*Submissions for this column are encouraged, and qualify for SBE recertification credit. Fax your submission to (703) 323-8044, or send e-mail to jbisset@harris.com.*



With the winners of the Radio World "Cool Stuff" Award announced, let's give one more nod to last year's honorees.

360 Systems DigiCart/E  
Audemat AM-Fieldstar  
Broadcast Tools SS 16.4 Stereo Switcher  
Comrex Corp. BlueBox POTS/Wireless Codec  
Crown Broadcast RF Sentinel  
dbm Systems Inc. Pocket Radio Station  
Digidesign Mbox  
ERI Electronics Research Inc. Axiom FM Antenna  
Gangverk Mayo Radio Interactive Music System  
Harris Broadcast Communications  
Studioflex Furniture  
Logitek Electronic Systems Remora Digital Console  
Mager Systems Inc. Touch-Sensitive Solid-Surface Keyboard and Switches  
RCS Selector Smart Ripper  
Sabine Inc. SMW-5000 2.4 GHz Spread-Spectrum Wireless Systems  
Sierra Automated Systems RIOLink for 32KD Digital Audio Network  
Stardraw.com Stardraw Radio  
Syntrillium Software Corp. Red Rover Tascam PocketStudio 5 Recorder/MIDI Arranger/MP3 Encoder & Player  
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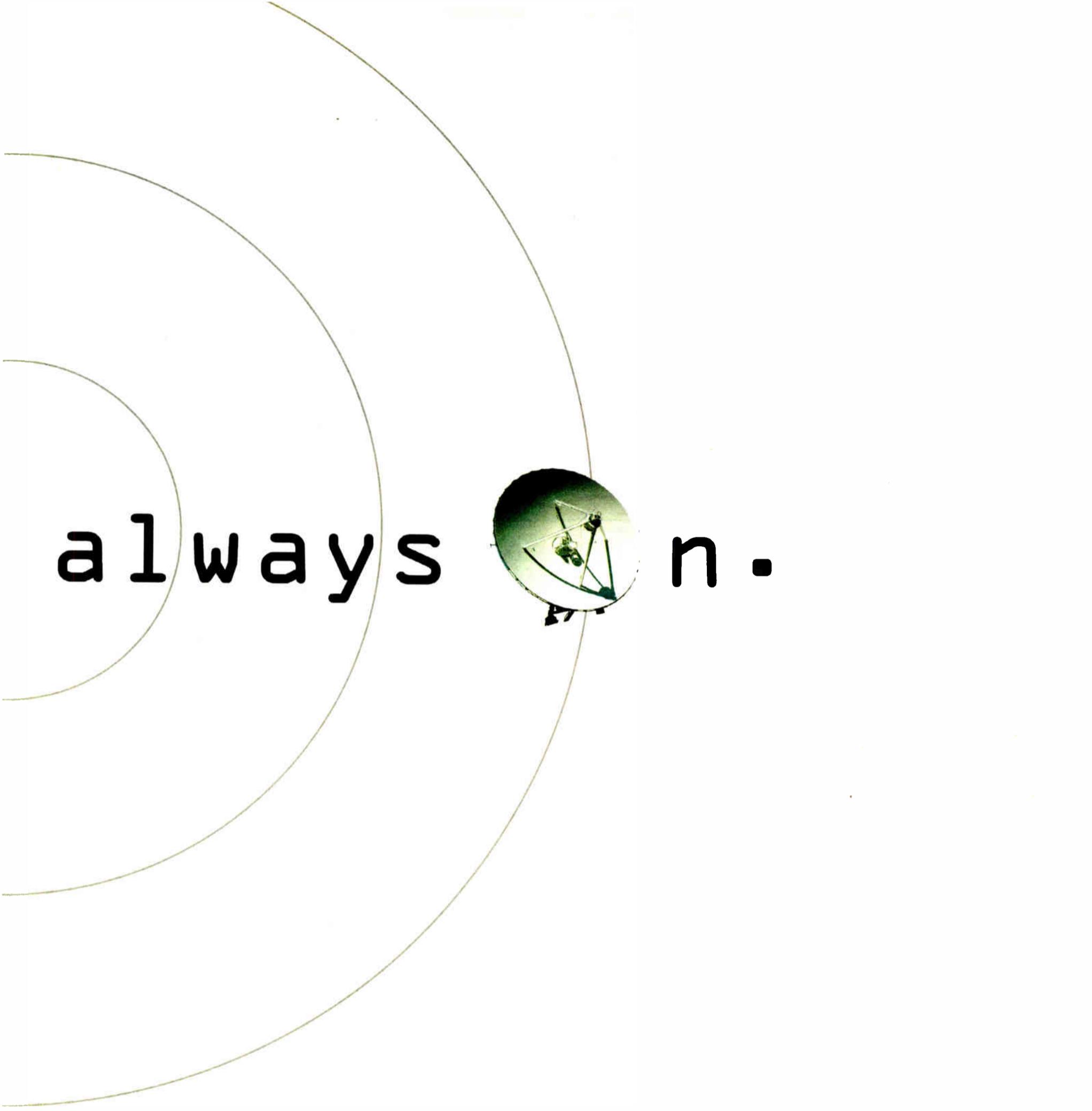
**Company: Sierra Automated Systems & Engineering Corp.**  
**Product: Rubicon Radio Broadcast Console Control Surface**

Oooh, look at the blue lights! OK, the Rubicon has got much more than pretty on/off buttons. SAS made a splash at this show, first by entering the control surface market in a big way, then by bringing Jack Williams, former head of PR&E, on board as director of console and systems development.

Rubicon uses the SAS 32KD Digital Audio Network for its mixing, switching, effects and level control. This is a modular, customizable platform for on-air and production, shipping in the fall. Many neat features and cool display functions. Ed Fritz and Al Salci celebrate the news.

Info: (818) 840-6749 or [www.sasaudio.com](http://www.sasaudio.com)





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# Pizzi

► Continued from page 22  
unique advantages.

One such system is the High Altitude Platform Station or HAPS, a NASA-sponsored project that proposes the use of pilot-less, high flight-longevity aircraft as transmitter sites.

Aerial Vehicles or UAVs, are being developed jointly by NASA's Environmental Research Aircraft and Sensor Technology (ERAST) program and a commercial partner, California-based AeroVironment, which has recently formed a company called SkyTower Inc. to pursue business applications for the system.

Prototypes for the HAPS design originated in 1977, when the ERAST project



The Helios HAPS prototype appears as a straight wing on the ground.

The vehicles are designed to fly in a tight circle over a single area for a period of several weeks. They are intended to operate at approximately 65,000 feet, placing them above the disturbances of weather and commercial air traffic once they reach their cruising altitude.

These aircraft, called Unmanned

began development of its Pathfinder series of aircraft. Using a "flying wing" design with multiple small propeller engines and solar cells on the upper wing surface, these vehicles set new altitude records for propeller-driven aircraft (>80,000 feet).

Second-generation units, dubbed

**Company: PocketREC Inc.**  
**Product: PocketREC Portable Digital Audio System**

The judges got lathered up over this software, which turns a standard PocketPC into a portable digital audio recorder/editor. "I can see PocketRec changing the entire way our newsgathering happens. Having the reporter gathering their audio, editing it with their wrap, then having the ability to e-mail the entire piece to the newsroom in studio quality is mind boggling."

"For my clients, it takes them from the linear transferal to virtual instant transferal via any standard Flash card socket. Plug and play on your laptop in the field or in the newsroom. No tapes or cartridges." ... "A profound breakthrough."

Compact Flash or PCMCIA modules are supported. By using Windows-compatible audio files, it is able to load to a DAW or playout system at your studio via docking station, ISDN, mobile telephone, modem or Internet. Functions include simple editing,

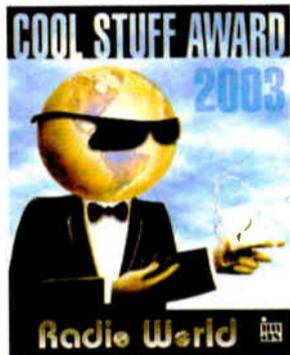
labeling, comments, markers, and text and photo attachments. Thus you have a recorder plus PocketPC applications such as e-mail, Web browsing, schedule and document management. The system has modules for record/playback, multimedia content management, audio editing

and content transfer. Distributed by Harris in North America.

The company said it will keep the package — hardware, mic, bag, mic cable, foldable keyboard and around four hours of linear storage — under the price of a good laptop with software and a portable MD recorder.

Marty Martin and Josef Hallermeier enjoy all the attention.

Info: (571) 218-7766 or [www.pocketrec.com](http://www.pocketrec.com)



In flight, the flexible design of the Helios wing becomes apparent. The flying wing is shown in 2001 near the Hawaiian islands of Niihau and Lehua during its first test flight on solar power.

Centurion, extended the wingspan in 1998, while a third generation, called Helios, added more efficient solar cells and further increased wingspan to 247 feet. For comparison, a 747-400's wingspan is 211 feet.

In 2001, Helios broke the world altitude record for both propeller and jet-powered aircraft, formerly held by the SR-71 Blackbird spy plane, by reaching 96,863 feet. Last year, the Helios platform performed a successful test transmission of HDTV and 3G mobile telephony from 60,000 feet over Kauai, Hawaii.

This work proved the viability of the pilot-less, high-altitude operation for RF transmission/reception, but maximum mission time remains on the order of a few daylight hours. Next-gen units will include specialized, lightweight fuel cells, now under development, to allow nighttime flight and greatly extended missions.

The target is a vehicle that can remain aloft continuously for up to six months. When maintenance is required, another vehicle would be launched prior to taking the first unit out of service, implying that each area served would require two working vehicles. Alternatively, in-flight spares could be kept aloft as hot standbys and flown where required quickly (assuming the correct complement of transceiver equipment was on board).

A similar approach is proposed by a number of companies that are developing large balloon-based platforms, called "stratellites," which would hover at approximately 70,000 feet, using small jet thrusters to maintain position within a cube of about 1,000 feet on a side. A Canadian firm, 21st Century Airships, is developing such devices in cooperation with two Atlanta-based companies, Techsphere Communications and Sanswire.

Current models of these "strats" are approximately 1/4-sized prototypes 60 feet in diameter, which have been tested to an altitude of 18,000 feet. By mid-2003, an altitude of 30,000 to 40,000 feet should be reached by models 130 feet in diameter. The final design, expected in 2004, calls for 260-foot diameter Kevlar balloons operating at 60,000 to 70,000 feet, with systems that could remain aloft for as much as a year before requiring ground maintenance.

The operating altitude of 12 to 13 miles occupies a theoretical "sweet spot" for some broadcast and telecom applications. It can offer relatively uniform, line-of-sight coverage to a large circular region about 600 miles across (~300,000 square miles — about the size of Texas) from a single transmission point.

This is impossible by terrestrial means due to the constraints of the radio horizon, and it can be achieved by the HAPS or Strats with less power than DBS due to the much lower altitude used. The latter attribute also increases throughput for two-way services (such as broadband Internet connections) due to the reduced latency provided by shorter path lengths.

The relatively vertical orientation of sightlines will also provide a more unobstructed path in urban areas than geostationary satellite service, and the higher effective power may improve building penetration, perhaps reducing the requirement for external, roof-mounted antennas. Some mobile applications might also be possible.

To date, no specific radio broadcasting applications are envisioned, but there is no technical reason precluding such service to be included. Any broadband digital technology (uni- or bi-directional) intended for regional service is appropriate for these platforms. The use of dynamically tracking spot beams has also been considered.

## Next steps

Raising capital and other market challenges still remain for the operators that propose such services, but all are moving forward. Beyond pure technical viability, ultimate success of these systems will hinge upon operators' ability to provide adequate, mainstream services at competitive prices. Filling a unique but small niche market is not likely to be sufficient, as recent experience in the LEOsat environment has shown.

Current FCC rules would consider these systems as terrestrial services, but a new class of regulation will likely also have to be developed to address these new transmission sites specifically, should they become widely deployed.

It's another item to keep on broadcasters' radar as digital evolution continues.

Skip Pizzi is contributing editor of *Radio World*.

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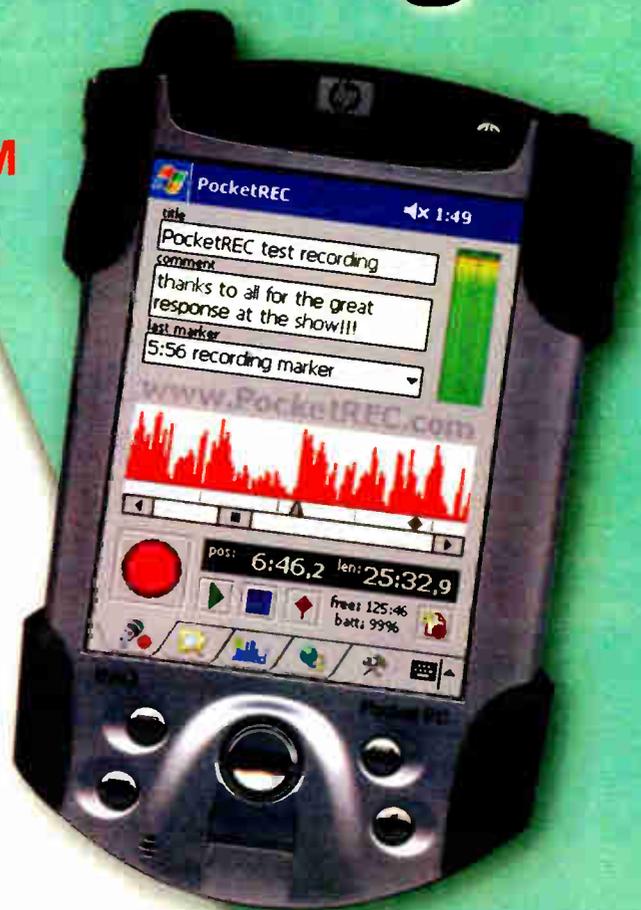
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of pink that he's chosen to become part of the BSW team.

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## Giveaway Prize! June 2-8



### Professional CD-R with Word Clock

The HNB CDR830 BurnIT PLUS has a full complement of professional features at a great price. An advanced laser assembly delivers consistent, accurate recordings with broad compatibility, and a Word Clock input enables synchronization to a host clock during playback. It also features balanced XLR and unbalanced RCA analog I/O; balanced XLR (AES/EBU), optical and coaxial digital I/O; parallel remote input; and double speed CD finalization.

The prize package adds a K171S sealed-ear headphone from AKG and 250 (yes, two hundred and fifty) CD-Rs! Don't wait, enter now at [www.bswusa.com](http://www.bswusa.com)!

CDR830PLUS	List 789 <sup>00</sup>	<b>699<sup>00</sup></b>
K171S	List 199 <sup>00</sup>	<b>149<sup>00</sup></b>

## Giveaway Prize! June 9-15

### Dual CD Deck with MP3

The Gemini MP3000X is a high-performance dual CD player that also plays MP3s, for hours of music on a single CD-R! **Features:** playback of standard CD, audio CD-R/RW and MP3 CD-R/RW; automatic disc calibration; auto-cue to music; instant-start; variable pitch control; 'Robo-start' continuous ping-pong playback mode; analog and digital outputs; jog/shuttle wheels; real-time looping and more, all at BSW's low price of only \$599.95!

The giveaway prize package adds a Furman PL Plus power conditioner/rack light module, a tough SKB 19-6U six rack space road case, and a one-of-a-kind XL jacket from Gemini (not available for sale). Enter to win today!

MP3000X	List 899 <sup>95</sup>	<b>599<sup>95</sup></b>
PLPLUS	List 229 <sup>00</sup>	<b>159<sup>00</sup></b>
SKB19-6U	List 239 <sup>95</sup>	<b>144<sup>00</sup></b>

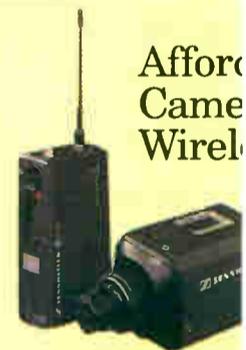


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### Dual-Channel ISDN Codec

The amazing AEQ Eagle is a dual-channel ISDN audio codec with unique multiplexing, allowing two remote broadcasts from anywhere to feed audio to the studio and all three locations to communicate with one another. The Eagle also interfaces with many popular codecs on the market, and even has a back-up POTS mode with frequency extension for when an ISDN line isn't available and you need to get on the air. **Features:** IP remote control by internet or computer network; dual-channel for 64 kbps encoding modes: G.711, G.722 and MPEG; mic input; headphone jack; front phone jack; dual display for easy operation; metering of send and receive audio; analog and AES/EBU digital I/O; silent no-fan operation, compact 1RU design.

EAGLE	List 2,795 <sup>00</sup>	<b>Call For Price</b>	
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Sennheiser's Evolution UHF Wireless Mic System offers professional performance at a price anyone can afford. It includes a plug-on transmitter, a portable camera-mount receiver, and utilizes Sennheiser's patented HDX technology for suppressing HDX components for crystal clear sound. It features a switchable UHF with 100 channels, 100 mW RF power) and more.

EW101P	List 835 <sup>00</sup>	<b>299<sup>00</sup></b>
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\* No purchase necessary. See web site for complete rules.

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**Giveaway Prize!**  
**Time 16-22**

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The AT4050/CM5 features a remarkable combination of warm, transparent and super-high SPL capability; free switchable polar patterns; large-diaphragm design for extended frequency response; symmetrical direct-coupled electronics for excellent transient response and low distortion; switchable 80 Hz hiss filter and 10 dB pad; and includes the 8441 spider shock mount. Order today.

The prize package adds a dbx ProVocal vocal processor, a Proboom-B boom mic stand, and a 25 ft. cable. You're ready to record—enter to win!

4050/CM5 List 995<sup>00</sup> **599<sup>00</sup>**  
 PROVOCAL List 499<sup>95</sup> **299<sup>95</sup>**



**Giveaway Prize!**  
**Time 23-29**



## Portable CD-R Deck with XLR Inputs

The CDR300 by Marantz Professional is a stand-alone portable CD recorder that offers the ease-of-use of a tape recorder but uses blank CD-R/RW media, for playback in virtually any CD player. You can even record live using either the internal microphone or thru the stereo 1/4" or XLR mic/line inputs, with preamps and phantom power! A built-in speaker, headphone jack and full-function IR remote are included. Operates on AC power or thru a 4-pin DC connector for using a battery pack (sold separately).

The prize package includes the Marantz RPS300 lead acid battery pack for truly portable recording, the CA300 carrying case and a 50-pack of CD-Rs. Enter now at [www.bswusa.com](http://www.bswusa.com)!

CDR300 List 849<sup>00</sup> **689<sup>00</sup>**  
 RPS300 List 199<sup>00</sup> **169<sup>00</sup>**



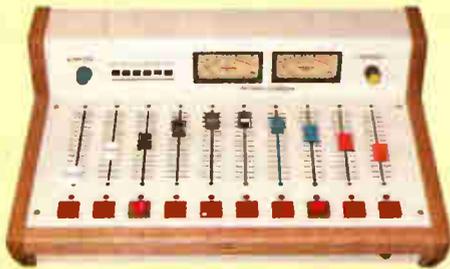
## Portable Surround Sound System



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The Alesis ProActive 5.1 is a THX-certified, professional 5.1 surround sound monitoring system with Dolby Pro Logic II, 450 watts of RMS power and an 8", long-throw subwoofer for powerful, distortion-free bass. There are digital optical and coaxial inputs as well as six channel analog inputs for simple, simultaneous connection to nearly any audio source including PCs, recording equipment, DVD players, and portable audio players. Wireless remote included.

PROACTIVE5.1 List 499<sup>00</sup> **399<sup>00</sup>** ALESIS



## Broadcast Console with Analog RCA I/O

The Arrakis NOVA console features RCA connectors for connecting consumer or unbalanced source equipment without interface boxes, as well as inputs for traditional balanced broadcast source equipment. The NOVA console is digital on the inside with a mix of analog and digital inputs and outputs. **Features:** Program and Record mixing buses with analog and digital outputs, Control Room Monitor, Headphone, and Cue outputs, Talkback input and output with logic for inter-studio communication. 10 mixing channels: 2 channels analog microphone or stereo line level, 4 analog stereo line level, 2 analog telephone hybrid or stereo line level, and 2 digital (AES/EBU) input or stereo line level.

NOVA-10C List 2499<sup>00</sup> **Call For Price**



## Rack-Mountable Digital Distribution Interface Amplifier

The new Henry Engineering DigiMatch 2x6 is an AES/EBU-to-S/PDIF interface and distribution amplifier, mountable 3-up with other Henry 1/3-rack-space units on the optional rack shelf (model #RMA). It has one AES/EBU input and three AES/EBU outputs, plus a S/PDIF input and three S/PDIF outputs.

DIGIMATCH2X6 **279<sup>00</sup>**  
 RMA (rack shelf) **50<sup>00</sup>**

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K240S List 159<sup>00</sup> **99<sup>00</sup>** AKG



## Portable Cassette with Telephone/XLR Ins

The PMD222 is a mono 3-head portable cassette recorder that runs on three "D" batteries or an included AC power supply, and features a modular telephone jack for direct telephone recording and playback; switchable limiter; built-in condenser mic; speaker; 3-position mic attenuation; line level I/O; XLR mic input.

PMD222 List 519<sup>00</sup> **379<sup>00</sup>**



## Quality 4x4 Distribution Amp

The Symetrix 581E is a quality 4-input/16-output distribution amplifier. Each 1-input/4-output module operates independently. Simple rewiring creates 2x8 and 1x16 configurations. **Features:** removable Phoenix-type connectors for easy installation; precision circuitry yields THD + noise less than .009%; LED input metering; level control on inputs and outputs; internal power supply.

581E List 549<sup>00</sup> **399<sup>00</sup>** Symetrix



## Pro MiniDisc Deck with XLR I/O

Sporting a 1RU design, the Sony MDS-E12 is loaded with professional features like control interface capability (RS-232C and DB-9 for broadcast remote control), plus record/play relay control I/O and balanced analog XLR I/O. **Features:** 24-bit converters; Wide Bit Stream technology for yielding 20-bit detail with 16-bit media; ATRAC type "R" encoding; LP play/record; 10 multi-access "Hot Start" memories; variable-speed  $\pm 12.5\%$ ; 6-second pre-record buffer; Control-S input for supplied wired/wireless remote; unbalanced RCA analog I/O, coaxial/optical digital I/O.

The MDSE10 an economical deck similar to the MDSE12 but without the control interface capability, relay control I/O and XLR I/O.

MDSE12 List 945<sup>00</sup> **699<sup>00</sup>**  
 MDSE10 List 630<sup>00</sup> **459<sup>00</sup>** SONY

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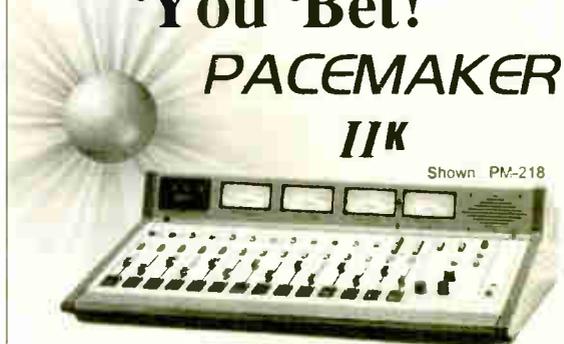
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# Forum

► Continued from page 20  
 'brand valuable,' whereas an 'NPAD' (Non -PAD) data service could be utilized to supply revenue opportunity."

"aacPlus — Highest Efficiency Audio Coding for Broadcast Applications" — Stefan Meltzer, vice president of business development for broadcast applications at Coding Technologies in Nurnberg, Germany, discussed aacPlus.

Incorporated as the audio format of XM Satellite Radio and Digital Radio Mondiale, aacPlus is a combination of MPEG-4 aac (Advanced Audio Coding) and SBR (Spectral Band Replication). It is an audio bandwidth extension tool. The Plus nomenclature indicates the addition of SBR technology. It is also incorporated in MP3Pro.

Metzler emphasized that high-efficiency coding allows the incorporation of a greater number of channels into a given multiplexed data rate such as with XM Radio. Also in the instance of a single program channel, such as HD Radio, higher efficiency coding enables more generous auxiliary data services to "make the program more attractive to the listener."

Explaining the inherent backward compatibility of SBR as it is a pre-processor and post-processor technology, he said SBR's implementation adds significantly to coding efficiency while providing approximately 15 kHz audio bandwidth at 24 kbps and up. Convincing examples were played for attendees.

aacPlus is a "dual-rate" system. "Usually there is a strong correlation between the characteristics of the high-band and low-band portions of a signal," he said. Commonly the high band consists of harmonics of the low band. The low band is encoded at a conservative sample rate. Embedded into the low band is "shaping data" which is the form of the high-band spectral envelope plus its characteristics in relation to the low-band data.

Upon decoding, the high band is created by upsampling the low band by two and applying the shaping data as "guidance info." To avoid artificial sound, care is taken for signals with highly non-correlated low and high bands by making reference to specifically encoded guidance info.

"A Network-enabled Radio Console Architecture" — "Despite a trend toward digital processing, the basic architecture of the console has not changed in 20 years," said Michael Dosch, of Telos Systems.

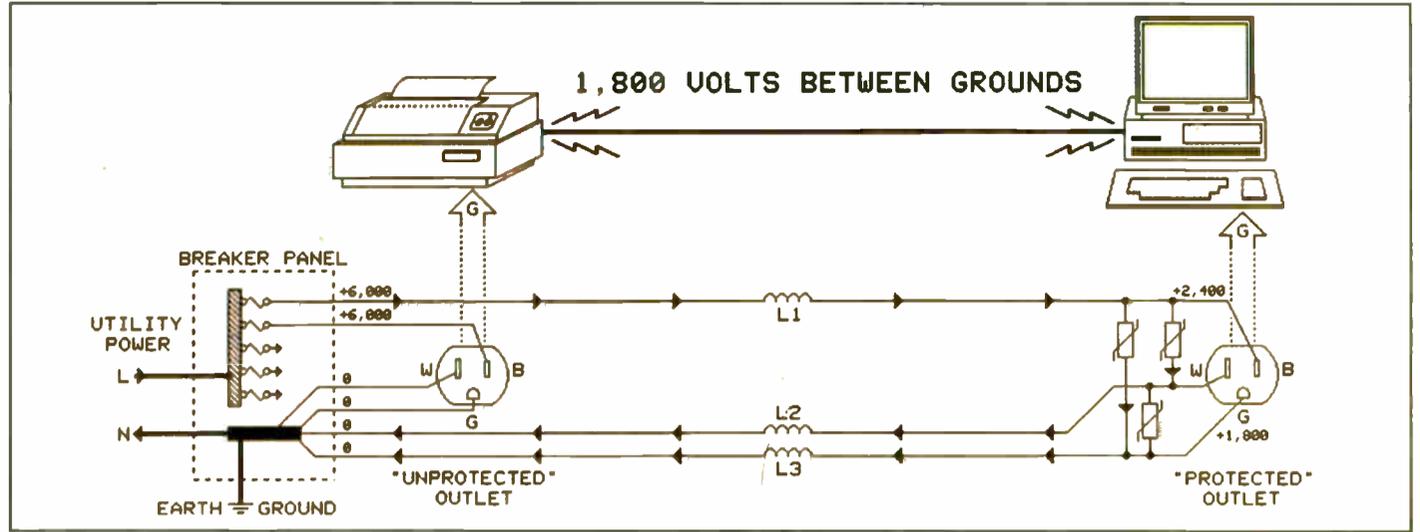
"Switched Ethernet is the future," said Dosch. "It enables console and other studio interconnectivity to become as simple as that of computers."

Pointing to expensive, proprietary hardware of conventional consoles and the inefficiencies of interconnecting such diverse technologies as analog and AES3, Dosch introduced the concept of the "network enabled console."

Acknowledging the more sophisticated, contemporary designs of today as incorporating a central engine core performing all the mixing, switching and console processing for a group of studios, Dosch pointed to the Ethernet audio network as "providing all of the benefits of the centralized core approach while adding a wide new range of capabilities."

"The network enabled console remains in the network domain," he said. Running

See FORUM, page 32 ►



Shunt-type (MOV) surge suppressors can create dangerous ground voltage differences in a system. From Bill Whitlock's paper on grounding.

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# Forum

► Continued from page 31

the Linux operating system, "a single P4 computer motherboard-based mixing engine can support a complex studio setup with 24 or more linear PCM, 48 kHz sampling rate, 20-bit resolution active channels."

In a simple example, connecting six such workstations to a switching Ethernet hub results in a 144 x 144 cross-point matrix.

The concepts described are incorporated in the Telos Livewire system, Dosch said. Livewire gives the highest priority to live audio streams, called Livestreams, resulting in less than 1ms latency per hop. A control surface such as Telos' SmartSurface provides a tangible user interface.

**"Reliability and Redundancy in Linearly Expandable Routers"** — Digging deeply into routing system reliability, Carl Christensen, senior design engineer of Thompson Broadcast and Media Solutions, stated, "AES3 was supposed to die, but our clients display an ever-increasing thirst for bigger and bigger routers." He outlined considerations and solutions for enhancing reliability of routers expandable in equally sized increments.

"Redundancy can *weaken* a product," Christensen said. Creating a router architecture with greater reliability involves careful consideration of granularity, parts count and switching mechanisms.

Yes, redundant paths should improve reliability, he said, "but not when solving one problem adds another." If the switch between the redundant paths is not itself perfectly reliable, *less* reliability results.

"A better approach to redundancy switching is to move the switch to a separate module from the two redundant modules. The best place to put the switch is the module that uses the data," Christensen said.

It is obvious that reliability relies on better part quality and lower part count. It is less obvious that increased granularity, "smaller is better" for each size increase, greatly increases parts count, he said.

"If we have to add parts count to get redundancy schemes to work, less reliability may result," said Christensen. In the example given, a signal would rely on 14 stages passing through the router. Maximum integration, keeping parts count low, and integrated redundancy with optimally placed switching results in five times greater reliability.

Reliability is strongly dependent on connection topologies. According to Christensen, both bus and star topologies suffer from single-point-of-failure probability. He considers only the fully connected mesh adequately robust.

Because errors are highly noticeable with audio, greater reliability for audio routers should include forward error correction. Any router should also pass asynchronous as well as synchronous signals, he said.

**"Understanding and Avoiding 'Ground Loop' Problems"** — Bill Whitlock, president of Jensen Transformers, claimed most people "don't know a ground loop from a Froot Loop!" He dismissed as myth and misinformation such statements as cabling "picking up hum."

"Electrons have not changed. Physics still works the same."

Grounding has profound effect on coupling. Citing the "nebulousness of the ground symbol," Whitlock commented that electrons don't just disappear down ground symbols. They create currents, and it is important to understand where those currents flow and how they couple noise and hum into an unbalanced signal at a common impedance in their paths, such as a cable shield.

The inherent noise-immunity of balanced circuits has nothing to do with signal symmetry. Impedance balanced to ground of each conductor is necessary for best Common Mode Rejection Ratio, or CMRR.

Tips and insights offered by Whitlock included:

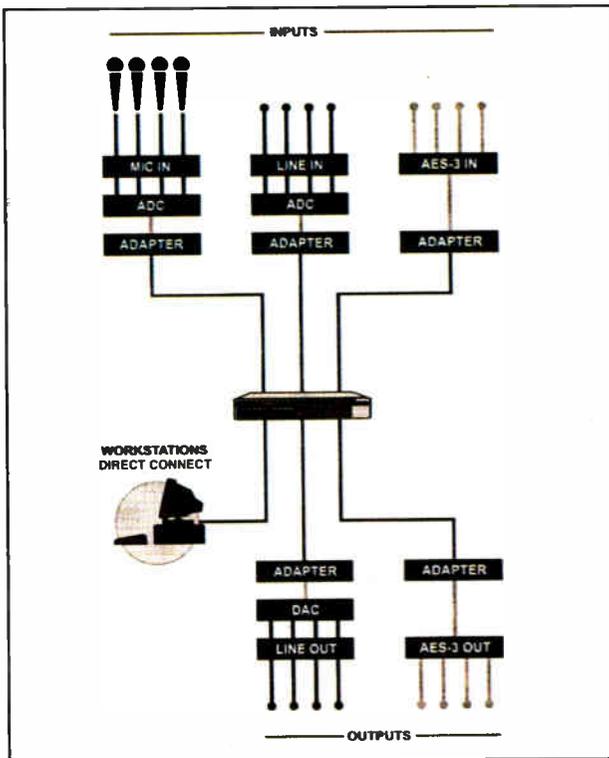
- Ground the send end of a cable (or both), but never the receive end.
- Be aware of the XLR "Pin 1" problem in which, even in a balanced system, common impedance coupling occurs internally to the device due to loops through the chassis and circuit board traces.
- Use a single power strip to minimize ground pin differentials and the resulting loop current.
- When converting an unbalanced output to balanced in, use shielded twisted pair with the pin 3 cable grounded

only at the unbalanced source.

- Finally, according to Whitlock, "Use the ideal device, an audio transformer, to provide ground isolation."

**"Tomorrow Radio: Testing HD Radio Services"** — Mike Starling, vice president of engineering and operations for National Public Radio, outlined the Tomorrow Radio Project and described IBOC-provided supplementary data and audio as a "digital roadside Nirvana."

He described stages of implementation of the supplementary data. First generation: Artist and title info. Second generation: on demand traffic and weather, news headlines and stocks. Third generation: "TiVo" radio, enabling recording of specific programs for personally desirable playback times. Fourth generation: conditional access or registered listening.



An Ethernet audio network is shown configured as a crosspoint audio switcher. From Mike Dosch's presentation.

"The Tomorrow Radio Project is all about providing a second audio channel, especially desirable in markets with one NPR signal," he said. Starling outlined expansion of block programming to the secondary channel, programming all music or all news to either, and supplying niche, but strongly desired, programming there.

These auxiliary services will be implemented by "throttling back" the main 96 kbps channel to a lower rate and by means of HD Radio "open architecture audio delivery" to include the supplemental audio and data.

He said the NPR Tomorrow Radio Project is not about audio quality, nor about cost savings, but about enhancement of content to public radio listeners.

**"Radio Production: Beyond the Digital Editor"** — Just as computer hardware technology is beginning to be used in the broadcast sphere, Alan Peterson of Montgomery College and Radio World advocates "adopting the same digital technologies used by music producers to create compelling radio productions." His presentation encouraged adventurous radio produc-

tion people to enter a realm previously the province of musicians, that of music and pro audio production software.

Providing many examples of Virtual Studio Technology and Direct-X plug-ins, Peterson showed how implementing this technology could be used to "set our work apart." He approached his talk as "music creation for production people, not musicians, and more from the creative end than the technical end."

In addition to self-contained loop-based music generation programs such as Acid, some computer-based tools can be amusing toys. iZotope Vinyl Simulator implements reintroduction of the unpleasant artifacts long ago associated with vinyl. Peterson recommends searching [www.kvr-vst.com](http://www.kvr-vst.com) or [www.directxfiles.com](http://www.directxfiles.com) for such plug-in tools and toys.

Music creation software enables generation of particular sounds that may not be found in any loop. Music environment creation tools such as Neon Synth, LM-9 Drum Machine, Orion Platinum, Storm (bundled with Hercules sound card) and Fruity Loops were mentioned or demoed. Peterson introduced "the grand-daddy of them all, Reason. It has all the toys we used to fill our racks with."

Vocal manipulation enables the untalented vocalist to sample his voice and sing like a choir of angels. "Clone Ensemble," which generates as many as 32 voices, was demoed as an example of such software. Computerize vocal harmony, synthesize speech, create synthesis with your mouth, or recreate the "Cher effect," a vocal "pitch glitch" with "RBC Voice Tweaker." Speech synthesis creates amusing fake vocal tracks in a computer voice. Among the most humorous is the "Delay Lama."

Computer Music magazine was mentioned as a good source of information in this area. Peterson pointed out that since you own the software, there are no legal rights issues to thwart commercial use of your creations.

**"Don't Re-invent the Wheel, Find a Different Spoke"** — If Rick Kemp's presentation was unabashedly low-tech, he expects that the working broadcast engineer will find many useful applications of old favorites.

Kemp, chief engineer of Journal Broadcasting Group in Boise, Idaho, stated, "the major challenge in contemporary broadcast engineering is consolidation." Jamming many stations' studios into space designed for one or two requires resourceful engineering practices. According to Kemp, the most useful is, "I do not have any more room for more sales cubicles!"

With that most GMs or owners will spring for new facilities, but they will tell you, "Don't spend any money." Putting together old tech, when appropriate, with new tech, such as audio over Cat-5, results in cost effective studio build-outs.

"Even though we will all eventually be running virtual studios, we still have to live in the real world of XLR connectors and 66 blocks," Kemp said.

Intelligent synthesis of old tech and new, such as analog audio over Cat-5E cables connected through 66 blocks to RJ-45 connectors, allows rapid "plug-n-play" studio relocation and interconnection. The LPB Blue 5c is a good example of an inexpensive, easily interconnected mixer. Kemp recommends compact Krone Blocks for AES3 cable. For a modular approach, another build-out employed 25-pair telco Cat-3 cable with many RDL Labs modules in a quickly set-up and versatile facility.

Kemp recommended custom-built, pre-wired interconnect components as time- and money-savers.

"For an extreme cost-saving measure, there is still the tin can," said Kemp. "There is, after all, little delay." 🌐



**Company: MUSICAM USA**  
**Product: NetStar**

Connectability gone wild.

This codec can send and receive real-time stereo audio via ISDN and data lines, and also can connect via IP, both ways, with uncompressed linear audio and low delay. It has the usual coding algorithms like G.711, G.722, MPEG 1 and 2 Layers II and III, but also MPEG 2 Advanced Audio Coding (AAC) and MPEG 4 AAC-Low Delay. It comes with its own Web server for remote control from a browser. Optional X.21/RS422 and V.35 interface allow for connections to synchronous data transmission links.

Art Constantine, Dave Pearce and David Lin get connected.  
Info: (732) 739-5600 or [www.musicamusa.com](http://www.musicamusa.com)





# EtherCon®

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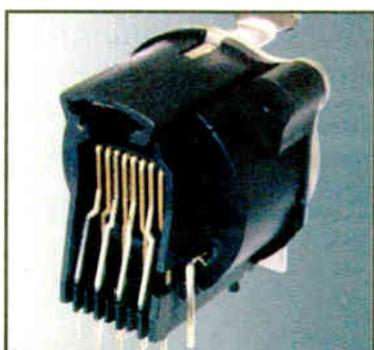
Pre-assembled RJ45 cable inserted into Neutrik female receptacle



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PCB Horizontal & Vertical terminations also available for OEM applications

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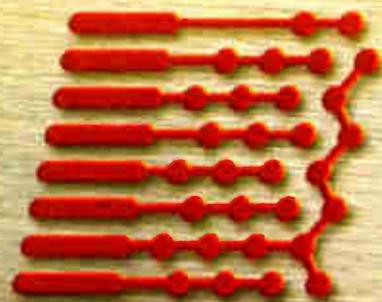
The EtherCon system makes available male cable carriers and fully assembled female chassis receptacles. The diecast metal shell acts as a carrier for pre-assembled RJ45 cables. The female chassis receptacles are based on the Neutrik "A/B" and "D" series XLR receptacles and feature a secure latching system not found on other RJ45 receptacles.

Panel mount terminations include horizontal or vertical PCB contacts and Krone® or "110" IDC terminals. Receptacles with horizontal PCB contacts comply with Class D specifications; the requirements for Cat 5E are met on receptacles with IDC or vertical PCB contacts.

Color-coded accessories are available for the cable carrier and both series of receptacles for easy identification.



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# XML

► Continued from page 19

Perhaps the most popular application for XML and open standards in broadcast is for interoperability between automation systems. The proprietary data formats of years past have given way to XML-based standards. An open architecture initiative spearheaded by RCS and adopted by many other software vendors provides a standard way to represent the data at the core of most operations: schedule, song information, media information, traffic, data, etc., so that it can be transmitted easily between systems, across WANs and over the Internet.

Philippe Generali, president of RCS, says the initiative was beneficial to all manufacturers.

## Beneficial

"The idea of opening up the architecture of a program is actually not new. It's a good strategic position for any software company to be interconnected with as many external components as possible. You want to be difficult to replace."

Other parts of the broadcast marketplace are also involved with XML and open standards. One effort proposes to replace the cumbersome interconnection schemes for studio gear: analog audio, AES3 and MADI digital, and audio data file transfer, with streaming over an Ethernet network.

For this to work, several technical issues need to be addressed, and there needs to be a standard. Steve Church, president of Telos Systems, supplies details on a proposal that his company has advanced.

"The existing standards for streaming audio, the Real Time Protocol, and some proprietary standards from Microsoft and Rio, don't address broadcaster's needs. What's needed for live audio over a network is very low delay, or latency time, in network links."

The maximum tolerable audio delay for live broadcasts is 10-20 milliseconds. Church said there are currently no off-

the-shelf solutions for radio stations.

"We've invented a scheme called Livewire to address these needs. We'll try to promulgate it, and convince others to use it too." Whether Livewire will be submitted to a standards organization for formal ratification remains to be seen.

Datacasting via the Data Radio Channel, a high-speed 76 kHz subcarrier, is becoming a hot topic for FM broadcasters.

## Broadcast applications for XML include compatibility among manufacturers' automation components and transfer of information directly from the Internet to broadcast media.

DARC enables transmission of a more robust data stream than RDS, including video. One solution developed by Audemat-Aztec utilizes XML to help converge Internet and broadcast technology. On the Internet end, a specialized Web server called DARC-ARTHUR seeks updated information in XML format on Web sites, and creates content in text, flash animation or JPEG, which is then broadcast over the 76 kHz subcarrier. One interesting application for this technology is outdoor billboards enabled for VGA/NTSC video.

Sophie Lion Poulain, operations and communications manager for Audemat-Aztec, notes a growing interest in subcarrier technology among American broadcasters.

"Managers are looking for additional ways to make money. High-speed subcarriers combined with Internet technology offer a wealth of potential revenue streams for a modest investment in an encoder and receivers."

End users have a variety of philosophies and responses to the need to standardize. Large groups have unique challenges and opportunities when it comes to developing broadcast standards.

Jeff Littlejohn, senior vice president for engineering at Clear Channel Radio, said, "What's most important is

the ability to freely interchange data, not only between systems in one house, but also to stations in another market. Rather than using XML or another interchange format, Clear Channel has purchased Prophet Systems and installed their software in every location. What is also important is the ability to transfer data between an automation system and a commercial scheduling system.

again in a few years.

"XML is the perfect standard," Baden said, "because it defines data, not presentation. Once you have a script file, you can design different style sheets to display the same info on a WAP phone, Web browser, teleprompter or computer screen."

RFA's limited budget made the purchase of commercial broadcast software impractical. Instead, Radio Free Asia's engineering staff developed its own suite of inter-operable programs known as R-Boss. Collectively, they function as a content management tool. In order to future-proof the content and ensure cross-platform open file formatting, R-Boss makes extensive use of WAVE, MPEG and XML files.

And a new Web-to-radio delivery system received much press coverage when it was announced by Microsoft this winter. SPOT, or Smart Personal Object Technology, uses XML on the server side to deliver personalized Internet content via FM subcarriers to wristwatch display devices. To provide the service, Microsoft is partnering with Clear Channel, Entercom, Greater Media and Rogers Communications.

While open standards and XML make it possible for both vendors and end users to tweak and modify software, most of that work is done by manufacturers. The role of the chief engineer seems to have changed considerably over the past 20 years, from one who adapts and modifies technology, to an administrator of that technology.

"This used to be a business where you crafted everything," said Generali of RCS. "Today's software has to be fast, cheap and efficient. If it doesn't work, you replace it. The engineers' function nowadays is to keep the station on the air 24/7."

"Once you take that perspective, you understand that the job is not about designing or modifying software. Your job is on the line and there are too many risks involved."

Tom Vernon is a multimedia consultant working in Philadelphia. Reach him via e-mail to [tvernon@blazenet.net](mailto:tvernon@blazenet.net).

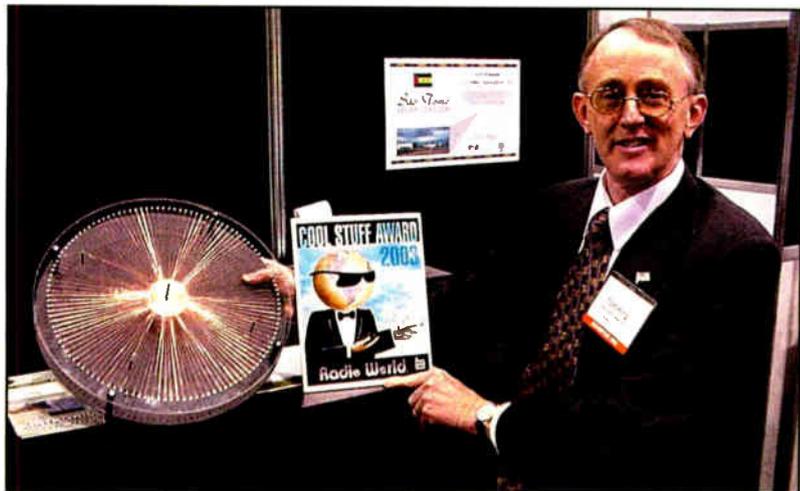
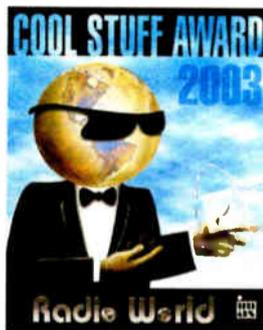
### Companies: Kintronic Labs and Star-H Corp. Concept: KinStar AM/Medium-Wave Low-Profile Antenna

Ah, the dream of a smaller AM antenna.

The KinStar promises radiating efficiency 98% of that of a quarter-wave tower but with a vertical height 67% less than that of the quarter-wave. As we've reported in Radio World, the developers say the bandwidth is compatible with IBOC or DRM DAB. It will be popular where local ordinances limit the height of any new structures and near airports and such.

A judge said, "Finally, a very short antenna that works for AM the FCC will have to accept." Tom King shows off a scale model.

Info: (423) 878-3141 or [www.kintronic.com](http://www.kintronic.com)



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# RADIO SOFT

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**Company: Eventide Inc.**

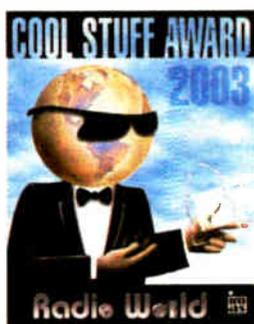
**Product: Reverb 2016 by Princeton Digital**

Eventide was at the show with a modern version of the 1980s-era SP2016 reverb, again designed by Tony Agnello. He duplicated its original reverb algorithms, including Stereo Room, Room Reverb and High Density Plate; and added enhanced versions that take advantage of the greater processing power now available.

Our judges loved that this device uses *knobs*, not menus. As Eventide states, "It was created from the perspective that reverb warrants a dedicated box with an optimized, 'one knob, one job' user interface."

Features include 24-bit DSP, 24-bit balanced XLR, analog I/O, 24-bit SPDIF digital I/O, MIDI in and out, software-programmable footswitch, and direct input for guitars and other high-impedance instruments. The controls are lovely. Up to 99 user presets can be stored. Dave Fournier and Ray Maxwell are shown in the Eventide booth.

Info: (201) 641-1200 or [www.eventide.com](http://www.eventide.com)



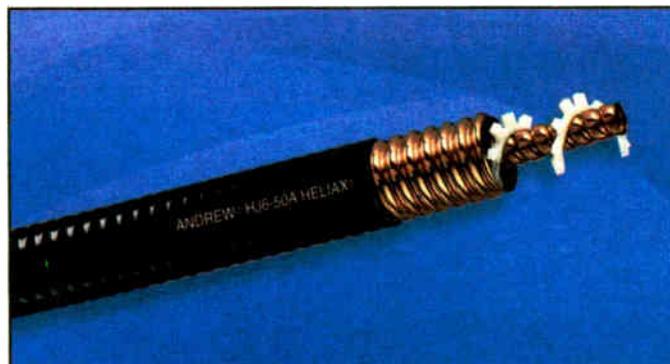
MARKET PLACE

**Heliac Line Expands**

New from Andrew in its line of air-dielectric cables is 1-1/4-inch Heliac HJ6-50, which the company says is targeted for antenna jumper cable assemblies and low-power main feeds for radio and TV transmitting systems.

The cable is flexible and has a peak power rating of 205 kW. A polyethylene spacer is used, and the company says the design produces low attenuation and excellent heat-transfer characteristics. Attenuation at 600 MHz is 0.687 dB per 100 ft.

For information, call the company in Illinois at (708) 349-3300 or visit [www.andrew.com](http://www.andrew.com).



**Company: Middle Atlantic Products Inc.**

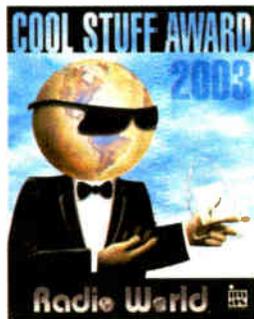
**Product: FC-4 Thermostatic Fan Control**

Call it a "fan brain."

You can maintain proper temperatures inside your racks with this thermal management device. The fan speed operates in proportion to the temperature sensed in the enclosure, so you get proper cooling — but only as much as you need. One unit controls up to four 120V fans. We loved playing with the demo, making the fans go on and off by putting the sensor under a heat lamp. Also in the product line are fans and vent blockers.

Judge: "Equipment likes automatic temp control, just like humans." Diane Cote, David Amoscato and Whitt Adams try to cool off.

Info: (973) 839-1011 or [www.middleatlantic.com](http://www.middleatlantic.com)



**Alphaton Introduces Cable Tester to U.S.**

An active remote cable tester used in Europe now is available to U.S. buyers. Alphaton, based in Germany, will offer the ACT-100 Cable Tester through its North American distributor, Atlantic Pro Audio.

The unit has a hand-held base unit in a metal casing. Error codes are displayed via multicolor LEDs; the code legend is printed on the casing so there are no paper code sheets to keep track of. It operates with 9-volt batteries. An included adapter plug allows the unit to test snake lines and long cable runs where the ends are in different locations.

"The ACT-100 cable tester is especially suited for fixed installations where cables cannot be tested with a standard-type cable tester or ohm meter," the company stated. "Cold" solderings and junction resistances are displayed by color or luminosity changes in the LED display. The ACT-100 does not require phantom power for testing.

Send and return sections are built into the base unit. In addition to stereo phone jacks, both sections contain male and female XLR connectors, allowing for testing of any gender combination cable. The Remote plug also has male and female connectors for "any-gender" testing. An optional stereo Remote jack for testing jack panels is available, as is an adapter to enable the testing of MIDI cables.

For information contact the distributor in Florida at (407) 865-5784 or visit [www.atlanticproaudio.com](http://www.atlanticproaudio.com).



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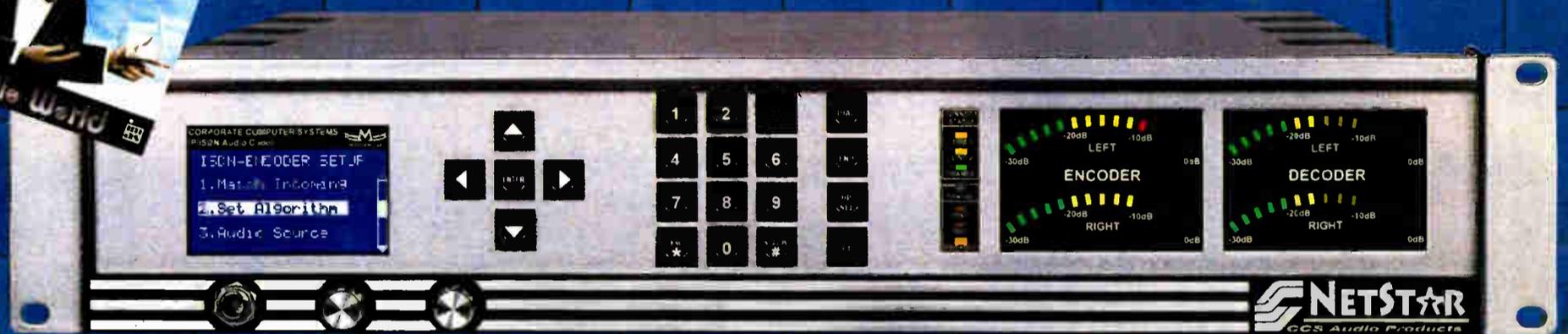


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Top it all off with the exceptional quality and consistency you count on from Audio-Technica, and the result is, quite simply, something special, for a lot less than you'd expect.



# Studio Sessions

**Shecky's Back  
From NAB**

**See Page 40**

Radio World

Resource for Radio On-Air, Production and Recording

May 21, 2003

## Hot Mics: Is Anyone Listening?

by Christopher Springmann

The only thing that gets between Traci LaTrelle and several hundred thousand of her closest friends tuned to "The Flow" at XM Satellite Channel 61 is an Electro-Voice RE27 microphone.

The award-winning program director, who works for Radio One in conjunction with XM, probably does not think much about the classic shock-mounted mic on her Klotz broadcast console in Landover, Md. Sure, the RE27 is bulletproof and engineer-proof, and the price is pretty good, too, but the bottom line is, LaTrelle sounds good.

### Meanwhile ...

Three thousand miles away at KQED(FM) in San Francisco, Michael Krasny leans into an RE20 in his studio. Krasny's 10th anniversary show is well underway as his guests curl around their six RE20s, blithely unaware of the historical roots of that microphone.

The broadcast world may be going digital. Car audio and home systems produce awesome sound. Yet the crucial port-of-entry for talent, the all-important microphone, very often is still one of a few familiar models from companies like EV and Shure that have been on the market for many years.



Dr. September Williams, co-host of the syndicated show 'Health Rhythms,' uses a BLUE Mouse mic.

Where are the "hot mics" in this bi-coastal radio portrait? Is anyone in radio using recent-vintage microphones — state-of-the-art, yummy to look at and even better to use?

"The mic came with the studio," LaTrelle said. Not that she's complaining. "In 17 years, I've never had the opportuni-

ty to choose a mic, as I've always trusted engineers to select the best one."

The engineer LaTrelle trusts is Rashad Smith, who says he has "seen people bang around the E-V mics like rag dolls and they keep on going." No phantom power issues or delicate parts as with an expensive Neumann U87.

"If it ain't broke," says Smith, repeating the standard radio mantra, "don't fix it."

But other models do find homes in radio-related applications.

Some end up in voice studios, which are eagerly investing in the latest stuff to service their ad agency and entertainment industry clients.

I toured the new, spare-no-expense NPR facility in Santa Monica, Calif., where the staff recently purchased 25 Neumann U87s, following the lead of the East Coast NPR mothership. I even found out Howard Stern's dirty little secret: a TLM 103 makes him sound so good.

Another secret: Musicians live and die with microphones. That is true of Ed Goldfarb, who has the ear and soul of a musician; selecting the right microphone

See MICS, page 42 ▶

### Company: Broadcast Tools Inc.

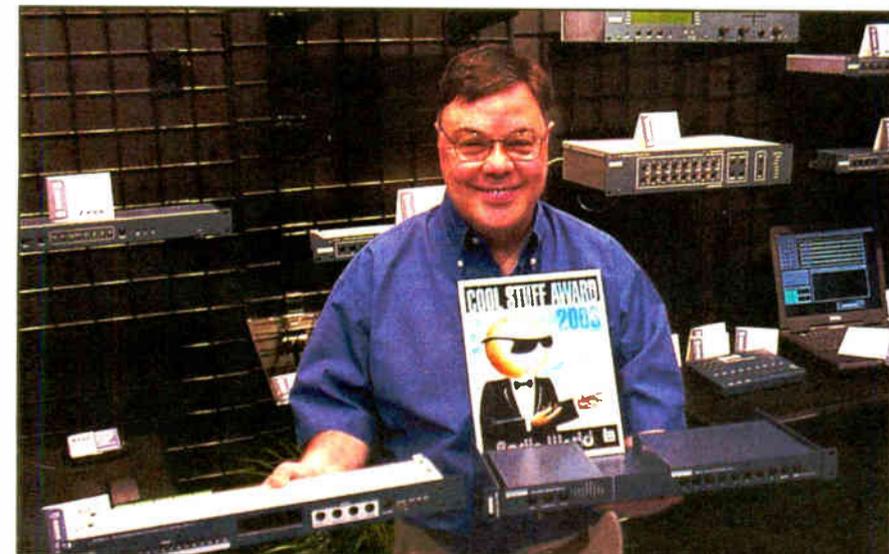
#### Products: Program Schedule Controller II & Silence Monitor III

Don Winget's company keeps cranking out helpful problem solvers. As one judge wrote, "Don is the master of very nifty and very affordable studio tools."

The PSC II can be used as a scheduler, sequencer or both. Judges liked that it includes a GPS receiver with embedded antenna. The PSC II controls functions by time and date, time and day of week, serial port commands and remote contact closures. The non-volatile memory has 512 scheduled events, which can be set to latch, unlatch or momentary pulse one of the 16 SPDT relays.

Also honored was the upgraded Silence Monitor, which keeps an ear on any stereo or two monaural sources, generates alarms and switches to backup source transparently. Delay is from 2 seconds to 85 minutes.

Info: (360) 854-9559 or [www.broadcasttools.com](http://www.broadcasttools.com)



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# It Must Be Spring: Shecky's Back

by Alan R. Peterson

It's as predictable as the cherry blossoms in Washington, as timely as a squirt from Old Faithful and as lame as a circus performer on rubber stilts.

It's the return of Shecky Peterson.

Every year right after the NAB convention, Shecky emerges from the dark corners of my psyche. Take the smarmiest Vegas lounge act you can think of, give it a radio spin, add a song or two, grease up the hair, loosen the tie, and add a vodka gimlet in one hand and a Shure Beta 58 mic in the other.

You now have a solid idea of what Shecky is all about and why I try to keep him repressed throughout the year.

So grab a table close to the stage, try the veal piccata, drink up 'cuz there's a \$15 minimum and settle on back for the show.

For the fourth year in a row, complete with the requisite rimshots on the drum kit, Shecky's back, bay-bee!

## Cue the band

*(Music intro, polite golf claps from the audience.)*

Heyy-yy, good evening folks. Good to see you all here. So, any of you manage to make it all the way down to the South Hall at the Las Vegas Convention Center? Am I mistaken, or is the walk from the Radio Hall down the Strip to the Sands now actually closer?

And does it seem to you like mergers and takeovers have finally settled out? Man, that was crazy for a few years. But things seem a lot quieter now.

I was waiting for the guys at Ice Krackers to buy out the voice-tracking product from RCS, then create its own station financing and brokering division. The new company would have been called Krackers, Trackers and Backers.

Maybe if Graham-Patten came into the deal, they'd be Graham-Krackers.

What if Scott Studios picked up power tube rebuilder Freeland Products? Would Scott-Free fit on the sign outside?

And how about if Rane Corp. did a merger with Stormin Protection Products? RaneStorm, naturally.

*Ba-da-bump!*

But Sirius-ly, folks ...

## I once knew a guy named Jack Field, but he was only half-normal. Ba-da-bump!

Oh, don't even get me started on that whole digital radio thing! Yeah, it's working and those guys at Ibiquity make it better every month, but I still don't know whether to call it IBOC or HD Radio.

Frankly, I like IBOC better. It reminds me of all those great songs that have IBOC in their title.

Songs like "I-BOC a Lovely Bunch of Coconuts," "IBOC-cycle Built for Two," "I-BOC Spurs That Jingle-Jangle-Jingle," or "Baby Got IBOC."

And let's not forget the Paul Simon classic, "I Am Just IBOC-xer" or the bane of every school bus driver, "99 IBOC-kles of Beer on the Wall."

What's the best we can do with HD? Oh, I don't know ...

*H-D sweet?*

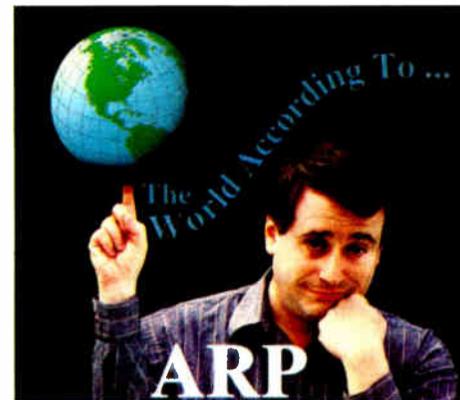
*See her wal-king down the street,  
Now I ask you very con-fi-den-tially,  
H-D sweet?*

See, it just isn't the same!

Maybe top it off with an encore of

"MPEG of My Heart." And when that one antenna company gets in the act, we could probably do a rendition of "CRI Me a River."

And what's with all these "X" things? We've got a movie all about the X-Men, we have XM Satellite Radio, Telos Systems has the Xport and the Xstream,



tried humanely trapping them and releasing them back into the wild, but they always found their way home.

In desperation, he called up an engineer at another station. "My basement is full of squirrels," he said.

"Yep," said the second engineer on the phone. "We had them too."

"What did you do to get rid of them?" the first fellow asked.

"Hired 'em," he replied. "Put 'em in charge of running the Sunday morning public affairs shows. They were here for one week and we haven't seen them since."

*Ba-da-bump!*

## Bring down the lights

*(Piano player touches a gentle chord.)* Okay, let's send you nice people home with a song. Every year it's always something schmaltzy and slow, so let's pick up the tempo a little bit this time.

You all know the Monkees tune "I'm a Believer," right? Well (loosens tie even more, wipes brow and finishes gimlet), let's shake this place up a little!

Heyy-yy all you account executives, here's one for you! *(Band swings into overdrive.)*

*I bought lunch for two with my expense account,  
The total bill was \$80.23 ...  
The boss was not too happy,  
Boy he looked depressed,  
Said I couldn't even sell R-O-S...*

*And then I made a sale,  
Now I'm leasing a Beemer.  
Livin' large,  
On cash that's not mine.  
Got it made (hum-mm) I'm drivin' a Beemer,  
That "No-I-in-Team"-er stuff's a lie ...*

Now the engineers on this side of the room!

*I put up with guff from the em-ploy-ees here,  
Lots of things like, "Who's our I-S-P?"*

*"Can you fix my headphones?"  
"Where's the paper stored?"  
"I just spilled my coffee down the board ..."*

*I'm on call all day,  
And I'm driving a Kia.  
Solderin' stuff,  
And ordering lines,  
O-ver-time? (Ha!) I'm driving a Kia,  
I'll prob'ly be hee-yah 'til I die ...*

Thank you, thank you, yer a wunnerful audience. See you at the 10 o'clock show.

*Al just recently reported in for a new position: production and program coordinator for talker WMET(AM), Gaithersburg, Md., poised for a power hike to 50 kW and a new studio buildout in downtown D.C.*

## PRODUCT GUIDE

### SoundSlice Peripheral Breaks Ground

The AudioScience ASI2214 SoundSlice USB 2.0 pro audio peripheral includes multistream MP3 record and playback with multiple simultaneous sample rates.

SoundSlice provides four balanced analog stereo outputs, one AES/EBU output, one balanced analog stereo input, one AES/EBU input, two record streams and four play streams.

In addition to MP3, other format choices include MP2 and 16-, 24- and 32-bit PCM. The ASI2214 is backward-compatible with a USB1.1 bus and may be run in full speed (12 mbps) or high-speed (480 mbps) modes.

Applications include broadcast and entertainment markets. The ASI2214 runs on Windows 2000 and Windows XP. It presents itself to the Windows audio subsystem as one waveIn device, four waveOut devices and one mixer device.

DirectX API is supported.

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For more information contact AudioScience in Delaware (302) 324-5333 or visit [www.audioscience.com](http://www.audioscience.com).



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# Mics

► Continued from page 39  
for the talent, getting that edge, is what he is all about.

Goldfarb, owner and head engineer of Corte Madera Madcap Labs in California, composes, records and mixes music plus voice — and he is very picky. He tossed me a copy of Radio World's sister publication Pro Audio Review, where mic reviews read like copy straight out of the Wine Spectator: "Richly detailed with subtle textural nuances ... warm and passionate ... an unusual balanced blend of air and punch."

All very entertaining. However, Goldfarb does not record hyperbole, he does sound. He placed my "Health Rhythms" co-host September Williams, M.D., whose voice is warm and passionate, in back of a BLUE Baby Bottle (\$649 list) condenser microphone, complete with matching Baby Pop metal-mesh windscreen.

Goldfarb started the session and stared in disbelief at the Pro Tools waveform.

"Oh, man, this is sooo good. I don't have to do a thing to that sound," he marveled.

## Call me Mr. Blue

"That's the idea, making heroes out of the people who choose our mics," said Skipper Wise, founder of BLUE (Baltic Latvian Universal Electronics), who eschews model numbers in favor of colorful product names, such as Blueberry, Mouse, Kiwi, Dragonfly and Cactus.

Musicians such as Pearl Jam, Sheryl Crow and Limp Bizkit put BLUE on the music map, although Wise has made inroads into broadcasting with clients ABC, NPR and CNN/Turner Broadcasting.

The Baby Bottle pattern is fixed in a cardioid configuration and there is no pad or rolloff available, according to Nick Baily of Pro Audio Review. "Inside the lollipop-style grille is a single membrane, large diaphragm, gold and aluminum-splattered capsule." Definitely not your grandfather's microphone.

"This unit really cranks it out," Baily said. "The sound is extremely transparent, a difficult-to-define clarity that distinguishes great condenser mics, with a low that seemed to extend for miles and round, defined bass tones." The signal-to-noise ratio is 87 dBA while the self-noise is a very respectable 5.5 dBA.

"If you're using a mic that was designed 50 years ago, don't you think you owe it to the talent to take them to the next level?" asked an impassioned Wise. "Car stereos sound sensational compared to what was available just 10 to 15 years ago; people's ability to monitor signals, like XM, is just incredible, so your talent has to be delivered in a high-

er-quality fashion than with equipment from a half century ago."

The creation of the Mouse (\$1,699 list) was influenced by Ron Roland, a voiceover talent who requested a mic that would provide him with a larger-than-life sound.



Skipper Wise, President of BLUE, With the Mouse Microphone

Wise needed a large, deep bottom end capability that could handle a loud SPL. BLUE tuned the capsule to be prominent in the 60 Hz area, dipping a bit around 400 Hz while creating an edge in the 8-10 kHz areas. The result? A VO mic that works for a kick drum and a bass amp, as well.

The world headquarters of Royer Labs is tucked away in a nondescript Burbank, Calif., residential neighborhood. Rick Perrotta, president, likes it that way. Not that Royer mics are a secret. The Royer wall of fame is papered with awards, creating a gratifying and steady demand for a small shop making world-class ribbon mics. Ribbon mics, like the RCA 44 or 77? Hardly.

The Royer R-122 is the first phantom-powered ribbon, with a head amplifier that's fully balanced and discrete, one that uses a specially designed toroidal transformer and ultralow-noise FETs, according to Russ Long, also writing in Pro Audio Review.

"The head amp/transformer system makes the R-122 15 dB more sensitive than standard Royer ribbons," Long said, "bringing that sensitivity to the level of the average condenser mic, even when paired with low-impedance and standard gain preamps." Long said ribbon mics produce a "smooth, warm, natural sound

(that) works wonders on everything from vocals to violin."

The handmade R-122 is deceptively simple in appearance, 1 inch in diameter and 8 inches long, looking somewhat like a shotgun. Tucked into a shockmount, the



The Royer R-122 Microphone

Davis\*Glick, L.A.'s furiously busy voice production house. The 416 is the basis of the "West Coast Sound" for tens of thousands of D\*G's breathless entertainment industry promos, spots and tags ("Monster hits, more music, less talk, it's Monster 1-0HH-5!").

Wayne Ahlberg, D\*G's technical ops director and chief engineer, oversaw the studio's transition from the Sennheiser 421 to the current stable of seven 416s.

"We discovered that video and film shoots were using the 416 on location and later for looping to get match sound," Ahlberg said. "The 416 is a very directional mic, present and not boomy. We've got to watch it with younger, less-experienced talent who'll go off mic and off axis."

Legendary announcer Ernie Anderson originally used the 416 for openings on the Carol Burnett Show, and then used the microphone for promos at ABC. "Ernie would really dig into that mic, right in the center of the newsroom, as it's so directional," mixer Tony Mederos said. "The staff would quiet down for a moment and Ernie would nail it with a very clean, present promo ("The Lovvve Boat ... tonight on ABC!")."

D\*G also uses the large-diaphragm TLM 103, especially for women, who often, mercifully, lack the low-end rumble of smoky-voiced male announcers.

Can radio stations somehow be persuaded to abandon their E-V RE20s and Shure SM7s in favor of the hot condenser mic *du jour*?

"Maybe they cannot — and should not," Mederos said. "If you have a noisy environment, the RE20 is great because it has very low gain, although you've got to crank it up to get the signal. Talent often leans into the mic, making the experience very personal for them vs. a large diaphragm mic that'll pick up shuffling papers and your PA running in with the next spot."

Should you invest in a shelf full of new mics? You may not have to. Ahlberg called up Antares' Microphone Modeler software plug-in for Pro Tools and ran down the list of more than 100 mic emulation choices, from an AEA R44C to a Telefunken U47.

"Check this out," Ahlberg said as he ramped up the "voltage" on an emulated tube mic's filament via the software, running it hot to increase crispness. "You want a hot mic, so hot that you melt the glass and cook the sucker? This is it. You can't beat the price."

Christopher Springmann is producer and co-host of "Health Rhythms." Find him at [healthradio.org](http://healthradio.org).

## Product Showcase



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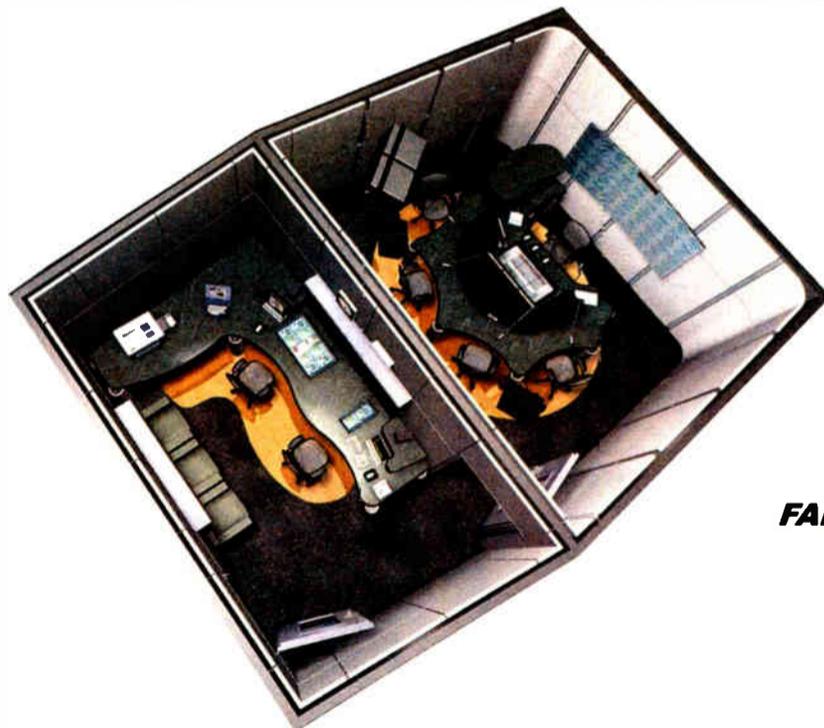
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# Sound Insulation, Sound Investment

by Blažo Guzina

Sound insulation in studio premises has a two-fold role: preventing noise interference from external or internal sources and ensuring, together with acoustic treatment of surfaces, that the studio sounds right to those who use it.

acoustic designers to inform studio owners about the technical and economical aspects of studio sound insulation and about possible cost savings when and where appropriate.

I have encountered situations in which a client has started planning the studio layout on his own and, for

## Particular attention is needed to protect speech studios against high-level sound coming from adjacent control rooms.

The sound heard live in a studio or at microphone output before broadcast or processing is a combination of direct sound from the source and a plethora of reflections from the surfaces of the studio and its furnishings and fittings.

Once in a studio or a control room, noise also is reflected and enters the soundfield, influencing both radio listeners and people working in the studio.

### Simple change

Although the role of sound insulation is well known, the acoustic design of studio premises often becomes a matter of compromise due to the high investment costs.

It is, therefore, highly advisable for

instance, places a studio in a room with large windows facing a noisy street with the control room facing a quiet backyard.

It is not uncommon for people to convince themselves that lower-quality absorptive acoustic treatment for walls and ceiling surfaces, such as acoustic cladding, also has magical soundproofing and problem solving effect. What might be sufficient for offices with typewriters is not appropriate for studios.

Fortunately, people usually accept the advice that a simple change in studio premises layout can sometimes prevent unnecessary costs for sound insulation from the start.

Studio and sound control rooms See INSULATION, page 45 ▶

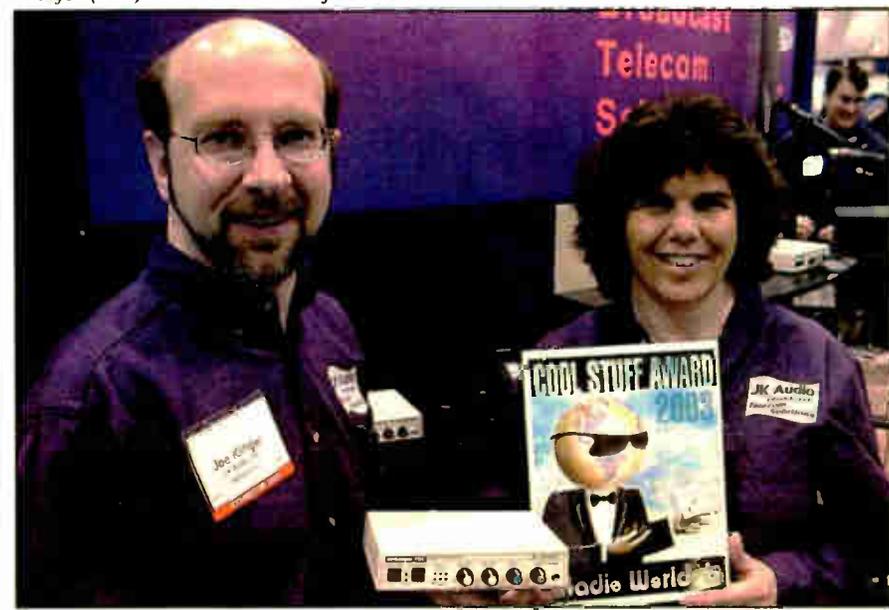
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Info: (800) 552-8346 or [www.jkaudio.com](http://www.jkaudio.com)



# Insulation

► Continued from page 44

should meet certain requirements to prevent unwanted sound (noise) from being audible on the program output and to help engineers subjectively control the sound quality.

Particular attention is needed to protect speech studios against high-level sound coming from adjacent control rooms.

The amount of sound insulation necessary to avoid interference between areas, and hence the acceptable level to which the unwanted sound must be attenuated in the protected room, depends on the existing ambient noise level, taking into account the psychoacoustic properties of the so-called "masking effect."

Ambient noise levels are different in a studio and in a control room and so are the permissible noise levels.

These levels usually are described by single-figure descriptors, such as dB(A), noise rating (NR) or noise criteria (NC) levels. For design purposes, it is essential to observe the entire spectrum of noise in the form of NR or NC curves.

While architects only have to consider a range from 100 Hz to 3.15 kHz, radio studio acoustics designers typically should consider a broader range, sometimes even from 63 Hz to 8 kHz.

The curves relate octave-band sound pressure levels to the center frequencies of the bands. Each curve has a numerical value corresponding to the octave-band level at 1 kHz. In the case of one-third octave sound levels, the entire curve will be shifted 5 dB downward.

Criteria are somewhat different, and so are the recommendations issued by national broadcast authorities or international organizations.

## Stringent criteria

Permissible noise levels for radio studios usually lie in the region of NR15 to NR25, depending on the requirements of different types of program. Bearing in mind that digital audio equipment has a potential signal-to-noise ratio of 90 dB, expected overall signal-to-noise ratio at the signal output is 75 dB (90 minus 15) or 65 dB (90 minus 25) for studios with NR15 or NR25 respectively, at 1 kHz.

Both values exceed the limits of AM and FM transmitters, but for digital radio broadcasting — be it Ibiquity, Eureka-147 or Digital Radio Mondiale — stringent criteria are inevitable, at least NR15 or, better still, NR10.

Permissible noise levels for radio control rooms are, in general, 5 dB to 10 dB higher than for adjoining studios, due to higher ambient noise levels produced by equipment, and also depend on the requirements of different types of program.

Acoustics designers have the task of adopting the permissible noise level criterion for each particular case, which has to be acceptable to the studio owner too.

The acoustician often has to also take into consideration the noise level in an average living room or a car where a program is heard. Good sense is needed to reach the opposite end of the permissible tolerances.

Knowing that noise levels in apartments may range from 30 dB(A) to 50 dB(A), and much more in cars, one could wrongly conclude that stringent criteria for external noise insulation of studios are unjustified.

Another argument that might be taken into account when cost savings are considered is the result of subjective psychoacoustic tests. These show that many balance and recording engineers at radio stations have preserved their operational capability even when the background noise level was increased 10 dB to 15 dB over recommended levels.

## Reduce sound level

This means of cost reduction is, however, advised only for control rooms in which less complex operations go on.

On the other hand, it would be possible effectively to reduce the cost of insulating a studio against high-level sounds from an adjacent control room by reducing the sound level of monitoring loudspeakers in the control room.

This method is unlikely to be feasible

when the owner consults balance and recording engineers who are accustomed to working with high monitoring levels, of 85 dB and even 90 dB.

Attempting to convince engineers to work with relatively lower monitoring levels, by stating the facts of rapid deterioration in hearing acuity due to high sound levels, often is worthless. It is particularly difficult with older engineers, whose hearing has decreased with age and who have to work with high sound levels.

That is why this method is rarely used in the design of new studio premises, although it may be applied, up to a certain degree, in stations where insufficient attention is paid to the insulation of the studio against the high level of sound from an adjoining control room.

Furthermore, this method is only

applicable when a control room is situated in a relatively quiet area, without disturbing noise coming from the adjacent space.

In other words, in order to enable balance engineers to work with lower monitoring levels, it is necessary to insulate the control room from external noise by avoiding vicinity to noisy areas or by providing complex — and often expensive — sound insulation solutions.

In such cases, the question is what is more useful and less expensive.

*Blažo Gužina is a senior engineer at Radio Televizija Srbije in Belgrade, Serbia. He is also a professor in the Sound Recording Department of the Arts Academy at Univerzitet Braća Karić. Contact him via e-mail at blazo\_guzina@yahoo.com; or visit <http://www.bg.dk3.com/>.*

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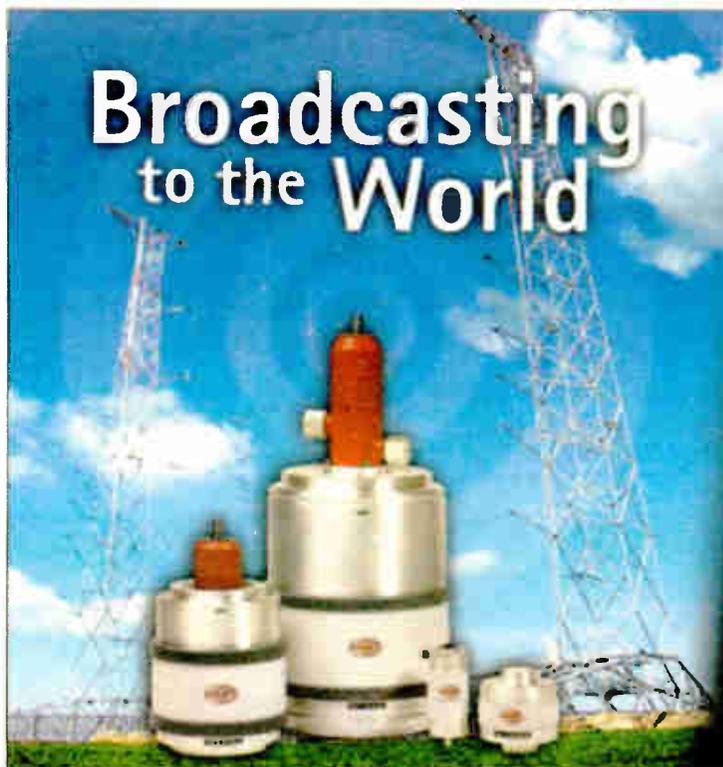
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PRODUCT EVALUATION

# CD Architect Is Back, Improved

by Read G. Burgan

When Sonic Foundry introduced CD Architect in the late 1990s it quickly became the software of choice for burning audio CD-Rs. It was easy to use and powerful.

In 2000, Sonic Foundry quietly announced that it would no longer support CD Architect. While those of us who had come to rely on it could continue to use it, the program would not support new CD burners.

For the better part of two years, Sonic Foundry tried to put a good face on its decision by suggesting that users could get the same features in the company's Vegas software. As good as Vegas is, it is not CD Architect, and many of us held on to our old copies of CD Architect and the host application Sound Forge 4.5 while using Vegas to import the CD Architect files so we could burn them on newer CD burners.

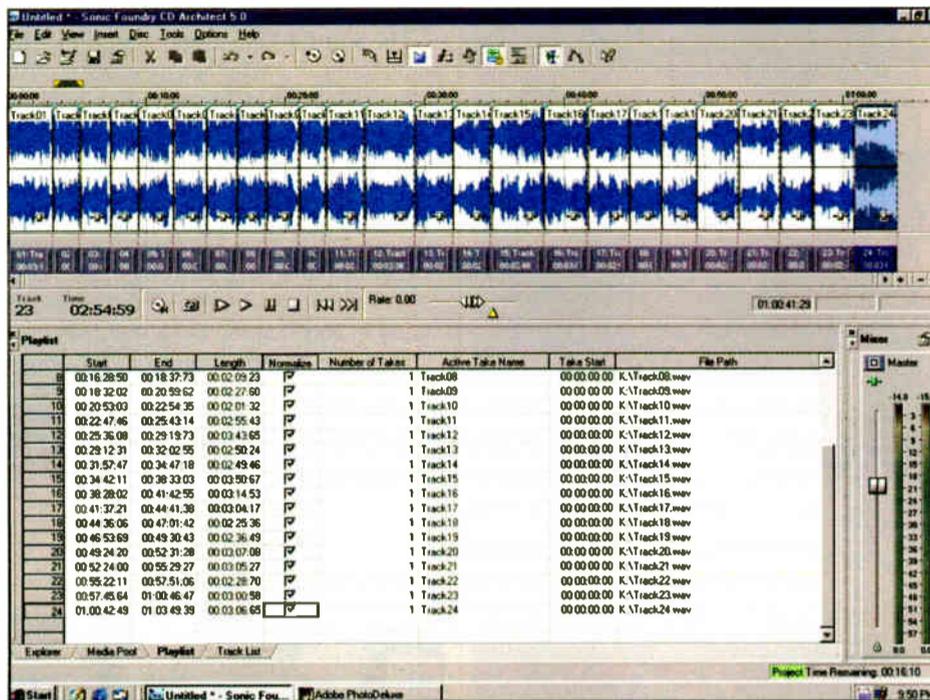
It was all fairly clumsy and anything but satisfying. Many of us felt betrayed by Sonic Foundry, whose product we had embraced into our work lives.

**Welcome return**

All that changed a few months ago with the introduction of CD Architect 5.0.

Aside from the support of current CD drives, what has changed? That is like asking what the difference is between a Model T Ford and a 2003 Lincoln Continental.

First, unlike the previous versions, CDA 5.0 is a standalone application. While the general screen appearance is



similar to the earlier versions, all kinds of features have been added.

I do not have room to highlight all of them, so let me mention my favorites and those that have particular applications for broadcasting.

Like its predecessor, CDA 5.0 has the tools necessary for importing WAV files from your favorite audio editor or audio CDs. And you can import cdp files made by previous versions. CDA 5.0 provides several ways to produce the requisite tracks, including the ability to change or eliminate the gaps between tracks.

If you burn commercials or news actu-

alities to CDs, you are going to love the time-stretch feature. Simply hold down your keyboard control button and use the mouse to drag the end of an event to stretch or compress its timing while leaving the original pitch intact. Nothing could be easier to use and it works great.

CDA 5.0 has added a trimmer window that allows you to do editing on individual events before you place them in the CD track list. This lets you do the kind of editing that would have required opening a separate audio editor in the past. It is convenient and saves time.

You can also audition multiple takes in a single track position. Let's say you recorded three cuts of a particular commercial but are not sure which one you like best. You can stack them all in a single track position and then compare them until you decide which one you like.

One of my favorite new features is the ability to normalize each of the events in the track list individually. Just check the normalize box for each event and the tracks are immediately normalized. Talk about a time saver.

**Event editor**

Perhaps the single most powerful feature of CDA 5.0 is the ability to apply virtually any DirectX plug-in effect either individually to any track or globally to all the tracks. Each event has its own event editor that allows you to chain as many DirectX compatible plug-ins as you want. You can add individual reverb, compression, noise reduction — whatever you want to each of the tracks. To any section of an event, you can split the event and apply effects to each section.

Then you can do the same to the entire CD by applying another set of DirectX plug-in effects to all of the tracks. This makes CDA 5.0 one of the most powerful CD burning programs that I know.

There is a price to pay for this kind of flexibility.

Once you begin to ask the software to perform a multitude of tasks, you are requiring the kind of processor overhead that cannot be applied in a "straight" burn. To compensate for this, CDA 5.0 has two features.

If you have set the software to perform number of complex processes, you almost certainly need to save the project

See CD ARCHITECT, page 48 ▶

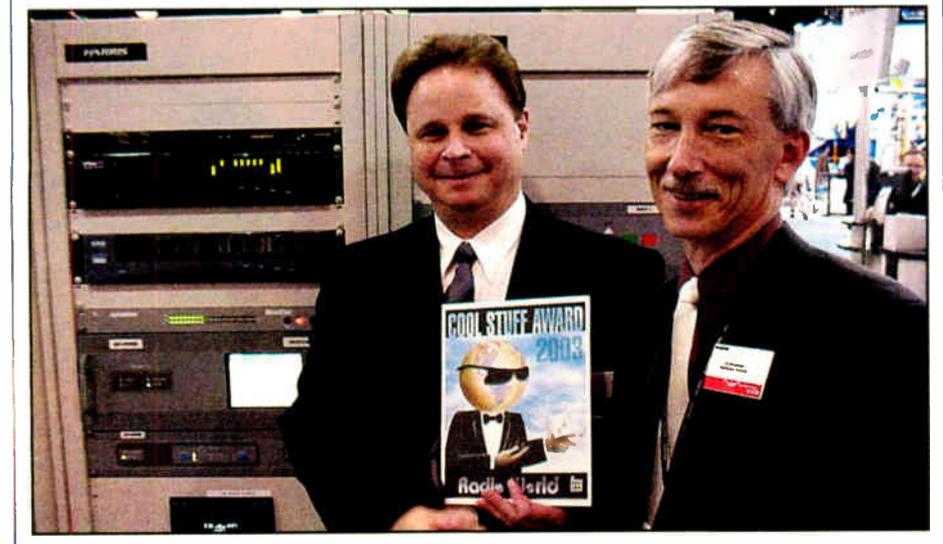
**Companies: NeuralAudio & Harris Corp.**  
**Product: NeuralAudio DSP Platform and Harris NeuStar Codec**

Neural Audio is a company that develops neural algorithms for DSP applications. Harris Corp. saw the possibilities and introduced NeuStar, a codec pre-conditioner, at NAB.

"Transparent digital audio is typically encoded at a bit rate of 256 kilobits per second, while transmission of digital audio is bandwidth-limited at 96 kbps for FM HD Radio broadcasters and 36 kbps for AM HD Radio broadcasters," Harris explained. "Broadcast signals enhanced via NeuStar deliver the highest quality, cleanest digital sound at low bit rates." The box works in the studio and transmission ends of the air chain and is compatible with HD Radio, DVD, DAB, DRM and Internet.

This approach promises to make digital AM comparable to analog FM and, notably, to enable digital 5.1 broadcast or quality dual-stream radio on digital FM, something that set our judges abuzz: "Station promos in 5.1? Awesome." ... "For certain uses, it will be a killer application." Robert Reams and Jim Hauptstueck shake on it.

Info: (513) 459-3400 or [www.neuralaudio.com](http://www.neuralaudio.com) or [www.broadcast.harris.com](http://www.broadcast.harris.com)



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## CD Architect

► Continued from page 47

as a CD Architect Image File. This is essentially a WAV file in which all of the operations that you have chosen are already performed.

If the number of processes to be performed on the WAV files is small to moderate, you can take the faster route of checking "Render To Temporary Image Before Burning." In either case, expect the time for burning the first CD to be longer than you would normally expect at the requisite burn speed. But that is a small price to pay for the ability to perform almost endless operations on your CD files.

### Steep learning curve

I have given only the highlights of CDA 5.0. There are many features. I recommend that you print out the manual's 100-plus pages and keep them by you as you work your way through the program.

Expect a fairly significant learning curve to master the features. If you have used previous versions of CDA, you should be able to perform your former tasks in a matter of minutes.

CD Architect 5.0 is a worthy successor to the earlier versions and should be a welcome software tool for anyone who needs to burn audio CDs. I have used it for several months and can't imagine my work life without it.

Minimum System Requirements: 400 MHz processor; Windows-compat-

**Product Capsule:**  
**CD Architect 5.0**  
**CD Burning Software**

**Thumbs Up**

- ✓ Back-compatible with previous versions
- ✓ Standalone application
- ✓ Time-Stretch feature lets you expand or compress time without altering pitch
- ✓ Trimmer Window permits editing of individual events
- ✓ The ability to automatically normalize individual tracks
- ✓ Multiple takes can be previewed in the same track position
- ✓ DirectX-Plug Ins can be applied to individual tracks and globally

**Thumbs Down**

- ✓ Processor overhead requirements for complex operations requires pre-rendering of file before burning
- ✓ Significant learning curve to master all of the new features

Price: Download: \$210; boxed version: \$240

For information from Sonic Foundry contact the company in Wisconsin at (800) 577-6642 or visit [www.sonicfoundry.com](http://www.sonicfoundry.com).

ible sound card; 128 MB RAM; Microsoft Windows 98SE, Me, 2000 or XP; Microsoft Direct X 8 or later; Internet Explorer 5.0 or later, included on CD-ROM.

Read Burgan is a free-lance writer and a former public radio station manager who can be reached at (906) 296-0652 or via e-mail to [rgb@chartermi.net](mailto:rgb@chartermi.net).

## LR Sound Product Line Acquisition

LR Sound recently announced the acquisition of the assets of Digital Audio Labs including brand names, trademarks and product lines. It will continue support for the existing customer base with enhanced driver software. Terms of the deal were not made public.

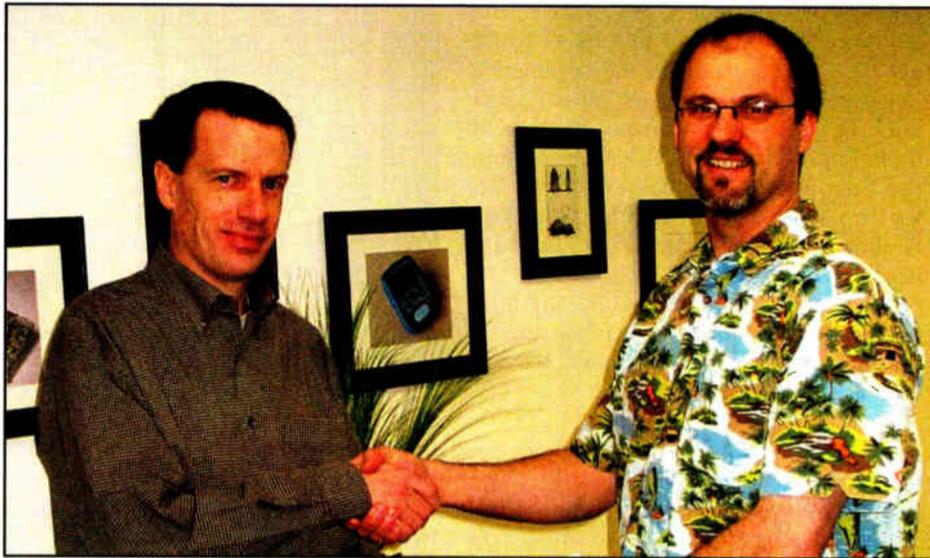
The CardDeluxe 24/96 stereo PCI interface is among the products included in the acquisition.

Ted Klein, president of LR Sound, will head the new Digital Audio Labs division. According to Klein, a priority is to update the support for existing products as well as expand the DAL line.

This acquisition brings Klein full circle; he was engineering manager of Digital Audio Labs from 1995 through 1998, and its president until 1999. He left Digital Audio Labs to start LR Sound, a hardware/software consulting group. The staff of LR Sound includes several former DAL engineers.

"As the original engineering team behind many of these products, we feel uniquely suited to carry on the DAL tradition of quality and value," Klein said.

For more information from LR Sound, contact the company in Minnesota at (952) 401-7700.



Al Pickard, Founder and Former President of Digital Audio Labs, and Ted Klein, Founder and President of LR Sound Inc.

## Audio & Media Degree Program Approved

Students now have another choice for careers in audio and media. The New England Institute of Art & Communications received approval from the Massachusetts Board of Higher Education to offer a Bachelor of Science degree in Audio and Media Technology.

The Institute already offers associate degree programs in audio production, but the new degree program will provide students with the opportunity to refine their skills, take additional business-oriented, math and science classes and spend more time on internships and in the studio obtaining hands-on training.

There are two concentrations offered as part of the bachelor's degree program: Audio Production and Audio and Video Technology.

Audio Production students will learn the necessary skills to obtain entry-level positions in sound recording for music and speech applications, in corporate audio/visual, digital post-production, digital editing and for Internet and multimedia applications.

For those students seeking repair and maintenance careers, the Audio and Video Technology concentration provides the skills needed for an entry-level position in this field.

For more information contact The New England Institute of Art & Communications in Massachusetts at (617) 739-1700 or visit [www.aine.artinstitutes.edu](http://www.aine.artinstitutes.edu).

### PRODUCT GUIDE

## Cedar Converter Complements Hardware Modules

The Cedar ADA is a stereo A/D-D/A converter.

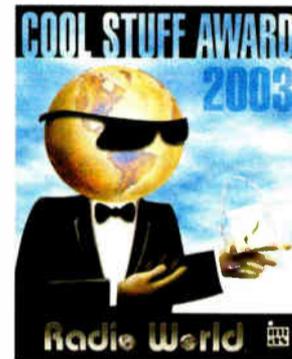
A rackmount (1RU) stereo, 24-bit, 96-kHz device, it produces AES/EBU or S/PDIF digital audio output from a balanced or unbalanced analog stereo audio input, and a stereo balanced or unbalanced output from an incoming AES/UBU or S/PDIF digital input signal.

The ADA is designed for use with the company's Series X, Series X+ and DNS1000 audio restoration hardware modules, as well as the newer Cedar Cambridge system. The ADA provides four sync modes, professional and consumer formats, emphasis on/off, user-selectable input levels up to 27 dBu and a maximum output level of +24 dBu.

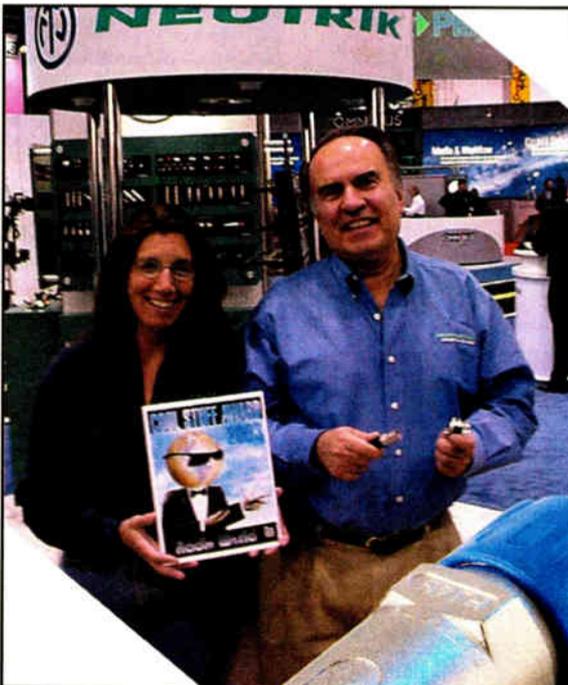
For more information contact Cedar Audio in Maine at (207) 773-2424 or visit [www.cedarusa.com](http://www.cedarusa.com).

**Company: Neutrik**  
**Product: EtherCon Series**

This series of ruggedized RJ45 connectors caught the judges' eyes thanks to its expanding options and newly realized functionality for radio. The EtherCon Series offers male cable carriers and assembled female receptacles. The cable end has a diecast shell as a carrier for pre-assembled RJ45 plugs. Female chassis connectors are based on the Neutrik A & B Series as well the D Series of XLR receptacles with secure latching, a cool feature for an RJ45 receptacle. Terminations are horizontal and vertical PCB or IDC, punch down. Color coding is available. They comply with Cat-5 (IDC versions) shielded or unshielded and are compatible for 10 Base-T and 100 Base-TX systems.



Judges: "RJ-45 Ethernet is married to the venerable XLR. Wired happiness using familiar connections." "No more LAN cables being ripped out in the studios by clumsy feet. And the jacks accept standard RJ-45 cables, so a guest can bring their own. Doesn't get much better than that." Kathi Evans and Fred Besnoff show off.  
Info: (732) 901-9488 or [www.neutrik.com](http://www.neutrik.com)



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www.acousticsfirst.com

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#### Want to Sell

Ramko Research DA-6RS/E distribution amp, 1 in - 6 out stereo, \$50. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

### ANTENNAS/ TOWERS/CABLES

#### Want to Sell

**Superior Broadcast Products FM Antennas**  
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Contact **Jimmie Joynt**  
Phone 800/279-3326

Cablewave CP-1000-2 FM transmit antenna with radomes, 2000 watt maximum power input capacity, tuned to 92.3 MHz, brand new, still in factory sealed cartons, \$1600/BO. Ray Knudson, KNXR, 1229 Park Ave, La Crosse WI 54601. 608-782-2254.

340' Rohn CC tower. Includes beacon, guy wire, lighting & other hardware, 24" face, disassembled & ready to ship. Any reasonable offer. 731-772-3700.

Central guyed tower, 44' guyed tower located in Central Iowa, 10 yrs old, excellent condition, available June 2003, \$20,000/BO. Pat Delaney, KKRF, Stuart IA 50250. 608-792-9524.

### S.W.R FM & Television Antennas

Contact **Jimmie Joynt**  
Phone 800/279-3326

Central guyed tower, 440' located in central Iowa, 10 yrs old, excellent condition, available June 2003, \$20,000 or BO. Pat Delaney, KKRF, Stuart IA 50250. 608-792-9524.

ERI 3 bay FM antenna tuned to 102.1 FM, 5 yrs old, great condition, available after 5/03, \$4000. Rod Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 530-257-2121; 1-800-366-9162.

### AUDIO PRODUCTION

#### Want to Sell

dbx 155 tape noise reduction system, \$50. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

### CD PLAYERS

#### Want to Sell

Pioneer PD-M502, six pack CD player, new in box, never used, \$100. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

Denon 950FA (2); Denon 951FA (2); Denon 961FA (2). Don Noordyk, WSHN, 517 Beebe St., Fremont MI 49412. 231-924-4700.

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Transaudio speakers model 10128 (2 ea), \$100/pr; Advent AV-009 computer speakers, never used, \$25. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.



### Want to Buy

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 972-271-7625.

### MICROPHONES

#### Want to Buy

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Motorola Radius P100 radio, with holster & rapid charger, \$150; 1964 Rock-O-La stereo juke box, good condition w/manuals, \$1500. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

New Pioneer Six Packs, JD-M300TP, \$25. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

### Want to Buy

Mod monitor for L-P FM transmitter, large meters, McMartin or others, \$100-\$200. Ed Timmons, Skyward Productions, 5953 Rte 31, Cicero NY 13039. 315-699-9024.

### RECEIVERS/ TRANSCIVERS

#### Want to Sell

GE MVP, 25 watt 1 channel radio with three sets of elements 147.210, 147.135, 147.270, new mic, \$25. Peter Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Wegener 1806 audio subcarrier receivers (2), one for mono, one channel 15 kHz, panda reception, \$125; the other receiver for stereo, two channel panda reception, \$150. Greg Fitzgerald, Deutsche Welle Radio, 22 Hawthorne Rd, Wayland MA 01778. 508-654-1644.

### RECORDERS

#### Want to Sell

Mackie mixer; System 360; Tascam 302, double cassette recorder and playback. Brand new, all for \$4500. Call 757-220-4256.

Akai DR-4d digital hard disk recorder, \$500. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

Otari MX-5050, 4 track r-r tape deck with remote control, \$1500. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

**Superior Broadcast Products**  
FM STL Transmitter & Receivers 3,500 for both  
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Phone 800/279-3326

Burk IP-8 Interface panel, \$100; Burk LX-4 audio switch, never used, \$250. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

Comrex Vector portable POTS codec mixer with large road case, \$3295. Steve, 877-722-1031.

Moseley MRC-1600 remote control, both studio & xmtr unit complete, \$1000. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

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Telos stereo Zephyrs 9200 (2), like new, used less than 10 times, \$3250 ea. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

BE Dolby digital STL, new power/synthesizer board, \$6500. Don Noordyk, WSHN, 517 Beebe St., Fremont MI 49412. 231-924-4700.

### SATELLITE EQUIPMENT

#### Want to Sell

Comstream ABR-200 digital satellite receivers, 8 available, \$695. Steve, 877-722-1031.

### STATIONS

#### Want to Sell

Radio station KYFO-AM in Ogden, UT. This is a 1k omni-directional station at 1490AM. Property is included. Asking \$600,000. For more information and pictures please email: Mraley@bbnradio.org or call 704-523-5555.

### Want to Buy

Looking for AM's, FM's, non-commercials, translators, or CP's in western US. Please email: Dougs@ihradio.org.

### TEST EQUIPMENT

#### Want to Sell

Delta OIB-2 operating impedance bridge, \$1250. Steve, 877-722-1031.

### Want to Buy

A Harris FM-3-H, 3KW FM. Continental Communications. 314-664-4497, email: contconfm@sbcglobal.net.

### FM Antennas

Dielectric 5 bay w/radomes on 88.1 MHz  
Jampro 3 bay w/radomes on 99.5 MHz

Phelps-Dodge 3 bay on 92.1 MHz  
Dielectric 1 bay w/radomes on 90.9 MHz

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#### FM's

Harris FM-1 1 KW 90.9 MHz, 15 yrs old  
Phase-Tek 5 KW 90.5 MHz, 15+ yrs old  
CCA 2.5G 2.5 KW 91.3 MHz, 10 yrs old  
CSI 5 KW 3 phase 88.1 MHz, 20+ yrs old  
CCA FM3000 3 KW 92.1 MHz, 15+ yrs old

#### AM's

Harris MW10B 1985 10 KW 1040 kHz  
Harris MW10B 1986 10 KW 1170 kHz  
Collins 20V 1 KW 980 kHz, 20+ yrs old

Note: These transmitters and antennas were used at Positive Radio Group and were removed for upgrading and/or power increases.

Contact: Vernon Baker, CEO, Positive Radio Group, 540-961-2377.  
Fax 540-951-5282, email: vbaker@mail.vtacs.com

Rohn #25 galvanized tower, 50' w/base. 5 - 10 foot sections with base, \$350. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

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Rohn #55 galvanized tower, 30', 3 - 10 foot sections, \$300. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

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#### Want to Sell

BE Duratrak 90 cart PB (2) & BE 2100C Series PB cart machines. Robert Mahaffey, Mahaffey Ent., POB 4584, Springfield MO 65808. 800-725-9180.

### LIMITERS/ AUDIO PROCESSING

#### Want to Sell

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CRL PMC-450 Tri-Band peak modulation controller with NRSC for AM, \$525. Steve, 877-722-1031.

Optimod 8100A audio processor, great working condition, \$2200. Rod Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 530-257-2121; 1-800-366-9162.

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Trace SW-4048 inverter (48 volt DC), factory rebuilt, never used, \$2500. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

Tascam 122 Mark II (3), low hours, \$150 each. Peter Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Gentner TS612-12 studio phone system, 12 lines, two independent TS612 control surfaces, split studio w/dedicated hybrid for each, used 2 months, BO. Don Noordyk, WSHN, 517 Beebe St., Fremont MI 49412. 231-924-4700.

Tascam 32 r-r, new pinch roller, low hours, good heads, \$150. Peter Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Panasonic SV3800 DAT recorders (2). Don Noordyk, WSHN, 517 Beebe St., Fremont MI 49412. 231-924-4700.

### MONITORS

#### Want to Sell

Used Mod Monitors, McMartin & Belar. Many to choose from, tuned & calibrated on your frequency, full guaranteed. Goodrich Ent. 402-493-1886.

JBL 4435 studio monitors, walnut cabinets on wheels, 1 pair, \$1200/pr. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

Optique Q41, 14" color monitor, never used, in box, \$100; EMC 14" super VGA color monitor, slightly used, \$75. Don Leutz, Clear Mtn Air Bdcg, POB 708, Twain Harte CA 95383. 209-586-5627 or email: sdl@goldrush.com.

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Harris MW-10-B, 10KW AM. Continental Communications. 314-664-4497, email: contcomm@sbcglobal.net

McMartin BA-1K, 1KW AM. Continental Communications. 314-664-4497, email: contcomm@sbcglobal.net

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TEPCO J-340M, 10 to 40 watt FM translator with local modulator included. Excellent condition, maintained by manufacturer technicians, \$2250/BO. Ray Knudson, KNXR, 1229 Park Ave, La Crosse WI 54601. 608-782-2254.

Energy-Onix MK3.5 FM transmitter. Included are almost brand-new low pass filter, one tube which was on the air, one rebuilt spare, 300-watt IPA as well as logic-based controller, was on the air at 101.3 MHz but currently may require minor repairs, digital photos available, \$2350. Call 314-374-6588 or email: wvil@aol.com.

Moseley TRL-1 transmitter, 450 MHz, one watt telemetry return link, with manual. Excellent condition, working, tested, guaranteed, you can use a scanner as the receiver, \$700/BO. Jon Banks, KAJX, 110 East Hallam, Aspen CO 81611. 970-928-9626.

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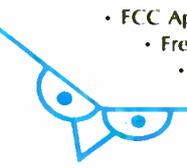
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## ◆ READER'S FORUM ◆

### GUEST COMMENTARY

# FM Transmitters: Cost Vs. 'Specs'

by Jim Trapani

*The author is president of JT Communications.*

FM transmitters have been in existence for decades. Technological advancements always assure that the product meets all current standards. Although the FCC has maintained the same specifications for FM transmitters over the years, manufacturers continue to make improvements in specifications. Due to the nature of FM transmission, there are inherent trade-offs for what can be considered "practical" vs. "affordable" in the design of the "ultimate" specifications.

For example, a typical de-emphasized signal-to-noise ratio beyond a practical specification becomes meaningless, due to the already limited anomalies that exist between the transmission and reception conditions. To achieve these additional specifications requires that additional engineering be incorporated into the design of a transmitter. This, of course, increases the cost of the product, which in turn gets eventually passed on to the customer.

Therefore, the customer winds up paying additional fees for extraordinary specifications that are only measurable by laboratory standards only under those conditions. Even near-perfect transmission conditions don't come close to the laboratory standard measurements that some manufacturers claim with their specifications. Given the nature of the transmission medium, these shortcomings will always remain. You reach a point of diminishing returns.

With the onset of LPFM, many customers are duped into believing that "better" is better. They are led to believe that they *must* have that exciter with 96 dB signal to noise, because it will be "cleaner," when in fact, a transmitter with 75 db signal to noise will yield the same performance.

For example, a typical consumer-grade digital receiver with an input signal at full limiting (plus 10 dB of input signal) has approximately 68-73 dB of peak signal (+/- 75 kHz deviation) to the de-emphasized noise floor) to noise measurement.

Some of the limitations are 1) the bandwidth of the IF filters (which are typically 280 kHz); 2) The local oscillator noise (FM receiver PLL synthesizers are not the most quiet oscillators on the block); 3) the bandwidth of the stereo decoder. Turning on the stereo pilot automatically reduces the noise floor by 23 dB, due to the increased bandwidth.

Given these conditions, a typical stereo signal-to-noise ratio of a consumer-grade stereo receiver would be reduced into the 50s. This would be near-perfect condition (well within the broadcast station's "primary" signal contour. Therefore, is it really worth the extra hundreds (sometimes thousands) of dollars to pay for meaningless specs?

This is just one measurement that comes into question. Another measurement is distortion, which can be covered at another time.

Unfortunately, some of the specs that *should* be listed that are important to the transmission path are:

1) Square-wave response. If a transmitter cannot properly pass a square wave, the transient response of the modulated signal will degrade. This will cause low frequencies to overshoot beyond the audio "envelope," reducing your allowable peak modulation. The net result will be lower modulation than competitors.

**Is it really worth the extra hundreds, sometimes thousands of dollars to pay for meaningless specs?**

2) Instantaneous frequency drift. If the transmitter cannot handle sudden shifts in frequency with large low-frequency transitions, it will cause the frequency to shift non-linearly. Positive and negative peaks will become asymmetrical.

3) Maximum modulation linearity. Although the FCC regulates deviation to +/- 75 kHz, the transmitter should be capable of at least twice the regulated amount, or +/- 150 kHz. This reduces intermodulation and harmonic distortion figures.

There are other factors that should be considered; however, they are not as important as the ones indicated.

With newer, digital (and expensive) exciters currently available, most of these factors have been all but eliminated, once again, at a cost. 🌐

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## GUEST COMMENTARY

# Going Digital? Consider Ethernet

by Steve Church

The author is president of Telos Systems.

We've seen a lot of change in broadcast studios these past years. Reel-to-reels have been pushed aside in favor of computer editors. PC delivery systems have replaced CD players and cart machines, which had only a few years earlier replaced turntables. And just now, we are smack in the center of a change to digital for mixing, routing, and processing — a trend certain to accelerate with the arrival of IBOC.

All of this finds us lashing up a mish-mash of analog and digital with XLR, RCA, DB-9, DB-15, 1/4-inch phone, mini phone and RJ-45 connectors. AES-3, MAD1, proprietary fiber and copper and network audio file transfer add yet more complication.

We surely need a better way to move audio around studio facilities. With analog soon to be obsolete, we need something digital. AES-3 is the common choice, but this is not a way into the future. It's a 15-year-old scheme that reflects the limitations of its day: one stereo channel, one direction and only a trickle for associated data.

### Audio's future

In contrast, Ethernet is a potentially powerful new medium for studio audio. While Ethernet was not designed with studio interconnection in mind, its capability has recently been improved to make it very attractive for both live audio and data.

The technology side of radio broadcasting is small beans compared to computing and telephony, so we usually borrow and adapt our technologies from those industries. The telephone world looks to be going to Ethernet. Voice over IP is gaining on traditional PBXs, with VoIP gear now taking around 10 percent of new installations.

So let's consider: what would Ethernet do for us as a studio infrastructure?

- Ethernet would be low-cost. Because it leverages R&D and manufacturing scale from the high-volume computer world, cables, plugs, tools, testers and PC network interface cards are standard and off-the-shelf. With its huge installed base, cost will continue to fall and capability to increase.
- A single Ethernet network could be used for audio, data and telephone.
- A system could scale from very small (two terminals connected to each other) to thousands of channels for the most sophisticated facility.
- A wide variety of wiring infrastructure components could assist installation.
- An Ethernet switch inherently could provide audio routing at no cost additional to the basic infrastructure.
- We would be ready for a radio future that includes synchronized visual and text elements, such as for IBOC.

Today's Ethernet is not your grandfather's Ethernet. Its near universal acceptance means a huge market for innovation. The result has been extensive R&D, and a dramatic increase in performance. Speed has increased from 10 to 100 to 1000 Mbps. The original bussed coaxial cable has given way to star-configured copper and fiber.

But it was the introduction of switching and full-duplex technology in 1998 that has opened the door widest to live media applications. Just as PCs have grown to be perfectly acceptable audio editing and delivery devices, so has Ethernet's performance grown to be able to support professional audio transmission.

be received at any number of locations. Audio terminals advertise their streams to the network so that receivers can build a list of available sources. This includes a numeric ID, characteristics and a text name. Receivers can display these lists to users for selection. Terminals can be placed near where the audio is needed and may be distributed throughout the facility according to convenience.

A unit located within a studio can collect audio from microphones and deliver audio to monitors, while another in the central equipment area can enter network feeds, codecs, telco remotes, etc. into the network. Because of the inherent audio routing function provided by the Ethernet



Could this be the way you'll be checking audio wiring?

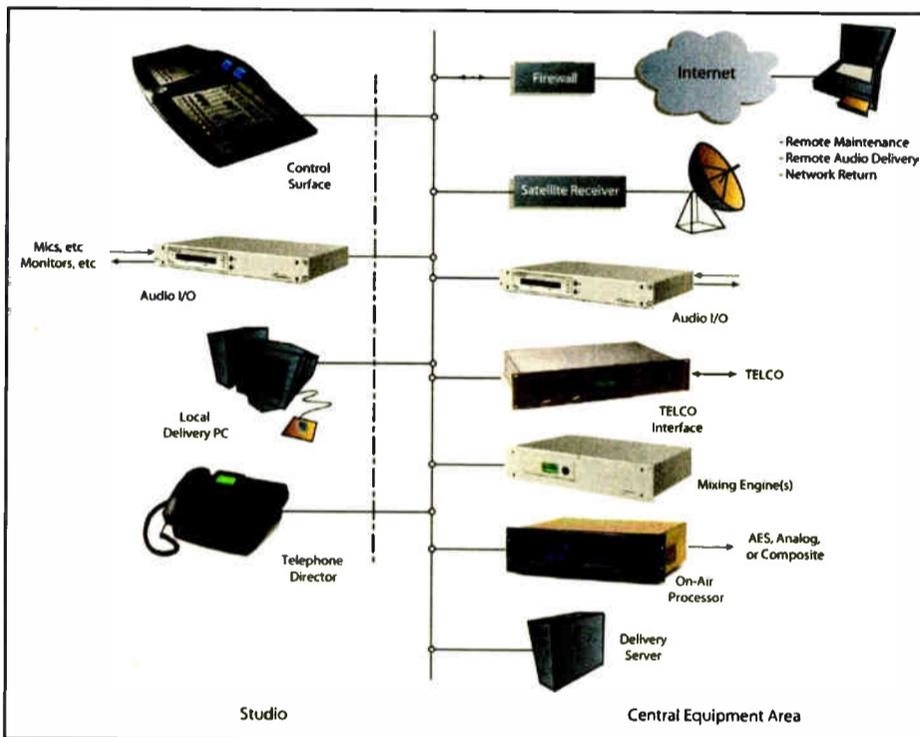
mathematician. So, which do we have here? Yes, Ethernet will function as a satisfactory audio transport medium, but should it?

Imagine if you were coming fresh to radio broadcasting from the computer world. Wouldn't RJ-45s suggest themselves immediately? Indeed, are there not vendors selling devices to wire-up analog with RJs already? Well, then, what keeps us from moving on? Make the audio digital, make it bi-directional, allow a bunch of channels on one plug and cable and combine with all the necessary control functions? And while we are at it, why not label each audio channel with a numeric and text ID? And have a way to simplify things so that audio, computer data, and phones share the same infrastructure? Be ready for program-associated data? And let's do all of this cheap by riding on computer industry R&D and volume, and get all the routing we need for nearly free. Doesn't this make a lot of sense?

True, you can't hang a pair of cans on an Ethernet Cat-5 to check for audio. But, with Ethernet everywhere, there are a lot of tools from the computer world that can be used to run down problems. There are cable and plug testers, packet sniffers and more. Switches, terminals, engines and surfaces will all have diagnostics accessible over the network.

Nearly two decades ago, I wrote in the introduction to the Telos 10 manual that DSP applied to broadcast telephony would slam-dunk solve hybrid leakage, a problem that had been around from the beginning of phones and broadcast studios. I predicted that the reaction would be forthcoming in the following order, as with almost all innovation: 1) It would be attacked as "ridiculous" and "impossible" — no chance it will work as the inventor claims. 2) Begrudging acceptance that the technology works, but with the arguments shifting to, "There is no need for change, the new approach is too risky, etc." 3) Imitation. This is almost certain to happen with the suggestion that data network technology be applied to studio audio. If not exactly Livewire, there will surely be a similar network in our future.

Ethernet has the potential to make broadcast engineering a little easier, while delivering all the flexibility we need to take us into the future. It seems somehow fitting that that a network technology with the name *Ethernet* finally gets applied to radio broadcasting.



A studio facility linked with Ethernet. All audio, control, phones and data connect over a shared network.

Taking advantage of these developments, Telos has developed a studio audio transport system called *Livewire*. Each Livewire link transports as many as 50 48 kHz/24-bit uncompressed audio channels (25 stereo) in both directions. 1000BASE-T or gigabit fiber can support over 250 stereo channels.

The main challenges to making a packet network like Ethernet work successfully for audio are achieving low delay and solid reliability. Talent must be able to listen to themselves in headphones, so delay must be kept below 10-15 ms.

Livewire uses a distributed clock and small packet length to minimize buffers and keep delay low — less than 1 ms per link, allowing a number of them to be cascaded. Then, we use two simple tools to ensure reliable, drop-free audio. First, we always calculate link capacity and never allow overfilling. Since, with Ethernet switching, each terminal owns its entire link, we know to the bit how much capacity is available. Second, we tag audio packets with high priority so that even when audio and data share a single link, audio flows smoothly.

Livewire uses Multicast (one-to-many) transmissions so that an audio source can

switch, any audio source from whatever location may be received everywhere.

A driver software component is used to get audio to and from Windows PCs. It makes the network look like a sound card, so any audio application such as a delivery system or an editor can be directly connected. No sound card is needed.

With a computer network at the heart of the studio, we can take the next step: use a PC as an audio mixing and processing engine.

PCs offer a lot of power at low cost due to being manufactured in very high-volume. If software is carefully designed, a single PC has plenty of DSP power to do everything a typical radio studio needs.

Telos has developed such an engine based on an off-the-shelf Pentium 4 motherboard and a reduced and real-time modified version of the Linux OS. It is able to support a full-featured 20-channel broadcast on-air control surface, including per-channel EQ, mix-minus sends, talkback, etc. with less than 1 ms throughput delay. Control surfaces connect via Ethernet, of course.

A horse that can count to 10 is a remarkable horse — but not a remarkable

## ◆ READER'S FORUM ◆

## Give me a buss

Sorry, Paul, but neither Bartlett nor you can spell ("Setting Up Remotes With Mix-Minus," March 26).

"Buss" means "kiss" — see your dictionary.

*Fax From a Reader*

*Ed: It's always nice to start our week with an anonymous fax that says we can't spell.*

*Nevertheless, you are correct; while "busses" is an acceptable plural in this instance, according to the American Heritage Dictionary, "bus" is the only proper singular.*

*We'll peel some potato(e)s as our penance.*

## Pay for play?

Having been in the radio business since the late '50s, I remember very well when the FCC was telling stations their license was in jeopardy if their staff took payola. We all had to sign documents swearing that we would not accept pay-for-play and it was made clear that any person taking payola would be unemployable.

large part of the record's income. It was made plain that he was not talking about the normal expense of promotion as he talked about the pay-offs being made to individuals at the stations.

The FBI put this particular individual in prison for, among other things, income tax evasion. Since they audited his financial dealings anyway, why was the payola business ignored? They wouldn't have even had to dig out the information — they already had it.

This morning I had a long-time, out-of-town, friend drop by. He just happens to own an independent label. I knew they had recently had a fairly good hit with one of their albums and he told me that he actually got very little out of it because, in order to keep it on the air and keep sales up, he had to take a lot of the money the record took in and keep making car payments etc. for the people at the stations.

His estimate was that he needed about \$100,000 more in payola money to get the exposure necessary to really have a hit. He said he reached the point where he had given all the money he had as payola and the record then disappeared from the play lists.

When all was said and done, the only

## His estimate was that he needed about \$100,000 more in payola money to get the exposure necessary to really have a hit.

— George Whitaker

Today payola is very much the modus operandi again. Where is the FCC now? They are too busy fining stations for not having proper signs at their transmitter site to notice that pay-for-play has, again, become an accepted practice.

Clear Channel has recently taken some steps to attempt to curtail the practice at their stations. I hope their idea works. However, I feel that a few more examples like Alan Freed may be the only thing that will stop the practice.

Recently I was watching an interview on A&E in which the former head of a record company in Philadelphia talked about the expense of payola taking a

people who really made any money on the record were the music directors and disc jockeys.

I am now retired from radio and proud of my time in the business. I always had a sense of pride that we watched our language and were cognizant of the dangers of pay-for-play. Staying a cut above the crowd in demeanor brought a certain pride. However, between the shock jocks, blue radio in general, and pay-for-play, I would be ashamed to admit being involved today.

*George Whitaker*

*Practical Radio Communications  
Arlington, Texas*

## Take License Renewal Seriously

The all-important FCC license renewal process is resuming. As in past cycles, applications will be due according to state-by-state groupings. The first group files in June.

Consider this an important wake-up call, as Barry Umansky detailed in his *Broadcast Law Review* column in a recent issue of Radio World.

If you work at a station, among your most important jobs is to help protect the FCC license of your employer. Perhaps you are an engineer or air talent, and you think only the GM or owner should worry about FCC license renewal. Nothing could be further from the truth.

What you do — each and every day of a station's eight-year license term — may affect whether the station will have a smooth license renewal process or hit severe bumps in that road.

A twist is a provision in the Telecommunications Act of 1996. It creates a new standard for license renewal to which the commission must adhere.

The FCC may grant a renewal if, according to the three-part test, it finds that the station: (1) served the public interest, convenience and necessity; (2) committed no serious violation of the Communications Act or the commission's rules; and (3) there have been no other violations of the Act or FCC's rules which, taken together, would constitute a "pattern of abuse."

Note this last item well. A pattern of abuse may grow out of problems beyond the typical headline-making violations such as airing indecent programming or misrepresenting facts to the commission. It can be issues as diverse as failure to keep records to minor or severe technical violations. And if the station's FCC track record reflects an unending series of violations that are the subject of FCC action, such as notice of violation or forfeiture order, the pattern of abuse may be established.

License renewal is not something to think about once every eight years; it is a continuing responsibility of all staff. Engineers, for example, should make sure the station operates within licensed parameters, that EAS gear is working and technical records are maintained with care. Make sure you comply with RF radiation exposure guidelines as well as with your station's pledge, during the last renewal cycle, to ensure such compliance.

Although a station no longer has to worry about "competing applications" as a result of another past congressional action, renewal time still has the potential for jeopardy. Virtually anyone can file a petition to deny or an informal objection against your application. Former employees or disgruntled employees may be reviewing your renewal application (available online to the world) and may wish to point out to the FCC that one or more of your "certifications" on the form were untruthful, teeing up a potential FCC charge of misrepresentation.

So take renewal seriously. It is not an "automatic" process. Every cycle, some broadcasters fail to achieve success. It's critical that all station employees strive each day to pass renewal muster.

— RW

## NAB math

Looks like the NAB is using some form of new math in the mailing they did (March 26, page 40) — 3,000 new songs and 250 different formats comes out to a playlist of approximately 12 tunes each station.

Now I know why Ken R. could have stated in his article about oldies stations in the same issue (that radio plays the) same 12 songs at different times. Guess I

better call Dr K as I'm bored to death.

Let's see how I can sing "California Girls" backwards.

*Eddie Torres  
Radio Vato  
Arlington, Fla.*

## More Opinions On Pages 52-53

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