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## Affordable, Not Cheap

A guide to outfitting that new LPFM.

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## Excellent Andy

Andy Andresen is the readers' choice for our Excellence in Engineering Award.

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Radio World®

$2.50 The Newspaper for Radio Managers and Engineers May 19, 2004

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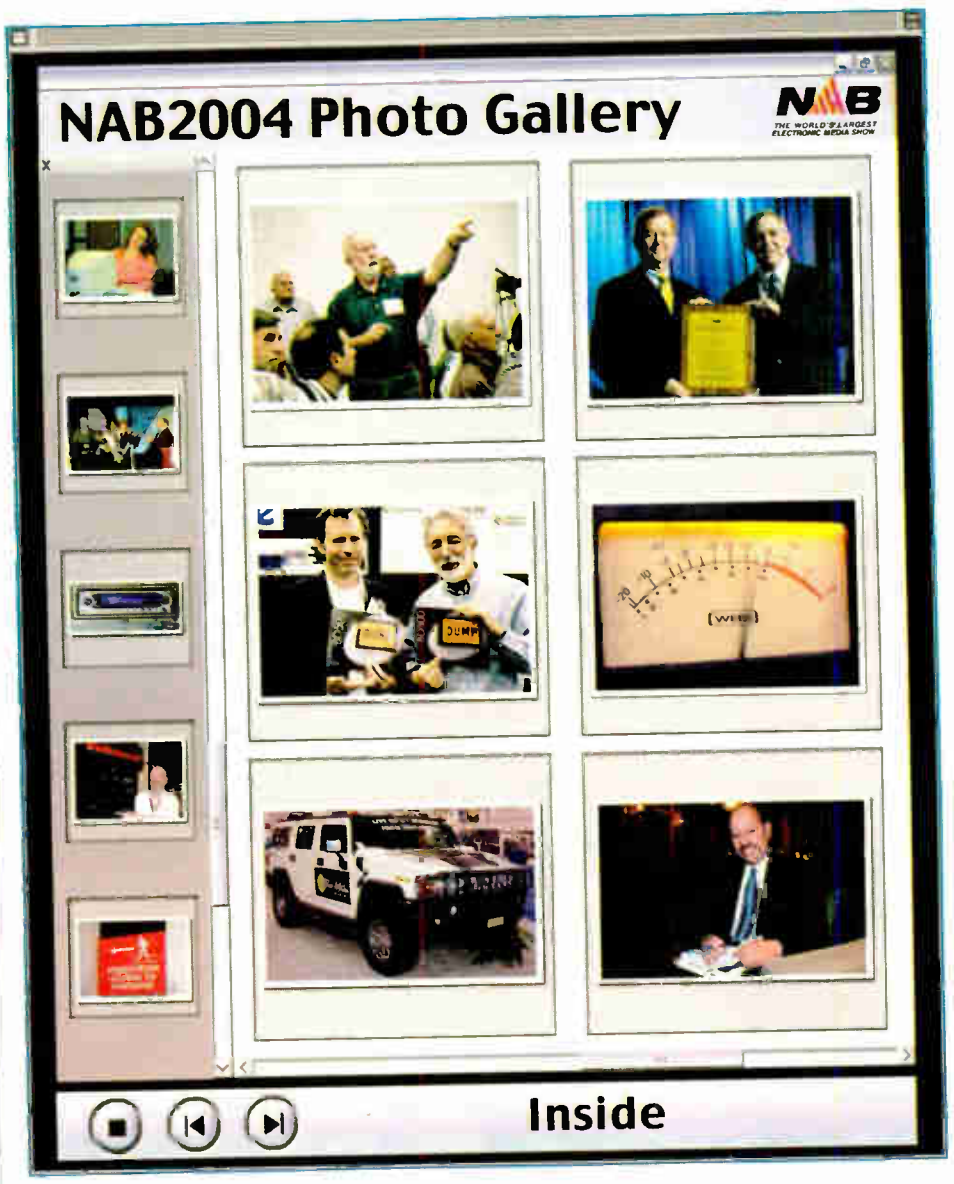


# IBOC Is In Hands Of Stations

*Ibiquity Issues Detailed User List and a Station Incentive Plan*

**by Leslie Stimson**

**LAS VEGAS** A year ago, many of the conversations Ibiquity Digital executives held with attendees and manufacturers at the spring NAB convention concerned the audio quality of its codec.

"Now, we talk about people buying products," said Ibiquity Digital President/CEO Robert Struble.

Ibiquity executives feel the digital radio rollout is turning a corner.

The number of stations going digital has passed the 100 mark, and manufacturers are shipping their second and third generations of IBOC transmission products.

The FCC, meanwhile, sought public comments on how it should craft permanent IBOC authorization and operation rules and how to proceed on AM nighttime operation.

Separately, engineers had been asking

See IBOC, page 12 ▶

World Radio History

# ◆ NEWSWATCH ◆

## BIA: 'Fill-In' Trend To Continue in '04

**CHANTILLY, Va.** The radio owners that were most active in buying stations in 2003 tended to be smaller groups, according to a report recently completed by BIA Financial Network Inc.

It said that only three of the top 10 radio groups as ranked by revenue were among the top 10 in acquiring stations. Clear Channel, the largest group, acquired 36 stations, followed by sixth-ranked Citadel with 22 and ninth-ranked Cumulus with 26.

Other groups that bought the most stations included Quantum Communications; Max Media; Cherry Creek Radio; Multicultural Radio Broadcasting; Nassau Broadcasting; Pacific Radio Group; and First Broadcasting.

Purchases during 2003 suggest that some groups have rekindled interest in picking up stations in markets in which they already operate. Nearly one-third of the stations sold in rated markets were to in-market operators.

"Given the sluggish advertising marketplace in 2003, we see the number of in-market sales a result of group owners concentrating on improving operating efficiencies," said Mark Fratrik, vice president BIAfn. "Group owners can increase cash flow margins in their existing markets by creating larger clusters of stations."

BIA believes this trend will hold for 2004.

## Harris Broadcast Revenue Off 3%

**MELBOURNE, Fla.** Government business continued to be strong for Harris Corp. in the third quarter. Sales for its broadcasting arm, however, were off 3 percent compared to the same quarter a year ago.

The parent company said overall net income in its fiscal third quarter increased 57 percent and revenue increased 23 percent, "primarily as a result of continuing strong performance in the company's two government businesses." Revenue in the quarter was $664.2 million; net income was $35.5 million, or 53 cents per diluted share.

CEO Howard Lance said Harris continues to be "very focused" on profitability improvement in the Broadcast and Microwave businesses and is "taking additional actions in the fourth quarter that will lower product costs and reduce expenses."

He said the Broadcast segment, which includes broadcast radio and TV products, "achieved sequential revenue improvement as well as strong order growth."

The Broadcast segment reported revenue of $73.3 million in the quarter, a 3 percent decline; operating income was $500,000 compared to $2.5 million a year ago. The company recently announced the departure of the head of that division, Bruce Allan, and is looking for a replacement.

The company cited lower sales in digital TV transmission gear and international radio transmission equipment for the continued decline in sales.

## Oregon Engineer Wins Automation Drawing

**LAS VEGAS** D.A.V.I.D. Systems announced the winner of an automation system in a drawing held during the NAB convention.

The prize is a Latitude Edition package, which includes three workstations, a file/audio server with 2,000 hours of music in MP2 format, three flat-panel monitors, soundcards, network switch and on-site training.

The winner is Oregon Public Broadcasting Director of Engineering Don McKay, based in Portland, Ore., according to the supplier's executive vice president, Richard Doll. Radio World Editor Paul McLane and IMAS Publishing CEO Steve Dana participated in the ceremonial drawing.

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# NAB2004 Photo Gallery

NAB
THE WORLD'S LARGEST ELECTRONIC MEDIA SHOW

Photo ©NAB

NAB Joint Board Chairman Philip J. Lombardo, left, and NAB President/CEO Eddie Fritts were at the center of press rumors concerning Fritts' employment. They are shown with Distinguished Service Award Recipient Oprah Winfrey and Keynoter Carly Fiorina, Chairman and CEO of Hewlett-Packard.

Photo by Bob Kovacs

Harris demo'd an FM HD Radio signal, including 5.1 surround sound audio delivered at a relatively low bit rate, in a Hummer.

Photo by Leslie Stimson

A Kenwood receiver displays the secondary digital channel, with the designation '2CH,' at the NPR Public Radio Engineering Conference.

Photo by Paul McLane

Don Backus, left, demonstrates the ENCO Systems Guardien obscenity replacement system to FCC Commissioner Kevin Martin.

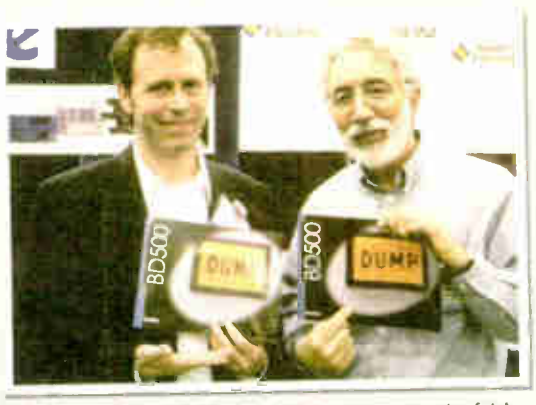


Photo by Paul McLane

Eventide's BD500 is now available with up to 40 seconds of delay. Ray Maxwell and Tony Agnello hit the Dump button.

Photo by Leslie Stimson

Cox Radio's Steve Fluker and Harris' Hal Kneller, from left, discuss the split-level digital combining concept with attendees at the NPR Public Radio Engineering Conference.

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World Radio History

FROM THE EDITOR

# Readers Honor Andresen

**by Paul J. McLane**

This year Radio World launched a new award, its nominees chosen by a panel of our advisers, contributors, suppliers and other experts. We asked them to identify colleagues who represent the highest ideals of the U.S. radio broadcast engineering profession; the winner was chosen by reader vote.

The result is the Radio World Excellence in Engineering Award. It's a big deal, and I was honored to present it to Richard "Andy" Andresen of Cumulus Media during the Amateur Radio Reception at the NAB2004 convention.

Photo by Al Peterson

Andy Andresen, left, was voted by readers to receive Radio World's Excellence in Engineering Award. We're shown at the NAB Amateur Radio Reception, sponsored by Heil Sound.

### Real world

I was fascinated to find out how the readers would vote, because the nominees were all worthy, for various reasons. But as usual the readers of Radio World know what they're doing.

Exceptional engineers these days must be both generalists and technical experts. They must understand ownership concerns; act as teachers; work in the worlds of audio, RF and IT. They must respond when called, and then know what to do.

Theirs isn't a high-profile world. But their high-stress work matters very much.

Andresen grew up in Davenport, Iowa — "right about where civilization meets the cornfield," as he puts it — and for lack of anything better to do, he began stringing up long-wire antennas, winding coils and building homemade radios. "Some kids played baseball, I played radio."

In 1978, Andresen (pronounced "An-DRAY-sen") joined the U.S. Army and was sent to Fort Gordon, Ga., to serve in the Signal Corps. "Not only did I learn the fine art of grid dip tuning but also fascinating things like how to make a resistor out of an earplug case, some water and the salt from some C-rations."

After three years in the military, he returned home; there was no time for college. He worked at a repair shop fixing TVs, stereos, VCRs and microwave ovens.

"I opened my own shop, Electron Laboratories, about 1983. Things were slow in the beginning and I applied for a job working second shift as a video engineer. My first broadcast engineering job was at WQAD(TV) taping syndicated shows off satellite and operating a tape cartridge recorder."

He moved to KWQC(TV), where he performed video dubbing, TCR operations and routine equipment maintenance. In 1989, he sold his interest in the shop and switched to radio as chief engineer for KFMH, KWPC, WKBF and WPXR.

"Stations were bought and sold; I even bought one of my own in 1993. I ran the little 500-watt AM and continued contract engineering until consolidation signaled it was time to get out."

Among his proudest accomplishments was Robo-Jock, his own hard-disk audio system. He began work on it in 1990.

"It became apparent that there was a great need to improve the automation systems in use at the time. New audio cards for computers had just come on to the market, which made high-quality computer-stored audio a possibility. … One year and 10,000 lines of code later, Robo-Jock went into operation on KWPC in Muscatine, WKBF in Rock Island and WGEN in Geneseo." He says it was the first viable computer automation system in the Quad Cities market and the first hard-disk based system there to control 100-disk CD players, play music on hard drive and use voice tracking. "During the year 2000 rollover, while the commercial systems were scrambling to make their units Y2K-compliant, 'Robo' required no changes. In its 14-year run, some 20 units were installed in seven stations. Robo-Jock is still in use at KJOC in Davenport and KCJJ in Iowa City."

Now 42, Andresen is chief engineer for two clusters in Iowa: the five-station Cumulus Quad Cities cluster, which includes WXLP(FM), KORB(FM), KBEA(FM), KJOC(AM) and KBOB(FM), as well as the five-station Dubuque cluster of KLYV(FM), WDBQ(AM/FM), WJOD(FM) and KXGE(FM).

He tries to take an electronics course each year, and he has his SBE Broadcast Networking Technologist certification. Recently he started working on a bachelor's degree, "not because I have to, but because I still enjoy learning everything I can about electronics, I still enjoy engineering and most of all because I still enjoy playing radio."

He acknowledges that radio engineers face more responsibilities, smaller budgets and rapidly changing technology.

"In my own case I have two market managers, nine PDs, and more DJs and sales reps than I can keep track of. With transmitters in three states, and everyone and everything connected to the Internet, it would be easy to get caught up in the doing, and forget whom I'm doing it for.

"Engineering is a service, and all the people just mentioned are our clients. I don't believe technology will be our biggest challenge; technology is what we do. Time management won't challenge us either; we'll just invent a better way to manage it. Our real challenge is to see the forest for the trees, and like any good business spend some time with our clients."

Here's what Aaron Winski, chief engineer of WPW Broadcasting, wrote in nominating Andresen:

"Andy has contributed to local broadcasting and my knowledge far more than any school or panel of instructors could. Andy is what I refer to as a 'real-world engineer.'

"Though he works for one of the largest companies in the nation, that doesn't mean he has blank checks arriving in giant sacks every day. Andy takes upon himself to make happen what *shouldn't* happen, and in *ways* that it shouldn't happen — whether it be building a certain project instead of buying it; or learning how to repair something so as not to hire someone to do it.

"He sees every day as a challenge and an opportunity. Downtime is not an issue; and whatever measure needs to be taken to ensure that within his means, I guarantee you it will get done."

Andresen and his wife Kathy made the trip to Las Vegas for our ceremony. They have four children, ages 11 to 18.

Thanks to all our nominees; the readers who voted; and Heil Sound and NAB for allowing us to share their podium. Host Bob Heil presented Andresen with a fabulous Heil microphone, complete with its own "ANDY" mic flag.

Cumulus Corporate Director of Engineering Gary Kline and several of the company's engineers also shared the moment with us.

"When you consider the fine competition he was up against, we couldn't be prouder," Kline said. He describes Andresen as "always ready and willing — to travel to any market nearby, to help any engineer in our company — anytime I've asked him to drive to another transmitter site, to chip in, to lend a hand — he never says no."

What a fine choice to represent the radio engineering profession.

World Radio History

# ◆ NEWSWATCH ◆

## Former Turro Frequencies To Calvary Chapel

**HOWELL, N.J.** Former licensee Gerry Turro's frequencies have been reborn with a new owner and format.

"The Bridge FM" is owned by Bridgelight LLC, a subsidiary of Calvary Chapel Old Bridge. The non-denominational evangelical Christian church has been criticized by some broadcasters and aspiring LPFM applicants for its activities in aggregating translators in other parts of the country.

The Bridge FM ties together four FM frequencies, including two translator frequencies formerly used by Turro to retransmit the programming of WJUX(FM) as JukeBox Radio until he lost a nine-year battle with the FCC last year.

Now Calvary owns WJUX on 99.7 MHz in Monticello, N.Y; WWDR at 89.7 in Howell, N.J., formerly WPDQ; and FM translators at 103.1 in Fort Lee, N.J., and 94.3 in Pomona, N.Y.

Calvary Chapel executives say The Bridge is the only non-commercial Christian FM in the region.

The signal originates in Howell, N.J., according to Calvary Chapel, which paid $875,000 for WWDR(FM) and a total of $3.3 million for the other frequencies. Chapel said the total power output is 11,000 watts. The format is a blend of Biblical teaching and contemporary praise and worship music.

"As the only non-commercial Christian radio station in the area, we are excited about providing Bible-based family programming to our community. We have been thrilled to hear from dozens of listeners whose faith has been strengthened and who appreciate the quality programs aired on our station," said Dennis Radeke, general manager of The Bridge FM.

## Independent Spanish Broadcasters Organize

**LAS VEGAS** The new Independent Spanish Broadcasters Association has elected its first board of directors and officers. Members made their choices at the association's organizational meeting held during NAB2004.

Independent Spanish-language networks, broadcast companies, financial institutions and other service providers to the Spanish media industry formed ISBA. The association is open to TV and radio broadcasting and media companies addressing the Hispanic market in the United States, regardless of ownership; the primary membership focus is independently owned, non-publicly traded, Spanish-language broadcasting companies.

In welcoming remarks, FCC Commissioner Jonathan Adelstein congratulated the members and stated that an organization such as ISBA was overdue.

New ISBA President Amador Bustos said, "We had independent Spanish-language media groups from across the country, and virtually all commented on what a great idea this was."

Elected to the board were Bustos of Bustos Media in Sacramento, Calif.; Rosamaria Caballero of Caballero Television in Miami; Ronald Gordon of ZGS Broadcasting in Arlington, Va.; Tony Hernandez of Latin Entertainment Network in Tampa, Fla.; Zenon Ferrufino of Latino Broadcasting in Denver; Alfredo Plascencia of Lazer Broadcasting in Oxnard, Calif.; Jose Luis Muñoz of BMP Radio in Houston; Abel de Luna of Moon Broadcasting in Los Angeles; and Francisco Montero of Fletcher Heald & Hildreth in Arlington, Va.

The board elected Bustos president, Gordon vice president, Caballero secretary and Hernandez treasurer. It established working committees for public affairs and advocacy; access to capital; advertising, ratings and promotions; and membership and administration.

## DeLaHunt Leaves FCC

**WASHINGTON** The FCC Audio Division's Ed DeLaHunt has left the commission to work with his family's radio stations in Minnesota. He recently had been promoted to deputy chief of engineering along with Jim Bradshaw.

In the meantime, Susan Crawford from the Mass Media Bureau and previously Denny and Associates was expected to handle some of DeLaHunt's duties.

DeLaHunt oversaw the AM and FM technical processing staff. Most recently, he was involved in technical matters related to digital radio and AM auctions. In 1990, he joined the commission as a staff engineer in the Audio Services Division and in 2002 became associate chief of the division.

His last day at the FCC was April 30.

## Villarreal, Warfield Join NAB Radio Board

**WASHINGTON** NAB Radio Board Chair Carl Gardner has appointed two members to the NAB Radio Board. The appointment of Miguel Villarreal Jr., executive vice president of sales and network operations for Amigo Broadcasting, Dallas, was effective in April. Charles Warfield Jr., president/COO of ICBC Broadcast Holdings Inc., New York, will begin his term in June.

## ERI Expansion Set for May

**CHANDLER, Ind.** Electronics Research Inc. plans to open a new manufacturing facility for TV antenna and rigid transmission line manufacturing this month.

The company said construction of the addition in Chandler, Ind., is on schedule. The project was made necessary when ERI bought the assets of Andrew Corp.'s Broadcast Antenna Products Business Unit.

The company plans in mid-May to close temporary facilities it has been leasing from Andrew for making those television antenna and rigid transmission line products. ERI will keep and continue to operate a Passive Power Products facility in Maine.

## Crystal Winners Recognized

**LAS VEGAS** San Francisco, Chicago and Minneapolis have some darn fine radio stations, at least based on the NAB Crystal Radio Award list. Those three cities accounted for six of the 10 winning stations.

Photo ©NAB

Here are the honorees of the NAB Crystal Radio Award, which recognizes efforts to improve the quality of life in a station's surrounding communities.

Shown at the NAB convention are, from left, back row: KTCZ(FM), Minneapolis, Vice President of Marketing/Operations Dan Seeman; WDEL(AM), Wilmington, Del., President/General Manager Pete Booker; WDRV(FM), Chicago, Vice President/General Manager Jerry Schnacke; KFOR(AM), Lincoln, Neb., Three Eagles Communications Chairman/CEO Rolland Johnson.

In the front row, KFOG(FM), San Francisco, Susquehanna Radio President David Kennedy; KDFC(FM), San Francisco, Operations Manager Bill Lueth; WLUP(FM) Chicago, Vice President/General Manager Cris Ohr; WSYR(AM), Syracuse, N.Y., Program Director Jim Lerch; and KSTP(FM), Minneapolis, Program Director Leighton Peck. Also honored was KSTZ(FM) in Des Moines, Iowa.


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World Radio History

# Indecency Hovers Over NAB2004

**by Leslie Stimson**

**LAS VEGAS** Indecency, satellite radio and HD Radio.

These topics dominate discussion in radio; and that was the case at the spring NAB convention.

Attendance was up to an estimated 97,544 compared to 88,020 last year; many exhibitors commented about extra foot traffic through their booths compared to 2003.

Providing an undercurrent of rumor among board members was the employment situation of NAB President/CEO Eddie Fritts.

Meanwhile, Ibiquity Digital Corp. executives said they saw fresh faces in their booth, attendees asking how to convert stations to digital. This interest comes as IBOC implementation options increase, more stations convert and the FCC takes action to solidify digital service rules (see story, page 1.)

FCC Chairman Michael Powell and ABC's Sam Donaldson

### Satellite radio

Debate over satellite radio and its attempts at localism was a big radio theme.

Fritts emphasized the association's opposition to new local traffic and weather channels offered by the satellite companies. In a petition filed before the show began, the NAB asked the FCC to prohibit XM Satellite Radio and Sirius Satellite Radio from sending local content over their nationwide radio services.

NAB wants the commission to forbid the satcasters from using receivers that can be programmed by the user to receive certain content depending on location. And the broadcast association raised the question of whether the FCC should reopen the entire satellite radio authorization.

"In lieu of the promised niche audiences, foreign language services, senior and children's programming, they have instead devoted substantial bandwidth to compete directly with local broadcasters with local content, without being subject to any public interest obligations," the trade association stated in its petition.

NAB is worried the satcasters are developing next-generation receivers that can deliver "localized" programming to subscribers by using Global Positioning Satellite and store-and-forward technologies.

The FCC seeks input on NAB's petition. Comments on Docket MB 04-160 are due June 4.

### No bill passage this year?

Fritts in his opening remarks reminded the audience of the limited life expectancy of XM's satellites. Over a sound effect of a falling object, he said that he looks out the window every morning "to make sure an XM satellite is not plummeting toward my roof."

**Satellite radio is here, and it's going to be here. You need to work something out.**

— Rep. Joe Barton, R-Texas

He urged broadcasters to support congressional legislation that challenges whether local traffic and weather channels services are allowable on the satellites.

Rep. Greg Walden, R-Ore., a co-sponsor of H.R. 4026, said the measure would help local radio stop losing market share to the satcasters.

Michigan Republican Rep. Fred Upton said letters written to the satellite radio companies by previous House Commerce Committee Chairman Rep. Billy Tauzin of Louisiana have gone unanswered.

"This legislation puts them on notice. This is a shot across the bow," Upton said.

Sen. Conrad Burns, R-Mont., called the issue "the tip of the iceberg." He said he had been optimistic when he heard about an agreement earlier this year between NAB and XM; that agreement would codify language in the FCC rules stressing that satellite radio repeaters not be used for local programming.

"Someone's not holding to their word," said Burns.

But Rep. Joe Barton, R-Texas, now chairman of the House Commerce Committee, cautioned broadcasters about the measure, saying he doesn't think it will pass this year.

"Satellite radio is here, and it's going to be here. You need to work something out," he said.

Barton compared today's satellite radio to early satellite TV; he suggested satellite is not now a big part of the market but is likely to grow. He urged broadcasters to work with the satellite companies on the issue.

Sirius spokesman Jim Collins said, "We consider ourselves to be a nationwide broadcaster. We do not broadcast locally." As for a receiver's ability to pull in local content, that's a selection ability built into the device, he said. For example, Sirius has "S-seek" on plug and play models, allowing consumers to program certain choices into the radio. Alerts show up on the screen, and the consumer can decide if he or she wants to hear the new program. The programming itself is still broadcast nationwide, he said.

He also said satellite radio is attempting to co-exist with terrestrial radio, as cable TV and satellite TV co-exist. "We have never said that satellite radio is a replacement for terrestrial radio."

Satellite radio has garnered much attention lately, Collins said, from Wall Street and automakers. "We're at the beginning of a growth curve."

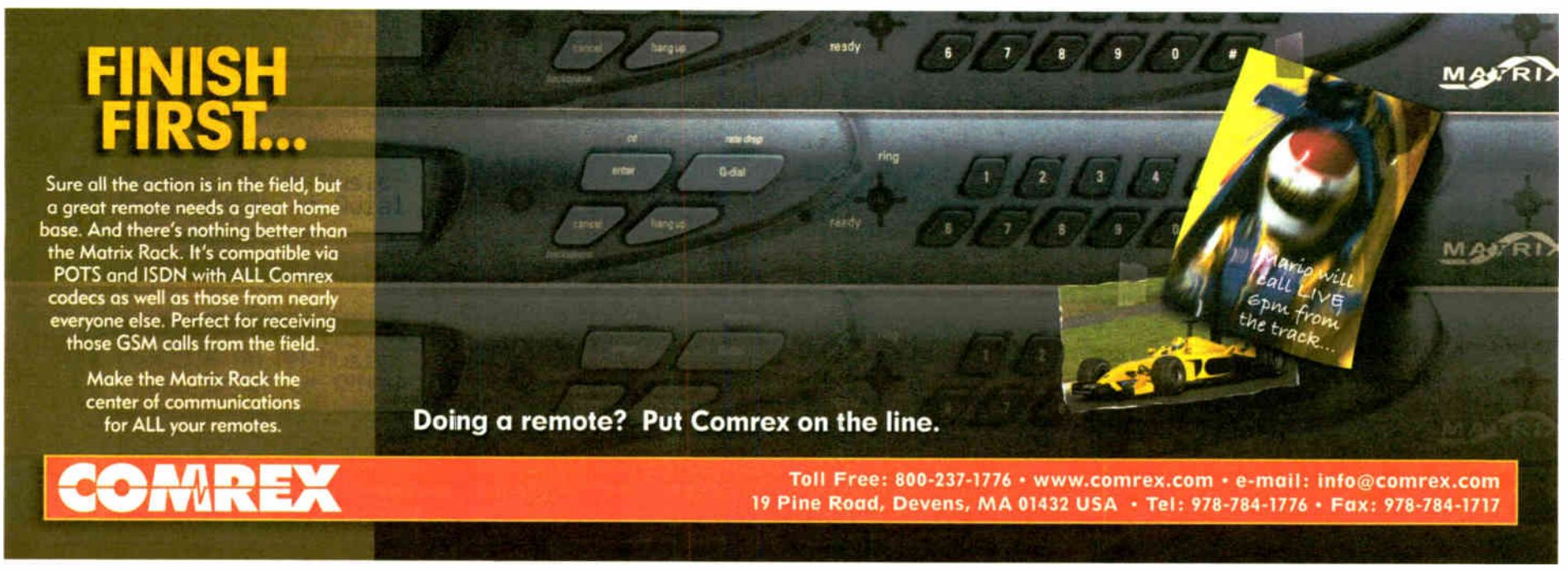
### Hill talk

With the topic of indecency and the FCC's tougher stance drawing attention in this election year, exhibitors of profanity delays and related hardware reported strong interest in their products.

Meanwhile, NAB has formed a task force on the issue in the wake of its recent Responsible Programming Summit in Washington. The co-chairs are LIN Television President Gary Chapman and Susquehanna Radio President David Kennedy. Fritts said other members would be named.

Lawmakers at the show debated the merits of indecency measures in the House and Senate. Upton said his bill would raise the fines for indecent programming. The Senate bill is tougher, lawmakers agreed, because it does more than increase indecency penalties. It includes provisions affecting media

See NAB, page 7 ▶




World Radio History

# NAB

▶ Continued from page 6

ownership; but it also protects affiliates from being fined for indecent material carried in network programming.

The House passed Upton's bill before the show and he said the Senate was close to passing its bill; the measures would then go to a conference committee to iron out differences. President Bush supports the House version, Upton said.

Burns predicted the Senate would act on its indecency measure quickly. In the meantime, he and other panelists urged broadcasters to "police themselves."

### 'Chilling effect'

Some of that is happening as stations install profanity delays, institute zero-tolerance indecency policies or enforce current policies more strictly. But others are fighting against what they see as a "chilling effect" at the station level.

During the show, a group of broadcasters, unions and performers asked the FCC to reconsider its indecency ruling in the Bono case. In that instance, the commission reversed an earlier decision; it declared the singer's use of the f-word during a live TV broadcast in 2003 profane and indecent. Experts say the action sets a precedent that the use of the word in the future would likely trigger a fine.

**Fritts said he looks out his window every morning 'to make sure an XM satellite is not plummeting toward my roof.'**

Signers to the petition, including Viacom/Infinity, Radio One Inc., Minnesota Public Radio and others, called the decision "an unconstitutional expansion of the government's intrusion into broadcast content."

NBC, which aired the show in question, also filed a Petition to Reconsider, saying the commission's latest ruling essentially creates a list of words that will bring a fine, regardless of their context. Both petitions are under review.

FCC Chairman Michael Powell said any perception that the FCC has only recently begun to focus on indecency enforcement is incorrect. He conceded that fines have grown and that the commission has begun fining stations per indecent utterance, rather than per program.

"The increase in enforcement is in response to public complaints," Powell said. The agency received 250,000 indecency complaints total in 2003; so far in 2004, the number is nearly 540,000.

The agency is trying to act more quickly to resolve such cases, Powell said.

Some broadcasters have said the FCC should clarify what it does and does not consider indecent. But as he did after the NAB's summit, Powell said it's preferable for broadcasters to control what's on their airwaves than have government step in with a mandate.

"You do not want the government to write a 'Red Book' of what you can say and not say," he said.

Many broadcasters also argue that the government should apply indecency statutes to apply to cable and satellite as well. Asked his views on the issue, Powell said, "I think the government should be conservative about regulating content for anybody." He said it's a question for Congress, not the FCC.

Rep. Barton said he recently met with cable industry representatives about indecency. Cable is going to develop a policy to police itself, he said, but he predicted failure for self-policing policies in general.

He thinks Congress will craft legislation so that the same indecency rules that apply to broadcasters would apply to cable.

### Board rumblings

Also making headlines was some behind-the-scenes drama between Fritts and Joint NAB Board Chairman Phil Lombardo. Some news accounts pegged the rumors as a power grab for Fritt's job.

NAB offered no comment on the rumors. After the show, other board members seemed to close ranks in support of Fritts, who's been in his present position more than 20 years.

In a memo from the Radio Executive Committee to the rest of the radio board, Radio Board Chair Carl Gardner, Vice Chair Bruce Reese and committee member Al Harris stated that Fritts is in the last year of a five-year employment contract, which expires next March. An extension has been discussed, the memo stated, as discussions of a new contract have begun.

"The irresponsible speculation and poor reporting we've seen ... serve to illustrate why we have a discreet process for selecting leadership and handling employment agreements," they wrote, imploring board members to give the process "a chance to work."

World Radio History

# Radio's Iraq Embeds: One Year Later

**by Kathy Merritt**

The war in Iraq continues to make headlines more than a year after it started. As American troops face skirmishes daily, journalists also are still on the front lines.

A year ago, Radio World spoke with reporters embedded with U.S. forces as the conflict began. We recently caught up with two and asked them to reflect on their experiences in Iraq.

Associated Press Radio journalist Ross Simpson is back on the morning anchor desk after covering the first weeks of the war. On a recent day he talked with an AP reporter in Fallujah, covering the United States Marines' effort to quell the uprising there.

Simpson listened to her description of a situation growing more dangerous by the minute. In his calm, baritone voice, he told the reporter to drop to the ground if shooting starts. "Get something between you and the gunfire."

Simpson knows what the reporter is facing. A year ago he was traveling with the First Battalion of the Fifth Marines as they made their way from the Kuwait-Iraq border through Iraq's southern oil fields and on to Baghdad.

### Large-scale embedding

Some 600 journalists were embedded with military units at the start of the Iraq war. Observers debated the pros and cons of the decision to let reporters spend 24 hours a day with American military forces.

Simpson said his 40 days spent with the Marines make him better able to do his job on the anchor desk. "I'm able to see the story from a wider picture, and I know the danger my colleagues are in."

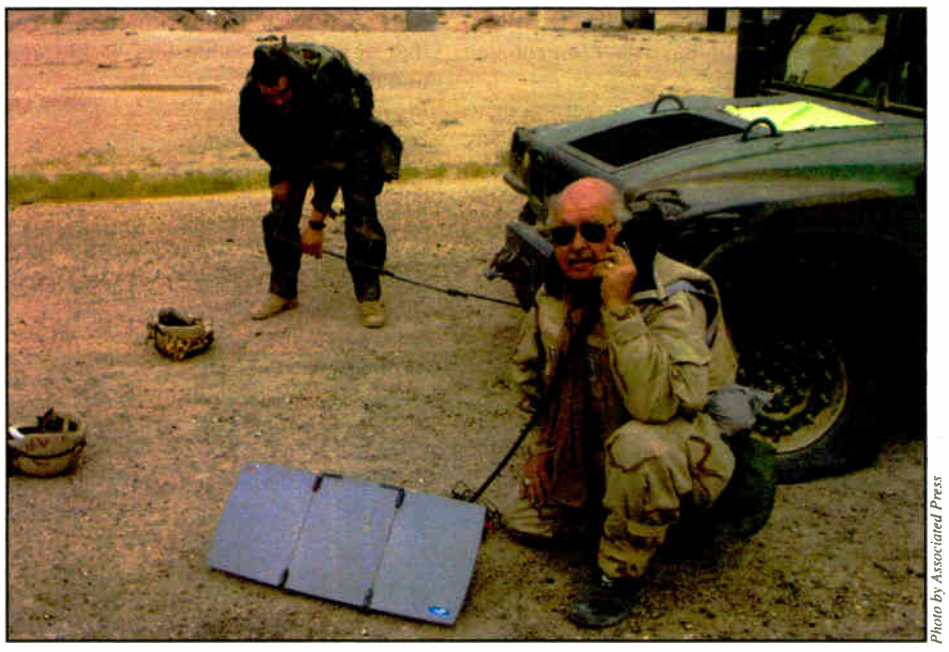


Photo by Associated Press

AP's Ross Simpson files satellite feed from southern Iraq in the Rumalya oil fields on the first night of the war. The satellite phone is a foldout NERA unit used to file audio, digital stills and digital video. Simpson's Humvee had just run over a land mine. Its occupants were unhurt.

He experienced danger firsthand in Iraq. The day after Simpson's unit crossed the border in March 2003, the Humvee in which he was riding hit a mine, blowing out all four tires and the engine and rupturing the fuel tank. He and three Marines walked away from the incident unharmed.

Going into Iraq, Simpson says, he wondered how close he would be to the action. He quickly learned that being embedded meant being in the thick of it.

"You were along for the ride, you experienced the same dangers they did." He said he was often in the lead scout vehicle.

Simpson, a veteran of military actions in Panama, Somalia, Haiti and the Persian Gulf, said he "lived the life of a Marine" in Iraq. He ate their food, drank their water and went for days without sleeping.

"I was in their house," he said, "and lived by their rules." One of those rules was to never leave the vehicle unless he had permission.

"I could have filed shortly after 9 o'clock on opening night (of the war). I asked the lieutenant if I had long enough to fire up the satellite," a NERA World Communicator portable Inmarsat M4 satellite terminal with 64 kbps ISDN capability.

"He said, 'I might have to leave you.' An hour later, he said, 'Now you have time.' I don't think that's compromising your ability to report. I went there to report what I saw, what I heard and experienced."

Having time to file was only one of the problems reporters faced. Having the right equipment and keeping it running from a sandy, hot environment were constant challenges.

Reporter Aaron Katersky also was embedded at the start of the war. He reported for Clear Channel Radio and ABC News Radio. Katersky was with a Marine fighter squadron at a Kuwaiti airbase and, although he was briefed on missions, patterns of attack and locations, he was not allowed to reveal some of that information.

He said being embedded made it difficult to get a larger sense of the war.

"We had a small sense of how our Marines were participating. A little peek into a larger picture."

Katersky believes he enjoyed a different perspective on the war, though still not a complete one, when he entered Iraq with a convoy of resupply units.

### Going network

Now Katersky is in New York City as a general-assignment reporter for ABC News Radio. He was a reporter at KTRH(AM) in Houston when he volunteered to cover the war in Iraq.

He said the network hired him full-time a few months after his two-month stint in the Persian Gulf. Like Simpson, he believes the experience informs his reporting.

"Without question. I think it's almost a requirement to fully understand the situation ... to even understand where places are or what the terrain is like and what people might be thinking. I'm grateful for it."

Katersky said it took a little while for the Marine fighter pilots to get used to having a reporter follow them. But as he filed his reports, family members of the Marines would write to say they had heard their loved ones on the radio.

Soon Katersky had Marines coming to him with their stories in hopes that their families would hear them. He said he developed a good rapport with his unit.

### Equipment woes

Both Katersky and Simpson faced technical challenges filing reports.

At first, Simpson used the NERA portable satellite unit, which he connected to a Comrex Matrix codec. He used a Sony TCM 5000 cassette tape recorder to record sound; he employed 19 cassettes and one change of four C-cell batteries in covering 37 days of combat. Simpson gathered sound using an Electro-Voice 635 or a Sennheiser shotgun microphone.

He was able to insert tape in his radio pieces and conduct live interviews using the NERA unit — that is, until a gunner from his Humvee accidentally stepped on its fold-out antenna five days into the war. Simpson walked three miles to borrow a Motorola Iridium satellite phone from two journalists from the Orange County Times who were embedded with another unit. Simpson said without the borrowed phone, he wouldn't have been able to file.

Simpson said the Iridium phone only took about 15 seconds to make contact with the satellite — much quicker than the NERA unit — "but you couldn't move or you'd lose the connection. An inch here on the ground means you miss the satellite, by who knows how much."

The NERA worked well, Simpson said, if he had time to connect with the satellite and then feed his material, but with the Marines constantly on the move, the Iridium phone allowed him to file at almost any time. In the battle of Baghdad, "I was able to hang out the window of the Hummer on the Iridium phone. You could hear the rockets."

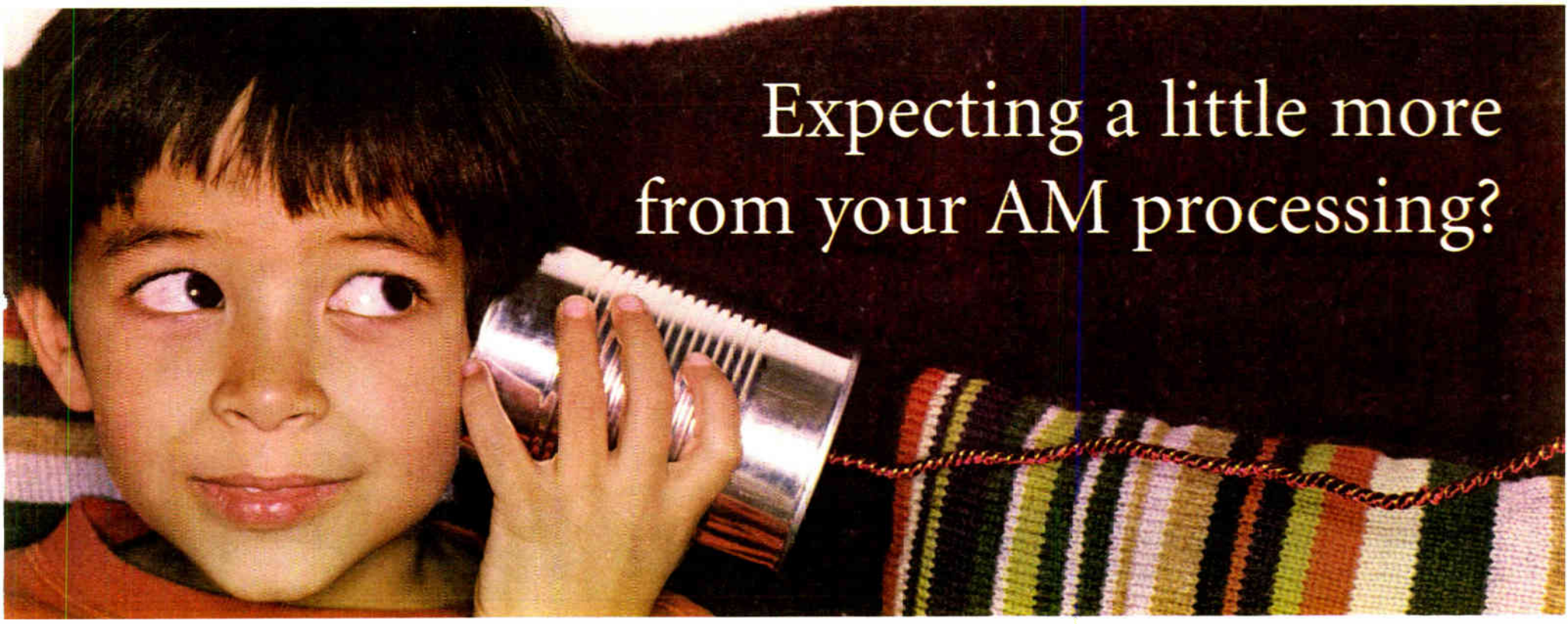
Katersky isn't so fond of the Iridium phone. He says it didn't work well and didn't hold a charge long.

Simpson solved the battery problem by using a Radio Shack transformer that converted power from the 24-volt battery system on the Humvee to 12 volts.

Katersky used a cell phone to do live Q&As while he was in Kuwait. And once he got to Baghdad, Katersky said, ABC

See EMBEDS, page 10 ▶

World Radio History

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World Radio History

# NAB2004 Photo Gallery

Photo by Paul McLane

Logitek President Tag Borland invited guests for champagne and cake to celebrate the company's 25th anniversary.

Photo by Bob Kovacs

Richland Tower's Paul Richmond explains a feature to Madison Batt and Michael Goodman. The company owns and manages multi-tenant facilities.

Photo by Bob Kovacs

Jim Hoffman of Switchcraft points to the company's new EH-Series of connectors, including FireWire, USB, Ethernet and S-Video.

NEWS WATCH

## Telos-Omnia, Fraunhofer Demoed Surround Sound For HD Radio

**LAS VEGAS** Telos Systems, Omnia Audio and Fraunhofer Labs teamed to demonstrate Surround Sound HD Radio in 5.1-channel audio at the NAB show.

The companies believe surround sound will compel consumers to buy HD Radios.

"Only a couple of years ago, it seemed we didn't have enough bandwidth for full-fidelity stereo on IBOC," said Telos President Steve Church. "With this breakthrough, it's possible to have very impressive surround on HD Radio."

## Md. Tech Council Honors Ibiquity

**COLUMBIA, Md.** The Tech Council of Maryland named Ibiquity Digital's HD Radio technology as its IT Product of the Year. The award was presented by Maryland Lieutenant Governor Michael Steele at a dinner attended by 700 people.

"By helping stations around the country convert to digital, Ibiquity's HD Radio technology is revolutionizing the entire radio broadcast industry, and for that reason, they were honored as our Product of the Year," said Dyan Brasington, president of the Tech Council of Maryland.

The council is a non-profit membership consortium open to high-technology firms, government laboratories, higher-education institutions and business-support firms in the state's technology community.

## Five Attend PREC on Scholarships

**WASHINGTON** Five station engineers and one student attended the NPR Public Radio Engineering Conference in Las Vegas. NPR Distribution selected five scholarship recipients: Nathan Chervek, student engineer, KXCV/KRNW, Maryville, Mo.; Shawna Claiborne, program and operations director, KBUT(FM), Crested Butte, Colo.; Karl Fontenot, chief engineer, KRVS(FM), Lafayette, La.; Walt Gander, operations director, WXPR Public Radio, Rhinelander, Wis.; and Burton Poley, radio production engineer, KNAU Arizona Public Radio, Flagstaff, Ariz.

The scholarship amount of up to $1,000 per person helped defray the costs of PREC attendance and provided recipients a chance to learn about HD Radio and the Public Radio Satellite System's ContentDepot, a new program delivery system meant to streamline the process of distributing and acquiring content.

The recipients also had a chance to visit the NAB exhibits.

Additional opportunities will be available throughout the year to learn more about ContentDepot and the implications for station operations.

In the fall, as the network nears implementation, NPR plans to offer regional operations forums where operations and engineering personnel can receive training and exposure to ContentDepot technology.

# Embeds

▶ Continued from page 8

had more infrastructure in place. Katersky recorded sound using a Sony Portable Digital Mini-Disc MZ-B100 Recorder.

The biggest problem in keeping the equipment running was sand. Katersky said it's "not like sand between your toes" on the beach, but rather like a fine talcum powder.

Simpson said he's "still shaking sand out of equipment a year later." He carried cans of compressed air to try to clean the sand out. Both men used Ziplock plastic bags to protect their equipment.

Simpson was a "multimedia" reporter for AP, filing audio, video and still photos. He said early television broadcasts from Iraq were bumpy and blurry as technicians learned the best ways to send their live feeds.

He thinks radio deserves more recognition. "You can't beat a good radio (reporter) with a satellite phone, he's right there in the thick of battle, crawling to get away from the gunfire. It's a real rush."

Katersky said he experienced that adrenaline as well, but he's not ready to go back to the battle zone yet. Before the recent outbreak of violence, he returned to Iraq to report for an ABC News Radio special on the one-year anniversary of the war.

He said ABC has an established bureau in Baghdad with producers, correspondents, security people and translators. But he believes the city is more dangerous and unpredictable than a year ago.

"I admire the people who are over there right now," said Katersky.

Simpson doesn't want to go back to Iraq because "I don't feel lucky anymore. There were three times I could have been killed. I felt I couldn't survive if I went back."

He reads the names on the casualty lists, looking for the names of the young Marines he got to know. His experience in Iraq has made him appreciate life.

"Things that were important when I left are no longer important. I spend more time with my grandchildren. If I'm working on a project and they come in, I put it down. What matters is what's happening right now."

World Radio History

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World Radio History

# IBOC

▶ Continued from page 1

Ibiquity for a way to monitor their IBOC signals; now Belar Electronics Laboratory Inc. has signed a license with Ibiquity so it can integrate the digital technology into modulation monitors that will allow engineers to monitor the performance of their AM and FM digital broadcasts.

And on the receiver side, Ibiquity's big push is to get radios to consumers. It has accomplished several tasks to enable this and to help stations promote the technology.

### Station incentive

Ibiquity and Crutchfield have signed an agreement to get stations involved in the rollout. A station that is on the air with a digital signal can provide a click-through on its Web site to the Crutchfield site. There, consumers can purchase HD Radios from Kenwood, Panasonic and, later this year, JVC.

For every radio sold in this manner, the station would receive $20 from Ibiquity, paid on a quarterly basis.

"We want to make it easy for consumers to find out about digital radios and to buy them," Struble said.

One of Ibiquity's big "ooh, ahhs" for this show was an official list of stations on the air with a digital signal in specific markets (see page X). The chart was displayed prominently in the company's booth.

The station list is available on Ibiquity's Web site, which has been partly redesigned to make it easier for consumers to learn where to get HD Radios. Struble said, "Customers are asking 'Where do I go?' In the past, our Web site has been a business-to-business Web site. Now we want to reach consumers."

Several companies displayed surround sound capabilities that are meant to dovetail with HD Radio. While these systems are used by satellite radio and attendees of the Consumer Electronics Show have seen the displays, they are new for some broadcast attendees to NAB.

Ibiquity displayed its HD Radio receiver display wall, a traffic data demo and a Perstel radio coming out later this year with recording capability.

©NAB

Glynn Walden, senior vice president of engineering of Infinity Broadcasting, receives the NAB Engineering Achievement Award for Radio from Lynn Claudy, NAB senior vice president of science and technology.

### Home-recording brouhaha

Such consumer recording ability, touted as a feature of HD Radio data capabilities, is under attack by the record companies. When it issued its Further Notice about IBOC just before the show, the commission also sought public comment about whether to restrict home recording rights for radio (RW, May 5, page 1).

The recording industry is asking the agency to mandate that stations encrypt their music so that only legal downloads are possible.

Several broadcast execs were relieved by the FCC's approach. They said that by raising the issue in a separate Notice of Inquiry, rather than lumping it in with the rest of the IBOC issues in the Further Notice, the FCC keeps the flag issue not one but two steps away from formal adoption.

"The FCC is asking good questions. They want to see this as a permanent reality," said Ibiquity Senior Vice President and General Counsel Al Shuldiner. "It's good for broadcasters. We're talking (with them) about *how* to implement, not *whether* to implement HD Radio."

NAB's Senior Vice President and General Counsel Jack Goodman said the trade association had no position yet on the issue.

The Consumer Electronics Association believes the commission will reject the recording industry's "efforts to restrict the noncommercial home recording of digital radio broadcasts," said CEA President/CEO Gary Shapiro in a statement.

In its effort to seek comments for formal IBOC authorization and operational rules, the FCC asked the public to submit input on a wide range of topics, including radio's public service obligations, datacasting, multiplexing and subscriptions services.

Another question the commission raised is whether there should be a minimum audio quality level should stations split their digital signals into two channels.

NPR Vice President of Government Relations Michael Riksen said the network was pleased to have its secondary audio channel concept discussed in the item and "took that as a recognition that Tomorrow Radio will be a part of HD Radio going forward."

When asked by an attendee how NAB and commercial broadcasters feel about the secondary audio channels, Riksen quipped, "I think we're about to find out," referring to the mid-June deadline for comments on the digital radio issue. Commissioner Michael Copps has said the split-channel concept raises ownership concerns.

**Now, we talk about people buying products.**

— Ibiquity Digital's Robert Struble

### What about AM?

The commission also seeks public input on nighttime digital operation for AMs. Ibiquity executives are hopeful that will be allowed this year.

A few AM stations reportedly have taken their digital signals off the air due to interference to analog neighbors on adjacent channels. Ibiquity executives said transmission gear manufacturers are helping to work out implementation issues.

For later this year, expect to see more HD Radios roll into store shelves. JVC's is due out this month; Onkyo and Yamaha plan to ship home units later this year, Struble said.

When will consumers see HD Radios in cars? Bill Whikehart, senior technical specialist with Visteon, said automakers do want products such as digital radios that help differentiate their offerings. Visteon has an OEM contract for HD Radio receivers and is being asked to provide quotes on the devices for other automakers.

Struble predicts the market will see in-dash HD Radios next year, in 2006 model cars. Car radio sales are expected to build cash flow for Ibiquity. Struble predicts the company will break even "before 2007."

### Caution

Yet with all the good news about HD Radio during the show, Shapiro sounded a cautionary note. He warned that radio continues to lose market share from CDs, MP3 and video technologies in the car.

Broadcasters need to embrace and promote HD Radio, he said. "Radio has a small window of opportunity to do this. Ibiquity has a business model that will work," he said.

"Digital is coming, but complacency could be your swan song."

As implementation choices increase, manufacturers say they're ready to help more stations convert. Attendance at Broadcast Electronics' HD Radio seminar at the show was strong; roughly 200 engineers attended, twice the number company President John Pedlow said was expected.

Photo by Leslie Stinson

Entercom's Clay Freinwald, ERI's Eric Wandel and Greater Media's Paul Shulins swap conversion experiences during the Broadcast Electronics HD Radio seminar.

Noncommercial stations are heavily represented among those that have licensed Ibiquity's technology, spurred by matching grant money from the Corporation for Public Broadcasting.

"We've worked hard, in four years, to ask and justify to Congress why we need transition money," said Riksen.

Given that HD Radio equipment continues to evolve, BE is offering a new HD Radio equipment deal. The company's Vice President of RF Systems Tim Bealor said, "We want to make sure the products you buy today don't paint you into a corner. Tell us what you need today. We will guarantee a price for 3 years."

According to a flyer passed out at the meeting, "BE guarantees that, should you purchase a transmitter from us in 2004 without HD Radio implementation, we will provide you with a firm quotation, valid for three years, on the BE HD Radio components you plan to purchase at a later date."

Glynn Walden, senior vice president for engineering at Infinity Broadcasting, was honored with NAB's Radio Engineering Achievement Award for his hand in designing the Ibiquity HD Radio system. In Walden's 30-year career in radio, he has devoted 14 to digital radio development.

He thanked "all the GMs who let me work on IBOC" and scores of people, including Derek Kumar and his former Ibiquity colleague Rick Martinson; he singled out Martinson, now with Northrop Grumman, "who led the 'dream team' to excellence."

World Radio History

# It's Zephyr's 10th birthday (But you get the present).

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World Radio History

# 'Split-Level' Combining Explored

## *Harris, Cox Tout Approach for Power And Space Benefits; CPB Reviews Grants*

**by Leslie Stimson**

Cox Radio's Steve Fluker, director of engineering of Orlando's WMMO, and Harris Principal Electrical Engineer George Cabrera have invented what they are calling "split-level combining" for HD Radio. Patents are pending on the methodology.

At the NPR Public Radio Engineering Conference in Las Vegas preceding NAB2004, Fluker said initial tests conducted before the convention indicated the implementation scheme showed promise for helping stations to save on operation costs and equipment space needs when they go digital.

In tests conducted on April 15, Fluker said he used a Harris HT-5 analog transmitter plus a Harris Z Series-16 for the digital signal. The scheme uses a hybrid IBOC/FM signal in the auxiliary transmitter. By passing some of the analog signal through the auxiliary IBOC transmitter, combiner losses are reduced and the existing analog transmitter can still be used, he said.

His station TPO is 7.3 kW and the IBOC power level was 73 watts. That compares to traditional high-level combining of 8.5 kW for the analog transmitter and 85 watts for the digital transmitter, with both signals being fed to a high-level combiner.

Fluker said he did not need to apply for an STA from the FCC for this combining method. A standard 3 dB combiner was used.

With the split-level combining, he said, rather than sending 90 percent of the digital power and 10 percent of the analog into a dummy load, less power is wasted. He said a station's overall power consumption could be 5 to 25 percent less than with high-level combining. He and Harris said the scheme can trim power consumption and cooling costs.

Harris representatives answered questions from numerous engineers at the show. Harris Vice President of Advanced Product Development Geoff Mendenhall said that, with this implementation, "The analog transmitter is no longer required to operate at higher-than-normal power levels to offset high-level combining losses. This eliminates the need for a station to upgrade the existing analog transmitter."

**Fluker said a station's overall power consumption could be 5 to 25 percent less than with high-level combining.**

A station also may use its existing transmission line and antenna system to radiate identical digital and analog signals, he said.

"Stations without floor space to add an IBOC transmitter can use the space occupied by their current backup transmitter for IBOC."

WFMT(FM) Chief Engineer Gordon Carter said the method potentially could save his station half a million dollars a year.

Corporation for Public Broadcasting representatives at the show said they would now review recent grant awards totaling more than $5 million to help 76 stations go digital. They want to see if this new implementation, plus the FCC's recent authorization of dual antennas, saves these stations in their conversion costs. If so, grant money could possibly go to more stations than originally announced, CPB said.

Asked for reaction, Broadcast Electronics Vice President of RF Systems Tim Bealor said, "It may be appropriate for some stations." However, he cautioned, "It presents a different set of problems because now you've doubled the power output into the digital transmitter. The question is, will it save stations money?"

*This story originally appeared in the NAB Daily News and is ©NAB.*


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DIGITAL NEWS

## RBDS Group Wants Standards to Jibe With HD Radio

U.S. RBDS standards aren't drastically changing — good news for those stations that want to begin using the technology and those that use it now.

A working group of the Radio Broadcast Data Systems Subcommittee of the National Radio Systems Committee has recommended that no changes be made to the bulk of the U.S. standards.

Subcommittee co-Chairman Marty Hadfield said the group's mission was to recommend changes or to affirm the current standard for another five years. The American standards were last revised in 1998 and originated in 1993.

The group took a straw poll at the show and hopes to have final votes received from subcommittee members by June 22. If the final vote is yes, "We're done with reaffirmation of the standard," said Hadfield.

One portion of the standard is still open to change: so-called "PS data." The original U.S. standard assumed the PS data would remain static when RBDS standards were developed 11 years ago. Now, some stations sending RDS text data along with their program streams want this information to scroll across the receiver faceplate. Receivers react unpredictably to the scrolling, Hadfield said.

A working group will scrutinize this portion of the standard to craft a change. Clear Channel's Jeff Littlejohn, Wye Consulting's Tom Mock and Allen Hartle of The Radio Experience lead the working group.

The point is to put the text into a uniform standard, almost like a template, said Littlejohn, as the group explores the relationship between the analog RDS and HD Radio. They "want the listeners to have the same experience" with RDS in the receiver whether they're getting an analog or digital signal, said Littlejohn.

The distinction is important because a station entering its RDS text data sends it into an analog RDS encoder, which transmits the data over an FM analog subcarrier. On the digital portion of the signal, the text data is part of the HD Radio system's program-associated data, which is part of the digital signal and goes into an HD Radio encoder.

The group hopes to craft the RDS PS data template and offer it to receiver manufacturers to implement, Littlejohn said.

Until this portion of the standard is updated, the RBDS Subcommittee is recommending that broadcasters use caution on how often stations update the text. The group also suggests broadcasters talk to their legal counsel about possible driver distraction issues related to scrolling text, said Hadfield.

The next meeting of the RBDS Subcommittee is planned for Oct. 6 at the NAB Radio Show in San Diego.

## Antenna, Power Issues Emerge for AM IBOC

A handful of AM stations reportedly have turned off their HD Radio signals out of concern for analog interference to neighbors on adjacent channels.

Of these cases, Ibiquity's Bob Struble said, "Are we aware of it? Yes." In many cases, when an Ibiquity team goes to a site to help with an IBOC install, a station may already have antenna problems, he said.

"We're seeing arrays not pointed in the right direction and power levels that vary. This is to be expected," he said, as Ibiquity helps stations work through AM digital implementation issues.

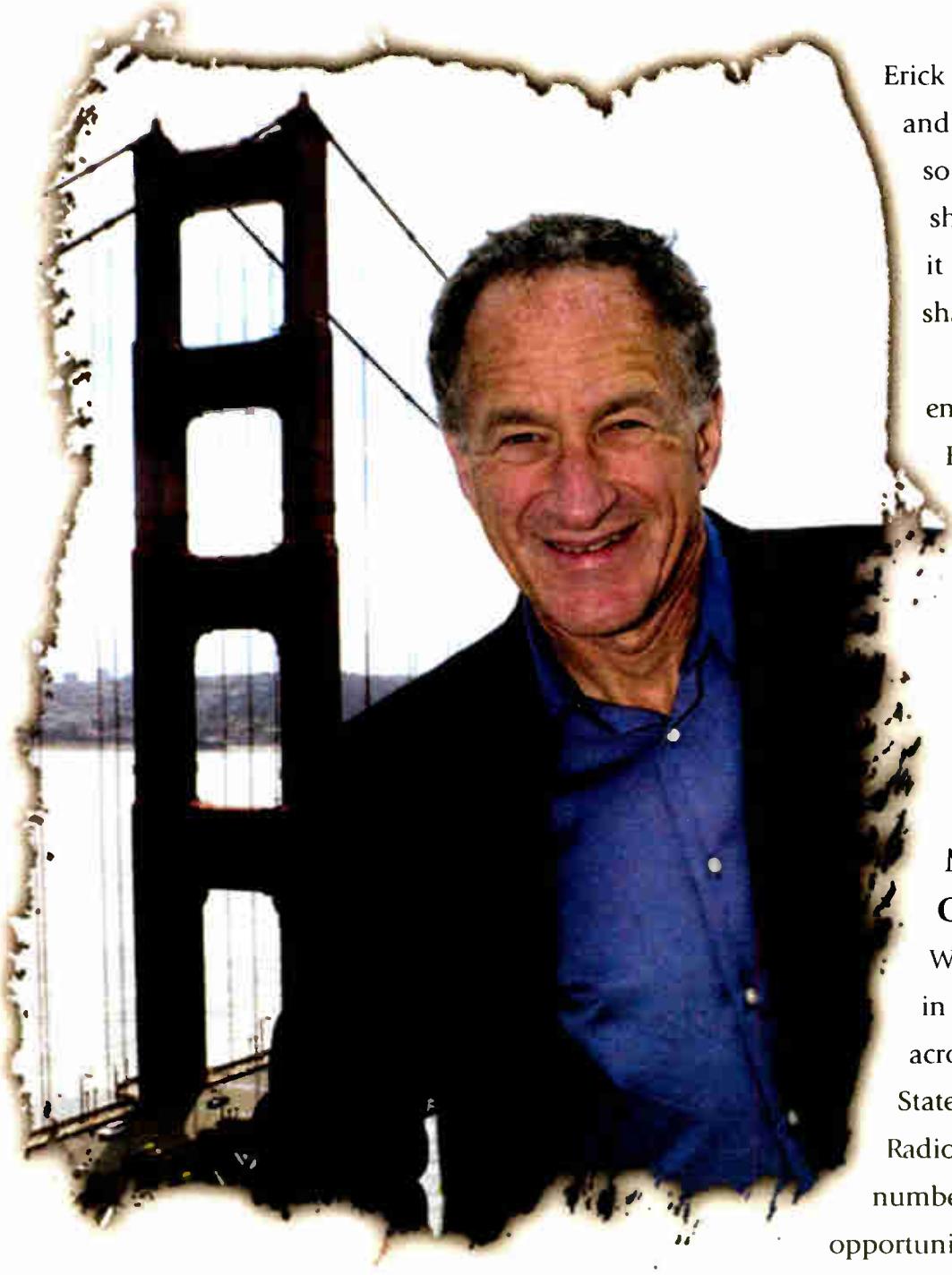
Ibiquity Vice President of Marketing Dave Salemi said some of these stations are short-spaced. "We're finding manufacturers step in and resolve problems," he said.

*— Leslie Stimson*

World Radio History

Susquehanna People

# Experience. Stability. Vision. *And Erick Steinberg.*

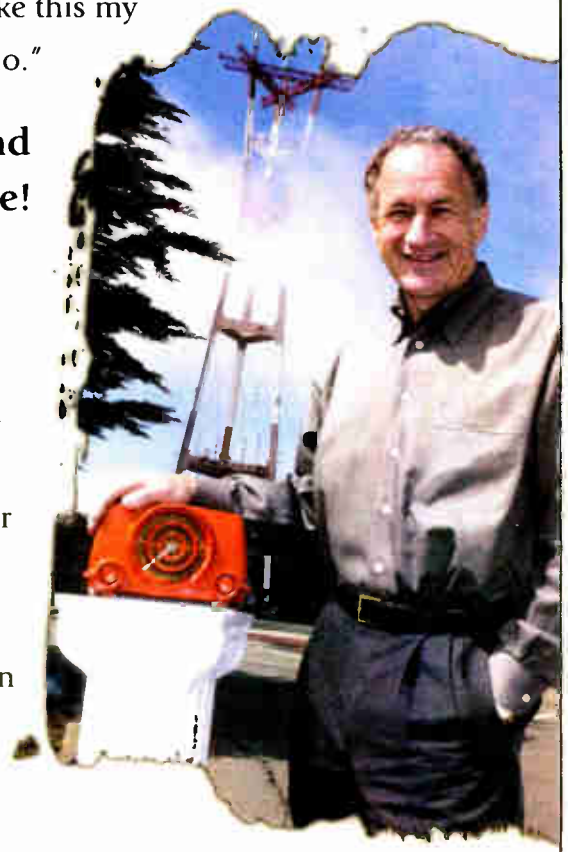


*Erick Steinberg*
Director of Technical Operations
Susquehanna, San Francisco

Erick Steinberg's job is challenging, demanding, and requires a very hectic work pace. It's something he describes as "hard fun." "Radio is show biz," he says. "It should be fun!" Of course, it also helps that he's surrounded by people who share his passion for the industry.

"We're all career broadcasters around here, and I enjoy working for a company that is run by broadcasters," Erick says. "Their commitment to technical excellence and training at all levels is unbelievable!"

When he first arrived at Susquehanna Radio, Erick says, "I felt right at home." Now, six years later he adds, "Susquehanna is just the right size. My work friends are here, my work family is here. I intend to make this my last stop in radio."



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With operations in major markets across the United States, Susquehanna Radio Corp. offers a number of radio career opportunities. For more information, visit our website or call our Human Resources Department at (717) 852-2132.

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World Radio History

HD Radio News

**IBOC Keeps Transmitter Market Humming**

Page 20



# Ibiquity Publishes HD Radio List

**COLUMBIA, Md.** Ibiquity Digital has published a list of stations it says are on the air with its HD Radio technology or that plan to be soon.

Until now, the most comprehensive list of digital radio stations on the air was compiled by Radio World from several sources, including the FCC; but it did not involve the official participation of Ibiquity.

Univision station KEMR(FM) in San Jose, Calif., was the 100th station to turn on an HD Radio signal, the company said. Also recently, Ohio State University's WOSU(FM) went digital, with U.S. Rep. Deborah Pryce pushing the button in Columbus, Ohio.

The list of stations on the air or planning to do so soon totals about 300. Visitors to *www.hd-radio.com* can search for stations transmitting the analog/digital signals.

The Ibiquity list is shown by state and market, with their on-air status as of April 19. Ibiquity intends to update its station list periodically.

Photo by Leslie Stimson

User Map in Ibiquity Booth

| Calls | AM/FM | Market (by State) | Freq | Format | On-air | Owner |
|---|---|---|---|---|---|---|
| KNBA | FM | Anchorage, AK | 90.3 | AAA | | Koahnic Broadcasting Corp |
| KSKA | FM | Anchorage, AK | 91.1 | Nws/Tlk/Inf | | Alaska Public Telecommunications, Inc. |
| KBRW | AM | Barrow, AK | 680 | FullService | | Silakkuagvik Communications Inc. |
| KBRW | FM | Barrow, AK | 91.9 | FullService | | Silakkuagvik Communications Inc. |
| KCDS | FM | Deadhorse, AK | 88.1 | — | | Silakkuagvik Communications Inc. |
| KTOO | FM | Juneau, AK | 04.3 | Variety | | Capital Community Broadcasting, Inc. |
| KYUK | AM | Bethel, AK | 640 | News/Talk | | Bethel Broadcasting, Inc. |
| WJLD | AM | Birmingham, AL | 400 | R&B/Tlk/Gsp | X | Richardson Broadcasting Company |
| WBUB | AM | Atmore, AL | 1620 | DARK | | ADX Communications |
| KAZN | AM | Los Angeles, CA | 1300 | Asian | | Multicultural Radio Broadcasting Group |
| KCRW | FM | Los Angeles, CA | 89.9 | Educa/News | | Santa Monica Community College |
| KCSN | FM | Los Angeles, CA | 88.5 | Classical | X | California State University |
| KIIS | FM | Los Angeles, CA | 102.7 | Top 40 | | Clear Channel Radio |
| KKBT | FM | Los Angeles, CA | 100.3 | Urban | X | Radio One Inc. |
| KKJZ | FM | Los Angeles, CA | 88.1 | Jazz | | California State University |
| KMNY | AM | Los Angeles, CA | 1600 | BNw/Eth/ASt | | Multicultural Radio Broadcasting Group |
| KMXE | AM | Los Angeles, CA | 830 | Spn/Tlk/Nws | X | Radiovisa |
| KMZT | FM | Los Angeles, CA | 105.1 | Classical | | Mount Wilson FM Broadcasters, Inc. |
| KNX | AM | Los Angeles, CA | 1070 | News | | Infinity Broadcasting |
| KOST | FM | Los Angeles, CA | 103.5 | AC | | Clear Channel Radio |
| KPCC | FM | Los Angeles, CA | 89.3 | Nws/Tlk/Inf | | Pasadena Area Community College |
| KROQ | FM | Los Angeles, CA | 106.7 | Alternative | X | Infinity Broadcasting |
| KSCA | FM | Los Angeles, CA | 101.9 | Ranchera | X | Univision Radio |
| KSUR | AM | Los Angeles, CA | 1260 | Adlt Stndrd | | Mount Wilson FM Broadcasters, Inc. |
| KTNQ | AM | Los Angeles, CA | 1020 | Spar/Varty | X | Univision Radio |
| KUSC | FM | Los Angeles, CA | 91.5 | Classical | X | University of Southern California |
| KWVE | FM | Los Angeles, CA | 107.9 | Christian | | Calvary Chapel Church Inc. |
| KALW | FM | San Francisco, CA | 91.7 | Nws/Tlk/Inf | | San Francisco Unified School District |
| KCBS | AM | San Francisco, CA | 740 | News | | Infinity Broadcasting |
| KCSM | FM | San Francisco, CA | 91.1 | Jazz | | San Mateo County Community College |
| KDFC | FM | San Francisco, CA | 102.1 | Classical | X | Bonneville International Corp. |
| KFOG | FM | San Francisco, CA | 104.5 | AAA | X | Susquehanna Radio Corp. |
| KKSF | FM | San Francisco, CA | 103.7 | Smooth Jazz | | Clear Channel Radio |
| KMZT | AM | San Francisco, CA | 1510 | Classical | | Mount Wilson FM Broadcasters, Inc. |
| KOIT | FM | San Francisco, CA | 96.5 | Soft AC | X | Bonneville International Corp. |
| KSAN | FM | San Francisco, CA | 107.7 | Clsc Rock | X | Susquehanna Radio Corp. |
| KYLD | FM | San Francisco, CA | 94.9 | CHR/Dance | | Clear Channel Radio |
| KZBR | FM | San Francisco, CA | 95.7 | Country | X | Bonneville International Corp. |
| KEMR | FM | San Jose, CA | 105.7 | Span/Rock | X | Univision Radio |
| KPSC | FM | Palm Springs, CA | 88.5 | Classical | X | University of Southern California |
| KFAC | FM | Santa Barbara, CA | 88.7 | Classical | X | University of Southern California |
| KCPB | FM | Thousand Oaks, CA | 91.1 | Classical | X | University of Southern California |
| KYKL | FM | Tracy, CA | 90.7 | — | | Educational Media Foundation |
| KALC | FM | Denver-Boulder, CO | 105.9 | Hot AC | | Entercom Communications Corp. |
| KCFC | AM | Denver-Boulder, CO | 1490 | News/Talk | | Colorado Public Radio |
| KCFR | AM | Denver-Boulder, CO | 1340 | News/Info | X | Colorado Public Radio |
| KGNU | FM | Denver-Boulder, CO | 88.5 | Educa/Edtc | | Boulder Community Broadcast Association |
| KNRC | AM | Denver-Boulder, CO | 1150 | News/Talk | X | NRC Corp. |
| KOSI | FM | Denver-Boulder, CO | 101.1 | AC | | Entercom Communications Corp. |
| KPOF | AM | Denver-Boulder, CO | 910 | Inspiration | X | Pillar of Fire |
| KQMT | FM | Denver-Boulder, CO | 99.5 | Prgvs/ClRck | | Entercom Communications Corp. |
| KUVO | FM | Denver-Boulder, CO | 89.3 | Jazz | | Denver Educational Broadcasting |
| KVOD | FM | Denver-Boulder, CO | 90.1 | Classical | | Colorado Public Radio |
| KUNC | FM | Ft. Collins-Greeley, CO | 91.5 | Public | | Community Radio for Northern Colorado |
| KCFP | FM | Pueblo, CO | 91.9 | Classical | | Colorado Public Radio |
| KKPC | AM | Pueblo, CO | 1230 | News/Info | | Colorado Public Radio |
| KPRN | FM | Grand Junction, CO | 89.5 | News/Info | | Colorado Public Radio |
| KPRE | FM | Vail, CO | 89.9 | News/Clscl | | Colorado Public Radio |
| KPRH | FM | Montrose, CO | 88.3 | News/Info | | Colorado Public Radio |
| KPRU | FM | Delta, CO | 103.3 | Classical | | Colorado Public Radio |
| WDRC | FM | Hartford-New Britain, CT | 102.9 | Oldies | | Buckley Broadcasting |
| WAMU | FM | Washington, DC | 88.5 | Nws/Tlk/Inf | | American University |
| WHUR | FM | Washington, DC | 96.3 | Urban AC | X | Howard University Board |
| WRTX | FM | Dover, DE | 91.7 | Clscl/Jazz | | Temple University |
| WDNA | FM | Miami/Ft Ldale, FL | 88.9 | Jazz | X | Bascomb Memorial Broadcasting Foundation |
| WEDR | FM | Miami/Ft Ldale, FL | 99.1 | Urban | X | Cox Radio, Inc. |
| WFLC | FM | Miami/Ft Ldale, FL | 97.3 | AC | | Cox Radio, Inc. |
| WHQT | FM | Miami/Ft Ldale, FL | 105.1 | Urban AC | | Cox Radio, Inc. |
| WHSR | AM | Miami/Ft Ldale, FL | 980 | Internatl | X | Beasley Broadcast Group |
| WKAT | AM | Miami/Ft Ldale, FL | 1360 | Classical | | Spanish Media Broadcasting |
| WKIS | FM | Miami/Ft Ldale, FL | 99.9 | Country | X | Beasley Broadcast Group |
| WLRN | FM | Miami/Ft Ldale, FL | 91.3 | Nws/Tlk/Inf | | Miami/Dade County School Board |
| WPOW | FM | Miami/Ft Ldale, FL | 96.5 | Rhymc/CHR | | Beasley Broadcast Group |
| WPYM | FM | Miami/Ft Ldale, FL | 93.1 | Rym/CHR/Dnc | | Cox Radio, Inc. |
| WQAM | AM | Miami/Ft Ldale, FL | 560 | Sports | X | Beasley Broadcast Group |
| WQBA | AM | Miami/Ft Ldale, FL | 1140 | Spn/Nws/Tlk | | Univision Radio |
| WRHB | AM | Miami/Ft Ldale, FL | 1020 | Ethnic | | New World Broadcasting |
| WRHC | AM | Miami/Ft Ldale, FL | 1560 | Spn/Nws/Tlk | | WRHC Management Corp. |
| WRMA | FM | Miami/Ft Ldale, FL | 106.7 | Span/BtfMs | X | Spanish Broadcasting System |
| WRTO | FM | Miami/Ft Ldale, FL | 98.3 | Span/Trpcl | | Univision Radio |
| WWFE | AM | Miami/Ft Ldale, FL | 670 | Spn/Spt/Nws | | Fenix Broadcasting Corp. |
| WWNN | AM | Miami/Ft Ldale, FL | 1470 | Motivationl | X | Beasley Broadcast Group |
| WUSF | FM | Tampa-St. Pete-C'water, FL | 89.7 | Educational | X | University of South Florida |
| WJNA | AM | W. Palm-Boca Raton, FL | 640 | Nostalgia | | Crystal Boynton Beach, Inc. |
| WSBR | AM | W. Palm-Boca Raton, FL | 740 | Bus News | X | Beasley Broadcast Group |
| WXEL | FM | W. Palm -Boca Raton, FL | 90.7 | Clscl/NPR | | Barry Telecommunications |
| WYCT | FM | Pensacola, FL | 98.7 | cp - NOA | X | ADX Communications |
| WABE | FM | Atlanta, GA | 90.1 | Nws/Tlk/Cls | | Atlanta Board of Education |
| WALR | FM | Atlanta, GA | 104.1 | Urban AC | | Cox Radio, Inc. |
| WBTS | FM | Atlanta, GA | 95.5 | CHR/Rhymc | | Cox Radio, Inc. |
| WCLK | FM | Atlanta, GA | 91.9 | Jazz | | Clark College |
| WDCY | AM | Atlanta, GA | 1520 | Christian | | Word Christian Broadcasting |

See page 18 ▶


Digitally Diverse

Omega_FM – $5880

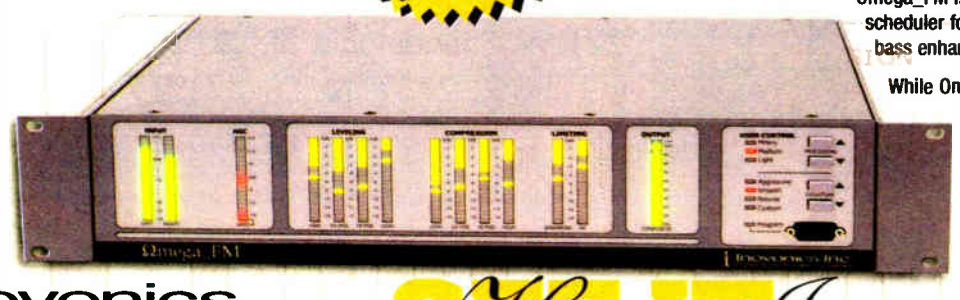
NEW! v2 Software

COMPREHENSIVE PROCESSING FOR FM, WITH AN INDEPENDENT AES/EBU OUTPUT THAT CAN FEED A DAB EXCITER AT THE SAME TIME.

Omega_FM is a 100%-digital, software-based design. New Rev2 software offers a built-in scheduler for dayparting, plus advanced AGC logic, a fourth section of parametric EQ, harmonic bass enhancement and composite output filtering.

While Omega_FM's composite/MPX output feeds your existing FM exciter, the fully independent AES/EBU digital output can be configured for flat, 20kHz response with programmable delay. This allows a single processing chain to impart a common 'sonic signature' to simultaneous FM and DAB transmissions. The inherent audio quality limitations of FM (15kHz cutoff, plus pre-emphasis and its attendant 'protection' limiting) will not compromise the digital broadcast.

Despite its modest price, Omega_FM challenges the versatility and performance of any processor on the market. Even if you are delighted with what you're using now, see your preferred equipment supplier for a comparison demo at your station.



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Hear It... Processing doesn't get any better than this.


World Radio History

▶ Continued from page 18

| Calls | AM/FM | Market | Freq | Format | On-air | Owner |
|---|---|---|---|---|---|---|
| WHRS | FM | Cookeville, TN | 91.7 | Classical | | Nashville Public Radio |
| WTML | FM | Tullahoma, TN | 91.5 | Classical | | Nashville Public Radio |
| KCAF | AM | Dallas-Ft. Worth, TX | 990 | DARK | | Renaissance Radio, Inc. |
| KERA | FM | Dallas-Ft. Worth, TX | 90.1 | Nws/Tlk/Inf | | North Texas Public Broadcasting Inc |
| KNTU | FM | Dallas-Ft. Worth, TX | 88.1 | Jazz/Clscl | | University of North Texas |
| KSOC | FM | Dallas-Ft. Worth, TX | 94.5 | Hip Hop | X | Radio One Inc. |
| WRR | FM | Dallas-Ft. Worth, TX | 101.1 | Classical | | WRR-FM, City of Dallas |
| KCHN | AM | Houston-Galveston, TX | 1050 | Ethnic | | Multicultural Radio Broadcasting Group |
| KEDT | FM | Corpus Christi, TX | 90.3 | Variety | | South Texas Public Broadcasting Systems Inc. |
| KRGN | FM | Amarillo, TX | 102.9 | Christian | | Family Life Communications, Inc. |
| KOAL | AM | Price, UT | 750 | Nws/Tlk/Spt | | Eastern Utah Broadcasting |
| WXGI | AM | Richmond, VA | 950 | Sports | X | Gee Communications, Inc. |
| WOWZ | AM | Roanoke-Lynchburg, VA | 1280 | News | | OneCom, Inc. |
| WWWR | AM | Roanoke-Lynchburg, VA | 910 | Gospel | | Perception Media Group, Inc. |
| WANC | FM | Burlington-Platts., VT-NY | 103.9 | Nws/Inf/Cls | | WAMC/Northeast Public Radio |
| KAYO | FM | Seattle-Tacoma, WA | 99.3 | Country | | South Sound Broadcasting |
| KBKS | FM | Seattle-Tacoma, WA | 106.1 | AC | X | Infinity Broadcasting |
| KBSG | FM | Seattle-Tacoma, WA | 97.3 | Oldies | X | Entercom Communications Corp. |
| KING | FM | Seattle-Tacoma, WA | 98.1 | Classical | | Classic Radio, Inc. |
| KISW | FM | Seattle-Tacoma, WA | 99.9 | Rock | X | Entercom Communications Corp. |
| KMTT | FM | Seattle-Tacoma, WA | 103.7 | Adult Rock | X | Entercom Communications Corp. |
| KNDD | FM | Seattle-Tacoma, WA | 107.7 | Alternative | | Entercom Communications Corp. |
| KPLU | FM | Seattle-Tacoma, WA | 88.5 | Jazz | | Pacific Lutheran University |
| KQBZ | FM | Seattle-Tacoma, WA | 100.7 | Talk | | Entercom Communications Corp. |
| KUOW | FM | Seattle-Tacoma, WA | 94.9 | News/Info | | University of Washington |
| KFMY | FM | Raymond, WA | 97.7 | Clsc Hits | | South Sound Broadcasting |
| WTMJ | AM | Milwaukee-Racine, WI | 620 | Nws/Tlk/Spt | X | Journal Broadcast Group |
| WPFF | FM | Sturgeon Bay, WI | 90.5 | Christian | | Family Educational Broadcasting |
| WRGX | FM | Sturgeon Bay, WI | 88.5 | — | | Family Educational Broadcasting |
| WKWS | FM | Charleston, WV | 96.1 | Country | X | West Virginia Radio Corp. |
| WVAQ | FM | Morgantown-Clrksbg, WV | 101.9 | CHR | X | West Virginia Radio Corp |

DIGITAL NEWS

## ERI Takes Orders For Dual-Input Antenna

**CHANDLER, Ind.** Electronics Research Inc. is taking orders for its dual-input side-mounted FM antenna designed for FM IBOC applications. The product won a Radio World "Cool Stuff" Award at NAB2004 in Las Vegas, where it was unveiled.

The company said the antenna can transmit the analog and digital FM signals without requiring a high-loss hybrid combiner or a circulator to attain the required isolation between the digital and analog transmitters.

ERI says the design meets the FCC requirement for informal notification of IBOC implementation that all elements in an FM antenna array be excited by both the digital and analog FM signals.

"This new antenna design is a significant technological advance that will speed the implementation and deployment of the IBOC digital broadcasting in the United States," said ERI President/CEO Tom Silliman. "This allows FM stations to implement simulcast operations without needing additional tower aperture."

## Harris Appoints Kneller To Pubcaster Initiatives

**LAS VEGAS** Public broadcasters are getting a new Harris representative to help them with digital radio conversions. Hal Kneller is giving up his sales territory to become manager of public radio initiatives.

In his new position, Kneller will be responsible for working with groups such as National Public Radio, the Corporation for Public Broadcasting and the Public Telecommunications Funding Program.

He also will work with networks including Connecticut Public Radio, Public Radio International and Minnesota Public Radio for support of on-going technologies and new projects such as Tomorrow Radio.

Kneller replaces former public radio manager Lucius Stone, who is now focusing on federal government initiatives at Harris' Broadcast Communications Division.

The news broke at the NPR Public Radio Engineering Conference, which preceded the NAB convention.

## How to Submit Letters

Radio World welcomes your point of view on any topic related to the U.S. radio broadcast industry.

Send letters via e-mail to *radioworld@imaspub.com*, with "Letter to the Editor" in the subject field; fax to (703) 820-3245; or mail to Reader's Forum, Radio World, P.O. Box 1214, Falls Church, VA 22041.


Logitek Brings Flexibility to Fast-Paced Operation

The Remora-4 is a tiny but powerful workhorse for production, news and backup operation.

Console Configurations Include

Numix - 6 to 24 faders (12-fader system shown)

Remora - 4 to 22 faders 4-fader system shown)

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As your needs change, Logitek can change with you.

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World Radio History

# IBOC Keeps Transmitter Market Humming

## *Meanwhile, Manufacturers Also Explore Making Units Smaller, More Compact*

**by Scott Fybush**

The new breeds of IBOC transmitters on the floor at the NAB2004 convention in Las Vegas weren't that big — and they're anything but generic.

Implementation choices for FM IBOC range from low-level combining, to a new "mid" level (see story page 14), and high-level combining of the analog and digital signals. And now that the use of duel antennas has been approved by the FCC under certain criteria, engineers may choose to keep separate digital and analog air chains.

Harris, Broadcast Electronics and Nautel were the first equipment manufacturers companies to license the IBOC transmission technology from Ibiquity Digital Corp. They each had new IBOC HD Radio transmitters on display at NAB2004.

Harris used NAB2004 to roll out its Mini-HD FM series of HD Radio transmitters. The Mini-HD series includes configurations from 10 W to 600 W and supports multiplexer input, interleaved antenna and separate antenna designs, complementing the existing Z-HD product line.

Like the Z-HD transmitters, the Mini-HD line can be ordered with the Harris NeuStar option. NeuStar enables the transmitters to support 5.1 surround sound and supplemental audio channels.

Broadcast Electronics rolled out an updated version of its solid-state FM transmitter line. These analog units, in power levels that range up to 20 kW, are upgradeable to HD Radio as soon as they're shipped from the factory, eliminating the need for PA module replacements or control system modifications.

BE showed its new XPi10 and Exgine FM HD Radio signal generator.

Another big name in transmitters has a new name this year: Continental Electronics is now DRS Broadcast Technology, although the Continental name remains the brand for its transmitters.

This year, the line includes the first of a series of solid-state FM transmitters, the 815D5 and, for HD Radio, the 815HD5. These 5 kW units use Continental's "Pure Reliable Deployment" design, an RF combining and splitting system that the company says is tested to withstand up to three times its operating RF requirements, and can continue to deliver rated output power if multiple amplifier modules fail.

The Virtuoso 10 from Nautel is a solid-state 10 kW FM transmitter for low-level, high-level or space combining for HD Radio.

Continental continues to add to its shortwave transmitter line. This year's version of the 418G 100kW shortwave transmitter includes a new control system and the ability to handle the Digital Radio Mondiale standard for digital broadcasting.

Nautel introduced the Jazz 1000, a 1,000-watt, 19-inch rackable AM transmitter; Maestro FM Exciter; and Virtuoso 10 kW FM Transmitter. All are designed for HD Radio transmission and integration with Nautel's NE IBOC digital generator.

Nautel added to its solid-state line this year with its compact Virtuoso 10, a 10kW FM-HD Radio transmitter for low-level, high-level or space combining. The company also introduced the Maestro 50, a 50-watt direct-to-channel digital FM exciter, which ships ready to operate in analog, analog/HD Radio and all-digital modes.

Armstrong displayed its solid-state, HD Radio-ready AM transmitters, and solid-state and single-tube FM transmitters from 10 W to 30 kW.

### Compact units

Another category that's been increasingly visible on the floor at recent NAB exhibitions is that of ultra-small low-power AM and FM transmitter. This niche features new entries.

Old-time engineers accustomed to 1 kW rigs that filled several racks' worth of space probably would find it hard to imagine today's solid-state units, which take up just a few inches of rack space and can be hauled from site to site easily.

For today's engineers, of course, such units have become useful tools for emergency backup, low-power post-sunset/pre-sunrise operation on AM or

See TRANSMITTERS, page 21 ▶


TS9000

FM Broadcast Analyser

microGen electronics

New!

- The TS9000 is a high performance FM receiver and Modulation Analyser providing accurate broadcast measurement
- The USB port allows for on-site and mobile monitoring. The unit samples the Multiplex signal at 240kHz at 12bits precision, with all measurements and calculations performed by Windows software
- Modulation Power is calculated with 32bit floating-point precision. The band covered is 87.5 to 108MHz in 10kHz steps

- Drag or Click Tuning
- RDS Decoding
- MPX power Measurements
- Modulation Measurements
- RSSI Signal Strengths
- Multi-Path Measurements
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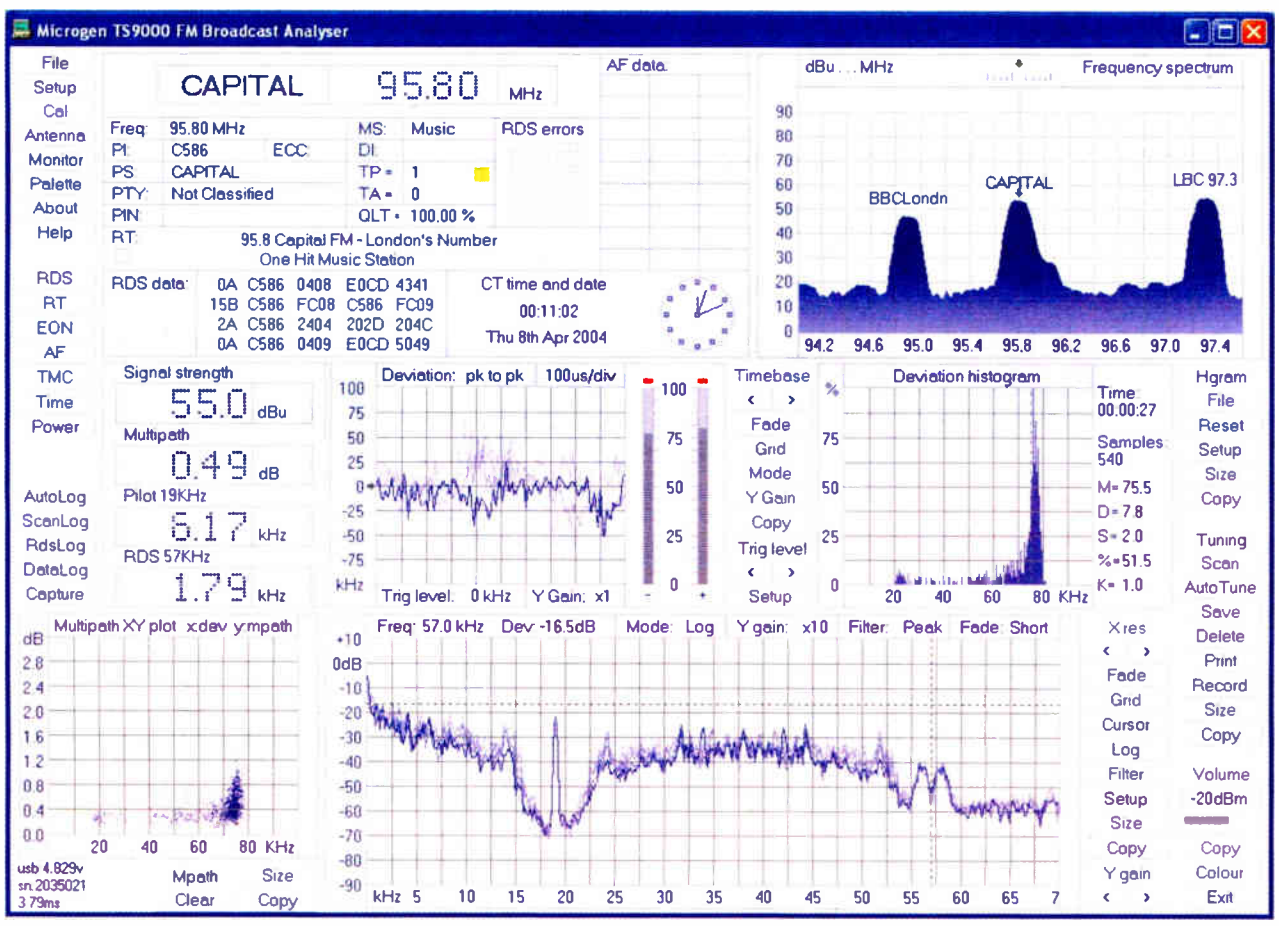
NAB 2004 Radio Magazine 'Pick Hit' Award Winner

NAB 2004 Radio World 'Cool Stuff Award' Winner

MSRP $1800




Information: www.microgenelectronics.com

Sales: www.broadcastwarehouse.com


World Radio History

# Transmitters

▶ Continued from page 20

even as primary transmitters where space is tight.

Energy-Onix displayed entries in this category as well. Its Pulsar 250B, 500B and 1000B solid-state PDM AM transmitters consist of a two-piece basic chassis just 10.5-inches high, weighing 70 pounds and offering 70 percent overall efficiency.

Bext Inc. has debuted the XT 1000 frequency-agile 1 kW FM transmitter. In addition, the company showed its Star Point and Constant Impedance FM high-power combiner systems and a new FM band pass filter that can be used to build multichannel combiners.

Crown Broadcast IREC has its Signal Clear FM250G at the show, a 250 W FM transmitter that it says meets the strict requirements for low-power broadcasting in Europe.

Also on display was its Omnia DP3 three-band digital audio processor, available as an option on new and existing "T" series transmitters; and the RTC redundant transmitter controller, which enables two Crown transmitters to be connected for multiple (1+1 or 1+n) backup capability.

Continental Lensa introduced an IBOC-compatible AM solid-state digital transmitter with power levels from 1.5 kW to 100 kW.

RIZ Transmitters Co. brought its RIZ DRM Compact Solution from Croatia; it is a DRM-ready exciter that works with older analog transmitters in the shortwave, long wave and AM bands.

Harris introduced the Mini-HD FM series of HD Radio transmitters.

RVR Elettronica showed the TEX-1000LCD FM exciter/amplifier, which offers adjustable output up to 1 kW, multivoltage power supply and an internal stereo generator in a compact body 3 RU high, with telemetry and remote control capability. RVR also showcased compact PJ1000M-C and PJ2000M-C 1 kW and 2 kW amplifiers for FM broadcasters.

And on the tube front, Eimac displayed its new 4CM100,000G-power tetrode, designed for shortwave and digital shortwave DRM transmitters.

*This story originally appeared in the NAB Daily News and is ©NAB.*

DIGITAL NEWS

## Belar Will Develop Monitors

**DEVON, Pa.** Belar Electronics Laboratory Inc. has signed a license to develop station monitoring products using Ibiquity's HD Radio Technology.

Belar plans to integrate the digital technology into modulation monitors that will allow AM and FM engineers to monitor the performance of their digital broadcasts. Belar is the first company to license the technology for such a purpose.

"Our customers are expressing an increasing need to monitor HD Radio broadcasts to ensure the transmission meets FCC requirements, and we have been working closely with Ibiquity to meet the growing demand for these products," said Belar's President and founder Arno Meyer.

Belar makes modulation monitors, frequency monitors, specialized AM receiving antennas, and other related equipment.

## Radio Experience, Omnia Partner

In a deal that revolves around RDS, Omnia Audio is partnering with The Radio Experience in a joint venture.

The companies said they will provide dynamic data technology for broadcasters wishing to datacast to RDS, HD Radio and Internet Web pages.

Frank Foti, president of Omnia, said, "Broadcasters have really begun to realize the positive potential in displaying dynamic information related to their on-air activities."

Allen Hartle, president of The Radio Experience, said, "As more cars sold in the American market come equipped with advanced radios, broadcasters see the advantages of adding the system to their service."

According to the companies, RDS hardware products offered by the joint venture will include an RDS Encoder with integrated RDS Accelerator, to give broadcasters the ability to send text information to RadioText and Dynamic PS displays, and a Dynamic Data Processor that provides data distribution capabilities for RDS and HD Radio.

Software products will include "Now Playing" software to interface RDS with automation systems for automatic music information retrieval, and "NewsFlash," which enables studio operators to broadcast weather reports, RDS Traffic alerts, Amber Alerts and sponsor participation in RDS, HD Radio and Web site displays.

World Radio History

# NAB2004 Photo Gallery

NAB THE WORLD'S LARGEST ELECTRONIC MEDIA SHOW

Photo by Leslie Stimson

Entercom's Clay Freinwald praises his experience with a recent IBOC installation at an HD Radio seminar sponsored by Broadcast Electronics.

Photo by Leslie Stimson

ERI's Marty Sacks, left, and Greater Media's Milford Smith are up to no good on the exhibit floor.

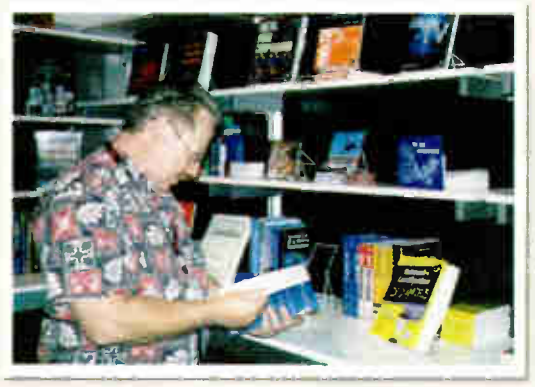


Photo by Paul McLane

Bob Kelley browses the selection of books in the SBE booth.

Photo by Bob Kovacs

A classic look from Ward-Beck Systems.

Photo by Paul McLane

Mike Dosch, left, is president of Axia Audio, a new subsidiary of Telos Systems. At right is Axia user Marc Johnson of WEGL(FM).

Photo by Paul McLane

Frank Seidel of Digigram points to the new PCX882HR multichannel sound card.

Graphic courtesy RCS

RCS Mobile demonstrated listener polling using SMS. It polled attendees about FCC indecency dealings.

Photo by Bob Kovacs

Show attendance was up about 11 percent to an estimated 97,544, about a quarter of them international. Carlos Henrique is with Teclar Telecomunicacoes in Brazil.

World Radio History

BUSINESS DIGEST

## AirCheck Acquires Media Monitors

One broadcast verification company is buying another.

AirCheck LLC said it is acquiring Media Monitors Inc. The buyer said the move enhances its presence in the spot and song monitoring services industry. The owners of Media Monitor, John and Anita Selig, become AirCheck employees.

MMI retains its name and becomes a division of AirCheck, which itself is a subsidiary of RCS Inc., the company that makes Selector music scheduling software and other products.

AirCheck's technology matches audio to fingerprints commercials and songs.

Shown marking the acquisition are, from left, Frank Cammarata, vice president of new business development for AirCheck; John Selig of Media Monitors; RCS/AirCheck President Philippe Generali; Anita Selig of Media Monitors; and Joe McCallion, executive vice president of AirCheck.

A cutout photo of AirCheck mascot Spot appears in front.

MARKET PLACE

## Staco Touts Power Protection

The FirstLine Conditioning Power System (CPS) from Staco Energy Products is intended for use in broadcast transmitters to protect equipment from damage by poor power quality. Features include diagnostic tools. FirstLine isolates the connected load from the primary AC supply, protecting it from voltage sags, high voltage spikes, transients and frequency variations.

The system can be configured for any 208, 400 or 480 VAC application. It can handle an input voltage range of +/- 20 percent while holding a tight regulation of +/- 0.5 percent for 100 percent balanced loads and +/- 3 percent for 100 percent unbalanced loads. Total harmonic distortion is less than 3 percent for 100 percent linear loads and less than 5 percent for 100 percent nonlinear loads. The FirstLine CPS has a front-mounted display panel that allows for monitoring and control of connected systems. Optional remote diagnostics and a remote alarm unit notify users when power problems occur.

*For more information from Staco Energy Products call the company in Ohio at (937) 253-1191 or go to* www.stacoenergy.com.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World Radio History

# 2004 Excellence in

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Radio

## Class of 2004 Nominees

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Crawford Broadcasting Co.

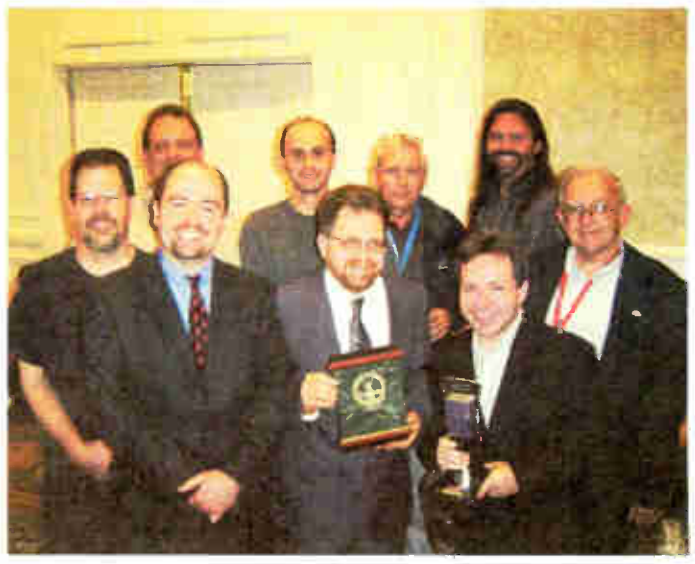
Andy Andresen
Cumulus Communications

James W. Davis
Radio One Inc.

Robert P. (Bob) Hess
Viacom/KMAX-TV

Ralph E. Hornberger
Minnesota Public Radio

Stephen M. Poole
Crawford Broadcasting



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Comrex would like to congratulate Andy and all the nominees!

Dielectric

To Andy and all the 2004 nominees, our congratulations for your achievements, your friends at Dielectric.

orb

Congratulations and ALL of the

PSI
PROPHET SYSTEMS
innovations

Congratulations to all the nominees and winner, Andy Andresen!

Telos

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A Telos

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World Radio History

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World.

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...munications

Thomas R. Ray III
Buckley Broadcasting

Greg Savoldi
Clear Channel

Stephen H. Schott
Broadcast Electronics

Michael Sirkis
Radio Systems Inc.

Milford K. Smith Jr.
Greater Media Inc.

E. Glynn Walden
Infinity Broadcasting Corp.

...dan

...Andy Andresen
...other nominees.

dorrough

Dorrough Electronics sends congratulations to Andy and all the nominees.

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Highest accolades to engineering's best from Harris.

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...Company
...o see so many
...on this list—
...ions to all.

AXIA
A TELOS COMPANY

Less time wiring studios, means more time to polish your well-deserved awards!

Wheatstone

Congrats to both Andy and Cumulus Media for redefining excellence and ingenuity in the broadcast industry!

World Radio History

TECH TIPS

# An Alternative to Traditional STL

*In the Coming Years, the ISM Band May Well Become a De Facto Broadcast Auxiliary Band*

**by W.C. Alexander**

For many years, competition for the limited number of STL frequencies has been an issue in and around the bigger cities. Crowding in the STL bands became even more of a problem 25 or so years ago when broadband composite links became popular.

Consolidation added to the problem, and antenna farms — efficient in many ways but presenting challenges with respect to STL frequency usage and RF radiation — brought their own set of issues. Digital and hybrid digital/analog links, while efficient users of spectrum by multiplexing many audio channels onto one link, still soak up a good bit of bandwidth, equal to that of composite links in many cases.

SBE coordinators have, over the years, done a tremendous job of keeping radio stations out of each other's way on the STL bands, but there has been only so much they could do. With only 13 possible 500 kHz channels in the 944 to 952 MHz Broadcast Auxiliary band, the options have always been limited.

### 5.8 GHz

This sort of thing has sent broadcast engineers scrambling for alternatives.

Today, in addition to over-the-air STL links, radio stations are taking advantage of all sorts of technology to deliver the goods to their transmitter sites. They are using T1, ISDN, even DSL in some cases. A few still rely on leased analog equalized telco lines ("broadcast loops").

Harris Aurora 5800

Now, with PCN coordination required on all fixed Broadcast Auxiliary applications (which can cost upwards of $1,000), there is even more incentive to find alternatives to traditional 950 MHz STL links.

A couple of years ago, Crawford added a new class C FM station to our established Birmingham, Ala., cluster. This station had a transmitter site well north of the city, and the current owner was using a two-hop 950 MHz STL to feed the site.

We had no desire to continue that arrangement, primarily because it required a monthly lease for the relay site, which was remote and for a number of reasons, added another point of failure to the overall equation.

We already had a tall tower on Birmingham's Red Mountain with a clear line of sight to the new station's transmitter site, but Red Mountain is an antenna farm, with numerous FM stations operating from the top. It became clear that getting another 950 MHz signal from the city up to that site without causing or receiving interference would be, well, impossible. We had to find another way.

That was when we began looking at unlicensed digital spread spectrum in the 5.8 GHz ISM band.

This band has a lot to offer. Low transmitter powers through small, high-gain antennas produce small-beamwidth transmissions that are unlikely to receive interference from co- and adjacent-channel users. In addition, the packetized, error-corrected nature of the transmissions carries a high immunity from even on-channel interference.

The whole architecture is designed to allow many users in a given geographic area to share a frequency, and the transmissions are bi-directional.

### Aurora

In Birmingham, we chose the Harris Aurora 5800, from the company's microwave division. It provides, in essence, a bi-directional T1 link between two line-of-sight locations up to 30 miles apart. T1 was nothing new to us; Crawford has been using T1 for STL applications around Birmingham for many years. The thing is, T1 terminal equipment can be expensive. We wanted to avoid having to purchase an Intraplex or QEI CAT-Link in addition to the Aurora.

That led us to our friends at Moseley Associates. Most broadcasters these days are familiar with the DSP6000 digital encoder/decoder system. This hardware, when connected to a composite 950 MHz STL, can provide a hybrid digital STL system carrying two or four channels of audio plus an auxiliary data channel.

When Moseley created the DSP6000, it included a feature that would allow it to operate over a fractional T1 in addition to a composite STL. It was this fractional T1 capability, in addition to relatively low cost, that made the DSP6000 attractive to us in this application.

To make the DSP6000 work with the Aurora, we had to purchase an inexpensive Adtran CSU (channel service unit) for each end. Moseley was a big help, assisting us with the proper cabling between the Aurora, the CSU and the DSP6000. The end result was a four-channel audio link with a data channel from our Birmingham studios and our Red Mountain transmitter site.

Two of the audio channels feed a 950 MHz digital STL link to the new FM station's transmitter site some 50 miles north of the city; the other two feed one of our AM stations via a different 950 MHz digital link. The trick was getting the feeds for the two stations to the Red Mountain site.

The Motorola Canopy cluster, including NEMA enclosure, was installed on KLZ's east tower.

This ISM-band link has been 100 percent reliable since we installed it. We experienced no dropouts even through a couple of tropical storms that produced rainfall so intense that one could drown standing up in the parking lot.

### Under the Canopy

Last year in Denver, we were looking for ways to cut operating costs. With our Denver cluster's studio located in a historical district near downtown, over-the-air 950 MHz STLs have always been out of the question.

We have fed each of our four transmitter sites with T1 circuits since day one. These T1s have been expensive and somewhat less than reliable. Each site has an ISDN backup, which gets us through the T1 failures (except in the case of "backhoe fade," which, thankfully, hasn't happened).

We briefly considered the Aurora in Denver, but about that time another station in town began using a different product, the Motorola Canopy. This is really a wireless broadband platform, meant to be used by wireless Internet providers. It consists of access points (used to "broadcast" to subscribers), subscriber modules (used at subscriber locations), and backhaul units (used for site-to-site links in the wireless network).

It was the backhaul units that initially caught our eye. These units mate a 60-degree transceiver/antenna with a reflector (dish) to provide a point-to-point link over up to 35 miles with a 1.8-degree beamwidth at 5.8 GHz.

Unlike the Aurora, which provides a 1.544 Mbps T1 link, the Canopy provides a 10/100BaseT connection between sites with 10 Mbps bandwidth. In addition, by using access point and subscriber modules, we could get around isocoupling from our hot AM towers. All we had to do was provide continuous 110-volt AC power on the towers (already there for tower lights via Austin Ring transformers).

The transmitter end of the backhaul modules would connect to an access point that would in turn connect to a subscriber module a few hundred feet away on the transmitter building. The base insulator would be crossed with 5.8 GHz RF, and that would have no effect whatsoever on the tower impedance or current distribution.

That left us with the question of how to get audio into and out of the Canopy. The other Denver station that was using the system used an audio streaming encoder on a PC for this purpose. That is certainly an economical way to get the job done, but I was uncomfortable with a PC in the air chain. That was when we found out about a new Harris product, the CM-20 TCP/IP module for the Intraplex. This new module would allow the Intraplex to operate point-to-point over any TCP/IP connection, even the Internet.

### No lines

It took a bit of experimenting to get things just right, but Ed Dulaney and our Denver engineering crew were successful. We have been running for the better part of a year now on Canopy in parts of our Denver cluster.

The Canopy helped Crawford solve a problem in Denver. The backhaul module with reflector is shown.

Between the studio and our critical KLZ(AM) transmitter site, which is a hub of sorts for our entire operation, we run four channels of audio outbound and eight on the return. Outbound, we feed not only KLZ on-air audio but also audio to our corporate satellite channel (the uplink is located at the KLZ transmitter site). The return feeds multiple channels of satellite audio and air monitor back to the studio.

For redundancy, we ran a completely separate link to KLZ via the second tower at the KLZ transmitter site. It is identical in every respect to the first link, consisting of a backhaul link from the studio, a backhaul module and access point on the second KLZ tower and a second subscriber module on the roof of the KLZ transmitter building. Should lightning wipe out any part of one system, the other system should be ready to take over. We kept the ISDN backup as well, giving us a place to go for last-ditch emergency situations and for system maintenance.

One great thing about the Canopy system is that there are no transmission

See STL, page 27 ▶

World Radio History

# STL

▶ Continued from page 26

lines. Shielded CAT-5 cable is used to feed the self-contained "transceiver-antenna" modules. The backhauls, access points and subscriber modules all look alike and are about the size of a paperback.

A "wall wart" power supply is used to insert power on the CAT-5 through an RFI filter/surge suppressor. For our on-tower installations, our Denver crew built up weatherproof NEMA electrical enclosures that contain additional surge/RFI suppression and electrical outlets for the power supplies. The NEMA boxes are mounted outside the tower structure within a few feet of the Canopy cluster to keep lightning surges from inducing damaging voltages in long runs of CAT-5. So far, we have made it through one thunderstorm season without damage or outage.

**Unlicensed digital spread spectrum in the 5.8 GHz ISM band has a lot to offer.**

The cost? Excluding the Intraplex equipment, the over-the-air portion is about half that of a typical over-the-air 950 MHz STL. Include the Intraplex, and depending on the configuration, the cost is about twice that of a hybrid 950 MHz over-the-air system.

**Net access**

There are other benefits, we found, to having a 10/100BaseT connection between our studios and transmitter sites. One is that we now have high-speed Internet access at our transmitter sites. Two is that we can use excess capacity for all sorts of other things.

Broadcast Tools, for example, makes a device that connects over TCP/IP that gives you 32 contact closures on each end. Close a contact on one end and the counterpart on the other end also closes. There is little latency with this device over the Canopy, so operation appears instantaneous. We use this device to transmit satellite contact closures back to the studio.

Another device manufactured by Digi and distributed by BT provides a point-to-point RS-232 connection over TCP/IP. With that little goodie, you can connect your remote control or other serial device.

For security, we have installed Webcams that we can monitor from anywhere over the Internet. The one at KLZ is aimed at the transmitters and equipment racks. Should an off-air condition occur, our engineers can look and see what transmitter fault lights are on. If the room is full of smoke, they can call the fire department!

I'm sure there are a number of other digital spread spectrum systems out there that will work equally as well as Aurora and Canopy. At the spring NAB convention, Broadcast Electronics introduced the "Big Pipe," a 5.3 GHz bidirectional STL that provides up to 45 Mbps of bandwidth. Others are sure to follow. As consolidation continues along with allocation shuffles and market move-ins, finding creative, cost-effective means of delivering the goods to our transmitter sites will undoubtedly become one of the most challenging aspects of the radio engineer's job.

In the coming years, the ISM band may well become a de facto broadcast auxiliary band.

*Cris Alexander is director of engineering for the Crawford Broadcasting Co. Tell us about your own novel solution to a technical problem at* radioworld@imaspub.com.


## WE GIVE YOU PETERSON

Name: Alan R. Peterson

Occupation: Assistant CE for Radio America Network, audio production specialist, RW columnist since 1989 and "other duties as assigned."

Certifications and industry honors: SBE member since 1994, award-winning radio commercial producer, A+ computer certified, NAB convention speaker since 2000.

Personal heroes: Cousin Brucie Morrow, Dan Ingram, Les Paul, Dr. Robert Moog

Favorite station growing up: 77 WABC New York

Other: Celebrating 25th year in radio in 2004. Synthesist and guitar player, juggler, rapid-fire DJ. Dangerous around carpentry tools.

**Radio World**'s pages are home to the finest writers and columnists in the industry. Like Al Peterson. Just one more reason we're the newspaper for radio managers and engineers.

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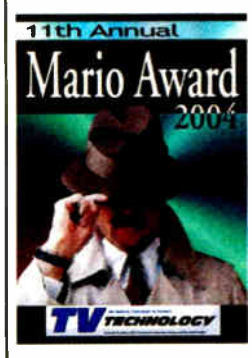


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World Radio History

# BFBS Keeps Pace With Change

## *British Forces Broadcasting Service Looks Ahead After 60 Years*

**by Lawrie Hallett**

Unless you are involved with the armed forces, you may not have heard of BFBS, the second-oldest radio broadcaster in the United Kingdom.

The British Forces Broadcasting Service, which recently celebrated its 60th anniversary, operates around the clock, providing a link with home for service personnel and their families at various bases, at sea and in conflict zones.

From humble beginnings toward the end of the World War II, BFBS now operates three radio services and two television channels from its headquarters northwest of London in Buckinghamshire, which are delivered worldwide via satellite and supplemented by a great deal of locally produced output. It produces its own news service and a wide range of specialist programming.

Although funded by the government defense ministry, BFBS is part of a registered charity, the broadcasting arm of the Services Sound and Vision Corp., which also is involved in cinema and live entertainment for British troops.

This not-for-profit status allows BFBS access to resources and programming streams that would be prohibitively expensive for commercial organizations. In many ways, BFBS is a giant community radio service.

The BFBS Fayid (Suez Canal Zone) Studios in 1955 (left) and the Chalfont Grove (England) Studios in 2003

Each of the three radio services targets a specific audience.

BFBS Radio 1 is a general entertainment service, while BFBS Radio 2 carries a greater percentage of speech and specialist material. The third service consists of Nepalese- and English-language output aimed at Gurkha service personnel who are recruited from Nepal and have been an integral part of the British Army since 1815.

Although BFBS Radio 1 is almost universally available, the other two services are not. The Gurkha service is broadcast only where such personnel currently are based, and BFBS Radio 2 is provided to larger military installations as frequency space and other resources permit.

Because military requirements change over time, BFBS has to be able to adapt quickly to circumstances. Although some locations, such as Germany, Cyprus and Gibraltar, have been home to BFBS stations for many years, other installations, such as Malta and Hong Kong, closed when political changes meant an end to British military involvement.

### New locations

With the world as it is, closures are less common than the setting up of new broadcast locations.

Within the last decade or so, new BFBS services have gone on the air in parts of the former Yugoslavia and Afghanistan, as well as in Kuwait and Iraq. BFBS also added a station in the Falkland Islands after the conflict between the United Kingdom and Argentina in 1982.

In the event of service personnel going out to an entirely new location, BFBS now has transmission equipment that it can fly out rapidly and install as required.

Such gear initially rebroadcasts satellite-delivered programs with locally produced material added later if the scale of the operation suggests that a dedicated studio installation might be required in the longer term.

In recent years, legislative changes at home have, for the first time, allowed BFBS to launch domestic services for military personnel based in the United Kingdom.

BFBS first set up low-power AM services, similar to those used by hospital and university stations here, at bases in Northern Ireland, followed later by others in England. Of particular importance is the provision of Nepalese-language radio for Gurkha regiments who cannot access alternative broadcasts in their native language.

It is no surprise that an organization with 60 years of history has changed considerably over that time. However, the pace and scope of change appear to have increased in recent years.

### Studio rebuilds

Technological advantages in the early 1990s allowed the distribution of increasing amounts of live programming via satellite instead of via prerecorded cassettes and reel-to-reel tapes.

Although a live news service from London began in the mid-1980s, it took several years for satellite airtime and equipment costs to drop to a point where longer programs could take the same route to almost all BFBS broadcasting locations.

The administrative relationship with the Ministry of Defence also has changed.

Prior to 1996, BFBS operated under the terms of a "blueprint" arrangement that provided the broadcaster with money to provide particular services. From 1996, however, a more formal contract replaced this arrangement.

This tighter arrangement provided the impetus for BFBS to change and move forward more quickly than might otherwise have been the case, managers say. In particular, it led to the introduction of more flexible staff working.

Previously, station staffing typically had been more static, with management, engineers and announcers spending several years at fixed postings; today, most will spend up to a third of their time working at other locations as operational requirements demand.

For the immediate future, a major project within the organization is a rolling program of studio rebuilds.

In a program scheduled for completion by 2006, analog installations are being upgraded to digital studios based around Lawo zirkon desks and Dalet playout systems.

Peripheral equipment will include Marantz PMD340 CD players and Sony MDS-E12 MiniDisc units. The main announcer microphones will be Audio-Technica AT4033/CL cardioid condensers.

The first set of new equipment is expected to be installed in Gibraltar, with the second going to the Falkland Islands.

A 10-year BFBS contract with the defense ministry runs until 2011, and management within the organization expect to be in competition with others bidding to run the service after that date.

However, while a contract to deliver broadcasting services around the world may at first glance appear attractive to some commercial operators, further investigation of the complex operational requirements and the specific needs of service personnel may dissuade potential applicants.

*Lawrie Hallett reports on the industry for Radio World from Norwich, England.*


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World Radio History

Radio World, May 19, 2004

Past columns are archived at *www.rwonline.com/reference-room*

# Zap! Ouch! Flames From the Fingers

**by John Bisset**

Two-thirds of the way into spring, it's time — past time — to take a close look at what winter did to your outside cabling.

This includes inspecting the cables on the studio roof feeding EAS and off-air monitor antennas. Cables that rip loose from their supports can cause damage to themselves and adjacent antennas or structures. (No doubt this will happen in the middle of morning drive.)

We've driven home the point of not using white nylon cable ties because the ultraviolet light will cause them to fail. Black has a better track record; but even the black ties, in practice, aren't much better than the white. After a couple years of wind, weather and sunlight they get brittle, break and let you down.

Jim Alexander is a contract engineer in Arkansas. He writes that his favorite technique for securing smaller lines is to use lengths of #10 or #12 solid-conductor copper wire with black insulation. Jim says any color will do; you could color-code feedlines with various colors of wire if you like. Wrap the wire around the tower leg and feedline a couple of times and twist with pliers. As an added benefit, you can re-use them several times if line feeds change.

Jim also wanted to comment on the nicked Heliax jacket mentioned in a previous column. Years ago, the crew at ERI was working on a tower and showed Jim the best way to repair a small hole in the jacket. They used a small piece of rolled roofing material, and some roofing repair compound, either tar, or plastic.

Cover the hole with the tar or plastic compound, then use hose clamp(s) as necessary to clamp the small piece of rolled roofing material over the small break or hole.

Jim can be reached at *ealexand@cswnet.com.*

★ ★ ★

Matt Krick is an engineer for KGMN(FM), KZKE(FM), KYET(AM) and low-power KKAX(TV), all located in Northwest Arizona.

Fig. 1: Check the location of meters in the circuit before touching them.

He writes to tell *Workbench* readers about a shocking experience he experienced a couple of weeks ago.

When doing post winter maintenance on his stations, he was at KGMN, which uses a Harris FM-1K transmitter. Matt noticed that the plastic cover on the Plate Current meter had fallen off and was lodged between the area where the meter sits and the front chassis.

Thinking nothing of it, he picked up the plastic cover and tried to place it back on the meter, while the transmitter was still on.

It was only after that Matt realized why the cover was off in the first place. One of the terminals was conducting to the meter's faceplate and just waiting for someone or something to come into contact with it.

Matt's hand came in contact with the meter and took the full force of the 3 V plate power supply into his left index finger.

"It was like having a camera flash go off in your face, followed by severe pain about five seconds later," he told us. There is a crater on the faceplate where the arc occurred, just below the 0.1 amp position.

Fig. 2: A dusty 'haze' is a tip that the meter is at a high voltage potential.

The experience left a pretty good electrical burn on his finger where the contact was made to chassis ground. Thinking fast, Matt threw his hand into some snow that hadn't finished melting. He waited 30 minutes for enough feeling to return to his hand so he could make the drive down the mountain. Slowly the feeling to his fingertip returned.

When he replaced the meter on the day after the incident, it appeared that a small fire had occurred in the original meter. There were char marks all over the place.

The experience taught Matt a number of good lessons: First, check schematics to see where meters are in circuits; assume nothing. After the incident, Matt checked the schematic and saw the ammeter was in series with the high side of the plate circuit. The dusty "haze" seen in Fig. 2 is another tip that the meter is at a high voltage potential. The high voltage attracts the dust that clouds the meter face.

When cleaning these meters, make sure the transmitter is off, and all high-voltage points properly discharged.

Matt also cautions readers to have a buddy present when working on transmitters. We've all "done it alone," especially in an emergency; that doesn't mean it's right. Last, the experience has taught Matt — and should teach us — to think twice before "thunking" a meter with a thumb.

★ ★ ★

Fred Shetler, a ham and engineer in Port Royal, Pa., writes about the picture of the "log rest" in our column of April 7. Although it's a good idea to help organize jocks' logs, Fred identified a potential problem: the two sharp corners. They need a good radius on them.

Fred says he can envision a jock wounding the back of his or her hand in a rush.

No wounding has been reported, probably because the log rest is located at the far right of the console, away from most hand motion.

Reach Fred at *weltetripp@acsworld.net.*

Fred also asks for comment on the use of transmitter tubes in cold climates, essentially operating in an unheated plant. We'd like to get your tips and experiences. Send them via e-mail to *john.bisset@dielectric.spx.com.*

★ ★ ★

Ihor Slabicky works for Raytheon and saw our April 23 mention of the woes of soldering RCA plugs. Ihor offers some tips for soldering these connectors.

First, fold the tip (center, hot, +) wire over on itself before inserting it into the center tip.

See WORKBENCH, page 31 ▶

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World Radio History

# Digital Music Gains Legitimacy

## *Emergence of Legal Downloading Means More Competition for Listeners*

**by Skip Pizzi**

There's been a lot of press lately on how Steve Jobs and his crew at Apple Computer are changing the face of the company from a computer hardware manufacturer to a "digital lifestyle organization," and in the process are helping awaken the music industry from its current commercial nightmare.

In fact, it has taken an entity with the clout, know-how and legitimacy of Apple to bring together the disparate players and call the first lasting truce in the music file-swapping wars. What Napsterization has wrought, Appleization may solve, and the giant sucking sound of recent music-industry revenues could soon be silenced, as iTunes and other similar services reseed the market with legitimate revenues, a dollar (well, 99 cents) at a time.

The primary stimulus for this movement was the music industry's own refusal to adapt its granularity of delivery to meet obvious consumer demand. Record companies' stubborn insistence on providing their product only in ~$15+ full-length CDs that might contain only one or two desirable songs is a classic case of wearing corporate blinders and sticking to outmoded traditions long after they have lost their value and appropriateness. No one should be surprised that at least some consumers sought alternative means of acquiring such content in ways that met their needs conveniently. The fact that early peer-to-peer file-sharing was essentially free certainly fueled the trend, but "stealing music" was not the initial motivation for most users.

This process has served as the best object lesson to date of the power of the digital economy (legitimate or otherwise). One need look no further than the recent bankruptcy of Tower Records to understand the depth of the record industry's miscalculation, and the dangers of denial as a corporate response. A business model that cannot or will not adapt to such forces is seriously at risk.

So it's important to understand that such music-downloading behavior also indicates a trend away from radio listening. If you want to hear music, why put up with commercials and other clutter when you can access a far wider and more personalized selection, in high fidelity, even with programmed crossfades and the like, making it almost like your own private radio station?

Sure, it takes more work than just turning on the radio, but for many digital natives such efforts are fun and empowering, and the results certainly more satisfying in most cases. The added conveniences of a good user interface and a broad selection of content provided by the new breed of legitimate music portals like iTunes further lessens this burden, and increases the pleasurable "shopping" aspect of the process.

Once these users initially shift their behavior to digital music downloading, they are likely to expand such activity and thereby increasingly reduce their radio listening. (In fact, some observers have actually *blamed* terrestrial radio in part for the original movement toward file-sharing, given listeners' dissatisfaction with the ever-narrowing playlists on most commercial stations today.)

But as good as file downloading and media players get, it's *not* radio, and when news, sports and other immediacies — or simple "live" human voice contact — is desired, radio is still there for these listeners. Nevertheless, most people only listen to one audio service at a time, so usage of iPods and similar devices is likely contributing to the continued overall decline in TSL of commercial, music-formatted radio stations.

### Reviving commerce

The legitimacy that Apple — and the other major players that currently or will soon offer similar services — add to the trend is accelerating the movement and expanding such behavior significantly by making more people feel comfortable about downloading music. The more pervasive mass-marketing message that such big businesses can bring to bear will undoubtedly also expand the market. The expected emergence of more competitors to iTunes will likely provide product and service differentiation, and possibly some competitive pricing pressure, making the business even more visible and attractive to consumers.

So just as the VCR once feared by Hollywood became one of its biggest profit centers by enabling video rentals, these previously dreaded digital music portals may restoke the ailing music industry, bringing on a renaissance that revives the sector with fresh revenues from previously disengaged audiences. But how will radio benefit from this white knight?

### Product over form

First, note that these audiences were never really disengaged from the music industry's *product*; in fact, quite to the contrary, they were highly motivated users. But they were not enamored by the associated retail process, and therefore primed to explore alternatives. The industry was slow to respond to this movement, and when it finally acted, it attempted the route, almost always unsuccessful, of stick instead of carrot (or in this case, Apple) to solve it.

So what routes can radio use to re-engage its disenchanted users? Here again, these audiences are still interested in the product — it's only the form of its delivery that turns them off.

One classical solution is the provision of exclusive, compelling content. Early windows of availability to new music prior to commercial release continue to fit this model, but consider that artists and record labels are increasingly moving such offerings to the Internet, having been discouraged by radio's limited accessibility to airtime.

Other exclusive radio offerings popular in many quarters are the shock-jocks and morning zoos that are being threatened by the current indecency purge. Consider also that both of these types of content may find warmer welcomes on satellite radio channels. So while this concept remains viable and important, broadcasters will be challenged to find new and better ways to provide appropriately exclusive content to their listeners in cost-effective ways.

Another approach is the expansion of a station's online services, and the exploitation of new on-air services that HD Radio (and recently revitalized RBDS) could provide. Here, too, the record industry has provided obstacles, successfully adding performance royalties to music Webcasts, and now seeking copy protection on digital radio broadcasts (as evidenced by the FCC's recent notice of inquiry on the subject).

Nevertheless, a music-formatted radio station's brand value still has some worth, and could be used to drive traffic to a music download portal or alternative streams (online or on-air) to provide more appeal and congruence to digital music users. Even artist and song-title data displays alone have value here, since they make radio more like the services that digital music users frequent.

Digital music downloaders quickly are moving from a fringe to a mainstream demographic. In order to survive, radio must find new relevance to this consumer profile. Next time, some ideas for using HD Radio's supplemental audio services to serve this purpose.

*Skip Pizzi is contributing editor of Radio World.*

## The Big Picture

Photo: Gary Hayes, BBC

**by Skip Pizzi**

# Workbench

▶ Continued from page 30

The fold should form a sort of "spring" effect, so that when you stick the wire in the center, there is enough pressure and friction to hold the wire in place. If the wire is thick, you can put a wiggle bend in it, so it still gives a friction fit.

Stick the wire in all the way, so it is flush with the opening, or even sticking out about 0.5 mm.

It helps to have the shell of the connector wrapped in some kind of heat sink. Ihor uses a piece of damp paper towel, wrapped around the shell and the insulated part of the wire going into the center. The damp towel guards against melting the insulation.

Once the wire is firmly in place in the center pin, heat the open tip of the connector and the 0.5mm piece of wire sticking out of the end. Have your solder ready. Use a very thin solder, so it melts quickly. As you heat the tip and the wire, lightly tap them with the solder, to see if the temperature is high enough to melt the solder.

As soon as you see that the solder is melting, push it into the center hole. Heat a little more, let the solder melt nicely then let it cool. You should end up with a nice round shiny blob of solder, the same diameter as the center tip.

The process takes practice, but is worth learning and doing well. Use less heat and more patience. You'll get good connections and won't melt the insulation of the center wire.

I've also found that tinning the center wire before starting the procedure helps in securing the wire to the inside pin of the RCA plug.

Thanks, Ihor, for sharing these tips.

*John Bisset has worked as a chief engineer and contract engineer for more than 30 years. He is the northeast regional sales manager for Dielectric Communications. Reach him at (571) 217-9386, or* john.bisset@dielectric.spx.com.

*Submissions for this column are encouraged, and qualify for SBE recertification credit.*


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World Radio History

# ESPN Radio Unveils New Facility

**by Scott Fybush**

They call it "Bristol University," and indeed, the ESPN compound in deepest Connecticut suburbia looks like nothing so much as a college campus — at least, one with dozens of satellite dishes lining the edge of the property.

And to hear the staff at ESPN Radio describe it, their original digs in a corner of "Building Two" here bore a startling resemblance to your average tiny college radio station.

Outside the Studio Looking in

Twelve years after the radio network signed on, though, it's now the proud occupant of a slick new studio complex occupying half of Building Two's second floor, optimally located right between the ESPN newsroom and the SportsCenter studio.

### Shatner 5000

"One of our operations directors put it best when he said we're transitioning from the Flintstones to the Jetsons," said ESPN Radio General Manager Bruce Gilbert about the recent move into the new digs, which followed two years of operations from a temporary location in another building on the campus.

"We were still in a primarily analog facility, still using carts," Gilbert said. "We really had a hodgepodge of platforms, some Digicart, a little bit of Pro Tools, a little bit of Replays and Short/cuts, but we were still using tape."

"It was not pretty," morning show co-host Mike Golic recalled of the old studio. "We'd have guests come in and sit in our great closet studio. It was awful."

There's no tape to be found in the new facility, which Golic's co-host Mike Greenberg dubbed the Shatner 5000. ("We kind of looked like we were sitting in the Enterprise there," Golic says.)

Instead, there's an ENCO DADpro32 automation system with 10 terabytes of storage, connected to six studios through a five-frame Sierra Audio Systems 32KD router.

"There are times when we can actually be sending three feeds out of here at once. We can have the general talk shows, we can have an NBA playoff game and we can have a Major League Baseball game all going at once," Gilbert said, "and you want to have the flexibility and functionality to do that from any of the rooms that exist.

"With today's software and the better router system, all six of them can do the same functions," Gilbert said.

Don Backus of ENCO Systems called the ESPN job "significant in size and scope" for ENCO. He said the network is using MPEG-1l compression at a 48 kHz sample rate to be compatible with TV needs.

"They are also using our DADpad user interface, based on the JL Cooper ClipShot, which allows tactile control of 40 color LCD-labeled buttons controlling the DADpro32 Array. They will be using these for live event programming and live shows. They also purchased our control interface to the Harris Pacific Digital BMX consoles."

Harris Broadcast supplied the equipment, which includes Harris Pacific Digital BMXdigital consoles, ElectroVoice RE27 mikes and Aphex Systems 1788 mic preamps.

Plans include installation of Logitek Remora consoles in several studios. ESPN Radio also has been experimenting with ENCO's Phonetica audio archive-search software to help manage its extensive archives, though Evans says simple text searches usually work well for ESPN's needs.

### 'That's just cool'

"We pretty much know what game we're looking for, and highlights get recorded with enough detail that we can just pull things up by time of day." He expects producers to increase their use of the Phonetica system as well.

Evans said the move to digital audio distribution required ENCO to develop some modifications to its software to accommodate ESPN's requirements. Because the Bristol facility only handles content production, it has to connect to ABC Radio Networks' broadcast operations center in Manhattan to handle spot breaks and network distribution.

The New Main Studio of ESPN Radio

A showpiece of the new facility is the newsroom, which occupies a long, narrow corridor that runs the width of the studio cluster. "SportsCenter" anchors now can go on the air live from their desks in the newsroom, which Gilbert says was one of the big goals of the move.

"It was just an interruption for the guy to do 'SportsCenter' (in the old studio) because he actually had to physically walk in the studio, sit down and do 'SportsCenter,' and that's the time when the talk hosts are going over how they did in the last segment, what they're going to do in the next segment, and it was just an incredible interruption for everybody."

The most eye-catching feature of the new studios is the plethora of flat-screen video monitors, more than 100 of them, lining the studio and control room walls. In addition to displaying every possible live sports feed, cameras in each studio connected to the monitors provide a crucial visual link, allowing talk hosts to see who's in the newsroom and vice versa.

"We have so many monitors in there, I think we're watching channels from other countries," Golic says — and in the morning, one of them is always tuned to Regis and Kelly. ("We usually have a comment about Kelly," Golic joked.)

Hartford-based Tecton Architects designed the 3,500-square-foot studio space, with acoustical design by the University of Hartford's acoustics department. The newsroom, essentially a glorified corridor, was a particular challenge, says Chief Engineer Tom Evans.

"We angled the walls and we used RPG (wooden diffusor panels, found throughout the studios) and it does not sound like a hallway," Evans said.

"We felt that ENCO was the most flexible in meeting those needs," Evans said.

The new studio space has given ESPN Radio some expansion opportunities that would never have been possible from the old closet studios.

"Since we moved in here, we're doing an Internet-only fantasy show every week. We could never have done that before, but we now have a studio available for these guys. That's a new revenue opportunity for the network," Gilbert said.

The additional studio space also will make it possible for ESPN Radio's 700 affiliates (250 of which carry the network full time) to send air talent to Bristol to do the occasional live show from network headquarters.

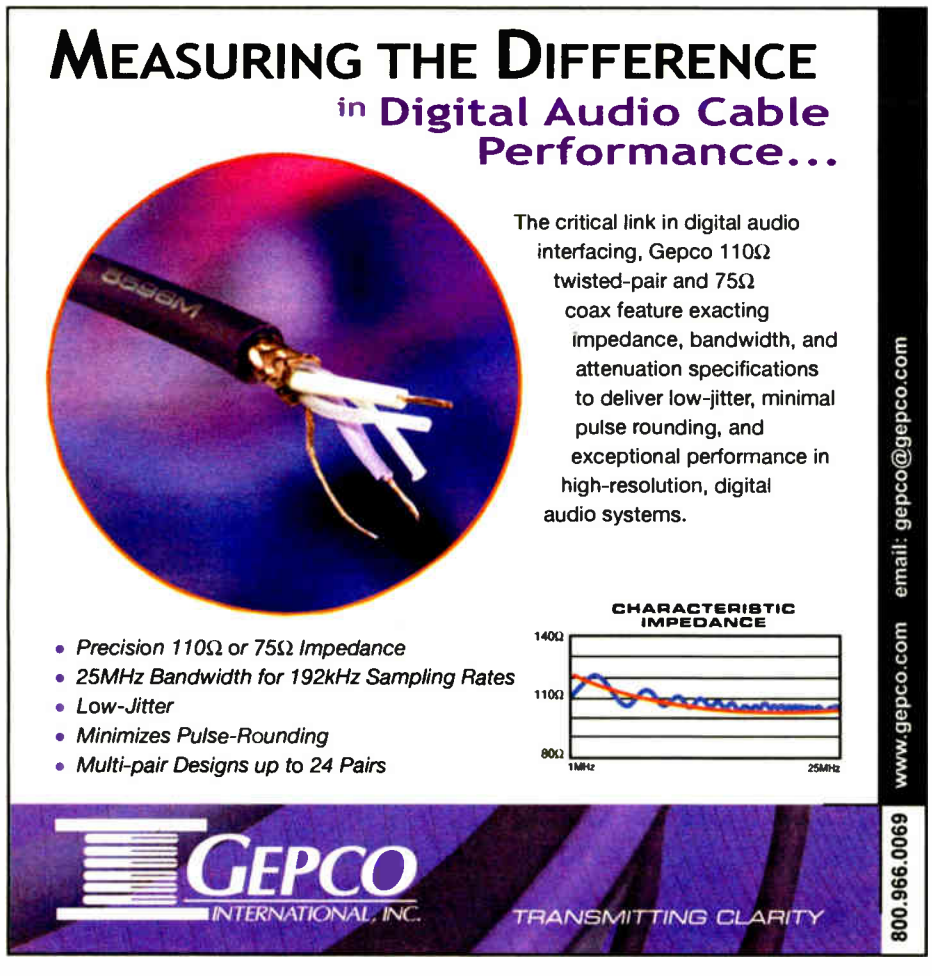
"You come in from Des Moines and do your afternoon show, and Peter Gammons walks by or Dan Patrick walks by, and that's just cool," Gilbert said.

Still on the horizon is an even closer connection with the TV side of ESPN: Gilbert says the ENCO system will be installed in the ESPN digital TV center that's now under construction, allowing audio to be shared instantly among TV and radio staffers.

And there's one intangible benefit to the move, staffers say. Gilbert says there's been a huge morale boost since ESPN Radio moved into its new quarters.

"It's really been neat to watch people go from that complete mode of apprehension and trepidation to euphoria and excitement," Gilbert said.

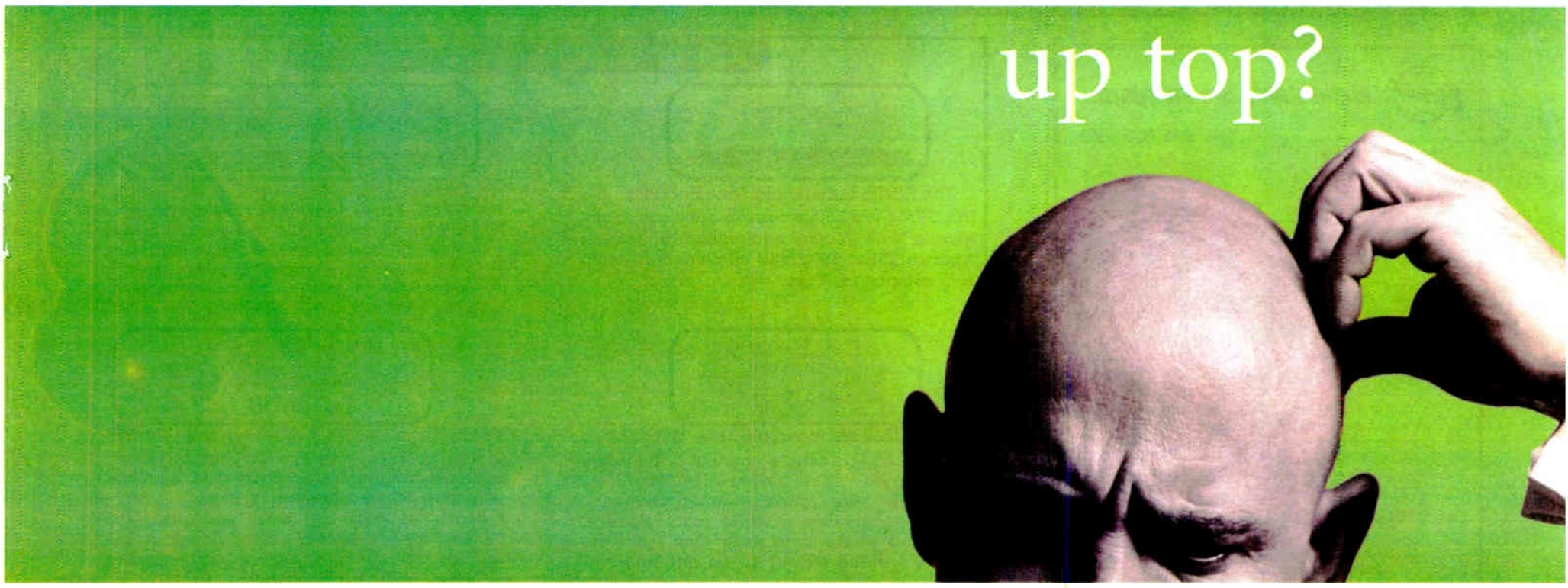
*Scott Fybush says he'd make a lousy "SportsCenter" anchor, especially on days when the Red Sox lose.*



World Radio History

# Wish you had more

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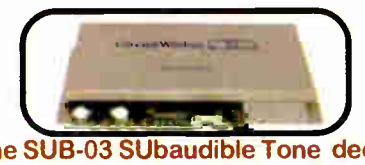

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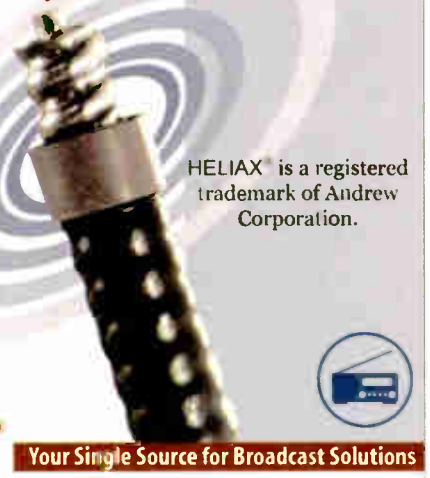

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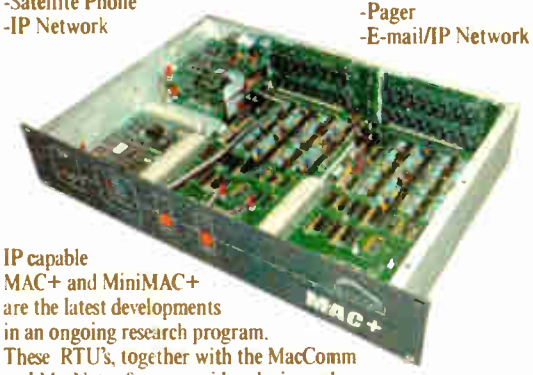


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Studio Sessions

Shecky's Back
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# Opening the Linux Window

*For Linux Fans, Radio Automation Has Been a Decidedly Mixed Bag*

**by Carl Lindemann**

Is Linux the operating system of the future for radio? Given the industry's reputation for running lean, cost-efficient operations, why would anyone pay the licensing fees — what some call the "Microsoft Tax" — on every computer and server if there were an industrial-strength alternative that was legal, convenient and free?

Applying Linux to automation systems seems a natural. But according to broadcast industry software developers, if the buzz over Linux that has hit other information technology markets is coming to broadcasters, it will not be happening anytime soon.

Scott Studios' SS32 is available in Linux and Windows versions.

## Open source movement

Linux, the proud product of the open source movement in the software industry, is something of a community creation. It operates on an alternate model from traditional software, created with source code freely given and shared for the common benefit.

Is this some kind of high-tech Utopianism of socialized software? No, not altogether. What Linux points to is the special place an operating system plays. Think of it as a key element in the community infrastructure, like public roads. Just because the roads are public works does not mean that the vehicles that run on them are community property.

By the same token, this open source operating system is free. But that does not mean that the application software that runs on it is also a freebie. Unfortunately for software developers, this distinction is not altogether clear.

"We get a lot of inquiries for Linux," said Dave Scott, president of Scott Systems. "When we tell them that the Windows and Linux versions of our systems cost the same, they're amazed. 'You mean it isn't free?' they ask. Well, I never saw anything free that was worthwhile."

For all the freebie frustration, Scott has taken the leadership in opening the door to a Linux future. At the NAB Radio show in Philadelphia last fall, Scott Studios announced the initial release of its air product for the new operating system. The aim was to take in-house development to stations for beta testing to polish and perfect the product.

The first takers did not arrive till five months later. In March, the company sold a four-station package. According to Scott, having beta testers marks a major step taking this from a part-time diversion project to a commercial product.

"Paying customers move us from presenting 'things we'd like to do' into making something commercially viable. The software gets more alpha testing by us as vendor, manuals and documentation get more serious attention, and support staff gets training in depth," said Scott.

Still, it is a long way from these first beta tests to establishing the Linux OS as an accepted industry standard. While Scott Studios has become the center of Linux interest, other developers have seen little demand except in specialized, embedded applications like Web servers and Network Attached Storage systems. There, the legendary stability and simplicity of Linux make for a cost-effective solution.

"We have done some work with Linux as an embedded OS for Network Attached Storage systems and have been pleased with the price/performance ratio," said Don Backus, vice president of sales and marketing for ENCO Systems.

"As far as a platform for actual development goes, we generally think of Linux as a solution waiting for a problem, at least in our specialized field of application development," he said.

What interest Backus sees from potential customers is not exactly a match for the advantages of the OS.

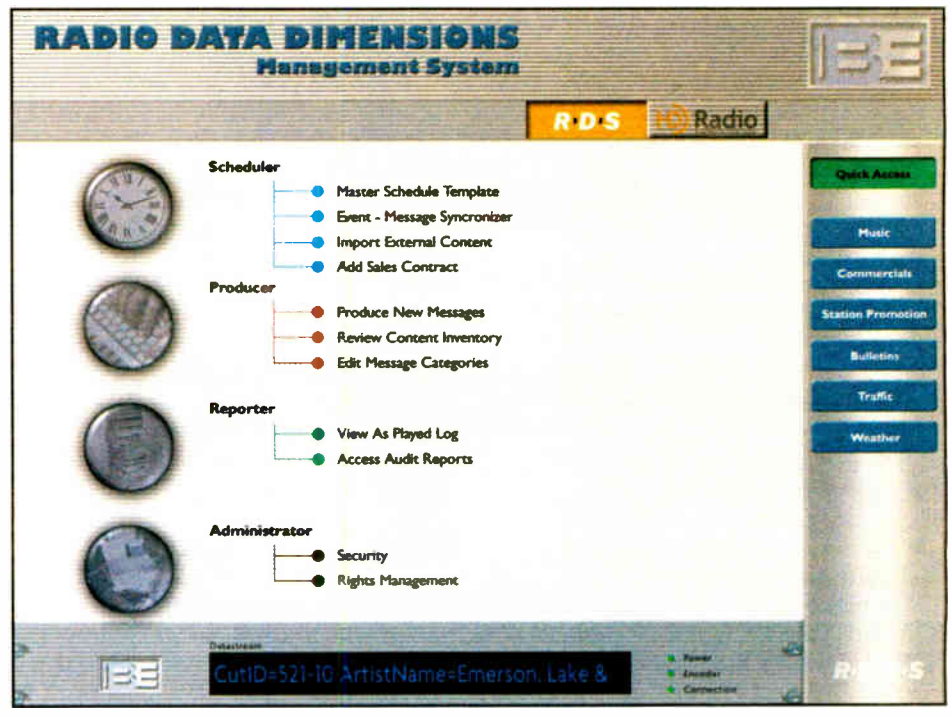
"The few that do ask for Linux are interested for reasons other than performance or reliability, which are keys to providing digital automation tools. Generally, they are interested because of the price vs. Windows or because of an intense dislike of Microsoft. Neither of these are a compelling business propositions for professional delivery systems," said Backus.

At Broadcast Electronics, plans for Linux start with a new Web-enabled software management suite. Radio Data Dimensions is intended to allow stations to develop, schedule, manage and provision advanced data services for their RDS and HD Radio products. End user access to the applications is done via a Web browser, but the main server application is Linux-based.

"For this application, we felt Linux was a good choice given the relative cost of Linux and Windows OS, and its reliability for this database server application," said Ray Miklius, BE vice president of studio products.

For Miklius, part of the benefit here is getting the BE development team acquainted with the OS.

"This will allow BE an entrée into supporting a Linux-based application in the field. If we ever do a Linux AudioVault, we will have developed some experience in supporting it through this effort," he said.




BE's Radio Data Dimensions Web-enabled software management suite uses Linux.

Still, Miklius says this initial effort is more about keeping current with the possibilities rather than charting a new direction.

"We currently have no plans to develop a Linux-based studio automation system. Our current AudioVault system is Windows-based, given that that is where we came from. We have over 2 million lines of code written to support the feature set that our radio customers depend on. Besides, there are only a limited number of audio cards and computer peripherals with Linux drivers. We are also concerned with the pending lawsuits between SCO and IBM and others regarding patent infringement," Miklius said.

There is uncertainty in the Linux community at large over questions of patent infringement. But for broadcast developers, of greater concern are the practical realities of running the operating system.

While the software may be free, the total cost of operation is not. In the real world, installing and maintaining a Linux-based system could cost more than running Windows. Savings should come to the largest organizations paying out the most for Windows licenses. But Prophet Systems says that one of its major clients — which also happens to be its owner — has not shown much interest.

"Clear Channel technology people are among the best, so they have definitely looked at Linux. For now, they are not asking us to ship it, mostly, in my opinion, because of cost of support, lack of drivers and lack of training products," said Kevin Lockhart, Prophet Systems president.

## Support problems

The support issue is particularly problematic to Lockhart. While Linux is "free," the reality is that companies must either pay for in-house expertise or pay for packaged Linux OS solutions that give it mainstream accessibility.

Red Hat, the best-known solution provider, offers the amenities that enterprise Microsoft users expect, but there is an initial cost as well as fees for ongoing support. Even though many of PSI's systems have been tested and are even supported on Linux, leaving the possibilities open, the actual cost today is not competitive.

"Any major company is going to insist on factory support for OS systems running large parts of their technology. We provide Novell, Microsoft and Linux support but must have access to factory support to make driver changes and bug fixes," said Lockhart.

He also said the full cost of Red Hat, including support, is higher than that of Novell by 5 to 25 percent, depending on license count. Red Hat also charges a higher charge for on-site training and, according to Lockhart, offers a far inferior training product.

"The other PC flavors of Linux may be cheaper but offer less support, training and

See LINUX, page 36 ▶

World Radio History

PRODUCT EVALUATION

# Compact Mixer Is Sound Card-Friendly

**by Alan R. Peterson**

Today, the primary audio containment and editing system for desktops and workstations is no longer a reel machine and a cart deck, but a PC and desktop mixer.

The demands on small mixers include personal monitoring, effortless connection to a PC sound card without the balanced/unbalanced rigmarole, and fairly versatile I/O. The mixer should be small enough for desktop use and inexpensive enough to obtain several for many desks.

For certain broadcast requirements, it is best to stick with a full mixer designed for the purpose. For a really versatile mixer that does what other small units cannot, consider the Compact4 ($149.99) and Compact10 ($299.99) models from Soundcraft, a division of Harman International Industries.

Actually created primarily for budding rock stars doing desktop computer-based music recording, the Compact line was designed to connect right into a sound card. It offers features that you might not need at first but realize "dang, that's clever" sometime later on.

Soundcraft Compact mixers combine basic functions of the typical small Mackie-style board with a few nifty extras like internal RIAA equalization for turntables, a dedicated high-Z input for electric guitars and separate headphone channels for separate engineer and talent. Plus it features both balanced TRS and unbalanced phono Main ins and outs, depending on what sound card you are trying to interface with.

And it gets done in a package small enough to fit anywhere on a desk: the Compact4 — the mixer reviewed here — is only about 10 inches wide.

Understand this is *not* a bulletproof mixer. Its plastic and metal construction restricts it to light-duty desktop use. As I said, there are times when the Big Bad Mixer is the more appropriate choice.

### On the job

I recently had the opportunity to use a Compact4 in a PC-based edit suite at the Radio America network in Washington. I will be describing the Compact4 specifically. Any differences that are found on the Compact10 will be indicated.

Following mixer topography established years ago, mic inputs on the Compact4 consist of a combined XLR/TRS mic jack, phantom button, an insert jack for an in-line compressor, gain trimmer, three-band EQ, pan and level pots. A high-pass filter button tips at 80 Hz to eliminate rumble.

An unusual feature is the inclusion of Record and Monitor buttons below each input. These are comparable to the Solo and Channel On buttons we are used to, but make more sense to the mind of the musician dealing with computer latency. The Record button directs a channel output to the sound card input, and lets the performer/voice talent hear their performance in the headphones without experiencing a delayed return from the sound card.

Line inputs feature many of the same controls and RCA phono-only plugs on the Compact4. The Compact10 also has balanced TRS inputs on channels 1 through 4.

The Compact4 is from Soundcraft, a division of Harman International.

With cables and cords connected to the Compact4, things get mighty crowded, and fingertip control becomes the word.

Do not expect to find Auxiliary Sends and Returns on the Compact mixer line. Designers determined that fancy processing would be done inside the computer, so no Aux Sends to an external reverb or multiprocessor were provided.

This limits the Compact mixer to dedicated tasks. This is not a mixer you would want to bring on live remotes, as there is no Aux line to set up for talkback or mix-minus.

One feature found on the Compact10 but not on the Compact4 is a set of mono/stereo input switches. If you are tapping a mono signal from somewhere (say, an old cart machine or mono cassette deck) and don't have any Y-cables at your disposal, press to put your source up on both channels.

One unexpected feature is an Artist Mix headphone line. When dubbing against prerecorded tracks, outside talent may request "more of me, less of the music" in the headset mix.

Rather than affect the entire room's perception of the scratch mix, a little yellow pot in the Master Section allows a variable blend of existing material and talent. Monitoring in this manner allows a good performance to come from the talent.

On another mixer, this could have been

See SOUNDCRAFT, page 37 ▶

## Product Capsule:
**Soundcraft Compact4 Desktop Audio Mixer**

**Thumbs Up**

- ✓ RIAA phono inputs
- ✓ Guitar channel
- ✓ Mono check button
- ✓ That cool patriotic VU meter

**Thumbs Down**

- ✓ Omission and errors in manual
- ✓ No aux sends

Price: Compact4, $149.99; Compact10, $299.99

*For more information, contact Soundcraft USA at (888) 251-8352 or* soundcraft-usa@harman.com

# Linux

▶ Continued from page 35

maturity than even Red Hat," Lockhart said.

It may be that the window for Linux has already been slammed shut. In the Windows 95/98 era, instability was a major issue. Broadcasters were plagued by the need to reboot these early Windows machines regularly. This was a step back from the maturity of previous DOS-based systems. Linux offered a serious advantage in stability and was tempting for WireReady founder David Gurstman.

"We were probably the last company to put automation in Windows. A good DOS system could run forever. Windows 95/98 was something else. You had to reboot every Friday or it would reboot you. So stations would toss a CD on air and reboot. I came close to putting all our efforts to porting to Linux because I could not envision automation running on Windows 95/98," Gurstman said.

Gurstman was not the only one to notice the shortcomings of a consumer-grade operating system in mission-critical applications. During the mid-1990s Microsoft understood the possibility for competition in the professional market and developed Windows NT (and then Windows 2000) to address the stability issues.

"We had clients with DOS that didn't reboot for years. Now we have Windows 2000 users that have been running constantly, too. The only reason I can't say that they've been up and running as long as the old DOS systems is because it hasn't been out as long," said Gurstman.

Today's Windows *is* a far cry from the notorious early days.

### Security vs. stability

But the success of Microsoft brings additional problems. Stability issues have given way to questions of security. Even as his company moves forward with Linux development, Dave Scott says that Windows — plus some common sense — is hard to beat.

"When all versions of Windows had to be rebooted, Linux made a lot of sense. Now, there's nothing bad about Windows 2000. Yes, it's prone to viruses. But air studios shouldn't be connected to Internet without firewalls. You shouldn't be surfing Internet with mission-critical systems," said Scott.

Kevin Loper, president of Pristine Systems said, "There was some interest ... regarding a robust digital automation system for Linux prior to the dot-com implosion. There has been literally no interest in it since.

"Once again Microsoft has proven itself as the leader in the OS arena by launching Windows XP PRO. It truly is the 'killer' OS of the decade. I believe that most tech heads in our industry have realized that XP PRO delivers all of the power and reliability necessary as a platform for robust automation."

Even more important than the technical considerations, he said, is the knowledge base in radio.

"There is no doubt that most everyone understands the basic daily operations of Windows. This just isn't true for Linux," he said.

"The main complaint about Windows not being reliable or being expensive simply isn't true in today's world of bits and bytes."

## Linux at Salem Radio Labs

In a rural community some 30 miles from Washington, one radio research firm has been at work creating broadcast-specific software that runs under Linux.

Salem Radio Labs — a division of Salem Communications Corp. and based in countrified Warrenton, Va. — has released SoundPanel (shown), a Linux-based "wall of carts" player that allows CD ripping, audio recording and instant playback of audio inventory.

SoundPanel is available as a free download under the GNU Public License from the Salem Radio Labs Web site. Full source code is available, as well as precompiled RPMs (prepackaged "flavors" of SoundPanel to work with Mandrake or SuSe Linux). SoundPanel has found an enthusiastic user base at the Radio America network in Washington, where it runs under SuSe Linux and can exchange files via the house network.

In recent years, loading and debugging Linux programs has soured many potential users on this ultra-stable OS. But Fred Gleason, director of broadcast software development, said, "Setup is pretty straightforward." New distributions load onto PCs with just slightly more intricacy than Windows. And, said Gleason, "The source code can be used to build it on virtually any general-purpose distribution."

SoundPanel can use the Advanced Linux Sound Architecture (ALSA), which is the standard Linux sound driver; or the special HPI driver utilized by sound cards manufactured by AudioScience, which adds metering and hardware MPEG support.

The Salem Radio Labs Web site recommends a minimum P-II 350 PC with 128 MB RAM; recent visits to a local used computer store show such a machine can be obtained for less than $200. When you also consider the free SoundPanel software and an inexpensive (or free) distribution of Linux, SoundPanel may become one of the best cart-replacement values out there.

Gleason and his team also are working on Rivendell, a fully contained Linux broadcast automation system. Currently in beta testing, Rivendell eventually will include a cut marker editor, audio recorder, automatic netcatching and on-air control surface.

See the product line at *www.salemradiolabs.com.*

*— Alan R. Peterson*

World Radio History

# Soundcraft

▶ Continued from page 36

done with Aux Sends, which would also allow the use of reverb or other enhancement for the talent's personal mix. But then, more pots equal more expense and more complexity, and the aim of the Compact4 is to get a signal into a computer ASAP.

The High-Z input and RIAA phono switch mean you do not need to purchase external preamps or interfaces. As a pair of discrete RIAA phono preamps could cost as much as the Compact mixer itself, having them included is a grin. Plug in your Technics wheel of steel and go.

Now why don't more manufacturers put in one of these: a Mono button in the monitor section? Punch this when you want to hear if that phased liner-guy voice track is going to stand up in the mix coming out of a clock radio.

### Guitar wizard

Creative production folks sometimes turn out the odd song parody or require the sound of a guitar or bass being recorded. The talk talent at Radio America occasionally requests such specialized cuts. Recording said instrument is easy with the Compact4.

The advantage of having an input designed for an electric musical instrument is not immediately appreciated. Typically, an electric guitar pickup is an unbalanced mic-level device with about 4k ohms impedance.

"Mic level?" you might think, "I'll just connect to a microphone input of the board and be set."

No good. A balanced mic input has an impedance of maybe 2k ohms and wants to see a microphone on the order of 150 to 600 ohms. Plugging in a 4k source will load things down, resulting in low-level audio that is seriously lacking in sparkle. Anyone who has ever tried this with a conventional mixer knows the sound quite well.

The high-Z input on the Compact4 offers greater than 300k ohms on its input, which is a better match for a guitar pickup. The same instrument plugged into this input will sound apparently louder and with high-frequency content that is more defined.

Once the clean recording is inside the computer, it can be processed in software to sound like a huge amplification stack, using any of the guitar emulation plug-ins available to musicians and home recordists.

### Mulling it over

I cannot think of any manufacturer that sells a bad-sounding mixer. Almost all boast near-flat frequency response to 20 kHz or better, nice safe EQ ranges and Insert jacks; all carry attractive price tags. Generally, it is the feature set that draws your attention: on-board effects, linear or rotary pots, lots of inputs and multiple busses.

The draws of the Soundcraft Compact line are its readiness to be clapped onto a sound card without special cables, its accommodation of turntables and guitars and the addition of a mono mix confidence button to check phasing and compatibility.

News reporters still tooling around with cassette and MD recorders can use a Compact back in the bullpen to connect decks to the computer audio input, and also on location recordings to mix more than one mic; a diagram in the manual shows how an interview can be wired up.

Departing from conventional green, yellow and red LEDs, the VU meter comes in a patriotic red, white and blue, topping off red at +12 dBu. Oddly, the legend under one blue LED indicates "low battery." Nowhere in the Compact4 literature does it suggest the mixer can be battery-driven. I am told an optional battery pack is being prototyped as we speak. So if it doesn't make sense right now, wait a month or two.

If I have any concern to voice, it is with the manual. I know, "It's a mixer, who needs a manual?" Well, as the Compact line is targeted to desktop musicians, not everyone is going to be an instant expert out of the box. Still ...

The earliest production run showed some inconsistencies between the top panel legends and the manual. This has since been corrected, so you should have no problems.

One passage suggests how to run cables to avoid interference from concert lighting dimmers. I realize this is boilerplate copy for a lot of Soundcraft manuals, but a two-mic, two stereo source mixer would not be my first choice for mixing a concert.

Still, this mixer may become a favorite for keyboard players in live situations, so there may yet be a need for this knowledge.

There is much in the manual that is veddy, veddy British, such as the use of earthing (grounding) and 3-pole "A" gauge jack (1/4-inch TRS). We can just look at these and smile.

Also, there is a huge grounding stud on the side of the mixer. While the manual includes a diagram on avoiding ground loops, I could find nothing about this stud. I am told this is a ground terminal for turntables. By this time, this too has been addressed in the new version of the manual.

On the plus side — and I have mentioned this before — the Soundcraft manual contains several pages containing wiring diagrams of connectors and how to use them, i.e., balanced Y-cables, TRS Insert cables etc. Soundcraft should post these on a Web Support page and make them available to all.

With manufacturers such as Mackie, Behringer and others stamping out desktop mixers by the ton, it is easy to make an impulse decision as to what to buy. For my own production purposes, I occasionally require a guitar to be plugged in, and sometimes have to pull a cut off of vinyl and need a turntable input.

Having these features built in to a Compact4 mixer makes it a valid desktop choice for me. Give it a look.

*Alan Peterson is a production coordinator and assistant chief engineer for Radio America. He can be reached at* apeterson@radioamerica.org.

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5 User Set-Ups

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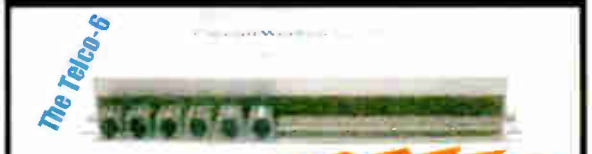


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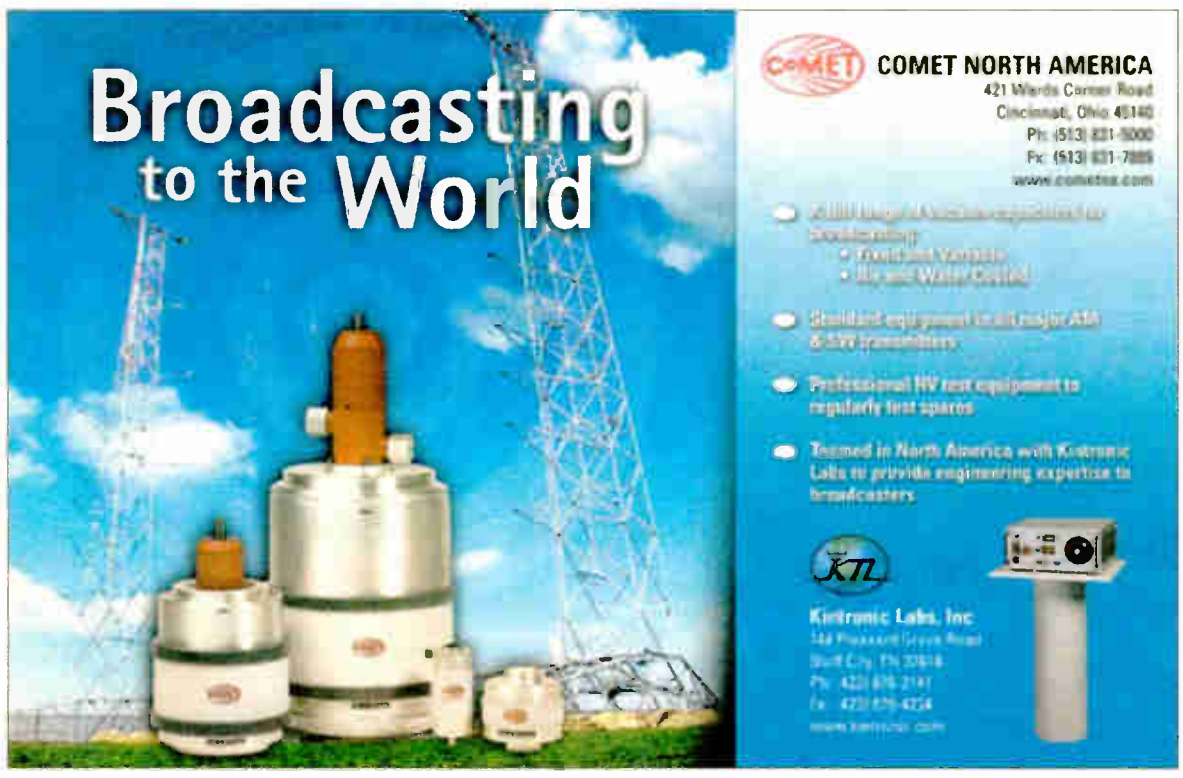
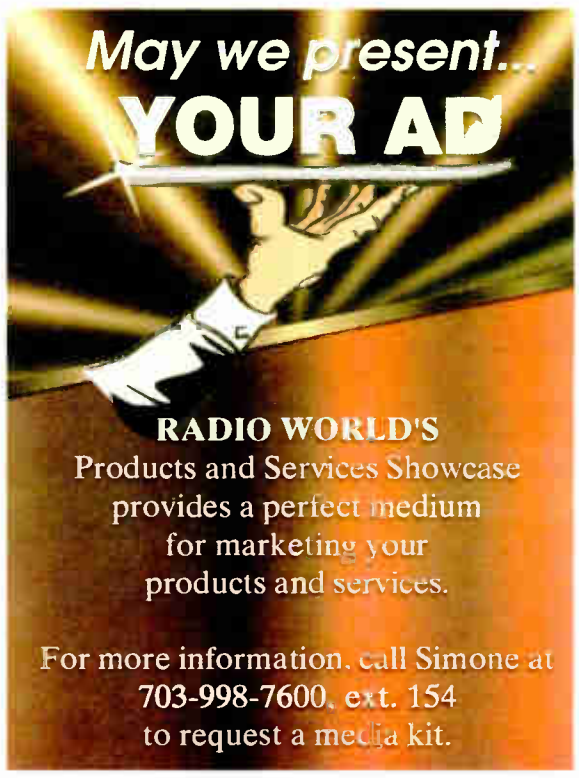



World Radio History

# Shecky's Back. Ba-*Dump*-Bump.

**by Alan R. Peterson**

Every spring when the NAB show wraps up, it's time once again to take the tarp off of Shecky Peterson, my Las Vegas alter ego.

I cannot help it. The pressure of the show, the overnight flights through transcontinental thunderstorms, the article deadlines and the shortage of good swag to take home from year to year all contribute to the stress levels. The only way I can depressurize is in letting Shecky take over my consciousness for awhile and get it out of his/my system.

Visualize the Sheckmeister in full regalia. Take your smarmiest lounge comic/crooner, loosen the collar of a frilled '70s-era tuxedo shirt, prop him up against the edge of a grand piano with a mic in one hand and a gimlet in the other, and you pretty much have him.

Throw in a sampled rimshot-and-cymbal that the piano player can trigger with a footswitch, and the illusion is complete.

With this year's NAB attendance up nearly 10,000 from 2003, it is clear they all came to see Shecky's act.

So let's not keep the nice people waiting — Radio World once again brings you Shecky Peterson.

### Cue the band

*(Cheesy Vegas-style fanfare, badly lit stage with moth-eaten curtain. Polite golf claps from audience.)*

Good evening folks! Heyy-yy, good to see so many of you here. How many of you came in by plane? *(Lots of applause.)* How about by bus? *(Some scattered clapping.)* Great, who got here by monorail?

*(Crickets off in distance.)*

O-kayy-yy. Let's move on ... So, who's got one of those new consumer IBOC HD Radios yet?

Man, I don't know if I'm coming or going. I've seen iPods and IBOCs... I should invent a new sound thingie. Call it an Ichabod; listen to it long enough and your head turns into a pumpkin.

How about that other competing format? ReBOC. You wear the headsets on your feet and other kids try to mug you for your radio.

I'm thinking about developing round digital radios that retirees go bowling with on their lawns back in the old neighborhood. Call it I-BOCCI.

Or maybe I'll try IPOX? It sounds great, but you break out into little red spots when you listen. And good luck if you didn't listen when you were a kid.

*Ba-da-bump! Kssscch!*

I've got to get some new shoes. These things are terrible. I walked past the FCC booth, tripped, stubbed my toe and cursed. They fined me 500 grand.

I stubbed my toe and cursed again in front of the Eventide booth. Man, I sound like Darth Vader over there.

And it happened again in front of the ENCO booth. I yelled five bad words in a row. Funny thing though, I didn't even hear them.

*Ba-da-bump! Kisssccch!*

### Does the fun ever start?

Hey, I saw where RCS has that new Mobile text message thingie that lets you play radio station contests and vote on stuff with your cell phone. You know what question I'd like to vote on? *"Are the buttons on your cellphone too #$*@ small to press really fast?"*

Whoops, guess the delay didn't build up enough. I'm gonna get fined again. Not only that, they told me backstage that it's not just *one* fine, but one for every issue this gets printed in. Oh, that's going to hurt ...

That's okay. I just saw this neat new music playout system on the exhibit floor and I think that it just might catch on. There's no computer, no screen, in fact it isn't plugged in at all. It takes care of music selection by itself, it doesn't crash, and the interesting thing is, it's made out of meat and hair.

And the principal says, "We got you a job numbering the floors at a convention center out west."

*Ba-da-bump! Kisssccch!*

### Drop the lights

Okay, it's getting late, so it's just about time to send you nice folks home with a song.

*(Piano player touches gentle Bb7 chord in anticipation, Shecky waves him off.)*

No, not tonight, Tom. Tonight, we're going *disco*!

*(Sound guy starts playing karaoke CD of "YMCA" by the Village People.)*

**'You're failing math and we're kicking you out of school. The good news is we got you a job numbering the floors at a convention center.'**

I think they called it a *DISC JOCKEY! Ba-da-bump! Kisssccch!*

And how about the exhibit numbering scheme in South Hall, huh? You could be at booth No. 3547, turn around and instantly be facing No. 4749! Star Trek transporters don't work that fast!

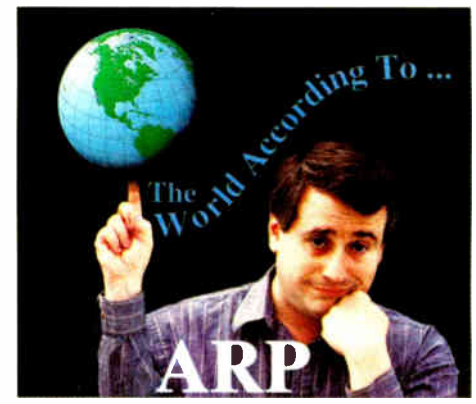
Reminds me of my cousin Frankie. Frankie never was very good at math; teacher would ask him "What's 2 plus 2?" and he'd answer "Tuesday." One day the principal took him aside and says, "I got some good news and some bad news, Frankie. The bad news is you've completely failed math and we're kicking you out of school."

"What's the good news?" Frankie says.

I thought this year, now that IBOC and HD and all that other stuff is the Big Thing everybody's talking about, we're gonna send you folks home dancing! So everybody get up and follow me! I'll teach you the special arm moves, so here we go!

*Young man — you've been waiting for years,*
*now the ...*
*Daw-ning — of IBOC draws near,*
*you can ...*
*Blow out — what remains of your ears*
*at un-god-ly vol-ume le-vels.*

*Save up — for a new stereo*




*cuz the ...*
*Old one — will be worthless you know,*
*when your ...*
*Station — puts out ones and ze-roes*
*You can chuck it in the land-fill.*

*CHORUS:*
*(Don't forget the special arm moves)*

*So get rea-dy for:*
*I-B-O-C!*
*It's fun to lis-ten to*
*I-B-O-C!*
*It has sidebands that buzz, there's no multipath fight,*
*It's just tough to get AM late at night —*

*So buy your tu-ner for:*
*I-B-O-C!*
*It's fun to listen to*
*I-B-O-C!*
*It joins AM and FM; XM, Sirius too,*
*You'll have receivers coming out the wa-zoo,*

*I-B-O-C!*

*(Audience of elderly gamblers dancing, then all topple over each other in a sweaty heap, gasping for breath.)*

Thank you, thank you, yer a wunnerful audience. Tell your friends about the 10 o'clock show.

PRODUCT GUIDE

## New Switchcraft Catalog Available

The fourth edition of the Switchcraft Engineering Design Guide is available.

The catalog contains information on new products including the EZ Norm audio patchbay, AAA series XLR connectors, EH series connectors, bantam and long-frame patchcords, IEEE1394 FireWire connectors, USB connectors and additions to Switchcraft TQG miniature XLR connectors.

*To request a copy of the catalog, send an e-mail to* sales@switchcraft.com *or visit* www.switchcraft.com.

## Titus WEB-REM Allows Remote Control

Titus Technological Laboratories' WEB-REM can be used to control broadcast or other equipment in facilities with LAN or Ethernet connectivity at a remote site.

The WEB-REM device interfaces the Internet to relay or open-collector outputs. These can be used to control anything that requires closure to work.

When using WEB-REM for status and metering of a remote location, control functions appear as pushbuttons on a Web page; status and metering functions appear as lights or meters on the same page.

There are four configurations of WEB-REM; two are designed for TTL inputs and outputs, one is designed with four control relays and four TTL status inputs, and one is a mixture of relay and digital outputs as well as digital and analog inputs. The WEB-REM IP address is user-changeable to match any IP address available.

*For more information from Titus Technical Laboratories, call the company in Connecticut at (800) 806-8851 or go to* www.tituslabs.com.

World Radio History

# NAB2004 Photo Gallery

Al Kenyon moderates a panel on the state of the art in radio as part of the Broadcast Engineering Conference.

CEA's Gary Shapiro, left, wants the FCC to reject efforts to restrict the home recording of digital radio broadcasts. He is shown with ATSC President Mark Richer.

NAB Joint Board Chair Phil Lombardo, right, moderates the Congressional breakfast with Reps. Joe Barton and Michael Bilirakis, Sen. Conrad Burns, Reps. James Sensenbrenner, Fred Upton and Greg Walden.

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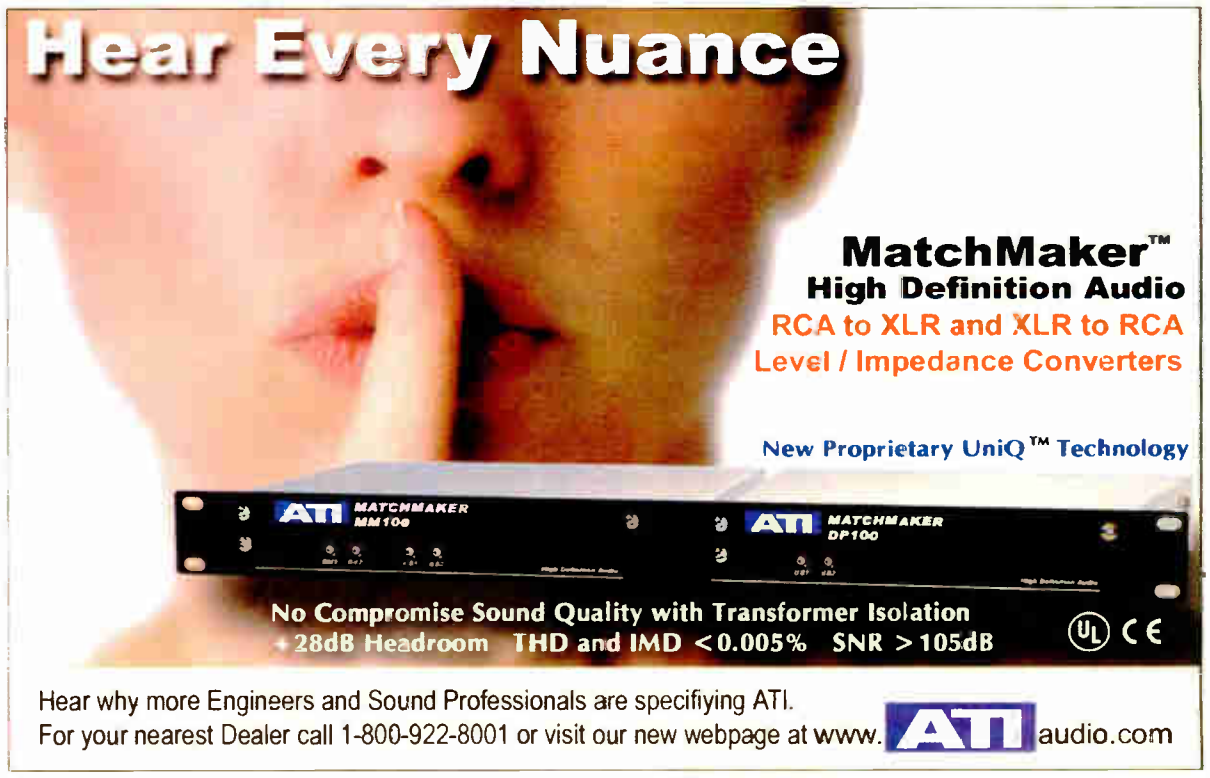


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**Cablewave 3" heliax**, 160' of 3" air dielectric with end flange connectors, $500. Bruce Campbell, Dove Media LLP, 209 S Danville Dr, Ste B-105, Abilene TX 79605. 325-677-3900.

**Stainless 24" face**, 260', on ground, solid rod, see photos at www.scott-inc.com/tower/stainless.htm, $3200. Chris Scott, WKYU, Western KY Univ, 1 Big Red Way, Bowling Green KY 42101. 270-745-3834.

**Talltower operating strobe system** of 12 flash heads, one beacon, controller and photocell, four years old, $15,000. Contact: paul.reynolds@cox.com, or 210-615-5427, F.O.B. San Antonio, TX.

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**ERI Rototiller**, 6-bay on 107.7 in great shape, BO. Clay Freinwald, Entercom-Seattle, 1820 Eastlake Ave East, Seattle WA 98102. 206-726-7071.

**Rohn 65G**, 440' tower, painted, on ground ready for pick up, $16,000. Ken Diebel, 1707 Louisa St, Rayville LA 71269. 318-728-2370.

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**Optimod 8000A** stereo FM processor, $1000. Tom Toenjes, KJTY, 6120 Riley Creek, St Marys KS 66536. 785-640-6047.

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**Inovonics 222**, must be in good working order. Michael Cardillo, 151 Morgan St., Cranston RI 02920. 401-942-8341.

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**Wagner DR-96** satellite receiver digital Rx, $500. Ken Diebel, 1707 Louisa St, Rayville LA 71269. 318-728-2370.

**Wegner DN 86** Digital Audio Reciever 3944.1 MHZ - $ 100.00 "as is" plus shipping and handling - Call Michael Raley @ (704) 523-5555 for more information or e-mail Mraley@rrb.org for a picture.

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| 38 | Autogram Corporation | www.autogramcorp.com |
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# READER'S FORUM

## Oops

I caught the "test" buried in the story about profanity delays, in the second-to-last paragraph in the right-hand column that begins, "Eventide Vice President ..."

That's a great way to see if people are carefully reading each article. Is it a way to smoke out the "boobs" in the business?

*Jack Gardner*
*Sacramento, Calif.*

Just thought you might want to know that in the next-to-last paragraph of your indecency and delay article ("Zero Tolerance = More Delays," March 28), a word slipped by instead of "it's." From the looks of it, this was intentional since there is no apostrophe and there is an extra letter.

I found it to be ironically comical since the article opens with the words "Janet Jackson's breast." Just thought I would let you know in case this wasn't a joke and it slipped through.

Personally, it doesn't bother me, but it might bother somebody else.

*Julio M. Alvarado*
*Assistant Chief Engineer*
*Univision Radio*
*Phoenix, Ariz.*

*RW replies: The typo was unintentional. (However, the omission of the apostrophe was correct. "It's" is a contraction of "it is," whereas "its" implies possession.)*

## Indecent Exposure

I have said I am glad to be no longer active in engineering because radio and television is so profane that I could not be a party to it. I can always just not turn it on in my own car or home. However, we are subjected to loud car systems in every parking lot, plus stores that leave radio on as foreground music.

When I have to stop in the mall and explain to my granddaughter what the lyrics meant when the guy said, "M***** F***er" I get absolutely outraged at the stations that play that stuff, and the stores that blast it into the mall. I let the stores know how I feel and, so far, all of them have changed stations. But the stations themselves I can't do anything about. And the FCC hasn't.

The same thing applies to printed material. I would simply choose not to read, write for or advertise with magazines that use gutter language. There are some music magazines that might be a good place for my mike flag ads. However, I will not support them because the writing style reminds me of a bunch of 13-year-old boys in the school rest room.

*George Whitaker*
*Practical Radio Communications*
*Arlington, Texas*

## Correction

The article "HDAM: No Static at All" by Frank Foti in the April 23 issue contained several text errors that were introduced when Radio World's production software incorrectly saved both old and new versions of that file. Readers may have been confused by the extra words and erratic punctuation.

A clean version of that article is available; e-mail a request to *radioworld@imaspub.com*.

# ACTION-GRAM

**EQUIPMENT LISTINGS**

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations *only*. All other end users will be charged. This FREE service does not apply to Employment Help Wanted ads or Stations For Sale ads. These are published on a paid basis only. Send your listings to us by filling out the form below. Please be aware that it takes one month for listings to appear. The listings run for two consecutive issues and must be resubmitted in order to run again. Thank you.

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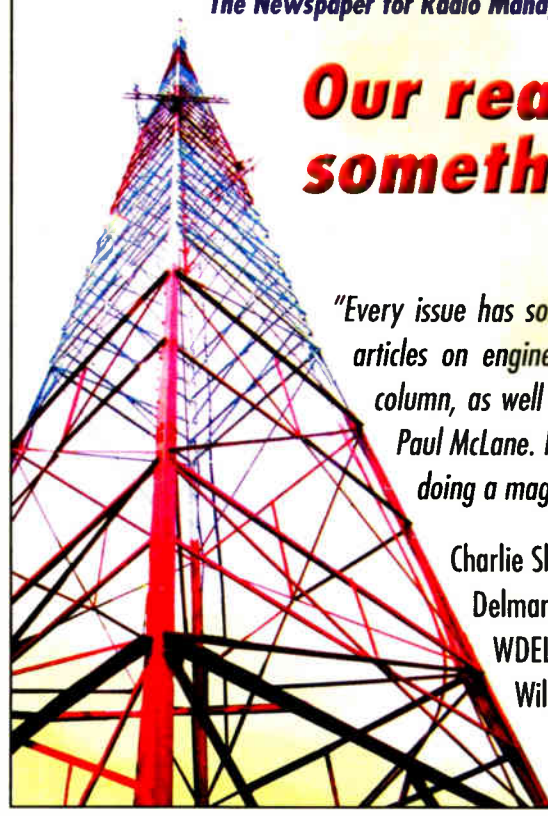

Our readers have something to say

"Every issue has something of interest. I love the articles on engineering, especially John Bisset's column, as well as stories by Scott Fybush and Paul McLane. Radio World is true radio people doing a magazine for radio people."

Charlie Slezak, Engineer
Delmarva Broadcasting
WDEL-WSTW-WXCY
Wilmington, Del.


World Radio History

GUEST COMMENTARY

# A Guide to Outfitting Your LPFM

**by Daniel Slentz**

In an earlier article on the start-up of low-power FM station WNHS ("The Cost to Put an LPFM on the Air," March 10, 2003), I offered cost-saving tips and equipment recommendations to engineers working toward the launch of an LPFM. Having since wired WNHS, installed its antenna and gone on the air on Aug. 27, 2003, I find myself with more useful information to pass along, observations and solutions that have enabled us to keep our performance high and costs relatively low.

After almost three years of planning and a week of installation, WNHS(LP), licensed to Newcomerstown Exempted Village Schools in Ohio, began broadcasting, at about the cost I had estimated, $35,000. This is not the cheapest an LPFM could cost to set up, but it's a solid price for a good, competitive-sounding operation.

To interconnect equipment in-studio and to the transmitter, we used Belden analog multi-paired snake cable and twin paired balanced/shielded line. It simplifies installation, gives a neater appearance and is easier to track down. We labeled wiring with Rite-On self-laminating labels and documented it.

The installation, from antenna to audio board, took about 50 hours. I suggest you make available a small tool kit for each person who's working, with a soldering station and a standard PanaVise model 301 clamp; provide wiring diagrams and pin-out drawings for anyone soldering. With our tight construction timeline, I created thorough "punch lists" of what needed to be done throughout the project. They helped everyone track progress and lend a hand where needed.

I became a fan of Neutrik Test Instruments' Minirator MR1 tone generator and Minilyzer ML1 audio analyzer — not inexpensive tools, but invaluable with set-up and balancing of wiring.

Like most LPFMs, WNHS is run by beginners. I had to choose equipment and design a system that would be realistic for broadcasting, yet novice-friendly.

I had two limitations: money and space. As a result, the on-air board would have to serve as the production board. I worked around this potential problem area by installing an audio board bypass switch. The board can be bypassed and fed from the computer automation system during production. A large indicator lamp shows when the board is live to the transmitter.

We installed a Wheatstone/Audioarts R-5. It's more cost-effective than modular boards, with all the features in one package; it has dual metering for program and audition, a mix-minus/mono "phone feed," plenty of inputs, simple design and ability to configure as needed.

Denon DJ CD players are nicely priced and built tough, featuring new 1/8-inch "fader starts," which made them easy to board-fire. They have the ability to play MP3 CDs. WNHS has produced a few extended-length MP3 "air CDs" complete with liners, IDs and undated PSAs in case of a catastrophic failure of both our air and production PCs.

The studio cassette is almost a necessary evil. This is a school, so the cassette audio format is readily available to everyone. Should staff ever want to record anything outside the studio, they can play it back directly from cassette.

I've built in dedicated mono balanced return audio lines from the gym and stadium for local high school sports coverage, and we've invested in Sennheiser sports headset/mics and a JK Audio Remote Mix Sport mixer. The secondary schools have multi-mode fiber interconnects to the high school studio, so with a couple of two-channel audio transmission systems from Fiber Options, they'll have the ability to go live from any of the other schools.

### Police access

The transmitter room, located about 100 feet from the studio, has its own little special features.

To the right of the clock is the studio's Audioarts board and Electro-Voice main mic. The racks on the left house Denon CD players, a Tascam PA-20MKII amp and a Rolls tuner.

We couldn't be happier with our Crown FMX250GT. It's awesome. The 4,000 citizens of this little town have crystal-clear coverage. Features of the new FMX include great processing through the Omnia card, remote control, auto-logging, self-correction and auto dial-up upon tolerance faults. These are valuable at WNHS — legal, reliable and "dummy-proof."

EAS decoders are not plug-and-play devices; they require a little work and understanding to program. I incorporated the TFT auto program-interrupt unit. This is last in line prior to the transmitter. We want any EAS test and alert to go on the air immediately, whether or not the station is attended. Our gear auto-logs EAS and transmitter readings.

The addition of a CircuitWerkes autocoupler provides the ability for our local police department or the school superintendent to dial in, enter a code to switch the PBX to the CircuitWerkes autocoupler and enter another code to trigger the autocoupler to go on the air. The autocoupler feeds a second TFT program interrupt unit, which installed in the chain prior to the EAS program interrupt so that EAS announcements always take priority.

This chain allows immediate phone access to air for emergency announcements.

### DIY installation

Both the studio and transmitter room have sizeable uninterruptible power supplies for about 10 minutes of air time during a brownout or blackout.

On our 50-foot tower we installed a Jampro two-bay antenna. Fortunately the school had a 50-foot bucket truck that simplified the installation.

Daniel Slentz

If you do it yourself, here are a few tips:

✓ Even if it's a cool summer day with clouds, wear sunscreen.

✓ Andrew Corp. and other antenna manufacturers include band clamps to attach the cables and antenna. These clamps seem to come in one size — large. When you are working on a standard house TV tower, each leg of the tower is about 1-1/2-inch in diameter and these clamps are about 3 inches. To install these, use a screwdriver to thread the clamp down. To speed up installation, clip these clamps to a shorter length while on the ground. Do as much prep work as you can on the ground.

✓ Read the instructions a couple of times *prior* to starting your work. It's not fun "undoing" anything. Also, get your questions answered from the antenna manufacturer or cable supplier ahead of time. Check to see if there's an after-hours or weekend tech person you can contact in case of questions, or do the job on a weekday when suppliers are open.

✓ Assume you *will* drop any important item while installing your antenna. Make sure no one is standing below the tower or where they'll get "clonked" with hangers, nuts or bolts.

✓ Handle the antenna carefully. It will take a lot of wind, rain and hail; but if you fumble around with a finely tuned antenna, you ensure that you'll fire up the transmitter to a hostile VSWR.

✓ Speak with everyone you can about what you need to do. Get opinions and suggestions on everything from programming to equipment.

My resources included some kind and patient people at Wheatstone, Jampro, BSW and Crown Broadcasting (IREC), among others.

✓ Additionally, be sure to read *everything* from the FCC's rules and regulations. Don't forget that your CP is not your license. The necessary steps to complete the process must be taken. Remember to that you are required to pay for music licensing (ASCAP, BMI, etc.)

All this work must be done prior to going on the air.

Being an LPFM will probably not afford you many opportunities for promo music service, so you may want to check into TM Century or a similar supplier for a subscription service. WNHS found that TM Century's Prime Cuts works well, as it is a comprehensive music service with all formats of music delivered weekly. It's reasonably priced and a whole lot more affordable than going to the CD store. Christian LPFMs will benefit in knowing that TM Century has a free music service of contemporary Christian music called PraiseDisc.

I hope this information is useful to budding low-power FM stations. I'd be happy to lend some advice or a little moral support to any fellow LPFMer who may need it.

*Dan Slentz is audio/visual services manager for The Longaberger Company, in addition to serving as volunteer contract chief engineer for WNHS(LP).*

**WNHS Transmitter Chain:**

- Jampro JLST-2 two-bay circular polarized antenna with automatic deicers
- Andrew Corp. cable and support gear
- TV Specialties 50-foot self-supporting tower
- TFT EAS 911 decoder
- TFT EAS 940 auto-program interrupt units (2)
- Inovonics 530 modulation monitor
- Crown FMX250GT transmitter
- Orban 2200 processor (borrowed/temporary until our Crown's Omnia card arrives)
- CircuitWerkes HC-3 Telephone autocoupler
- Inovonics PBS telephone line eliminator
- APC UPS
- Middle Atlantic rackmount power strips (2)
- 6' rack

**WNHS Studio:**

- Wheatstone Audioarts R-5
- Wheatstone Audioarts SDA-8400 4x4 audio distribution amps (2)
- Rolls RS79 radio tuner
- Denon DN-720R cassette deck
- Denon DJ DND 4000 dual-deck CD player
- Comrex DH20 phone coupler
- Middle Atlantic rackmount power strips (4)
- APC UPS
- OC White mic arms with risers (3)
- Electro-Voice RE20 microphone
- Shure SM58 microphones (2)
- Symetrix 528E mic processors (3)
- Dell Pentium 4 PCs (1 gig RAM, 100 Gig Hard Drives) (2)
- BSI Simian automation, BSI Wavecart, BSI Speedy and Syntrillium Cool Edit Pro 2.0 software
- Flat-panel LCD touchscreen
- KVM Switch (allows 1 keyboard and mouse to control both PCs)
- Henry Engineering Super Relay (2)
- Fidelipac on-air light
- JBL Control 5 monitor speakers
- Tascam PA-20MKII amplifier
- TOA 70 volt/100 watt amplifier
- Sony headset

World Radio History

# NAB2004 Photo Gallery

NAB THE WORLD'S LARGEST ELECTRONIC MEDIA SHOW

Inside

Photo by Bob Komes

Debbie Baker of Econco shows off a 4CX15000A radio transmitter power tube.

Photo by Leslie Stimson

Don Lockett autographed copies of his new book 'The Road to Digital Radio.'

Photo by Al Peterson

Susan Ashworth puts the finishing touches on a story for the NAB Daily News.

Photo by Al Peterson

Ah, so that's how we get there.

Photo by Al Peterson

The King was looking a little rough.

Photo by Bob Kovacs

Yu-Jan Lin of the Point Culture Co. in Taiwan tries on a Thermodyne shipping case for size.


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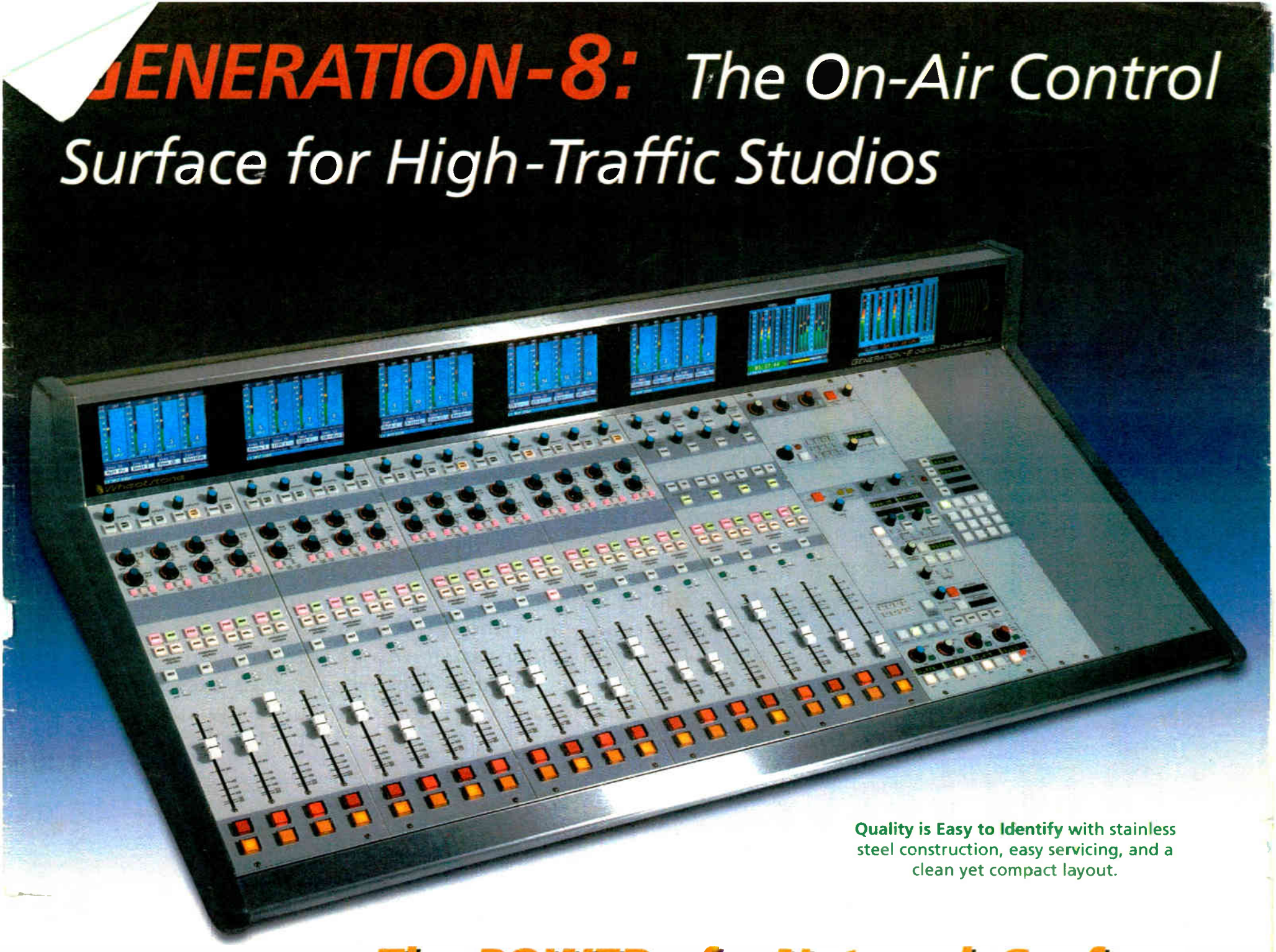
World Radio History

# GENERATION-8: The On-Air Control Surface for High-Traffic Studios



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