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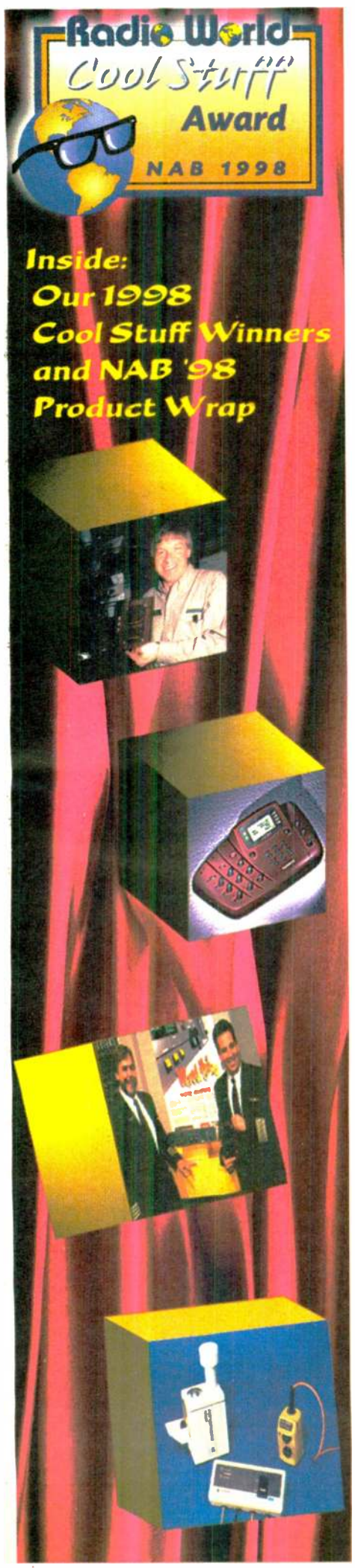
Radio World®

Otari Takes on the MO Format

In Studio Sessions

Vol 22, No 10 | Radio's Best Read Newspaper | May 13, 1998



Lucent Enters IBOC Fray Alone

Promises 'Huge Commitment' to IBOC As Alliance With USADR Concludes

by Leslie Stimson

MURRAY HILL, N.J. Lucent Technologies has entered the playing field to develop a commercially viable in-band, on-channel digital audio broadcasting system for the United States. The new venture is called Lucent Digital Radio.

The announcement puts a third name — a familiar, and presumably well-funded company — on the list of developers racing to solve the problems of IBOC so that the U.S. radio industry can go digital.

The venture is part of Lucent's plan to identify key technologies developed by Bell Labs, its research arm, and bring them to market.

Lucent is making a "huge" commitment to IBOC DAB, said the president of the new venture, Suren Pai. He declined to detail the exact dollar investment except to call it "substantial."

Familiar name

Lucent is no stranger to IBOC development. For 10 months, it had been involved in a joint development agreement with USA Digital Radio, another IBOC proponent. That agreement expired Feb. 28.

Although Lucent engineers gained expertise and patents from the joint venture with USADR, Lucent officials said they decided to go it alone in developing an IBOC system — and they apparently plan to do so globally.

"While the U.S. is our primary target (for IBOC), we are thinking broader. ... Taking that one step further, we would look at international countries," said Pai.

Asked by RW if Lucent Digital Radio would use anything gained from its agreement with USADR, Pai said LDR is "walking away from that technology." However, he said, Lucent obtained several patents from the joint venture. Those patents could be used in any IBOC system it develops.

In developing its system, Pai said, LDR will not use technology that it does not currently own.

Lucent enters a field already occupied

See LUCENT, page 6 ▶

NEWS ANALYSIS

Winter '98 Put EAS to the Test

by Lynn Meadows

NASHVILLE, Tenn. May marks the 18th month the Emergency Alert System has been put to work across the country.

Because EAS involves coordination between stations, emergency preparedness organizations and state and local governments, its implementation in large states that have varied terrain and severe winter weather conditions has been difficult.

Now, EAS has just gone through its first full winter. How did it fare?

Storm Damage at the Sine Systems Plant in Nashville. See page 3.

EAS activations continue to reveal problems that must be resolved for the system to mature. April's tornadoes in Nashville brought those problems to light.

Gibson Prichard, MIS engineer for WZTV(TV) in Nashville and contract engineer for two radio stations, said, "One of our LP2s does not really want EAS codes on the air. They find them an interruption to their programming. They are fully capable and broadcast weather information, but they do not send EAS alerts for weather very often at all."

FCC rules specify that stations must transmit national-level EAS messages and required tests. However, whether stations transmit civil defense codes like "EVI" (Evacuation Immediate) and "CEM" (Civil Emergency Message) is optional. And there is no FCC requirement that a station relay any weather code.

Officials in the local NWS office determine whether to issue an EAS alert for a winter storm watch. Not all do. Then, once the LP1 and LP2 stations receive the EAS alert for a winter storm watch, they can choose whether to broadcast it.

LP or "Local Primary" stations are

See EAS, page 8 ▶

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World Radio History

NEWSWATCH

Ginsburg Leaves Chancellor Media

IRVING, Texas Chancellor Media Corp. President and Chief Executive Officer Scott Ginsburg has resigned. Thomas Hicks, chairman of Chancellor Media and chairman and CEO of Hicks, Muse, Tate & Furst, will serve as interim Chancellor president and chief executive officer. Hicks, Muse is Chancellor's largest shareholder.

Ginsburg will continue to serve on the Chancellor board of directors, which was expected to name a permanent successor soon.

Hick said of Ginsburg, "Since founding Evergreen Media in 1988, he has assembled an outstanding group of radio assets and operating executives. Recently, he has played a key role in helping us to successfully consolidate the companies that now comprise Chancellor and in positioning the company for long-term growth."

Hicks said he is recruiting a "world-class CEO" in order to position the company for growth as the industry continues to consolidate.

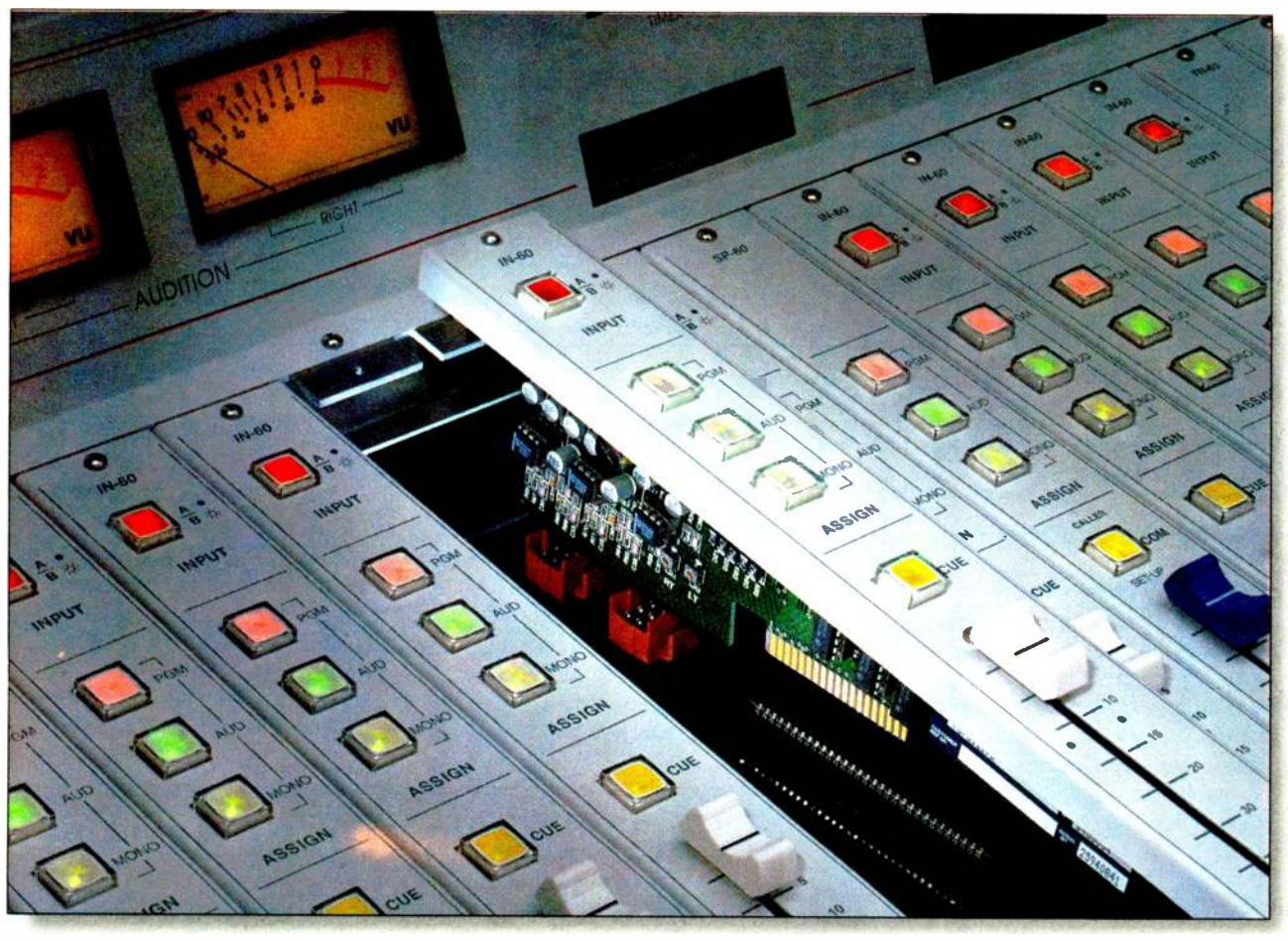
Chancellor is the largest pure-play radio company in the United States. If all pending transactions close, Chancellor will own and operate 108 stations.

FCC Seizes Equipment in Florida

TAMPA, Fla. The United States Attorney for the middle district of Florida has filed two civil suits seeking forfeiture of radio equipment federal officials said was used to operate two unlicensed stations in Tampa.

Agents of the United States Marshals Service and the FCC seized property alleged to have been used in the unlicensed broadcasts by Esther Nieves and the Rev. Alberto Acosta. Nieves allegedly operated an unlicensed station out of her home; Acosta allegedly operated an unlicensed station from the Pentecostal Church of the Shining Light. FCC officials are investigating the cases, and the forfeiture actions are being prosecuted by lawyers in the U.S. Attorney's office in Tampa.

Take a LOOK at THIS:



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Mic & Line, +4dBu	.004%
DIM	
Mic & Line, +16dBu	.005%
DYNAMIC RANGE	
Line	114dB
Mic	98dB
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World Radio History

Tragedy Hits Sine Systems

Founder's Death Follows Storm Damage At Equipment Maker in Tennessee

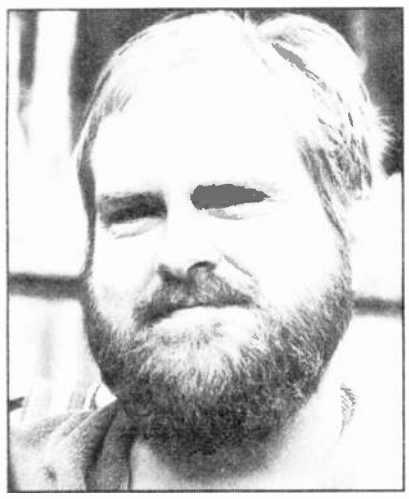
by Leslie Stimson

NASHVILLE, Tenn. Two employees of broadcast remote control equipment manufacturer Sine Systems expected to take control of the business and move it into temporary headquarters so they could begin shipping products again, in the wake of last month's tornado and the subsequent death of company founder and president John Pate.

When faced with the prospect of moving his business because of the tornado damage, Pate, already reported to be handling the stress of helping his father in an assisted-living facility, committed suicide. Police confirmed the cause of death.

Employees said Pate shot and killed himself in front of the company's building on Main Street the night of April 21. He was 48.

At the time of his death, Pate was the sole owner of Sine Systems, which he incorporated in 1984. Employees Susan Ford and Marc Pezzolla said Pate left a note in which they were given power of attorney and the assets of the company. At press time, the two expected to meet with attorneys to formalize the transfer of ownership.



John Pate

Pezzolla said, "We intend to continue the business. We do not intend to fold the company."

He said, "John Pate was a respected individual and one of the most likable people that myself or any of his friends, acquaintances or business associates ever had the pleasure to meet."

Ford, the office manager, said she was close to finding a temporary location to move the business for approximately two to three months. The company had to be moved because of the extensive damage from the tornado to its facility and inventory.

At the same time, Ford was negotiating with insurers over the logistics of the move, including a determination of how much stock could be saved. "We want to find a location to move to. They want an exact inventory. We want to go where it's dry and do the inventory."

Pezzolla said, "It's been raining on us for days. They (the insurance officials) want us to count everything. There's over 7,000 parts in the warehouse they want us to count."

Building a business

Sine Systems is perhaps best known for its remote control equipment for transmitters, such as the RFC-1 dial-up remote control. Pate began designing, building and selling remote control transmitter equipment when he incorporated the company in 1984. Expanding beyond remote-control equipment, Sine Systems engineers also designed, built and sold an audio switcher for use in Prophet Systems broadcast automation systems.

Pate grew up in Murfreesboro, outside of Nashville. He began working as a radio engineer while still in high school. Pate did stints at stations in New York and Birmingham, Ala., before returning to Tennessee to work in the engineering department of WSM-AM-FM-TV.

Robert Powell, an engineer for the Nashville Network, was a friend of Pate for 18 years and worked with him at WSM. "He created customized equipment. Pate created and got a patent on the Harris Phase Fixer, which solved the problems of wows and flutters and phase discrepancies on the old cart machines."

Pate was divorced and had no children.

Powell said Pate began Sine Systems in the basement of his home when he left WSM, and later moved it up to his living room, before finally moving to an office. The company has been at its Main Street location for two years.

Damage

All six employees were in the manufacturer's office on 972 Main St. when the tornado touched down.

Office Manager Ford said, "Right before it hit the (air) pressure changed. Our ears started popping. ... We saw the awning come off the back of the building and the roof peeled back. The wind was sucking me back through the door. I crawled. ... After three or four crawl steps, it was over."

Reported winds of approximately 180 mph pulled Sine's electrical panel off the wall and tore the roof off the warehouse. A couple of feet of water covered the floor.

On its Web site (*www.sinesys.com*), Sine told customers that most of its operating manuals were available online and that tech support and repair service were temporarily unavailable but expected to resume soon.

Nashville Radio Stations Weather April Storm

by Randy Stine

NASHVILLE, Tenn. "The glass windows of our building bowed in and out like the letter C. It was as if the building was pressurized, then it wasn't."

These were the words of a Nashville radio executive describing the wrath of the tornado that struck downtown on April 16.

The storm left hundreds of buildings damaged and dozens of people injured from flying broken glass. Radio stations in Music City for the most part escaped unscathed. Several were off the air for short periods of time, but none suffered building or tower damage. Other than for a few STLs knocked out of range, stations were fortunate.

The five stations owned by SFX Broadcasting Inc., in Nashville didn't miss a beat. "It was remarkable that all of the stations stayed up throughout the worst of it," said WSIX-FM General Manager John King. SFX also owns WLAC-AM-FM, WRVW(FM), and WJZC(FM). "Radio was made for covering an event like this. Our news/talk station, WLAC(AM), had reporters all over town calling in storm damage reports from across the city," said King.

On the following Monday, WSIX-FM spearheaded a food drive to help families displaced by the storm. "We collected over three semi trucks full of non-perishables," said King. "When a catastrophe like this happens, it's a chance for the radio broadcasting community to come together and work for the common good."

King said all of the radio stations in Nashville aired public service announcements to inform listeners where they can go to help with cleanup efforts.

Dickey Brothers Broadcasting has three stations operating on the ninth floor of the tallest building in downtown Nashville. "We are in the United Artists Towers along Music Row. The storm literally went right over our heads," said Michael Dickey, general manager of WNPL(FM), WQQK(FM), and WVOL(AM). "The storm knocked WNPL off the air for about an hour. And we had a lot of scared employees, but we were incredibly lucky."

According to Dickey, all three stations teamed up with the Second Harvest organization to collect food and clothing. "The east end of Nashville was hardest hit. The people there need our help. I know I speak for the Nashville radio community when I say that, through tragedy like this, we in radio can help bring everyone together, and make a difference," he said.

At WGFX(FM) and WKDF(FM), Program Director J.J. Duling said the staff watched on Doppler radar as the storm made a beeline for the station. "We are about four blocks off Broadway and we could see the storm headed right for us. Our staff did a fantastic job of staying calm through the whole thing. It is a very nerve-wracking experience," he said. The only damage at the radio stations was to an employee's car in the parking lot. "Every single window was blown out," he said.

The staff of WGFX took the money they would have given away on the air the next morning and gave it to the Nashville Salvation Army. "Their downtown store was very hard hit. We took the $2,000 and did the right thing with it," said Duling. WKDF broadcast live from the Red Cross on Monday morning the following week. "We raised $3,000 on the spot. It shows the human appeal of radio."

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World Radio History

Cool Congratulations Are in Order

We are proud to present our 1998 **Radio World** Cool Stuff Award winners. These are the products that caught the eyes of our secret judges on the floor of NAB '98, and made them stop and say, "Oh, cool!" The list contains familiar names and some less well-known companies. All of these products are well worth a close look.

Many thanks to the radio engineers and **RW** contributors who took part in our panel. I can't thank you by name, for obvious reasons, but you know who you are.

I saw a lot of fine new products at the show, demonstrating that initiative and entrepreneurial spirit are healthy in our business. Some did not win awards, but are cool just the same. We'll tell you more about them in upcoming issues.

Our NAB product wrap-up and Cool Stuff coverage start on page 17.

RW Editor Paul McLane, left, and Technical Editor Al Peterson announce the Cool Stuff awards in a live Webcast from the show floor.

★ ★ ★

During the show, Internet surfers could get **RW** product news, audio interviews and commentary at **RW Online**, our new Web site, at *www.rwonline.com*

A highlight of our online coverage came when Technical Editor Al Peterson and I announced the Cool Stuff winners live on the Web from the Telos Systems booth on the floor of the Sands Expo Center. The awards have become big news, and a number of exhibitors listened to our Webcast show from their booths.

Also during the show, host Craig Hall-Michaels and producer Ken Nosé aired interviews with a cross-section of the radio industry. Guests included Web priestess Peggy Miles of Intervox; Norm Miller, the president of DAB proponent Digital Radio Express; Richard Ducey of NAB; micropower attorney Louis Hiken; Sandy Goldman of WaveTop; Howard Stringer of Sony; and other interesting visitors. I took part, too, with daily live phone-in reports from the show floor.

The experience was fascinating, and pointed up the changing nature of information technology in the late 1990s.

For music and production elements, we thank Groove Addicts and Who Did That Music? Vocal jingles were courtesy of Ken R. Inc.; on-site production was by Dan and Scott, and Ken Nosé. National voice talent Joe Cipriano handled our liner duties. Frank Beacham conducted live interviews. Digigram kindly loaned us a PCX9 sound card and Xtrack software. **RW** editors and staff provided their voice talents. Many thanks to all, and particularly to John Casey and Miriam Carey of Telos Systems, who provided the Web technology, booth space and coordination. The sponsors of **RW Online** are Telos, Cutting Edge, Harris Corp., BSW, MUSICAM USA and QEI.

Our pre-show engineering was handled by Al. For more on that, see page 78.

★ ★ ★

With this issue, Brian Galante joins us as assistant editor responsible for the *Buyers Guide* section of **RW**. He moves down the hall from the Special Projects staff of IMAS Publishing, where he worked as Daily Coordinator since the summer of 1997. A graduate of Mansfield University in Mansfield, Pa., he is a former managing editor of specialty publication Eagle Express and board operator at WUST(AM) in Washington, D.C.

Send him your ideas for *Buyers Guide* at *bgalante@imaspub.com*

★ ★ ★

Should **RW** cover the micropower and pirate radio stories as much as we do?

This is not an idle question. At least some editors of trade publications in radio apparently think like this: "The pirate and low-power issues are bad for existing licensed radio stations. We don't need this. We should be radio boosters. We should back off from the story and not give these people a platform."

Nonsense.

To follow such a course is to treat your

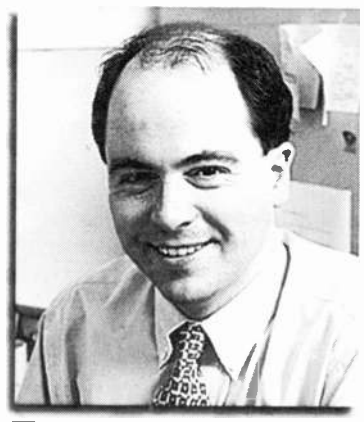
RW Online Producer Ken Nosé, Al Peterson, Host Craig Hall-Michaels and Paul McLane

readers like children. Our readers are adults. They want to know what's going on in their industry.

Pirates and low-power issues are not fabricated news stories. Consider the facts: Responsible estimates put the number of pirate stations now on the air in the United States at close to 1,000. The chairman of the FCC has indicated an open mind on the question of low-power radio, and the FCC has accepted comments on at least two specific proposals to allow it. Meanwhile, the commission has taken action against numerous unlicensed operators in the past year.

Stephen Dunifer continues to do his thing in California. The NAB put pirate radio on its session agenda at its recent

From the Editor



Paul J. McLane

convention. Outside, protesters shouted their opinions in a public demonstration during the NAB show. **Radio World** — and national news media — were there, but some trade publications missed the story or chose to ignore it.

Low-power radio is legitimate news.

We don't support pirate radio. **RW** has argued, and continues to believe, that anybody who wants a piece of the spectrum must play by the rules, and should stay off the air otherwise. But we also feel that ownership deregulation and cultural changes in the age of the Internet may bring about regulatory changes in our industry, perhaps in the form of new low-power services, and we want radio managers to pay attention now, not to proceed in ignorant bliss.

I have strong convictions about the role of a newspaper. We owe it to you to print diverse ideas and opinions, some of which you, and we, may not like. That's why, in the past two years, we have profiled, interviewed or printed comment from the likes of Bill Kennard, Charles Morgan, Eddie Fritts, John McCain, Stephen Dunifer, Rodger Skinner, Tom Taggart, Billy Tauzin, Rush Limbaugh, Gary Shapiro, Glynn Walden, Steve Church and many other leaders of our industry. We will tell you our opinions, too, on pages 4 and 5. But in the end, **RW** will let *you* decide how to think.

We will continue to cover the low-power story, to print the opinions of outsiders as well as industry insiders, and to print your comments on issues that matter to radio. That's my promise to you.

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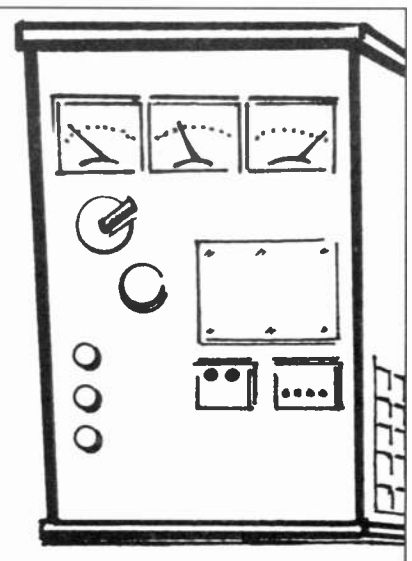

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◆READERS FORUM◆

Letters received are the property of **RW**, and may be edited for space considerations.

Polka praise

Dear **RW**,

Just a quick note to thank you for the excellent article "At WNBF, Polkas Equal Profits" in the March 18 issue.

As a producer the "Early Bird Polka Show" which runs Saturday mornings on WMUA(FM) at the University of Massachusetts, our station also benefits from our audience loyalty and financial contributions.

Each fall our station runs a fund raiser for a week, and the polka shows "Early Bird Polka Show" and "The Polka Bandstand," produced by Billy Belina, run a 15-hour Polkathon. Our 15-hour Polkathon raised $12,000 out of the entire week's total of $20,000-plus.

I believe this shows that polka music does indeed have a place on radio, and that radio is actually the loser for not programming more ethnic programming.

Mitch Moskal
University of Massachusetts
Amherst, Mass.

Open letter to the RAB

Dear **RW**,

I just read the article "Radio Sales, Down to the Letter" (**RW**, March 18) by S.D. Yana Davis. He culled my comments for this article from letters I had written on the subject that I e-mailed to him. I felt he missed some of the key points that I made, and ask that my open letter to Gary Fries and the RAB Board of Directors be printed regarding the elimination of the CRMC certification:

Dear Gary,

I am terribly disappointed with the RAB's decision to terminate the CRMC certification.

For the record, I am a Diamond CRMC and received my CRMC certification in 1980. I'm number 559 and Miles David and Ken Costa signed my certificate, which proudly hangs in my office.

I urge the board to reconsider this decision and reinstate the CRMC certification. If Coca-Cola can admit they made a mistake with New Coke and bring back Classic Coke, then so can the RAB admit a mistake.

The RAB's rationale for making the change was that today, the knowledge base is much greater than it was at the time the CRMC program was initiated. On this point, I would agree. But I hope you would also agree that to win a gold medal at the Winter Olympics in figure skating, a man must now do the quad jump and in speed skating, "clapper skates" are a must. Does this mean that since the old skills needed to win a gold medal in years past are no longer good enough, that the gold medal should be dropped and a higher standard should be adopted? Maybe platinum medal. How would the board feel about this fix?

The motto of the Olympics is "Faster, Stronger, Better." The medals reflect, as they always have, the best there is at that moment in time.

There is not a professional career on the face of this earth that is the same as it was yesterday. But you don't see CPAs changing their certification label, or CLUs or CFPs.

I don't have a problem with increasing the standards it takes to earn a CRMC. Heck, it shouldn't be the same. I don't for a moment think the curriculum at either the college from which I obtained my BA degree or the university from which I obtained my MS degree is the same as when I attended those institutions in the '70s. But guess what? The degree they confer on the graduates today is the same as when mine was conferred.

I also take issue with the fact that if the new "master" doesn't keep paying the RAB/Lytle organization annual fees, they will be stripped of their certification. Boy I hope our country's colleges and universities don't catch wind of this concept.

My college will never strip me of my degrees, and the Olympic Committee will never strip an athlete of their medals, because they cease to compete; why then should the RAB?

I'm also very disappointed to think that the RAB thinks so little of the 7,000-plus CRMCs who studied, took and passed the CRMC certification test. If the RAB thought that the radio sales professional who became a CRMC considered that to be a destination, rather than a beginning, they've sold their CRMCs short. I look at the CRMC certification as not someone who knows it all, but rather someone who is in the continual pursuit of trying to be the best that he or she can be. The CRMC certification says that I'm someone who is committed to a program of constant learning and improvement.

I do not believe that the RAB holds the entire world's knowledge when it comes to effective selling. In fact, some of the best things I've learned about selling, customer needs analysis and getting results have *not* come from the RAB. I rely on the RAB to provide me with industry Instant Backgrounds, the latest co-op information and as a great source for additional stimulation and information. Most important, maintain our professional CRMC certification.

I have had several of my comments published over the past several months and many CRMCs have contacted me regarding this decision. This decision is not going over well with any of the CRMCs I've talked with.

The CRMC should continue to be the "Gold Standard" of the radio industry's sales and marketing certification program. Just as the RAB learned the importance of not changing its theme each year, but staying with the frequency and repetition of "Radio Gets Results," the RAB should not change from the 25 years that it has invested in the CRMC certification program.

Improve the curriculum; make the testing program more intensive, but make the CRMC certification mean that you are dealing with radio's best. And isn't it time to celebrate Ken Costa as the father of the CRMC certification program? This is a man who gave so much for so many and only accepted a "thank you" in return.

Dick Taylor, CRMC
General Manager
WQJZ(FM)
Salisbury-Ocean City, Md.

Radio's Success Story

Anyone who attended NAB '98 must have noticed the trends. Computers are everywhere. The Internet is everywhere. And, of course, digital is everywhere.

So what does this mean for our industry? With consolidation continuing, and moving to medium and small markets, the term *convergence* is truer than ever. Consolidation has forced the issue of running smarter and leaner, hence all of the unified computerized solutions exhibiting at the show. One example was a system set up to feed programming to several stations in-house while linking to other stations across the country.

Consolidation issues, coupled with advancements in computer and digital technology, seem to have ignited fears of the disappearance of on-air talent. But we think these concerns might be exaggerated. Think, for example, of how many telephone products for field reporting you saw on the exhibit floors in the Las Vegas Convention Center. There is still the need for a real live person somewhere in the operation. Smart stations will embrace the technology, but not forget the human element in the job to be done.

DAB was another issue that caught attention at the show. It seems folks are no longer asking "why", but "when" — broadcasters are realizing that every communications industry is doing it, and we must join in order to keep up. It's going to make AM sound better. It's going to make FM sound better. Just as television and phones are going digital, we must go digital as well.

On the advertising side, the RAB tells us that while sales in larger markets are beginning to level off, radio revenue growth is booming in smaller markets. And as always, radio proved it's commitment to community with a six percent increase in PSAs, to almost $600 million in 1997, compared to the year before. The Advertising Council called this "music to our ears."

This all proves that broadcasters are stepping up to the plate to meet some intimidating challenges. Radio is, after all, a survivor that not only follows the trends, but embraces them to their best advantage.

— **RW**

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Clarification

The Pyramix DAW (**RW**, April 15), is no longer distributed domestically by Panasonic. Merging Technologies, the manufacturer of the Pyramix line, has taken on distribution of its own product. The new number for product information is (847) 272-0500.

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Next Issue of Radio World
May 27, 1998

World Radio History

EEO Comes Under New Scrutiny

by Leslie Stimson

WASHINGTON Observers say a recent U.S. Court of Appeals decision overturning FCC EEO rules for radio and TV could have long-term effects.

May 29 is the first deadline for commission attorneys to appeal the court's ruling, in which a three-judge panel found the EEO rules unconstitutional. For now, those rules remain in effect.

Broadcasters are required to recruit minorities and document their efforts through annual employment reports. The Federal Communications Commission adopted the rules in 1968.

In reviewing the rules, the panel rejected the FCC argument that the EEO recruitment efforts are designed to achieve diversity in programming, and said the commission has not defined what that means.

Judge Laurence Silberman wrote, "Perhaps this is illustrative as to just how much burden the term 'diversity' has been asked to bear in the latter part of the 20th century in the United States."

Many broadcasters agree, and they have pushed to persuade the commission to ease its EEO paperwork requirement for small-market stations. That rule making is pending.

Varied reaction

The NAB, which has pushed for relaxation of EEO paperwork requirements, had a muted response to the ruling. President/CEO Eddie Fritts said, "We are confident that broadcasting executives will continue to diversify their workforce."

Some broadcasters, including managers at Capstar, said they would maintain their minority recruitment programs.

But others will not, industry observers say. The ruling is a "complete disaster" for minorities who want to enter the broadcast business, according to Gigi Sohn, executive director of the Media Access Project, a public interest law firm.

"The new ownership policies have made it more difficult for minorities to own stations. Now, they can't even get a job."

Former FCC Commissioner Henry Rivera agreed. "These rules are not for the good guys. There will be some folks who are not interested in promoting a minority workforce."

A source close to the case said he has received phone calls from worried minorities who work in broadcasting. He said he has been asked, "When are they going to fire us? ... After the rule changes, will my job still be there?"

The decision is a blow for new FCC Chairman Bill Kennard, who has made increasing diversity in the broadcast workforce a major goal of his chairmanship. Kennard said he was "confident our rules are constitutional," and that the commission was reviewing its options for appeal.

Kennard said, "The unfortunate reality in our nation today is that race and gender still matter."

In 1971, the FCC said, women constituted 23.3 percent of full-time broadcast employees, and minorities comprised only 9.1 percent. Last year, the figures rose to 40.8 percent for women and minorities 19.9 percent.

But while overall employment of minorities and women is up since EEO began, minorities and women are losing gains in broadcast ownership. That trend has accelerated as the industry continues to consolidate following passage of the Telecommunications Act. A survey conducted by the Commerce Department National Telecommunications & Information Administration for 1997 showed minority ownership of radio and TV stations remained about 3 percent for the sixth year in a row, and black ownership dropped to about 2.8 percent of commercial ownership, down from 3 percent the previous year (**RW**, Nov. 12, 1997).

At the time, National Association of Black-Owned Broadcasters Executive Director Jim Winston said of the FCC, Congress and the Clinton administration, "While no one has suggested minority (broadcast) ownership is no longer a needed public policy, we see a retreat from fostering minority ownership."

An NTIA official said the agency will work with the FCC to determine the next step for the government. NABOB has thrown its support on this issue to a coalition of civil rights groups led by the Rev. Jesse Jackson.

Of the ruling, Jackson said, "The decision to strike down all FCC efforts to promote diversity in broadcasting raises the specter of the resegregation of ownership and employment in the mass media."

Options

Another blow to increasing minority ownership came in 1995 when Congress killed the minority tax certificate program, saying that on paper, stations were being sold to minorities, but in reality, whites retained controlling ownership. Supporters of the program say that, while not perfect, the tax certificate program worked. Kennard, in asking broadcasters for ideas to foster minorities in the business, has said he is open to bringing back some type of mechanism similar to the certificate program.

Under the program, broadcasters who sold stations to minorities and realized capital gains on the sale could take the gain and reinvest it in another broadcast property, and delay tax on that gain. The definition of "broadcast property" was broad, said Rivera.

"It could mean stock in GE. It did not necessarily mean you had to buy another station."

Former FCC Chairman Dick Wiley said a revised program that "avoided shams" might work. Whatever policy would be adopted, he said, the policies would have to assure "a real role for minorities" and ensure that the minority owner held onto the property for a specified amount of time, instead of going for a quick resale.

Nearly all observers agree that giving minorities access to capital would help increase their chances of station ownership. Wiley said, "In a big marketplace, there's always buying and selling ... and in large mergers, there are spin-offs. Willing buyers and sellers need to know each other. Perhaps the FCC can be a stimulus."

The near future

In its decision, the panel said the FCC definition of "diversity" was not narrowly defined. Critics say the FCC should streamline its EEO rules. The agency could do that in its pending EEO rule making.

But most observers expected the commission to appeal the ruling, either by asking for a re-hearing by the full appeals court, to get a wider opinion, or by asking the Supreme Court to hear the case.

The first option was considered to be the easiest and most obvious choice.

Lucent in IBOC Fray

▶ LUCENT, continued from page 1

by two other companies that are working to develop IBOC DAB for the United States: USADR, a partnership of CBS Corp. and Gannett Co., and Digital Radio Express, which announced its presence this year and has an alliance with semiconductor maker TriTech Microelectronics.

DAB had already earned new attention recently. USADR began to conduct technical tests of its systems. DRE made its intentions public, and asked the NRSC to cooperate in its tests. The Consumer Electronics Manufacturers Association issued its final technical evaluations of digital systems conducted earlier, and said the Eureka-147 system was superior to those tested. DAB generated interest at the NAB '98 convention, as the TV side of the industry began to make its own digital transition.

AM and FM

Like USADR and DRE, Lucent Digital Radio says it intends to develop IBOC systems for both AM and FM radio. LDR plans to use the Lucent-developed PAC algorithm to compress digital signals, to achieve the low bitrate without signal degradation that broadcasters want for IBOC DAB.

USADR also has said its system will use PAC; DRE is using the AAC algorithm.

LDR plans to develop some sort of hybrid system for both analog and digital, to be used during an expected transition period. Pai said, "Any practical rollout will have to find some way to bridge analog to digital. As an initial step, you have to provide a viable migration path."

Pai would not reveal whether LDR has begun testing a system. As part of its agreement, Lucent took part in recent FM characterization tests conducted by USADR. Pai said LDR can use information gleaned from those tests.

Also not revealed is LDR's rollout schedule, or whether the company intends to license and sell IBOC-capable hardware or simply develop technology for sale to others.

LDR intends to work with the National Radio Systems Committee to develop mutually-agreeable tests, a step toward setting a uniform IBOC DAB standard for broadcasters and receiver manufacturers.

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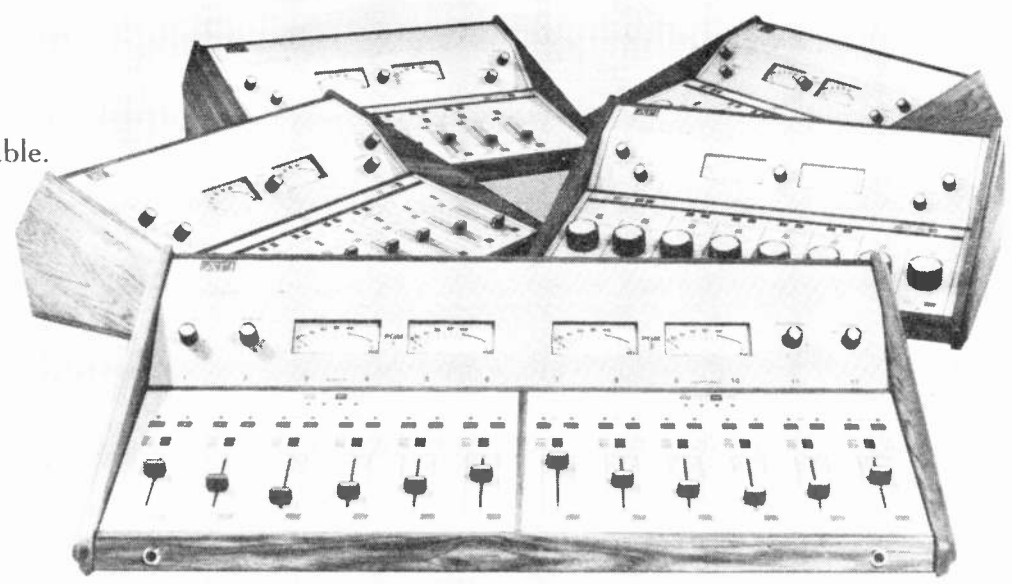

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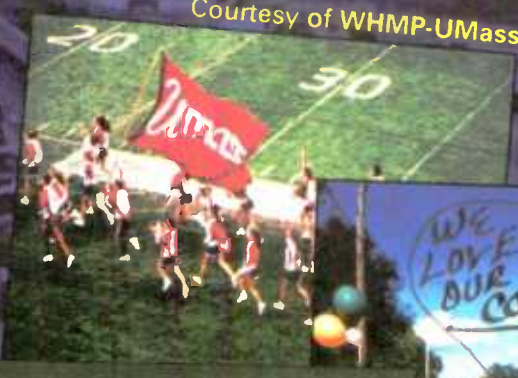

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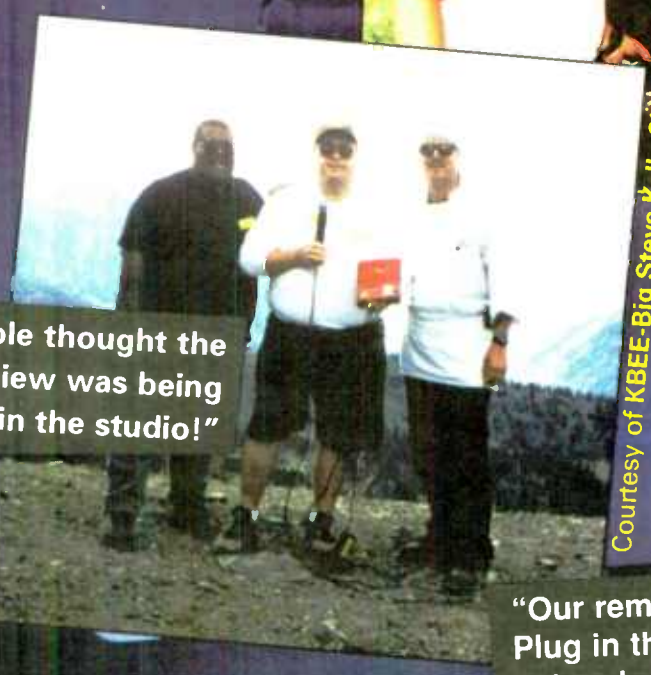

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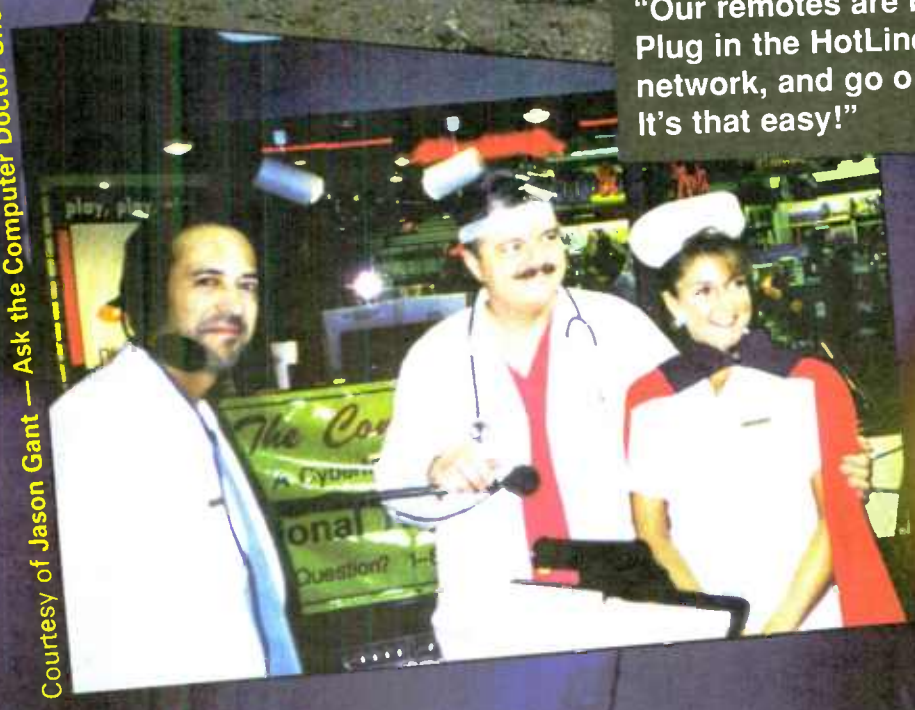

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World Radio History

EAS, in Practice

▶ EAS, continued from page 1

responsible for carrying common emergency messages as specified in the EAS local area plan. The numbers (LP1, 2, 3) refer to the sequence in which they are to be monitored by other broadcast stations in the local area.

The alert stops here

Not requiring stations to relay weather codes "was a big mistake," said Edward Brouder, State Emergency Communications Committee (SECC) chair for New Hampshire. "As a chairman of a system, I think it was a real oversight because we can't even require our seven key stations to monitor tornado warnings, for example."

Brouder said many New Hampshire stations refuse to include Winter Storm Warnings in the codes that they let pass through their box. On one hand, stations know the NWS will be quick to issue those alerts, which could use up airtime. Many stations also figure listeners will get that information from their periodic weather forecasts.

"That's a problem, because if some other station is assigned to monitor them, that low station in the food chain might not know which weather bulletins the other station is precluding," said Brouder.

In Nashville, WZTV chooses to monitor two LP1s: WSM(AM) and WSM(FM). Although he does not like relying on one studio facility for both inputs, Prichard said it is better than using the local LP2 station for the FM input.

Brouder said he thinks the system would be better if stations did not have so many options for how to react to an EAS alert. An automatic system would be ideal, he said.

"To me, that's the best warning system. Yes, it will cause interruptions for programming, but it would be the truly safest system," he said.

"There are certain types of chemical spills that can occur if a boxcar tips over or if a truck is involved in an accident. Certain chemicals can start poisoning people within five minutes, so if you delay a bulletin 15 minutes, then you can have dead people around."

Prichard said the two stations for which he does contract work near Nashville are fully automated and programmed by satellite. One, WVRY(FM), Waverly, Tenn., is the LP2 for its vicinity. He said officials for both stations were thankful EAS was working even though their programming was interrupted several times each hour during the tornadoes on April 16.

Training trials

Tornadoes also touched down in Georgia this spring. Bill Sanders, executive director of the Georgia Association of Broadcasters, said the EAS warning for the first round of tornadoes was issued at the same time they touched down.

But for the second round a few weeks later, EAS alerts were issued far enough in advance that Cobb County had time to activate its outdoor alarm system to alert the public.

One of the biggest challenges for EAS, Sanders said, is finalizing and solidifying the chain of response to EAS alerts and educating stations and their employees. The goal is to make staff EAS alerts a "no-brainer" even for weekenders and part-timers, said Sanders.

Another state co-chair, who preferred not to use his name, went a step further. He said the biggest problem with EAS is that radio stations still have difficulty understanding the whole concept. Engineers understand the system, he said, but small rural stations with no engineer on staff are weak links in EAS.

In Maine, Gil Maxwell, director of engineering for Maine Public Broadcasting and the SECC for the state, found out the hard way that more training was needed.

Like New Hampshire, Maine was hit with a severe ice storm this winter. The storm itself was not considered an EAS event, but the Maine Emergency Management office eventually did try to initiate an EAS alert to inform the public the office had no power. The alert never went out.

"They pushed a button, nothing happened and they walked away from it," Maxwell said. Nobody called the two primary stations to tell them the alert had failed. Although several EAS alerts were launched successfully last summer, the winter miscommunication resulted in a concentrated effort to make sure everyone knows the backup procedures.

"This seems to be a problem across the country, getting all the checklists taken care of, getting everybody trained, because this is all volunteers, and with no money it makes it very difficult," said Maxwell. "You've probably never read your life insurance policy until you need it. This was the same thing."

The situation concerns Michael Langner, SECC for New Mexico and chief engineer for the eight Citadel stations in Albuquerque. With almost no risk of bad weather in New Mexico, Langner said there is no "top-of-mind awareness" for EAS. His biggest concern, he said, is whether EAS will be as valuable a tool as it can be, or if everyone will just have a knee-jerk reaction in an actual emergency.

No one expected EAS to work perfectly right away. Some industry critics doubt it ever will. Mother Nature has tested the system in many ways. During the ice storm, Maine Public Radio, the backbone of the state system thanks to its microwave distribution network, lost power at WMEH(FM) and could not receive alerts. Officials for the station and the state are trying to find funds to purchase backup generators.

In New Hampshire, one of the seven LP1 stations in the state lost its antenna in the same ice storm. It took two months for WLNH(FM) in Laconia to get back to full power. Stations that normally monitored WLNH were sent a notice by fax whenever there was a weather-related or other type of EAS activation.

Another problem is encouraging non-broadcasters involved in the EAS plans to walk the fine line between alerting the community and tromping over the airwaves of broadcasters. Broadcasters want to help, but at the same time, they do not want to give up airtime unnecessarily, Maxwell said.

In Georgia, Sanders said the system of authority to activate EAS needs some work. He said the NWS has "jumped the gun" a few times with its weather watches. Sanders said he does not want severe weather alerts to become a case of the "boy who cried wolf." Ideally, he said, EAS should be for warnings with watches distributed via more traditional channels.

■ ■ ■

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EAS Pioneer Harter Is Remembered

by Lynn Meadows

SACRAMENTO, Calif. Colleagues of Stanly Harter recall the contributions he made to improving the emergency alert system in California.

Stanly Easton Harter, KH6GBX, passed away April 2 at age 68. He was a participant in the emergency planning community for more than three decades, and in that role was familiar to many broadcasters, particularly on the West Coast.

"His contributions were vast, to put it mildly," said Frank Lucia, director, Emergency Communications, FCC Compliance and Information Bureau.

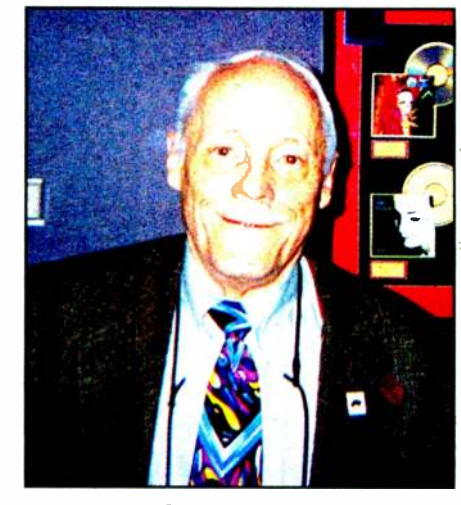
Harter was assistant chief of the telecommunications unit of the information technology branch of the California governor's office of emergency services. He was hired in 1985 as coordinator of the state auxiliary communications services (ACS). For three years prior to that, he was communications coordinator for Bakersfield California and Kern County.

From 1962 to 1982, Harter served as assistant director of the state civil division and chief of telecommunications for the State of Hawaii. In recent years, Harter served as vice-chair of the California State Emergency Communications Committee (SECC).

For EAS in California, Harter brought to the task knowledge gained from setting up the Emergency Broadcast System in Hawaii.

He developed "standardized communication operations," one- or two-page fact sheets about each local area in the state, including details such as the names of the local EAS chair and the LP1 and LP2 stations.

"He came up with a standardized format that made putting together local plans easier for people like myself," said Richard Rudman, chair of the Los Angeles County Local Emergency Communications Committee and California South State SECC Vice Chair. Instead of writing a plan that had to be reapproved for every change, Rudman said, Harter had one that included a boilerplate message up front and an appendix of operations orders, which could be changed more easily.



Stanly Harter

Lucia praised Harter for the work he

See HARTER, page 10 ▶

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World Radio History

Top Engineers Debate Digital

Heads of Radio and TV Standards Groups Exchange Views on Future of Broadcasting

by Paul J. McLane

LAS VEGAS The future of radio is digital, and it may be here. The future of TV is digital, and it is here now.

These themes ran throughout the remarks at an unusual — and heavily attended — opening keynote session of the Broadcast Engineering Conference at NAB '98.

"There is no question in my mind that digital audio broadcasting is in our future, and I hope that it will be some form of IBOC," said Charles Morgan, chairman of the National Radio Systems Committee and senior vice president of Susquehanna Radio Corp., referring to an in-band, on-channel solution.

"I believe that within the next two or three years, we will know if IBOC works, and works well enough to be a replacement for the existing AM and FM service. If this is the case, implementation will go very quickly."

Morgan shared keynote duties with Robert Graves, chairman of the Advanced Television Systems Committee. Rather than present a traditional single keynote speaker, the NAB invited Morgan and Graves to interview each other on the podium in their roles as leaders of industry standards organizations, about the most pressing digital concerns in radio and TV.

The DTV rocket

"I believe digital television is going to take off like a rocket," Graves predicted in reply to a question from Morgan about the timetable of DTV. "I'm one of the few people that does not scoff at the FCC's timeline of 2006. I think we have a real shot of making the conversion (by then)."

Attendees crowded into the session to hear Graves and Morgan trade opinions and predictions. Their questions to each other were friendly but pointed, reflecting awareness that convergence may bring

See KEY, page 14 ▶

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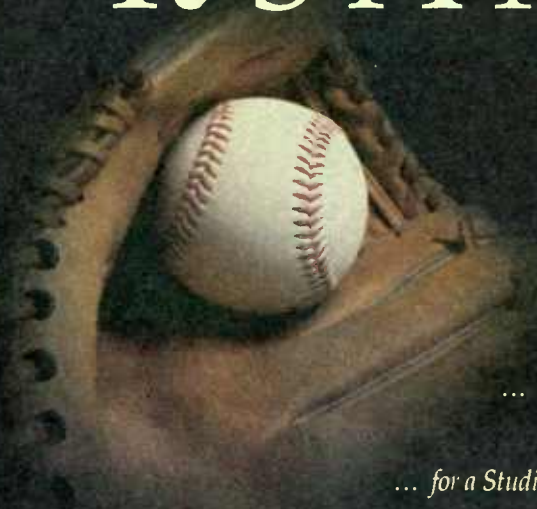

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Harter Was EAS Leader

▶ HARTER, continued from page 8

and Nevada SECC Chair Adrienne Abbott did in working out an interstate plan for the Lake Tahoe area. Harter was responsible for a lot of the "day-to-day, nuts-and-bolts work" in solving EAS problems, Lucia said. He said it would be hard to find someone with the same devotion.

The OES established a memorial Web page for Harter at *www.garlic.com/oes/harter.html* More than 100 people entered comments on how

Stanly Harter

helpful and knowledgeable he was.

Wrote Rudman, "I will sorely miss Stan's resonant voice, his sense of humor and his cut-to-the chase approach. Most of all, I will miss Stan as an essential internal emergency resource who not only understood the Mission, but marched toward it no matter what the obstacle."

Harter was active in the Civil Air Patrol and became a reserve police officer, wildland firefighter and fire lookout instructor. A survivor of polio, he used crutches to hike the rugged terrain of Yosemite and the floor of the NAB conventions.

Harter had an alter ego that he named Dr. Delmar U. Davis, PH and D. He would use the alias to give opinions or simply poke fun.

"It took me a long time to figure this Delmar thing out," Cary Mangum, chief of the state Auxiliary Communications Services said with a laugh. "He had a sense of humor you wouldn't believe."

Harter had a second job at KUMU-AM-FM from 1956 to 1982. He was a devotee of gospel music; one speaker at his funeral gave Harter a lot of credit for helping to get traditional gospel music accepted in this country. He was inducted into the Legends in Broadcasting in San Francisco in 1990. Harter, his admirers say, left behind many communities that are better prepared for emergencies because of his work.

Harter is survived by his wife Alicia and two children.

World Radio History

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World Radio History

Engineering Workshop Draws Eager Recruits

by Thomas R. McGinley

LAS VEGAS Harmonic distortion and efficient grounding are problems that today's engineers face frequently.

How to handle those and other challenges were discussed at the Ennes workshop at NAB '98, held annually by the Society of Broadcast Engineers. Former SBE President Richard Farquhar moderated, as part of the Broadcast Engineering Conference. The morning segment featured an in-depth review of issues covering primary power, including power line conditioning, harmonic distortion, lightning fundamentals and protection techniques, and the art and science of grounding.

Dangerous harmonics

Peter Gross, PE of Einhorn, Yaffee, and Prescott Consultants, discussed the challenge of coping with commercial power sources that contain ever-increasing levels of harmonic distortion. Fourteen percent of all loads are now "non-linear," caused primarily by the proliferation of switching power supplies that pump odd-order harmonics back into the distributed power lines. The harmful effects of excessive harmonic distortion of 60-cycle power include overloading of the neutral wire, reduced power factor, transformer over-heating, increased system losses, malfunctioning equipment, tripping circuit breakers, capacitor failures, communications systems interference and inaccurate instrumentation.

Lightning causes untold damage to broadcast facilities every year.

Gross reviewed other problems present in today's hostile power line environment. SCR loaded sources often induce various "zero-crossing" anomalies, adversely affecting regulators and generators. Incidental harmonic resonance conditions can cause serious fires, triggered by power factor correction capacitors exploding and overheated wiring. The remedies for these problems can be resolved by good applications engineering, including the use of oversized neutral wiring, line reactors, special "K factor" transformers, active and passive filtering, and proper power factor correction techniques.

Battling bad power

Patrick Reed of Northern Technologies reviewed the care and feeding of generic power line problems, including complete outages, swell and sag, harmonics and transients. The ills of outages are best conquered with appropriate UPS units and generator sets. Line regulators are used to correct swell and sag conditions, while ferro-resonance units reduce line harmonics. Eighty-eight percent of all power line problems can be traced to line transients, usually induced by lightning, grid switching, or the cycling of motors, copy machines and other industrial equipment. Good grounding is the first line of defense, along with the use of transient voltage surge suppressors. Reed stressed that any TVSS should be installed using short straight wiring connections using large-gauge wire with no tight bends.

Lightning causes untold damage to broadcast facilities every year. Reed discussed the application of various techniques to reduce the likelihood of such damage, including the Franklin rod, gas tube spark gaps, metallic-oxide varistors and silicon avalanche diodes. He compared the merits of each, citing the SAD as the most efficient clamping device. He reiterated the need for proper and adequate grounding for any of these devices to be effective, because most broadcast facilities are inviting targets for lightning.

Grounding is key

In addition to protecting equipment, human safety is a primary goal of proper grounding. Reed discussed how different soil conditions affect grounding efficiency, with deep loam the best and granite/slate rock the worst. Driving long copper rods into the ground around tower bases and connected buildings, all interconnected with large-gauge wire, improves efficiency and provides a bypass path to ground for induced lightning energy around equipment. Instead of rods, hollow copper pipes filled with chemical electrolyte are even better. Numerous radial ground wires fanning out from these sites also build lower resistance to ground. Reed also covered grounding facilities in tall buildings using specialized solutions.

The afternoon session of the Ennes Workshop featured an enlightening presentation on transmitter maintenance by J. Fred Riley of Continental Electronics. Riley reiterated the importance of "safety first, saying nobody ever died from lack of rock 'n' roll!

Fifty percent of all transmitter problems can be solved by a thorough visual inspection. The majority of transmitter outages are related to the control circuitry

See ENNES, page 15 ▶

Industrial Strength Digital Audio Delivery

Digital Audio Delivery systems are now recognized as a must for every broadcast facility. But few systems provide the features, flexibility or reliability required to maintain profitability in this demanding and fault critical application, nor the support mechanism to maintain them.

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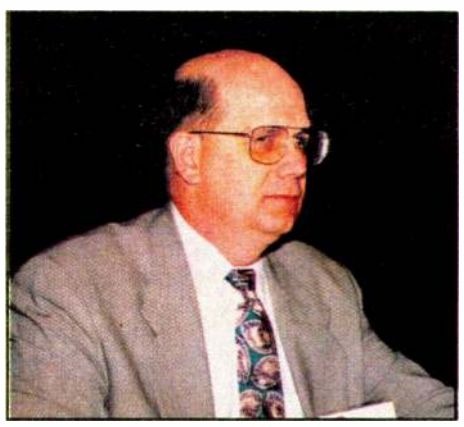
World Radio History

Radio, TV Questions

▶ KEY, continued from page 10

radio and TV into sharper competition.

Morgan pointed out that ATSC DTV systems offer ancillary capability that could be used for separate audio services. "Do you think DTV broadcasters will launch services that are essentially digital radio, that could compete head-to-head with DAB?" he asked.



Robert Graves

Graves said it was not the intention of the FCC or commercial TV broadcasters to use that bandwidth to compete with radio.

"But certainly it's possible, and it's a risk of further delay in introducing commercial DAB services in the United States," Graves said.

Graves, in turn, noted that the Eureka-147 DAB system in Europe supports some multimedia uses, possibly even including low-quality motion video that displays in cars. "Do you think DAB in the United States will offer services that might compete in some fashion with DTV?"

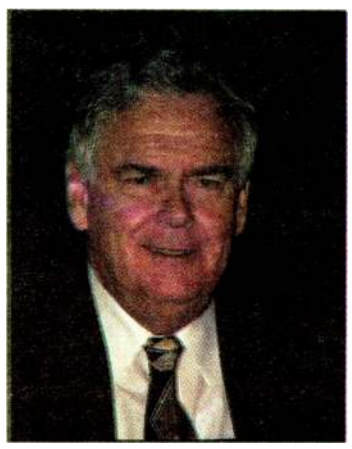
"Robert, you have really nothing to fear from us in that area," Morgan said. He said the FM IBOC systems currently proposed in the United States not only are bandwidth-limited, but will have to coexist with their analog signals for some period of time. "When radio becomes totally digital, the analog signal will go away." Morgan said. "When that happens, there's going to be a lot more capability for surround sound or other uses."

Morgan wondered how consumers would navigate the choices of HDTV or multiple-channel SDTV. Graves was upbeat.

"My personal opinion is that HDTV is the 'killer application' for digital television, the application that is going to motivate the consumers to invest. We have very few years before (viewers will demand that) top-notch programming, the Super Bowl, the NCAA, and top movies be provided in high-definition television. But there is a very important place for multiple programs in standard-definition television in other dayparts."

He said the ATSC and the Society of Cable Telecommunications Engineers completed a standard for the program guide and system protocol.

In radio, questions about developing a DAB standard continue. The NRSC DAB subcommittee met in Las Vegas; members are discussing the possibility of a new series of tests. Morgan said the NRSC is not planning to become directly involved in the testing process, although Digital Radio Express has requested the NRSC take part in testing of its system.



Charles Morgan

"Hopefully, we will be able to develop the test plan and measuring criteria that will allow independent agencies and laboratories to ensure a fair and impartial assessment of all IBOC systems that are submitted to us," Morgan said. USA Digital Radio is conducting its own testing.

"The potential for an NRSC standard for IBOC has yet to be determined," Morgan said. "As far as the FCC is concerned, I believe that it would prefer to not have to make a choice between two or more systems. Will the FCC authorize both systems and let the marketplace make a decision? Hopefully not."

The topics turned at times to specific digital questions. Morgan asked Graves about the compatibility of the Dolby AC-3 compression system as used in TV, and the PAC and AAC compression schemes considered by IBOC DAB.

"TV programs carry radio audio at times, and vice-versa. Has cascading any of these compression schemes been considered? Might this be a potential problem?" Morgan asked.

"This could be a problem if people try to cascade off-the-air signals with each other," Graves answered. "Both these standards involve the emission signals, and they're run at very low bitrates to be as efficient as possible. A much better idea, if someone plans to use a radio signal on TV or a TV signal on radio, is to use a higher-quality signal higher up in the distribution chain, and not take something off the air," he said.

"It could be a problem." Morgan made a strong pitch for an IBOC solution for DAB in the United States.

"Speaking as an existing broadcaster, IBOC and only IBOC can assure a smooth transition from our existing analog system of broadcasting to a digital world. This is ... in the best interests of my company, the companies that most of you represent, and the best interests of the American public," Morgan said.

"Make no mistake: If IBOC is not successful, new spectrum will be found, and Eureka 147 or some yet-to-be-developed new systems will become available. Who would get these new band allocations will probably be determined at auction. The new band system will be very slow to implement and very costly for both broadcasters and the American public."

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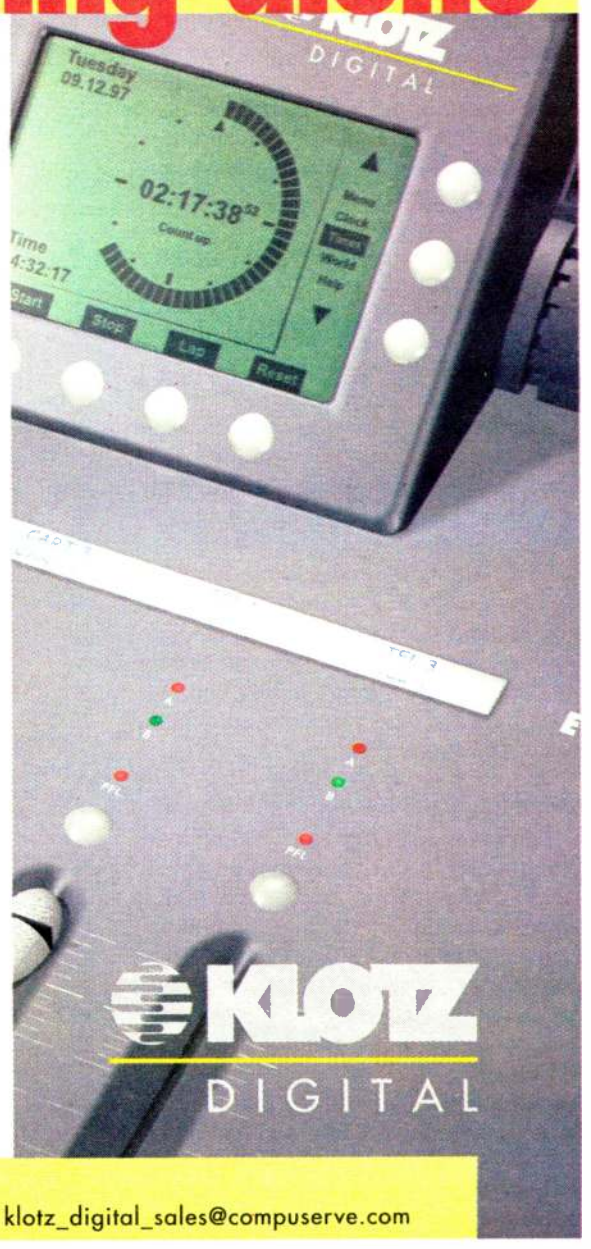

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World Radio History

Tower, Transmitter Solutions Aired

▶ ENNES, continued from page 13

failures. RF problems usually are the result of lack of proper drive and rarely are caused by catastrophic tube failure. Riley admonished those who replace tubes and retune transmitters attempting to fix them when the problem is almost always something else.

Riley cited several examples of transmitter problems caused by inadequate air supply. Installers often provide for elaborate exhaust systems but forget to allow for intake air. Engineers should always provide for positive transmitter room pressure. Longer tube life is a by-product of a clean and cool transmitter but is affected primarily by proper filament voltage management. He advised running filaments up to 10 percent lower than nominal after initial burn-in.

AM transmitters need more care and feeding than FM, as voltages and currents can double and triple under modulation. AM modulators need to see balanced antenna loads to work properly and will not work well at drastically reduced carrier powers. Riley stressed the need for antenna unit blocking capacitors to protect transmitters from lightning, but said that most lightning damage is caused by proximity strikes on power lines which induce high-voltage transients into power supplies. Riley also stressed avoiding open delta power feeds, preferring wye configurations and closed delta for better regulation and protection.

Maintaining
FM antenna systems involves more than watching the line pressure gauge.

Don't forget the antenna

Grant Bingeman of Continental discussed proper maintenance of AM antenna systems, which are too often ignored by too many stations. Weeds and trees need to be removed from antenna fields; transmission line trestles and tower fences need to be kept structurally sound. Engineers often overlook maintaining the tuning boxes and the detuning networks that protect other stations. Lightning protection is crucial and should consist of properly installed ball gaps, lightning feedline loops and horn gaps. He also advised installing a large ground screen at the tower base to add to system stability.

Tower base insulators can become cracked and are expensive to replace. Bingeman suggests converting to a grounded tower with a folded unipole feeder as a possible solution to gain the lightning protection advantages and dispense with the need for isolation components.

Keep a watchful eye

Maintaining FM antenna systems involves much more than merely watching the line pressure gauge.

Electronic Research President Tom Silliman offered an extensive and helpful list of tricks and hints drawn from 30 years experience concerning the proper care and feeding of FM antennas, including installation. When you get a new antenna, he said, carefully check all crates and all components for any possible damage or omissions. Watch the tower crew closely and only allow two bays at a time to be hoisted and installed. Upside-down bays will destroy an antenna's performance. After installation, watch the forward/reflected power closely for any changes and monitor dehydrator cycling or nitrogen consumption.

Silliman advised pressurizing an FM line and antenna with at least five or six pounds, but no more than 20 pounds. Inadequate pressure can be catastrophic if a serious leak develops. Occasionally purge collected water vapor from the top, because water is lighter than pressurized air. High voltage standing wave ratio problems can occur anywhere along the system. Silliman suggests the use of directional couplers at various locations and time domain reflectometer measurements to pin down the location.

Let your eyes climb

Using a transit to inspect the tower and antenna visually from the ground every few months and after heavy storms can be your best insurance against serious failures. Loose straps and broken hangers can wear holes in a transmission line and cause arcing and interference. Burn holes caused by lightning can be patched. Silliman suggests that every five years, an electrical inspection should be done with a high-pot tester and TDR. High VSWR problems often are found in the sampling equipment. Verify properly operating power slugs first before dispatching a tower crew. If there is a serious air-loss problem, start checking from the ground up. Many leaks are found at the dehydrator or the gas block flange.

The final and most comprehensive presentation of the Radio Boot Camp was by Chancellor Media's Barry Thomas. We'll cover "Moving Your Radio Station" in the May 27 issue.

■■■

Tom McGinley is chief engineer of WPGC-FM/WARW(FM) in Washington, and technical advisor to ***RW****. Reach him via e-mail at* k7qa@aol.com

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World Radio History

Global Peek at Digital Solutions

by Marguerite Clark

LAS VEGAS While the United States has opted for an in-band, on-channel (IBOC) approach to DAB, many countries have selected Eureka 147. Discussions and submitted papers at NAB '98 focused on IBOC, Eureka 147 and AM digital broadcasting in other countries.

Digital options for AM

More than 20 research institutes, transmitter/receiver manufacturers and broadcasters gathered in China in early March to inaugurate Digital Radio Mondiale, a consortium to develop specifications for a worldwide digital AM standard. Among members of DRM are the BBC, the Asian

Pacific Broadcasting Union, the European Broadcasting Union, Telefunken and Thomcast.

At the NAB show, Wolfram Schminke, vice president of research and development for Thomcast, outlined the Skywave 2000 digital system for short-, medium- and long-wave frequency bands. Skywave 2000, the Thomcast contribution to narrow-band digital broadcasting in the DRM consortium, is in the experimental phase.

According to Schminke, the system will bring benefits to listeners and broadcasters alike in the form of simpler receivers and clearer, wider-ranging audio signals. Skywave 2000, Schminke said, has shown positive capability and flexibility during its field tests.

Richard Zerod, an internal consultant for Visteon Automotive Systems/Ford Motor Co. in Dearborn, Mich., presented the results of experimental Eureka-147 L-band multimedia transmissions, which took place in Toronto.

In his paper, Zerod stressed the importance of value-added features, such as ancillary data services, for consumer acceptance of Eureka-147 DAB. Such services not only help attract consumers to the medium but also provide potential new revenue streams to the broadcaster.

Pretty pictures

In the Toronto field tests, ancillary data was transmitted in the X-PAD channel and received in a mobile test van under numerous conditions.

One of the objectives to these tests, Zerod said, was to determine the nature of the error patterns obtained during mobile reception and to access the image quality with different formats GIF, JPEG and BMP.

The future
MPEG-4 multimedia format will feature even greater flexibility and coding modes.

Another objective was to determine if cyclic repetition of the data file is required for satisfactory operation.

The results of the test indicated that penetration was generally good through tall buildings, resulting in good audio and datacasting performance. Though most files were received without errors, a few files were not error-free. These anomalies, Zerod said, should be correctable using simple modifications to the transmitting antenna system.

In his paper, Karl-Heinz Brandenburg of Fraunhoffer Gellschaft in Germany discussed how digital sound broadcasting systems are in need of improved bandwidth efficiency.

MPEG-4 to come

Brandenburg discussed advantages of ISO/IEC MPEG-2 Advanced Audio Coding (AAC) and said it has improved by a factor of two in compression efficiency over other systems, such as the ISO/MPEG Layer II.

Although MPEG-2 AAC was designed for applications requiring high-efficiency compression of quality audio signals supporting mono, stereo and multichannel material, Brandenburg said the future MPEG-4 multimedia format will feature even greater flexibility and coding modes.

According to Brandenburg, MPEG-2 AAC is likely to become the major format for computer-based audio as well as for future digital audio broadcasting systems.

Michael Pilath, head of sales for the German telecommunications company Deutsche Telekom, said the digitization of the AM wavebands would draw in listeners with fade-free and interference-free reception, among other features.

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World Radio History

NAB '98 Product Wrap-Up

and Radio World Cool Stuff Award Winners

Cool Stuff At NAB '98

In this special section, Radio **World** wraps up the largest NAB convention ever with more than 20 stories about the new products we saw on the exhibit floor. A small army of **RW** editors, writers and freelancers covered the show. Some of the industry's finest radio engineers contributed to this section, to help you sort through who-showed-what and why. Their stories are presented by product category. We hope you find this special section useful.

We are proud also to announce the winners of the 1998 **Radio World** Cool Stuff Award, listed below and described in detail throughout this section. A panel of anonymous judges, including radio engineers and **RW** editors, chose these as the most important or interesting products for radio users at the show.

1998 RW Cool Stuff Award Winners:

Avocet Instruments AV-2000 Delay Canceller
Belar CSA-1 Spectrum Analyzer
Comrex Vector POTS Codec
Gefen Systems PC/MAC 241 CPU Switcher
Klotz Paradigm Digital Console
Mackie HR824 Active Studio Reference Monitor
Moseley Starlink SL9003Q Digital STL
Neumann TLM 103 Microphone
Rode Broadcaster Microphone, introduced by BSW
Roland VS-1680 Digital Studio Workstation
Sierra Automated Systems SAS 16000-D Digital Audio Routing System
Will-Burt D-TEC Safety Package

Honorable Mentions:
CartWorks / dbm Systems VIO Visually Impaired Operator option
Digidesign ProControl
HHB CDR 800 CD-Recorder
Otari CDR-18 Professional CD Recorder

FM TRANSMITTERS

FM Transmitters at the Show

Mario Hieb

FM transmitters and related systems at NAB '98 included an eclectic blend of technologies ranging from rubber tires to GPS receivers. FM transmitter manufacturers responded to radio's love affair with digital exciters by introducing improvements and new options. Digitally generated RF has made tube final amplifiers the weak link in the chain, creating an interest in broadband solid-state FM transmitters. Also seen at this year's show were new products for synchronizing co-channel stations and boosters.

Digital excitement

"Everyone's looking for digital solutions," Dan Dickey, vice president of research and development at **Continental Electronics**, said. "We've had a steady stream of people looking at digital exciters." Continental showed a new version of its digital exciter, with features including an improved user interface, a new version of software, and an option to plug a T1 line directly to the exciter. Many radio people were surprised at Continental's introduction of a digital television transmitter, but Dickey reaffirmed the company's commitment to radio. "Digital television is not technically that much different from digital radio. ... We can use some of that technology for the radio side."

The **Broadcast Electronics** Predator is a modular exciter/transmitter that can be configured to a customer's needs. Power output levels range from 50 to 250 W. Features include AES3, composite and discrete analog input modules. "If a station has a digital STL and an analog STL for a backup, the Predator will monitor the digital signal, and should the digital signal be lost, it will automatically switch to the analog STL," Ron Pohler of BE said.

Darryl Buechting, FM product manager for Harris Corp., said, "If you can't afford a new transmitter, getting a digital exciter will have the most dramatic effect on your sound."

The potential increases in performance don't end there. "The typical situation with a tube final amplifier is that it does, to some extent, degrade the excellent exciter performance," said Jorgen Jensen, manager of sales and marketing at **Nautel**. "With solid-state, you have a bit more group delay, but it is extremely linear. ... The group delay doesn't vary with frequency."

The state of solid-state

"We've seen quite a bit of interest in higher-power FM this year," Jensen of Nautel said. "We have supplied more of our FM10s combined for 20 kW than as single transmitters. Everybody's looking for the 30 kW at a price they can survive."

Dickey of Continental added, "At the higher power levels — 25 kW and up — people are still looking at tube transmitters. The power level of solid-state is going to keep going up."

Why is there a ceiling on FM solid-state power limits?

"You can only put so many semiconductors together before you reach a critical failure rate and always have something broken," Dickey said, but there is good news: "The quality of semiconductors has really gone up, especially in the area of VHF/UHF transistors. There's been a phenomenal amount of research done. We feel a lot more confident to pile up many more transistors."

Bext introduced a new version of the LEX-25, a programmable FM exciter/transmitter available with an optional stereo generator/processor. The LEX-25 also can be used as a programmable input and output translator with the built-in receiver option. Also new from Bext is the FS line of Mosfet RF amplifiers rated at 300 W, 500 W, and 1, 2 and 3 kW.

Harris introduced the ZD20CD, which is two Z10CDs combined for 20 kW, and the Z3.5CD and Z7.5CD, transmitters rated at 3.5 kW and 7.5 kW respectively. Like the previous Z line, features on the new transmitters include

Harris ZD20CD

redundant, auto-switching IPA amplifiers, redundant RF amplifier modules, redundant power supplies and allowance for redundant exciters. Jim Woods of Harris said the Z series has enjoyed the most successful launch of a Harris transmitter line ever.

DB Elettronica showed its new PF-

See FM, page 19 ▶

Radio World Cool Stuff Award NAB 1998

Product: Vector POTS Codec

Manufacturer: Comrex

Retail Price: $4,500

Features: A codec for plain ol' phone lines, promising 15 kHz performance "at a realistic 24 kbps."

Compatible with the popular Comrex HotLine, but using a higher-level coding algorithm. Works with data rates as low as 9.6 kbps with lower fidelity. Built-in mixer, peak limiter and monitoring functions.

Shipping: August

Judges' Comments: "People on the show floor talked about the Vector more than any other product. POTS at 15 kHz, even in mono, is great for radio stations. An impressive followup to their HotLine."

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Tom Hartnett and Kris Bobo

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Most recent world firsts in radio broadcast

- **1987: Harris introduces Digital Amplitude Modulation technology used in DX series medium wave broadcast transmitters.**
- **1991: Harris demonstrates prototype digital FM exciter**
- **1993: Harris introduces DIGIT, world's first digital FM exciter**
- **1994: Harris introduces AES3 input module which allows DIGIT to directly accept digital studio standard audio**
- **1996: Harris introduces Platinum Z FM transmitter and DIGIT CD digital FM exciter**
- **1997: Harris introduces world's first *uncompressed* digital 950 MHz STL**

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World Radio History

Interest in High-Power FM

▶ FM, continued from page 17

3000 and PE-5000 solid-state MOSFET-based FM transmitters, with 3 and 5 kW power respectively. **Itelco** showed its line of solid-state units, rated from 30 W to 20 kW, as well as FM translators up to 250 W.

New company **ClearWave** introduced its solid-state Model SSPA500 and SSPA1000, with digital control and display, VSWR protection, internal low-pass filter and compact design.

OMB America touted its line of FM and TV transmitters, antennas and STLs. **Armstrong Transmitter** was on hand with its new Ultrasound "CD-quality" FM transmitters, with signal-to-noise better than 90 dB, in power levels from 30 W to 30 kW.

Backup systems

Because solid-state FM transmitters tend to have wider bandwidth than tube transmitters, a possible application would be a frequency-agile, backup transmitter for a site utilizing a multiplexer and a community antenna. One transmitter could feed the wide-band port of the combiner and serve as the backup for any station.

Crown showed the FMD30, a frequency-agile, digital exciter/transmitter combination available in 30 or 100 watts. In describing the FMD30 exciter, Don Spragg of Crown said, "The unit can be set up to operate with three different frequencies programmed in that you can remotely select between one, two or three different frequencies or power levels. It can serve well as a backup unit on a site where you need to back up several transmitters."

The Bext PTX30 programmable exciter also is remotely frequency programmable via an RS-232 interface.

We've all seen remote studios on wheels, but mobile transmitters?

As station values increase, so do efforts to optimize stations that may have less than ideal coverage. Darryl Parker of **TFT** states, "We've had an awful lot of interest in booster Reciters this year. We found that a number of stations realized that they don't cover their entire market."

The TFT system synchronizes the modulation between the main transmitter and the booster transmitter. The output frequencies of both transmitters are synchronized to the 19 kHz pilot to reduce heterodyning and beating. Parker said, "The third thing we do is provide delay compensation between the two transmitters, so that in the overlap area, the signal can be timed perfectly and get exact duplication of both transmitters signals at the receiver's location."

The **Intraplex** SynchroLink system allows FM broadcasters to simulcast programming over multiple transmitters on the same frequency. SynchroLink operates in conjunction with the Intraplex STL PLUS digital STLs, which can be used on leased T1 circuits, microwave radio links or fiber-optic links. The SynchroLink system uses GPS receivers to determine absolute reference times at each studio/transmitter location. At the transmitter sites, the GPS receivers provide the same 10 MHz reference signal to every transmitter, locking all of the carrier frequencies to the satellite-delivered reference.

With a special option, the Harris Digit CD exciter will also take a 10 MHz external reference typically derived from a special GPS receiver. This allows the carriers of two or more transmitters on the same frequency to be synchronized.

A product to introduce delay is in development. With this, a user will have more control over interference zones created by synchronized transmitters.

We've all seen remote studios on wheels, but mobile transmitters? One of the more exotic products displayed at this show was the **QEI** frequency-agile, mobile transmitter trailer. Not including tower and antenna, the system comprises a QEI 10 kW frequency-agile, broadband transmitter, HVAC and power system. A basic trailer, without the transmitter but including lighting, HVAC, and electrical, is available at a lower price for various radio station applications.

RFS Radio Frequency Systems promoted its balanced and star-point (branched) combiners, for combining from two to 16 FM channels into one antenna system, with combined power outputs of up to 160 kW and channel spacing as close as 800 kHz.

This year's NAB showed clear evidence of the acceptance of digital exciters. Less-costly PA designs, super-redundant systems and new applications are driving the transition to all solid-state transmitters. High-fidelity FM transmission is here to stay.

■ ■ ■

Mario Hieb, CPBE, is chief engineer of KXRK-FM in Salt Lake City.

Our AM Transmitter Coverage Appears On Page 90

Radio World Cool Stuff Award NAB 1998

***Product:* AV-2000 Delay Canceller**

***Manufacturer:* Avocet Instruments**

Retail Price: $1,895

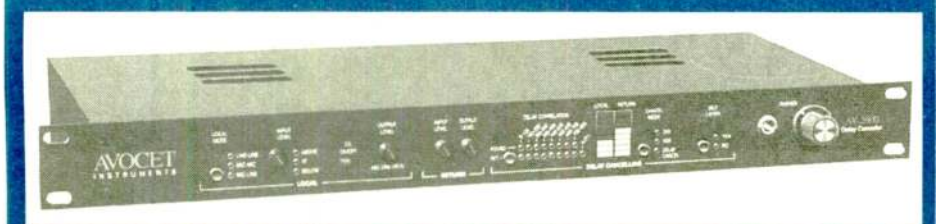
Features: Eliminate problems caused by delayed audio feedback in live broadcasts. Identifies a voice match between the mic and off-air return signals, and removes the delayed voice from the return. Suppresses voice by up to 40 dB and with up to 800 ms of delay. Performs the equivalent of a mix-minus from the remote site. Mic/line selectable I/O. Defeatable compressor/limiter. Balanced XLR loop-thrus; unbalanced input for consumer receiver feed.

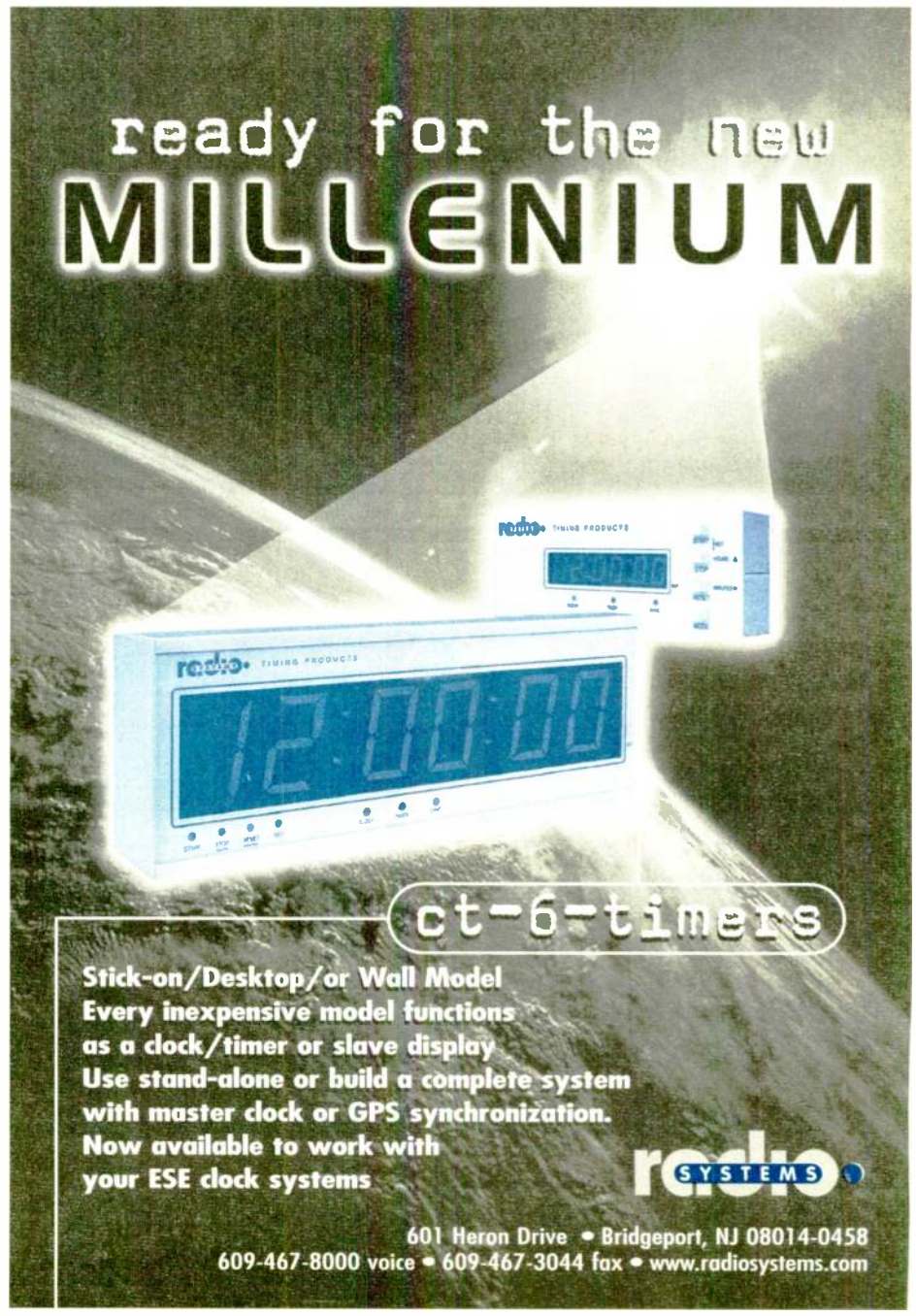
Shipping: June

Judges' Comments: "For anyone who engineers remote broadcasts using satellite and ISDN, audio containing delayed monitoring coming back to the site can be murder. Mix-minuses are not always available and are sometimes cumbersome to employ. This product solves all of that for an affordable price."

Eric Lane of Avocet Instruments

For information: Call (800) 443-0728, e-mail: *eric@avocetinst.com* or **circle Reader Service 10**





Circle (184) On Reader Service Card

World Radio History

MICROPHONES

Condensers Come Down in Price

Paul Kaminski

The selection of a microphone is one of a broadcaster's most subjective tasks. It is the ultimate price vs. performance decision.

As more new studios are built and upgraded, expect familiar on-air mic models to be challenged by new contenders in the low- to mid-priced cardioid condenser category. In the field mic category, the availability of good, affordable pro wireless equipment may make the wired mic the back-up option for future remotes.

What follows is a survey of new offerings that piqued our interest at NAB '98, along with a recap of other new products.

AKG showed its Solidtube condenser. At $1,500, it is in the high end of the mid-price range. But if you want high-end results on a mid-price budget, this is one to test drive. Is your budget is a bit smaller? AKG re-priced its condenser C3000, C1000S and C535 to fit that price range, with the price of the C3000 cut from $874 to $434 list.

Studio-style

Audio-Technica featured its new 30 series of condenser mikes. The AT 3525 is its newest studio-style condenser, with integral shock mount, flat frequency response and a list price well under $400. The AT 3527 omni and 3528 cardioid are appropriate for high-end field work with phantom powered mixers, along with the AT 4054 and 4055 hand-held condenser mikes. When we heard the 3525, we got the impression that with proper microphone technique and judicious equalization, a warm but bright sound would result.

Beyerdynamic showed five new models. The MC 836 and 837 are condenser shotguns, with the 836 the short and 837 the standard-length model. The MCE 82 is a stereo X-Y mike, for high-end production.

The Beyer MCE 58 is an omnidirectional battery powered condenser mike, which might be appropriate for high-end radio ENG.

The M59 Sport cardioid dynamic was designed by beyer for recording newsmakers on location. Jeffrey Brownstein of beyer said, "The M59 Sport was the solution to a problem faced by a broadcaster that needed a close-talking mic to reduce the background noise of the Formula One Grand Prix cars, while emphasizing the announcer's voice." This means you still get enough ambient sound to give the listener a sense of location, and still get the reporter's or newsmaker's voice coming through with punch over the background.

In addition to its standard line, **Electro-Voice** introduced another condenser, this one a boom pole shotgun for field production. Called the ENG 618, it is a two-pound boom mike, with integral headphone amp and XLR output. It collapses to 18 inches and can be powered by a 9V battery or phantom power. This allows the reporter or technician to focus the mic on the subject, and not get into a mic-flag war with TV reporters, because the mic will be out of their shot.

The Australian firm **Rode** came to the show with a line of mics. **BSW** had all three on display, beginning with the NT-1, a "plain-vanilla" (if there is such a thing) cardioid large-diaphragm condenser. The NT-2 includes a low-cut filter and supplied shock mount. The third model is called the Broadcaster. This is a large-diaphragm condenser with low-cut filter, integral shock mounting and integral foam pop filter. It also has an integral tally light, a red LED which reminds the talent that the microphone is on. The Broadcaster has a five-pin XLR type connector on the mike, two pins of which power the tally light.

Tim Schwieger of BSW said, "You can wire it up without the tally light, since the five-pin connector and a wiring diagram is supplied with the mike." The Broadcaster tended to flatter my voice. I could work it close (like an RE-20/27 or SM-7) and, with the low cut in, not pop the mike. It has a $499 retail price. This mic earned Cool Stuff honors from **RW**.

Shure exhibited its mic products. Tom Krajecki said the reliable SM-7 announce mic will be getting an upgrade. The SM7a will have the same performance characteristics, but according to Krajecki "reduce its susceptibility to computer monitor noise."

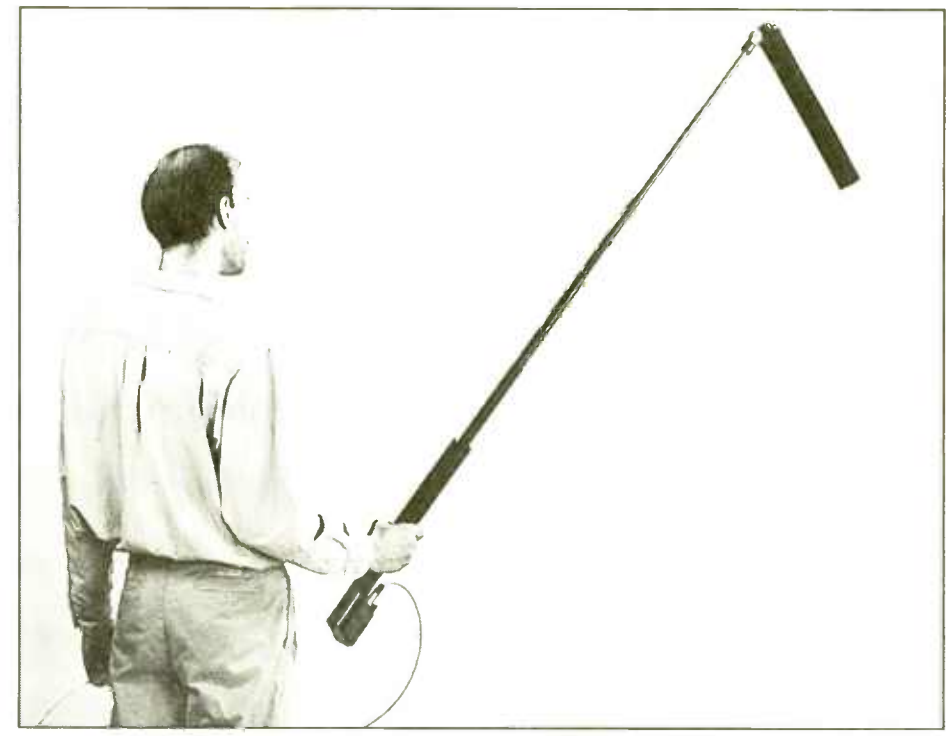
"It's something we're working on and hope to have for the Radio Show in Seattle (in October)."

Neumann showed its TLM-103, another Cool Stuff winner, at the NAB for the first time. We heard our voice through both the 103 and their U87, and once we found the sweet spot, were not displeased with the vocal reproduction. Sanken introduced the CS-3 shotgun, which gives a tight voice pickup thanks to sharp directivity.

Wireless

The wireless microphone segment was well represented by **AKG** with its WMS 60/80 line. **Azden's** 400UDR diversity UHF wireless receiver made its debut. The **Audio-Technica** entry in the UHF wireless category was the new 1900 Series, which includes a new body pack (ATW 1951) and hand held (ATW 1952) transmitter system. **Sennheiser** showed its EM3532 two-channel diversity UHF receiver, which with 32 programmable frequencies, gives a remote engineer many more options on location. The **Lectrosonics** UH200 UHF frequency-agile plug-on transmitter was shown for the first time.

Switchcraft has a solution for those who need to find a high-end 1/8-inch TRS plug (which will connect a microphone to a DAT, MiniDisc or Walkman-style high-end recorder stereo mic input). Their parts numbers are 35 HDBAU (the gold-plated model) and 35 HDNN (nickel-plated). They have the "Japan-style" tip, and allow the use of standard microphone cable for better reliability.



EV Boom Mic

Radio World Cool Stuff Award NAB 1998

***Product:* Broadcaster Microphone**

***Manufacturer:* Rode, introduced by BSW**

Retail Price: $499

Features: Large diaphragm condenser mic with low price. Switch-controllable on-air indicator. Low-cut filter, internal pop filter, stainless steel body. Noise 14 dB (A), sensitivity 18mV/Pa, max SPL 135 dB.

Shipping: May

Judges' Comments: "A price buster and a front-fire condenser mic, too. Radio will eat this one up."

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Tim Schwieger of BSW

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World Radio History

EAS & RBDS

EAS Upgrades, RBDS Questions

Harold Hallikainen

EAS is up and running. RBDS may be a solution in search of a problem.

Since the broadcast EAS deadline has passed, EAS manufacturers are concentrating on EAS for cable systems. Some manufacturers have added features that broadcasters can use. These were visible at NAB '98.

Burk Technology announced it will have a firmware upgrade available for its EAS units in May. The upgrade adds FIPS codes and improves the operator interface. This is a free upgrade that can be accomplished in the field by downloading the new code through one of the existing serial ports.

Telephone interface

Gorman Redlich has added a telephone interface to the EAS1. This interface could give local emergency officials access to the local EAS to broadcast emergency information. This is a lower-cost method of providing access when compared with using an EAS encoder at the county emergency operations center along with a radio link to broadcast stations (where the receiver audio is another EAS decoder audio input).

In addition, Jim Gorman described the Gorman Redlich radio automation interface. On receiving an EAS message that must be rebroadcast, the EAS decoder signals the program automation system that it has an announcement waiting. The program automation provides a start pulse when it is time to air the announcement, and the EAS provides an EOM closure back to the automation when finished.

As long as the program automation requests the announcement within the 15-minute window the FCC allows, this procedure allows the announcement to be fit into the program without a major disruption. Should the automation fail to request the announcement within the window, the EAS1 interrupts whatever is on the air and runs the EAS announcement, returning to normal audio at its end.

TFT also introduced a telephone access unit for its EAS units. This unit also allows local emergency officials to access the EAS through the public switched telephone network. TFT points out that many CATV franchise agreements require a provision for local access to the CATV EAS, so this satisfies that requirement.

Waiting game

Those with whom I spoke regarding RBDS are waiting for something to happen. As **RW** readers know, the promise of RBDS has yet to be fulfilled in the United States.

Inovonics showed a low-cost method for stations to transmit RBDS. The $350 Model 701 is programmed easily by connecting it to the parallel port of a computer. The RBDS data (such as station call letters, program type, etc.) is held in flash EEPROM.

Plug it into the exciter or composite STL, and you are on the air. This low-cost device may help prevent the chicken-and-egg problem between broadcasters and consumers.

Inovonics also showed the Model 510 RBDS decoder. This unit accepts RBDS data from the composite output of an FM monitor and displays a wide variety of RBDS characteristics. An RS232 port is included to drive software on an external computer for a more extensive analysis of the data.

CRL is not waiting for the chicken or the egg, but concentrating on producing a revenue stream through the use of RBDS. The SC-100 has extensive capabilities. Along with providing data to the broadcast receiver (station call letters, format type, alternate frequencies, traffic announcement flag, and so forth), the SC-100 includes a paging terminal. Connect a dumb terminal and you have a paging system that supports 300 pagers. The unit also can be driven with an external paging terminal or paging satellite feed to support 10,000 local pagers.

Sale of the paging capability of RBDS can offer an additional revenue stream to broadcasters. The unit also supports other low-speed data broadcasting applications, such as the transmission of differential GPS signals or billboard display data.

Modulation Sciences continues to produce the RDS-X data receiver, the PRD-3000 data decoder/monitor/analyzer, and the RDS-1 RBDS generator, a card that plugs into an existing computer. Modulation Sciences also manufactures the Sidekick audio subcarrier generator and the Data Sidekick, which allows 4,800 bps data to be broadcast on an FM subcarrier.

The **Belar** Wizard modulation monitor series also includes extensive monitoring of RBDS data.

SCA Data Systems is concentrating on high-speed FM subcarrier data instead of the lower-speed RBDS standard. For example, SCA offers the Music 4 Plus 9600 system that transmits 9,600 bps error corrected data and music over a single subcarrier (typically 9,600 bps). The system can be run simultaneously with 57 kHz RBDS data.

■ ■ ■

Harold Hallikainen designs transmitter control and lighting equipment for Dove Systems.

Radio World Cool Stuff Award NAB 1998

Product: D-TEC Safety Package

Manufacturer: Will-Burt

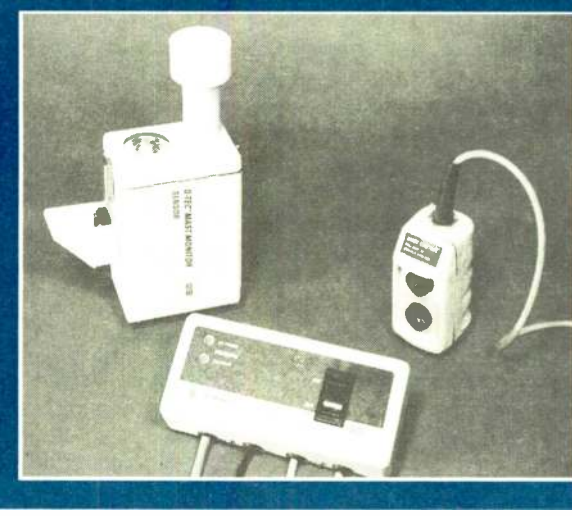
Retail Price: $3,900

Features: A safety rig for telescoping masts. Includes four safety enhancements: It illuminates the area above your mast, senses high voltages, and has alarms for anti-collision and tilt.

Shipping: Late May

Judges' Comments: "Will-Burt deserves praise for watching out for the safety of engineers and other staff working at remotes. Safety is a big issue in our business. This is a nice upgrade of an earlier version." "This product may well save the lives of a remote crew. Protection from overhead power lines? Hard to top that."

For information: Call (330) 682-7015 or **circle Reader Service 62**



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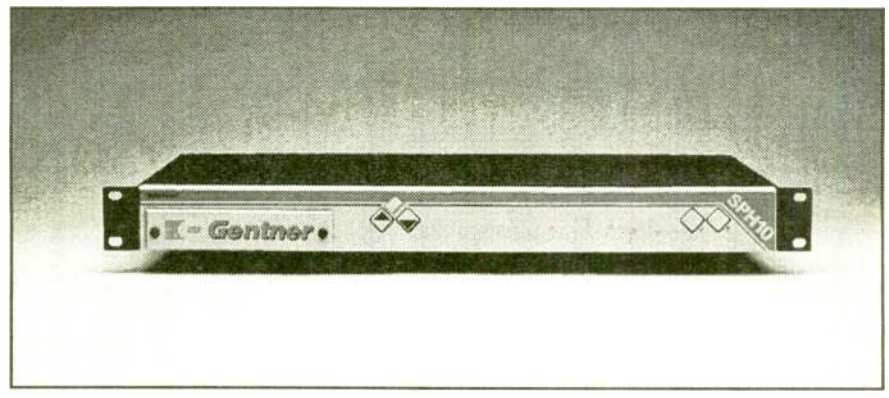

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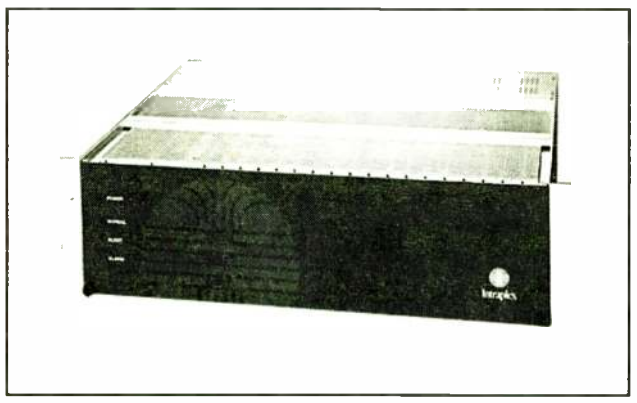
World Radio History

STL & RPU

Radio Squeezes More Into STLs

Mario Hieb

Studio-transmitter links continued their technical transformation at NAB '98. Not just adept at sending program audio from the studio to the transmitter, new units also can deliver uncompressed digital audio, auxiliary audio, RS-232 data, PBX, LAN and remote control. T1 systems can provide STL and TSL capability in a single package. Spread-spectrum technology brings T1 to remote locations where telco lines are not available. More data channels on a link give broadcasters extra flexibility in the location of the audio processor and modulation monitors.



Intraplex STL PLUS T1

Moseley introduced its Starlink SL9003Q uncompressed linear STL system, which earned Cool Stuff honors from the panel of **RW** judges. This unit features open architecture and can be configured with "personality modules" for four linear (32 kHz), two linear (48 kHz) or two linear (32 kHz) audio channels. AES3 I/Os combined with a built-in variable rate converter provide connection to a digital air chain. Plug-in MPEG audio modules and a digital multiplex allow for additional program, voice, FSK, async and sync data channels. A redundant power supply is optional.

Harris returned with the CD Link uncompressed digital STL system, which won a Cool Stuff award last year and complements the Harris DIGIT CD exciter nicely.

Broadcast Electronics provides digital STL and digital exciter combinations. BE now makes the DSTL digital STL system acquired from Dolby Laboratories last year. **TFT** exhibited the DMM92 digital modem/multiplexer for composite analog STL systems.

T1 weds spread spectrum

Intraplex introduced the marriage of its STL PLUS T1 to the Glenayre Western Multiplex LYNX.sc spread-spectrum radio. The Intraplex STL PLUS is a full-duplex T1 STL/TSL system designed to transmit 15 kHz digital stereo audio with no compression. The Glenayre Western Multiplex LYNX.sc is a spread-spectrum transceiver operating at 2.4 or 5.8 GHz and does not require coordination or FCC authorization.

Dan Rau of Intraplex said, "In a fully configured system that's nothing but program audio, we can do as many as eight 15 kHz, 16-bit stereo feeds each direction on a single T1."

Optional plug-in modules let you add program audio channels for second-station STL and backhaul, data channels to extend remote controls and LAN connections over the link and voice channels for intercoms, off-premise extension telephones, and PBX-to-PBX interconnection. "The major reason to use Intraplex

See STL, page 24 ▶

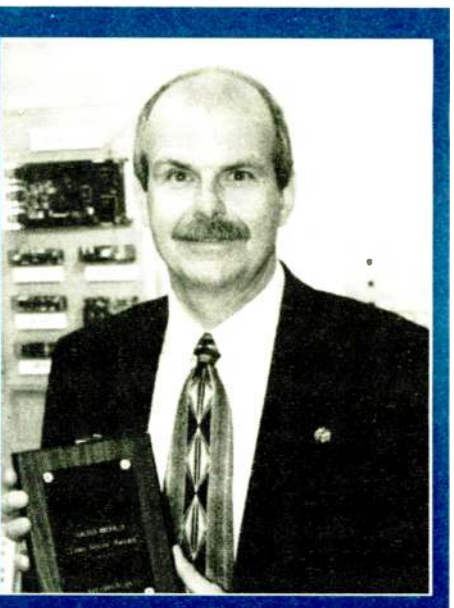
Radio World Cool Stuff Award NAB 1998

***Product:* Starlink SL9003Q Digital STL**

***Manufacturer:* Moseley**

Retail Price: $12,950

Features: Four-channel linear audio digital STL. Provides 48 kHz sampled 22.5 kHz audio channels; 16-bit linear audio with sample rate converter; AES/EBU and analog I/O; voice/data digital MUX for auxiliary channels; T1/E1 connectivity; selectable 16, 32, 64 QAM modulation; selectable 200-500 kHz channel bandwidth.



David Chancey

Shipping: Now

Judges' Comments: "Moseley deserves credit for trying to push the boundaries of digital STL further and wider. The industry will watch this one closely."

For information: Call (805)-968-9621 x 213, e-mail: *chance@moseleysb.com*, visit the Web site at *www.moseleysb.com* or **circle Reader Service 88**

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MP-4	4	800W	3.3	$1,280
MP-2-4	4	2,000W	3.3	$1,820
MP-3-5	5	3,000W	4.1	$2,270
MP-3-6	6	3,000W	5.2	$2,740

LOW POWER CIRCULAR SERIES

Model	Bays	Power	Gain	Price
GP-1	1	2,000W	-3.1	$350
GP-2	2	4,000W	0	$1,350
GP-3	3	6,000W	1.5	$1,900
GP-4	4	6,000W	3.4	$2,600
GP-5	5	6,000W	4.3	$3,150
GP-6	6	6,000W	5.5	$3,700

MEDIUM POWER CIRCULAR SERIES

Model	Bays	Power	Gain	Price
SGP-1	1	4,000W	-3.3	$690
SGP-2	2	8,000W	0	$2,690
SGP-3	3	10,000W	1.4	$3,595
SGP-4	4	10,000W	3.3	$4,500
SGP-5	5	10,000W	4.1	$5,300
SGP-6	6	10,000W	5.2	$6,100

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World Radio History

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OPTIMIZE LEVEL

The DBMax lets you work with both analog PPM's and digital meters. Dial in the type of level measurement you need to comply to, and the DBMax will get rid of your overs. Optimize: 5-band compression can make you very loud. Limit: Sample accurate, distortion cancelled limiter. Multi-slope: Mid level boost with the rest untouched.

OPTIMIZE QUALITY

The DBMax DSP engine uses precision calculations at a full processing rate to keep aliasing distortion low and audio bandwidth high.

Bandwidth: Processing at 48kHz sampling for 24kHz audio. Resolution: Processing of all the 24 bits of an AES/EBU signal.AD/ DA converters: 24 bit resolution with analog pre-scaling.

The 5-band limiting and compression functions of the DBMax are supported by a variety of additional DSP plug-ins. At the same time you may use e.g. AGC, EQ, Soft Clipper, 5 band Expander+Compressor+Limiter all at 48kHz sampling:

INPUT
HP and LP filters.
Sample Rate Converter.
Delay 0.5-400ms.

INSERTS
Use up to three of these: AGC, Dynamic EQ, MS Decoder, MS Encoder, Normalizer, Parametric EQ, Stereo Enhancer, 90 Degree Mono Generator.

DYNAMICS
Expander, Compressor and Limiter (simultaneously).1-5 bands with selectable crossover points and slopes.

OUTPUT
Final Limiter with adjustable Soft Clip.
Dither 8-24 bits.

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Circle (81) On Reader Service Card
World Radio History

Radio World Cool Stuff Award NAB 1998

Product: SAS 16000-D Digital Audio Routing System

Manufacturer: Sierra Automated Systems

Retail Price: $5.495

Features: 32x32 AES/EBU matrix in a 2RU chassis; full system access controls and alphanumeric displays; configuration and control software for PC included; multipoint RS-422 and RS-232 interfaces; non-volatile system memory; audio confidence monitor with stereo analog outputs for test and recording gear; various internconnect options.

Ed Fritz and Al Salci

Shipping: May

Judges' Comments: "For a 32x32 matrix in an all-digital package, this is a breakthrough product for the price. Everyone else's product in this size category is five to 10 times as expensive. The analog version (SAS 16000) is also a breakthrough, although twice the money for full 32 channel stereo."

For information: Call (818) 840-6749, e-mail: *sales@sasaudio.com*, visit the Web site at *www.sasaudio.com* or **circle Reader Service 114**

More Than Just Audio

▶ STL, continued from page 22

is our robust framing," Rau said. "We have a proprietary algorithm that allows us to stay framed up to the T1. We can hold pure audio at one out of every 1,000 random bit errors."

Moseley displayed the Starlink 9003T1 T1 STL. An open-architecture system, the Starlink 9003T1 uses source encoder/decoder and four-port MUX "personality modules" so that the user can add cards and configure the system up to the transmission limits of T1. Moseley also showed its PCL 6000 series analog STL.

TFT offered analog STLs in both composite and mono, and the 8500D subcarrier system for television microwave that puts four compressed audio channels on a single subcarrier.

Marti, now a product line owned by BE, was present with its STL-15C composite analog and STL-10 discrete analog systems. The STL-10 can be expanded to a multichannel analog system and licensed within Part 94 of the FCC rules, can provide relief to areas with congested RPU/STL bands.

New in RPU

Moseley also showed the Starlink 9001SS 2.4 GHz spread-spectrum link, providing a quality license-free alternative to RPU. Utilizing ISO/MPEG Layer II or the ADPCM compression algorithms, this system will accept analog or AES3 audio and operates at a range of up to 20 miles.

One supplier rolled out a frequency-agile, bi-directional RPU system.

Energy-Onix introduced the Roadcaster, a frequency-agile, bi-directional RPU capable of full-time two-way communication between a station and the remote broadcast station. Sixteen frequency pairs, 5 MHz apart, are programmed into memory. One frequency is the transmit frequency for the remote broadcast, the second is the receive frequency for the base station; both receiver and transmitter are diplexed into a single antenna. Software is provided which allows the user to delete or change preprogrammed frequencies via a PC.

Stations in synch

The **TFT** 8900 Reciter synchronizes the modulation between the main transmitter and the booster transmitter. It is discussed in the article on FM transmission elsewhere in this section, as is the **Intraplex** SynchroLink system, which allows FM broadcasters to simulcast programming over multiple transmitters on the same frequency.

Bext displayed its line of 1.5 W and 6 W STL systems at the show.

"I Won the Marconi with Scott"

"I do like to give credit where credit is due and acknowledge Scott Studios as a major player in my daily broadcasting battle. The time I now have to devote to preparation, and the ease of operation of the Scott System, has helped me increase show professionalism."

Bill O'Brian - KRKT, Albany, Oregon
Marconi Small Market Personality of the Year - 1997

"We Won the Marconi with Scott"

The 1996 winner of the Marconi Major Market Air Personality of the Year Award *also* uses Scott Studios' touchscreen digital audio system! Still another Scott Studios user won the Country Music Association "Station of the Year" award in 1997! The Scott System can help *your* stations sound better!

Mac Hudson & Irv Harrigan - KILT FM, Houston, Texas
Marconi Major Market Personality of the Year - 1996

"Scott has Improved our Product"

"We were very eager to 'go digital' last Fall, and compared different systems. Our decision to go with the Scott System was one we *all* felt good about. I'm confident knowing the comfort level of our different departments who use the system is high. Our Scott System has improved our efficiency and the quality of our product."

Michelle Mercer, PD - KPWR FM, Los Angeles

Tom Koza, Chief Engineer, top rated afternoon personalities "The Baka Boys" surround Program Director Michelle Mercer

More Stations got Scott Systems in the past 12 months than bought most other systems in the past 4 years!

Most managers, air personalities, program directors *and* engineers *prefer* the Scott System. That's why *more* radio stations *get Scott Studios'* than any other digital audio system!

It's a fact: over 1,700 radio stations have 3,800 Scott digital workstations, including *major* groups like CBS, Chancellor, Disney/ABC, Clear Channel, Emmis, Citadel and many more.

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- uncompressed digital audio;
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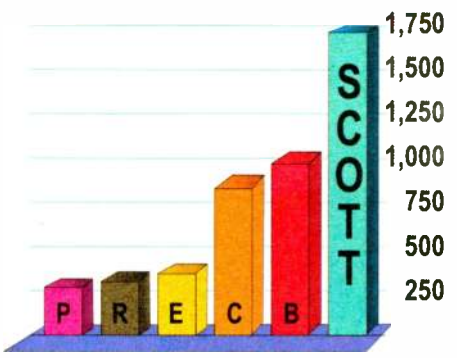

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World Radio History

BOTTOM LINE BROADCASTING

Here are three ways Eventide can help:

Consolidation brings market efficiencies, but also big headaches and challenges. It's essential for management to keep track of multiple stations. And keeping a legal record of what was said and when commercials aired is also more important than ever. Several groups have standardized on **Eventide Digital Audio Loggers**. Our economical VR204 records up to 550 hours on a tiny palm-sized cassette. VR204 records up to 4 channels simultaneously so you can keep tabs on the competition's spot loads, play lists and talent while you record your own stations. New!! Now Eventide loggers let you record/play in Hi-Fi for full "broadcast quality." Ideal for show replays, time zone delays, etc.

Eventide's **BD500 Broadcast Delay** makes talk shows run smoother and sound better, for less. The BD500's multiple dump feature divides the delay time into several "slices" so you're still safely in delay even right after dumping an offensive remark. It's the hassle-free talk solution... even when air talent is working without a producer. No other delay offers Eventide's high quality patented catch-up technology for clean audio combined with fast catch-up. And it's the only delay with optional digital inputs and outputs for new all-digital studios. Yet the BD500 costs thousands less than our previous model. See how much easier talk shows can be with Eventide's 4th generation BD500 Broadcast Delay.

Want to increase creativity without adding personnel? Add life to drive-time shows? Win new advertisers with better station-produced spots? An **Eventide Ultra-Harmonizer®** brand effects processor really does all that. Designed specifically for radio and production, the new DSP4000B Ultra-Harmonizer features radio effects designed by production whiz Jay Rose. Hundreds of comic voices, sound effects, reverbs, pitch changers and more are instantly accessible at the touch of a button. Plus, the DSP4000B has superb Timesqueeze® time compression /expansion capability. Shorten a 60 second national spot to allow for a local tag. Squeeze or stretch a music bed to fit the spot. The DSP4000B has optional digital I/O to interface easily with digital editors and consoles. It's the radio effects box designed to bring stations more business and more listeners.

The bottom line: Eventide broadcast products are potent tools for today's radio. To learn more, talk to your broadcast distributor, call Eventide direct at 201-641-1200, or see our website, www.eventide.com.

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World Radio History

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Circle (159) On Reader Service Card

Radio World Cool Stuff Award NAB 1998

***Product:* Paradigm Digital Console**

***Manufacturer:* Klotz**

Retail Price: $6,000

Features: Cost-effective digital air console. Voice processing and HPF on all mic inputs, machine control, mode/pan/phase reverse functions, analog/digital six-source selectors, flat-panel LCD screen, clock, timer. Digital and analog I/O. Retrievable configurations. Master AES/EBU clock output for digital sync.

Shipping: Aug. 1

Judges' Comments: "Interesting ergonomics and user functions. The best part is the price. Well worth a look for anyone considering a digital console."

For information: Call (512) 252-7091, e-mail: *digital@broadcast.net* or **circle Reader Service 140**

Ray Esparolini

TEST & MONITORING

Test Devices, Level Monitors on Display

Harold Hallikainen

Many of the companies manufacturing test and monitoring equipment for radio recently have focused on getting ready for digital television, so few major new products for radio were introduced this year. I had a chance to visit with manufacturers and see what they were up to.

Audio level monitoring

A wide variety of audio level monitors were available at the show. Most of these, though not all, used LED indicators to emulate the characteristics of a mechanical VU meter with an additional peak indicator (often with the VU indication using a bar and the peak using a dot indication on the bar graph display).

ATI showed its line of LED bar graph audio level indicators. A variety of models display two to 12 audio levels on LED bar graphs. They display a solid bar with VU characteristics and a dot with PPM characteristics. The units display analog audio levels.

Dorrough showed its line of LED bargraph audio monitors and introduced the PLM-120 power line monitor. The company has taken audio level monitoring technology to the power line. This unit displays, captures, logs and alarms all the power line violations of the Computer and Business Machine Manufacturers Association. These include brownout, blackout, crest factor distortion and transient peaks. The unit features an alarm output with user-defined setpoints and RS232 ASCII data for data logging.

Logitek offers a variety of audio level monitors. These range from the Ultra-VU with 63 LED segments to the 2VUB and 4VUB with mechanical VU meters. The three LED meters in the series are available with analog and digital interfaces. Through the use of digital signal processing, a variety of features are offered. The mechanical VU meters offer a very familiar look.

Logitek has combined a mechanical VU meter, an input selector switch, monitor amplifier and speaker in the rack mount MON-10. Now you can check a feed with the push of a button.

Radio Design Labs showed the RU-SM12 dual-channel LED level indicator. Each channel may be set to show either a peak or average level. The unit accepts balanced or unbalanced audio between -26 dBu and +12 dBu. It also has a "sum and difference" mode where stereo balance and phasing can be observed.

Ward Beck Systems showed its M405P portable extended-range VU meter. This unit has been "restyled for the millennium." WBS also showed the POD 11 AES/EBU digital audio monitor. Along with two channels of 20-segment LED level display, the unit displays sampling frequency, signal lock, CRC error, confidence, consumer mode, and phase error. The unit also includes a D/A allowing monitoring of the audio with headphones or an external power amplifier.

Ward Beck also showed the AMS4

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World Radio History

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World Radio History

Test and Monitoring Equipment

▶ TEST, continued from page 26

Audio Monitor System. This rack-mount monitor includes LED bar graph meters and monitor speakers. It accepts analog or digital audio signals for monitoring.

Audio test equipment

Audio Precision demonstrated the Portable One Dual Domain audio analyzer. This indeed is two analyzers in one. Analog audio is tested using precision analog techniques while digital audio is tested using DSP techniques. Both sections of the analyzer are connected to a microprocessor that handles the user interface and interface to an external printer for printing test results.

The analog portion of the analyzer measures level, noise, frequency, phase, THD, cross-talk, wow and flutter. An option to measure IMD also is available. The digital portion of the analyzer measures level, THD, frequency and phase. An option to measure IMD also is available. The digital analyzer also measures characteristics of the digital data stream, such as jitter.

Audio Precision also showed the System Two. This system also is "dual domain" and utilizes a Windows computer for the user interface. In addition to all the analog and digital tests available in the Portable One, the System Two includes a synchronous multitone test that allows the simultaneous measuring of frequency response, distortion, noise and cross-talk in 270 mS. A demo version of the software is available.

Neutrik showed the sophisticated A2 (analog) and A2-D (digital) audio analysis systems. These units measure most, if not all, characteristics of an audio system. The units are capable of measuring level, THD, phase, IMD, cross-talk, noise, wow and flutter, and frequency.

With the digital input, the units can measure the digital carrier level, jitter, sampling frequency, peak level and other statistics on the digital data stream. The units can also generate an impaired digital data stream (for example, with jitter to determine the acceptance capability of the device under test). The units can directly drive a variety of printers to print graphs of test results and can be controlled by a Windows program to automate the entire test procedure.

Neutrik also showed the Rapid-Test RT-1M fast multitone audio analyzer. This analyzer does a very quick (under one second) analysis of the audio chain. The test "chirp" could be included as part of a top-of-the-hour "sounder" in the programming, allowing an hourly test of audio quality.

Potomac Instruments showed the AT-51 audio test set. I look upon this series as an update to the old HP330 series distortion analyzer.

Radio Design Labs has a couple of neat little oscillator modules useful in doing a quick check of frequency response of a system. For example, the RU-OSC4A has four oscillators operating at 100 Hz, 1 kHz, 7.5 kHz and 15 kHz. The unit sequences through these frequencies (with a silent period between 15 kHz and 100 Hz to allow for a quick noise check). Since the output level of each oscillator can be set individually, the levels can be adjusted to compensate for pre-emphasis of an FM broadcast channel or tape.

Ward Beck Systems showed the aptly named ABS-1 "Audio Bit Spitter." This unit spits bits at 32, 44.1 or 48 K samples/second. The spit bits represent a 1 kHz or 400 Hz audio tone.

RF test equipment

Belar has been busy. The company has made extensive use of digital signal processing in its monitors. Digital display of a wide variety of modulation characteristics are available on the front panel and through a computer interface. A nice touch is that multiple monitors (FM, stereo, subcarrier, RBDS) can be tied together to drive a single computer.

Audio Precision Portable One

The stereo monitor also includes an AM demodulator that looks at the stereo pilot ± 1 kHz. The effects of multipath and composite clipping can be seen on this indicator. The company also displayed a new spectrum analyzer that works with its monitors. The displayed unit used a large graphic LCD to show the demodulated FM baseband. It earned Cool Stuff honors from **RW**.

AM stations with vastly different day and night powers have had problems with measuring RF base or common point current on a single meter without range switching. **Delta** showed the TCA-WB wide-band/wide-range RF ammeter. This precision RF ammeter has a 3.5 digit LCD. The unit on display had an operating range of 0.20 amps to 19.99 amps with a maximum error of 2 percent of the reading. The unit responds to average RF current, ideally not varying with modulation. The unit includes a DC output to drive

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Neutrik showed its Rapid-Test

fast multitone audio analyzer.

Product: VS-1680 Digital Studio Workstation

Manufacturer: Roland

Retail Price: $3,195

Features: A 16-track, 24-bit audio workstation with mixing, editing and effects processing. Tabletop design. 256 virtual tracks; useful graphic LCD; EZ routing function lets user save various templates; 10 inputs, 12 outputs; direct CD recording and data backup with optional CD recorder.

Shipping: Now

Judges' Comments: "They did it again. Roland's ever-popular multitrack hard-disk recorder gets more tracks and an easier-to-edit waveform." "Love the four-bus effects."

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World Radio History

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World Radio History

Test Gear for Radio Stations

▶ TEST, continued from page 28

remote indicators or remote controls. Delta has also moved the diode in the standard TCA meter to the outside of the box, making it easier to replace should it be damaged by lightning.

Holaday Industries showed a variety of monitors for EMF safety measurements. The HI-4460 is a graphical handheld readout that connects to any of the series 4000 probes. It directly displays the field in V/m or A/m. It also shows a bar graph of the field on each probe axis and plots a graph of field vs. time. This device also has an RS232 port to drive a computer for logging.

Holaday also showed products to measure induced currents (such as the current going through your foot to ground) and a safety monitor that looks a bit like a pager.

Inovonics showed the new Model 520 AM modulation monitor. This monitor accepts high- or low-level RF and displays the modulation level on a bar graph that displays 22 percent to 130 percent in 2 percent increments. Fixed peak flashers (-100 percent and +125 percent) and variable peak flashers are included.

Rear-panel outputs are provided for "flat" audio, NRSC de-emphasized audio, loss of carrier alarm, and loss of audio alarm. The company also showed a prototype of an active loop antenna for use with the modulation monitor.

The sharp null off the side of the loop can be used to null out an interfering station.

In addition, Inovonics showed the Model 530 FM modulation monitor. This appears to be an updated version of the typical FM and stereo modulation monitors (FM demodulation, level indication, stereo demodulation, level indication, etc.). The system is contained in one cabinet and uses LED bar graph displays instead of the more traditional mechanical meters.

Finally, Inovonics showed the Model 540 subcarrier monitor. This unit is an update to the traditional SCA monitor. It accepts a composite signal from an FM monitor, then demodulates and displays the level of FM subcarriers. The unit can be tuned to recover subcarriers in the 54 to 99 KHz range, with 1 KHz resolution. An optional RBDS decoder is available for the analysis of an RBDS subcarrier.

Modulation Sciences showed the ModMinder, probably the first FM monitor to include a microprocessor. This monitor also raised questions as to how we should measure modulation. Eric Small, president of Modulation Sciences, told me that the FCC issued a proposed rulemaking on FM modulation measurement several years ago.

There appears to be little progress on the regulatory front. Most monitor manufacturers now have an adjustment that allows short peaks to be ignored or caught by the peak flasher.

Potomac Instruments has been concentrating on the new RF measurement requirements for DTV (where an RMS field will be measured instead of the current NTSC measurement of tip of sync). Its new instrumentation will allow DTV stations to say confidently that their signal is viewable in a certain location before the consumer spends kilobucks on a TV that shows a blank screen.

Meanwhile, Potomac continues to be a major supplier of field strength meters and antenna monitors for AM directional stations. **Gorman Redlich** also supplies directional antenna monitors.

Radio Design Labs showed the ACM-2 amplitude component monitor. This unit monitors the AM component of an FM signal. Any AM component is due generally to mistuning of the transmitter, resulting in uneven FM sideband response.

The unit can be installed permanently at the transmitter site and drive a remote control to give a continuous indication of transmitter tuning.

Though not new, **QEI** showed its Model 691 FM modulation monitor and test set. Along with all the typical FM stereo modulation monitoring capabilities, this unit can drive an external oscilloscope to become an RF spectrum analyzer. This allows a user to conduct required occupied bandwidth measurements (as part of FCC required Equipment Performance Measurements). The spectrum analyzer can also be used to calibrate the modulation monitor using the Bessel null technique.

TFT showed its traditional line of AM and FM modulation monitors. These monitors use traditional analog means to precisely demodulate and analyze an AM or FM signal.

Although designed for analysis of BTSC television sound, the TFT 860 Multifunction Audio Analyzer is an interesting piece of equipment. This small unit plugs into the TFT 850 series and provides measurement of stereo channel separation, signal-to-noise ratio, frequency response, total harmonic distortion, and pilot carrier frequency. It would be interesting to try this out in radio applications.

Bird Electronics showed its line of THRULINE and termination wattmeters. Along with much of the industry, Bird is working on techniques for the measurement of DTV signals. New techniques could be applied to digital audio broadcast as well.

Coaxial Dynamics showed its line of wattmeters and dummy loads.

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World Radio History

HE DARED TO GO THERE.

World Radio History

Radio World Cool Stuff Award NAB 1998

Arno Meyer and Mark Grant

Product: CSA-1 Spectrum Analyzer

Manufacturer: Belar

Retail Price: $2,700

Features: Composite FFT spectrum analyzer for AM, FM or just audio. Vertical axis: 120 dB dynamic range (adjustable); amplitude resolution to 0.1 dB; linear (percent) and dB scales; infinite peak hold, 0.5 sec peak hold, average display modes; display sum and/or difference of L/R analog or digital inputs. Horizontal axis: display up to 150 kHz on composite input; cursor display of frequency and amplitudes to 0.1 dB; split screen function. Displays noise and distortion products; calculates SNR+Distortion; user-defined spectral mask for checking compliance.

Shipping: September

Judges' Comments: "Being able to see your whole market at a glance on a spectrum analyzer display gives the working engineer invaluable information about what he's got on the air vs. the competition."

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SOURCE GEAR

Source Gear Goes Portable

Ted Nahil

The trend in source equipment at this year's convention seemed to be towards portability, increased flexibility and lower cost. In addition, many new pieces of gear support multiple media types within the same unit.

The **Marantz** PMD 680 (mono) and PMD 690 (stereo) are portable digital recorders, well-suited for news gathering and on-site event recording, editing and transmission back to the studio. Storage is accomplished using either Flash or Hard Disk PCMCIA cards, and each offers the choice of MPEG (with selectable bit rates) or uncompressed (PCM) formats. Non-destructive editing is possible in the field, and the files also are easily transferable to a PC at the station. The PMD 680 includes a bi-directional RJ-11 telephone jack. Both the stereo and mono versions feature balanced analog inputs, unbalanced analog outputs, coaxial digital outputs, parallel connectors and remote control capability. The PMD680 is a moderately priced portable recorder. List price is in the $900 range.

The **Sonifex** Courier is a three-pound, rugged recorder with built-in non-destructive graphical editing, enhanced by the jog-shuttle scrub wheel integrated into the top of the unit. It uses standard, readily available camcorder batteries. Sonifex Sales Manager Julian Speed demonstrated the ease of recording, marking and editing an audio piece while pointing out the ergonomic features of the front panel that allow the user to "feel the play and mark buttons while maintaining eye contact with the subject of the interview."

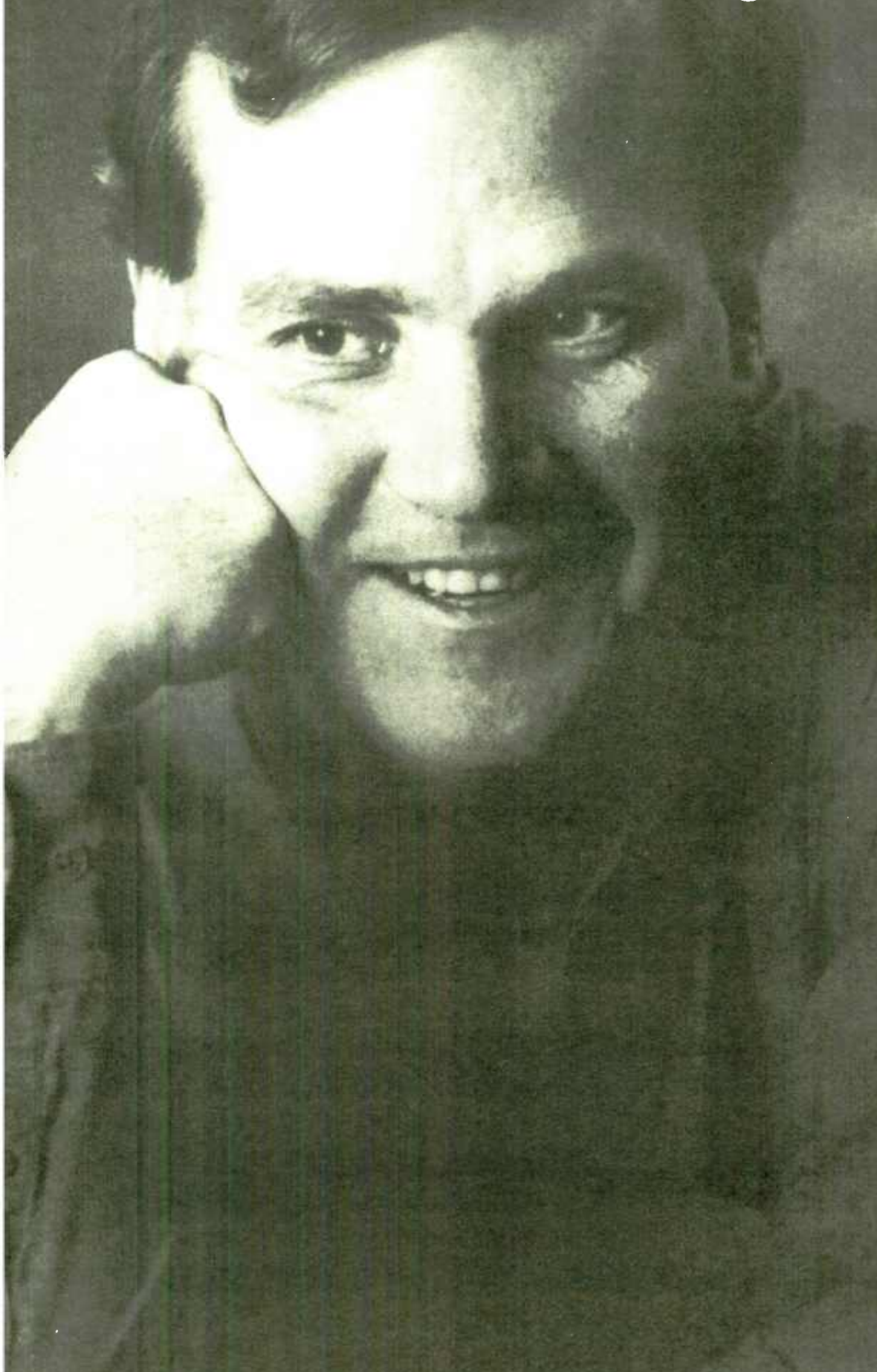
The Courier supports linear and MPEG II Layer 2 formats and is available with an optional ISDN interface. Available PCMCIA disk sizes range from 130 Mbytes to 720 Mbytes. The Courier also features phantom power, a switchable high-pass filter and limiter. In addition, the record function is "autolocked" so you cannot accidentally stop a recording in progress. Users can define "recording styles" — sample rates, file format, compression and mono versus stereo — that are labeled and easily retrievable at the time of a recording. This makes for foolproof field use, ensuring all recordings will be compatible. The Courier is at the high end of the price chart for portable recorders, at $3,650 without the ISDN interface, but the features and flexibility are substantial.

Otari has introduced the DX-5050 as a digital replacement for analog tape machines. This new product is portable and includes the usual analog and digital inputs and outputs. The DX-5050 uses standard Magneto Optical disks and a PCM (WAV) file format. The front-panel controls resemble the familiar reel-to-reel controls and include a jog-shuttle wheel for finer editing control. In the studio, the DX-5050 can be controlled using either the

See SOURCE GEAR, page 35 ▶

World Radio History

"We're the #1 FM all-music station in Philly, probably because the Omnia completes our all-digital studio. Now, our sound is so loud, so clear... very well-defined with absolutely no grunge. And the Omnia is one thing that my PD and I agree on. It's definitely a keeper."



Russ Mundschenk, Chief Engineer,
WBEB 101.1 FM, Philadelphia, PA

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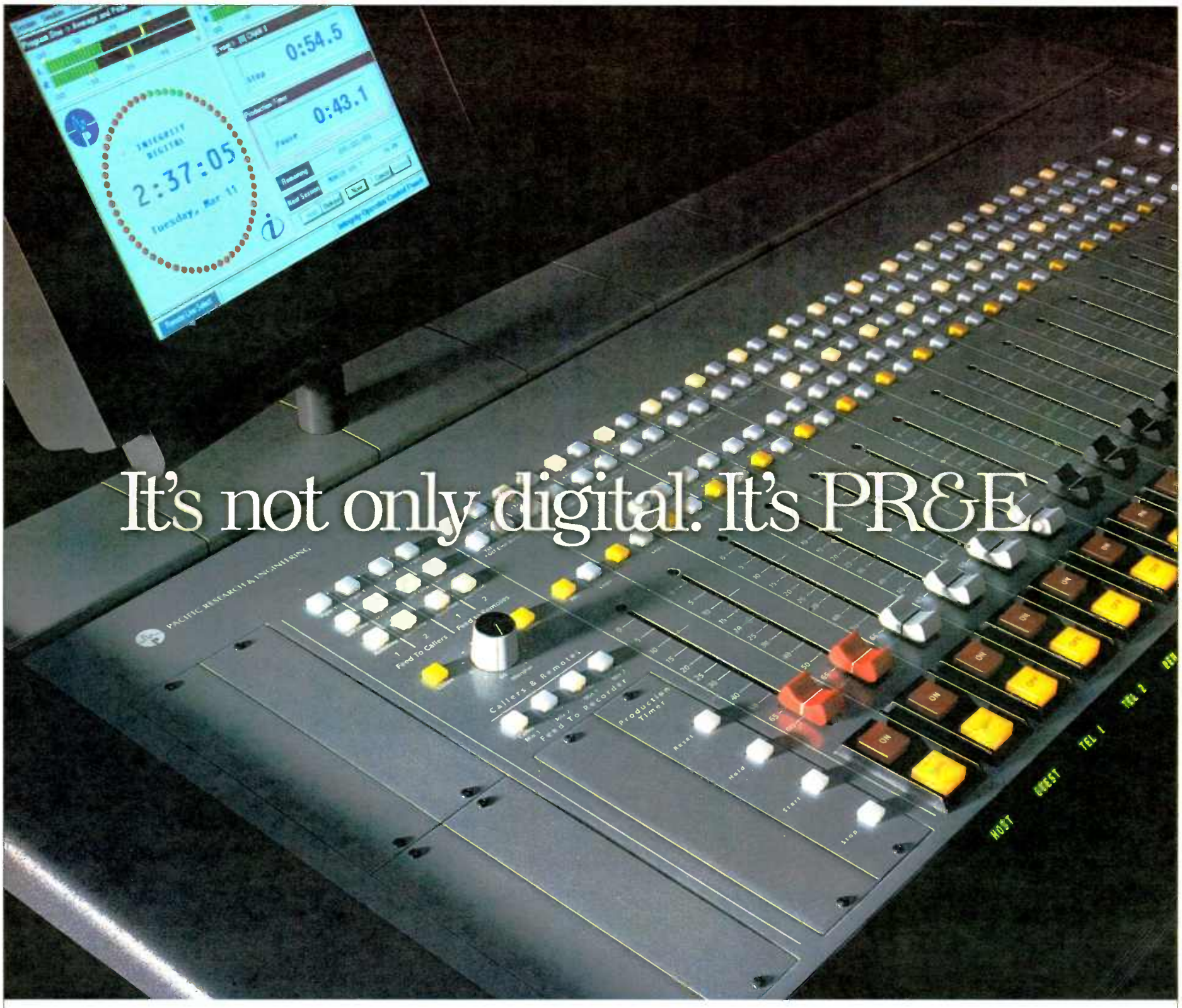
World Radio History



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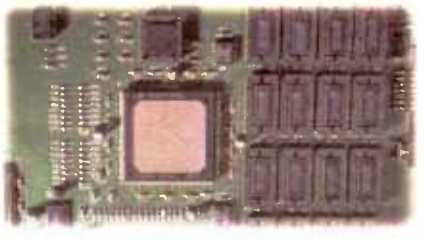
The LCD displays audio levels, time-of-day clocks, session status and event timers with a Windows® interface to powerful configuration management and session-based features.

Integrity's difference is more than just digital. It also offers four special-purpose buses to provide automated mix-minus for telephone and remote feeds, each with IFB.



Integrity uses an array of state-of-the-art floating-point digital signal processors to perform its mixing, routing and other functions.

Each fader has a 10-character alphanumeric display. The display changes when another audio source is assigned, which can happen either manually or at a preassigned time.

PACIFIC RESEARCH & ENGINEERING

Circle (108) On Reader Service Card

World Radio History

MO, MD, CD And More

▶ SOURCE GEAR, continued from page 32

serial or parallel interfaces, and interfaces to other PC equipment using the built-in SCSI port.

Otari also has introduced the MR-30 MiniDisc recorder. This studio unit uses standard MD media and features auto-record, multiple cue points per track, and a programmable playback of up to 25 tracks, which remain in memory even after power has been removed. Like the DX-5050, it includes serial and parallel control. It also has pitch control, two levels of edit-undo, and selectable SCMS.

New entries from **Denon** in the MD arena include the DN-M2000R and the DMD-1300P. Both are rack-mounted recorders. The DN-M2000R's features include Denon's "Hot Start" function, which allows instant playback of up to five tracks, seamless looping, pitch control, the ability to set five cue points per track and 25 track program play. There is a jog-shuttle wheel for precise editing, too, with an accuracy of one frame. The DMD-1300P features a sample rate converter, 20-bit, 8-times oversampling, program play of 25 tracks and timed record and play capability. It also has a small buffer through which playback occurs. This protects against what Denon terms "sound dropouts" — translated to lost or erroneous data.

Have fun, but beware. This technology changes fast.

The next generation of the **Fidelipac** DCR-1000 digital cart machine is the DCR-10. This machine is compatible with its predecessor up to a point; it will handle earlier MO recordings only up to 230 MB. Off the shelf, the DCR-10 has an HD (2 MB) drive and a sample rate of 32 kHz. However, it's easy to soup it up. Options include a Zip drive (100 MB), or an MO drive (640 MB) and AES/EBU inputs and outputs with 44/48 kHz sampling rates. Thus, recording times of up to 12 hours are attainable on a single disk, assuming APT compression (4:1) is used.

You can order the DCR-10 with no compression for compatibility with other PCM file formats. Any DCR-10 becomes a recorder by adding a PC keyboard to the front-panel jack. Fidelipac showed a new option called the Q50 Instant Access. This keyboard plugs into the front of the DCR-10 and allows a jock to access up to 50 cuts on a disk or to set up chains and rotations of any cuts on a disk. It costs $300.

A new version of the **360 Systems** Instant Replay was available for a "test drive." The name: Instant Replay 2.0. The company has taken its rugged, portable hard-disk system and added support for an external Zip drive through an expansion port on the back. Access to the external drive is easy, and the Hot-Keys on the Instant Replay 2.0 can access cuts on the external drive. Vice President Don Bird demonstrated the ease with which cuts are stacked, chained and assigned to a playlist.

In addition, audio from all of the 360 Systems pieces now is totally transferable using Zip drives. The DigiCart/II Plus now includes Zip drive technology, too. You can edit on the Short/cut Editor and move the audio to either the DigiCart/II Plus or the Instant Replay 2.0.

Sony was showing improvements to existing products in a special display at Bally's, well off the beaten path. There is now a software package for the MDS-B5 MiniDisc machine that allows you to connect to a PC through an RS232 interface, get song title listings and establish program play lists.

The MDM-X4 MKII, shown at the NAMM show in January, also was on display, with a software upgrade for editing enhancements and the ability to sync two units together. This 4-track MD recorder also has mic preamps built in. Sony also lowered the price to $895 in an effort to compete with cassette decks.

Tascam continues to introduce new studio source equipment, in the form of the CD-A500 integrated CD player and reversible cassette deck and the 130 cassette deck. The CD-A500 can dub directly from CD to cassette, keeping track of the elapsed time and reversing the tape as required. Continuous play from either the CD or tape is also available to the user. The 130 cassette deck is a three-head professional deck with Dolby B/C or Dolby HX PRO noise reduction. Variable speed (± 10 percent), automatic tape type detection and timer record and play capability are standard. Inputs and outputs are unbalanced. The price is attractive at $499.

Arrakis introduced its new Digilink 4 digital workstation. Storage is either on the internal SCSI drive, or external drives connected to the rear panel SCSI bus. At its simplest, the DL4 is a triple deck record/play cart machine. It has analog, digital (AES/EBU) and MPEG audio ins and outs, control logic inputs and outputs (ready, play, and so forth) and RS232 serial interfaces on the rear panel.

The DL4 has simple cut and splice editing. You can cue a file while others are playing. You can build and use a network of up to 32 DL4s that uses a common, shared audio library. The DL4 can be controlled by modem from a remote location, it can utilize a Wegener digital receiver in a store/forward capacity, and there's an optional ISDN interface available.

We now have a plethora of choices as we move to digital equipment to the studio and in the field. Almost every manufacturer has entered the digital fray, with constant advances in flexibility, durability, portability and price competition. The dividing line between what we used to call source equipment — cart machines, cassette decks, reel-to-reel machines and the like — and fully integrated, multifunctional pieces of equipment keeps moving.

Alesis, for example, showed a new 20-bit, eight-channel ADAT recorder. Given the substantial cost reductions in multitrack consoles and peripheral equipment, this type of capability is available to a station in almost any market size today. Even five years ago, it would have been cost-prohibitive. **Otari** introduced two new MO recorders; the PD-80 is for eight-track work; the PD-20 for two-track. Either of these pieces of equipment alone makes tape machines seem like stone-age technology.

Akai introduced the DPS12, which it calls a Digital Personal Studio. This is a portable, 12-channel, random access, uncompressed, 16-bit, MIDI-automatable digital mixer/recorder. Decked out with the processor and either a 2 GB internal SCSI HD or 1 GB internal SCSI JAZ drive, the DPS12 lists for under $2,150.

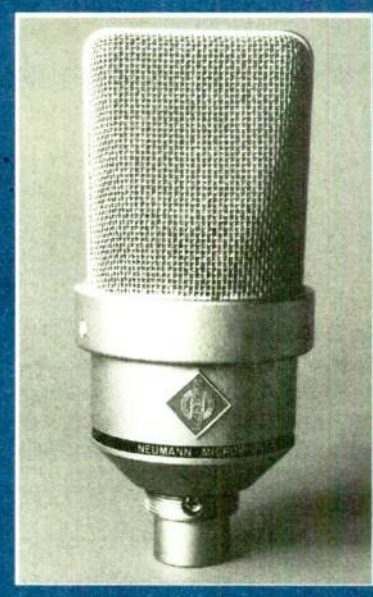
The pieces described here stand alone. Combine them with the power of a computer, put them on a network, connect them to an ISDN or T1 circuit and you will soon realize that the face of the modern radio station has changed. Have fun, but beware. As we see almost weekly in computer ads, this technology changes fast. Our advantage is that prices continue to drop, making it easy to scrap the new marvel of today for that of tomorrow.

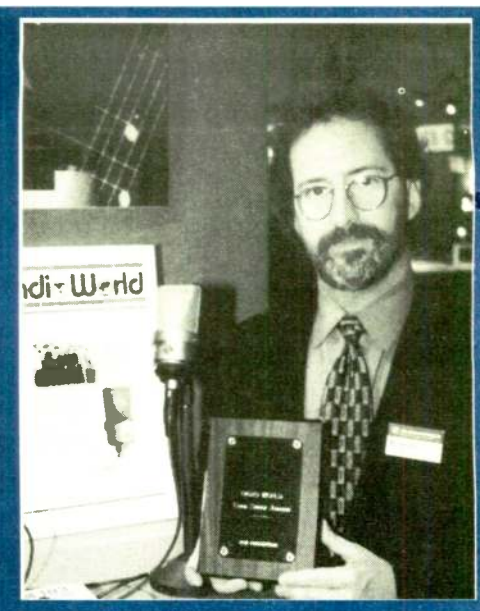
■ ■ ■

Did your company exhibit a new piece of source gear at the show? If we didn't cover it here, let us know. Send e-mail to radioworld@imaspub.com

Ted Nahil is director of engineering for Salem Communications' Colorado radio and satellite properties, including four FMs, two AMs and two satellite uplinks.

Radio World Cool Stuff Award NAB 1998





Paul Hugo of Neumann

Product: TLM 103 Microphone

Manufacturer: Neumann

Retail Price: $995

Features: Large-diaphragm condenser mic, very low self noise. Capsule derived from Neumann U 87.

Shipping: Now

Judges' Comments: "Neumann sound for less than a grand. Maybe this will shake up the on-air microphone business after all these years." "A genuine Neumann for less than $1,000. About time. Sounds incredible."

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World Radio History

LIVE ASSIST & AUTOMATION

PC Answers for Radio Automation

Val Davis

Today's radio automation and live assist products are nothing like the reel-to-reel behemoths of a decade or more ago. Seamless integration with traffic and billing systems, simple operation and the storage capacity for thousands of songs and commercials make today's systems attractive to broadcasters.

Many well-known companies exhibited at NAB '98, bringing with them all that was new in digital audio and computerized radio.

Enhancements incorporated in the **360 Systems** DigiCart/II Plus reflect suggestions from hundreds of users and some improvements not previously possible. Internal hard disks now offer up to 49 hours of storage, there are Zip disks for 16-bit linear recordings and a revised serial interface for compatibility with broadcast automation systems.

Also at the show was software version 2.0 and new SCSI ports for the Instant Replay, allowing storage expandability with any SCSI drive.

AEV brought in Virtual Radio, a Windows 95- or NT-based live assist or fully automated system, networked as a central audio file server, production workstation and on-air workstation. The system uses Digigram soundcards and stores audio in MPEG Layer II format. A music management package and AEV traffic system are also available. AEV manufactures a full line of broadcast audio mixers and processing, so an entire station can be AEV-equipped from front to back.

The **Arrakis** Digilink 2, 3 and 4 offer complete station solutions from live assist to full automation. These systems are capable of unattended recording and satellite switching, and multiple units can be networked for transfer of audio, text and logs. While the DL2 and DL3 are DOS-based, the DL4 can be controlled via Windows 95.

The Arrakis MDE-4 is a new software-based digital editor based on Digigram XTrack software and soundcards. A new interface allows audio file transfer directly from third-party digital editors using MPEG Layer II.

AudioVault is the complete automation system from **Broadcast Electronics**. The AudioVault core system, AV-Edit and AV-Schedule now support Windows NT. Audio Vault uses proprietary audio cards with either linear or MPEG Layer II audio.

One system — yet to ship — promises 25 uncompressed audio channels.

AV-Edit is a fully integrated waveform editor allowing direct cut-and-paste editing of AudioVault files. AV-Schedule will import schedules from virtually any traffic or music software and integrate them into the AudioVault automation system. AudioVault also offers the NewsBoss newsroom management system with wire reception, on-air prompter and links between stories and actualities.

Also new this year is AVExplorer, which makes AudioVault WAN-compatible; the new AirBoss networked copy management system; and BE's new talk show management system CallBoss.

The **CartWorks** System is Windows 95-based. The system uses apt-X audio compression with automatic conversion to SND or WAV format, allowing transfer of audio to and from virtually any source. This method allows field audio recorded on a laptop with soundcard to be transferred to the station via modem and ready for airplay in minutes.

The CartWorks system can be used for live assist or full automation, and can be networked via Windows 95 for unlimited expansion. CartWorks functions with satellite automation and also offers music on hard disk, with MPEG audio coming July 1.

The CartWorks VIO (Visually Impaired Operation) system allows the visually impaired to operate the device with synthesized voice commands or a Braille interface. This option won an honorary mention from **RW**'s Cool Stuff judges.

Although hidden away in a hospitality suite away from the show floor, **CBSI** demonstrated a pre-release version of its new Digital Universe live assist/automation system, slated to debut at the NAB Radio Show in Seattle.

The open architecture allows a station to configure a system to specific needs. A high-quality soundcard could be used in production and on-air while a consumer-grade card could be used to audition cuts in the sales office. CBSI says the Digital Universe will deliver audio reliably and quickly throughout an entire facility, up to 25 uncompressed stereo audio channels or 100 compressed stereo channels.

NT

The interface features a playlist log, cart-style monitoring of cued and playing tracks and up to 50 hot keys. The system is based on a centralized Windows NT server and uses individual PCs in each studio (touchscreens optional). The Digital Universe interfaces seamlessly with the CBSI traffic system to provide a complete station automation solution.

Computer Concepts had some interesting products at NAB '98, including Visual Traffic, a new enhanced traffic software package; NewsRoom, a wire and audio capture and editing system; Maestro, a control room system that operates on top of the DCS audio engine; Voice Tracker, which allows the recording of voice tracks to create a live sounding automated program; and the Studio Frame digital recorder/editor with eight to 24 tracks of digital audio.

Dalet introduced the Team Radio software package for effective management of traffic and billing. Dalet also offered Dalet News, full integration of text and audio for easy scheduling and airing of news; NetBack, a backup solution to server failure; the Surfer8 multitrack editor; and the Dalet Web Publisher software module for creating and maintaining active Web sites.

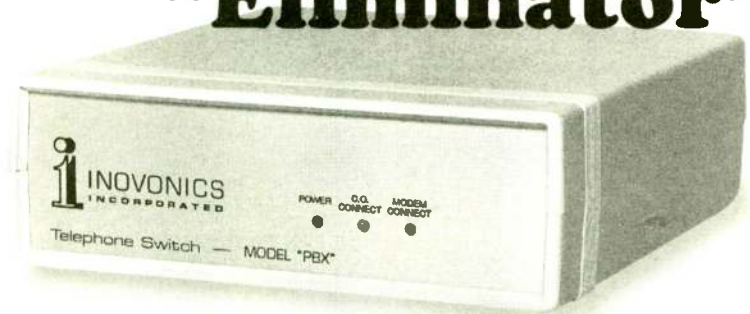
Dalet Digital Media released two new products this year. Newswires is a newsfeed display which displays news feeds onscreen, allows importing audio associated with each story and works with any news service. Also new: IntraWeb, which uses the Internet to transfer audio, scripts and logs to field reporters or other Dalet-furnished stations.

The **DARTS** system handles all aspects of traffic, billing, management reporting and collections. It also supports digital audio interfacing, letter processing, sports packages, commissions reporting and much more. DARTSEL is the entry-level version designed for smaller markets, offering the flexibility of the full version without unwanted extras. Super Log is designed to provide small- to medium-market stations with an affordable, feature-rich traffic system. General Accounting software streamlines business accounting and includes payroll, accounts payable and general ledger. Each module can be used independently of the other.

Digital Link Inc. had a suite of broad-

See AUTOMATION, page 37 ▶

Telephone Line "Eliminator"



7 DIAL-UP DEVICES CAN SHARE ONE CENTRAL-OFFICE LINE

Inovonics' PBX is a cost-saving alternative to the multiple telephone lines otherwise needed for modems, alarms and other dial-up apparatus installed at remote equipment sites. The PBX allows as many as seven devices to share a single central-office line, for outgoing calls and with selective incoming access as well.

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Circle (134) On Reader Service Card

Radio World Cool Stuff Award NAB 1998

Product: PC/MAC 241 CPU Switcher

Manufacturer: Gefen Systems

Retail Price: $795

Features: Lets you work on up to two Macintosh computers or two PC computers, using one monitor, keyboard and mouse, while switching between them. Keyboard/trackball extension up to 250 feet. Unclutters the desk or countertop, saves money on monitors and keyboards. Can be rack-mounted.

Shipping: May

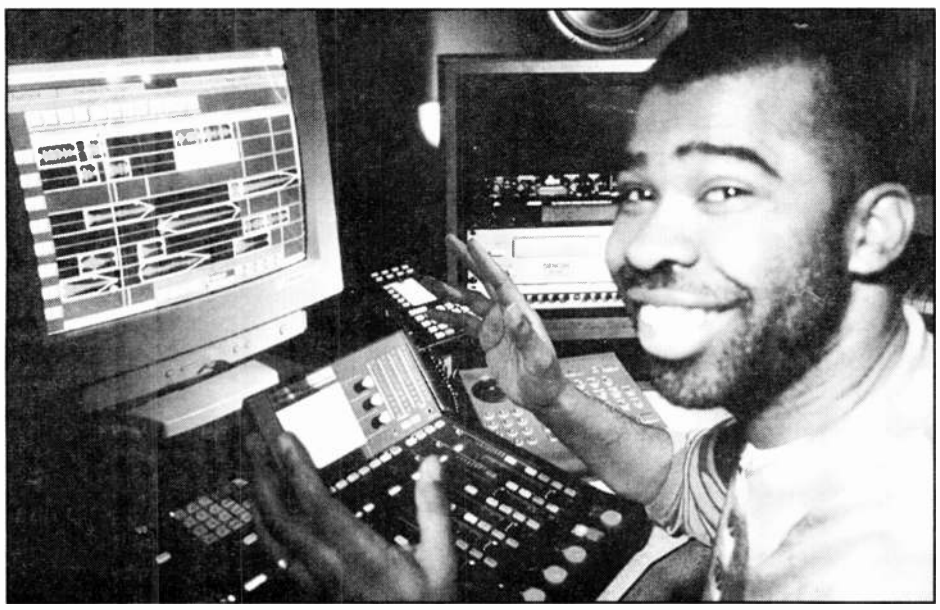
Judges' Comments: "Not a broadcast-specific tool but it has obvious applications in any environment where users are putting several computers to work at once."

For information: Call: (818) 884-6294, e-mail: *gsinfo@gefen.com*, visit the Web site at *www.gefen.com* or **circle Reader Service 11**

World Radio History

▶ AUTOMATION, continued from page 36

cast tools including the ADAS Advanced Digital Audio System. ADAS is Windows-based and features music on hard disk or CD Jukebox configurations, satellite and full automation, DTMF remote control and up to seven audio sources on-screen, all run via easy drag-and-drop operation. The company also has an MPEG editor and an automatic multichannel recording system.



Jay Dickson of KISS FM, New York, enjoys his Dalet system.

ENCO is proud of its latest: the DADPro32 Digital Audio Delivery System. This system runs on Windows NT or 98, features live assist or automation modes, production and inventory management, and global WAN features that permit the sharing of audio, scheduling and billing over a network or the Internet. The DADPro32 also can perform store-and-forward functions and, with the use of the DADSAT store-and-forward manager and DAD JR, can provide localized automation of unattended sites.

loads logs and allows manual control. PhoneEDIT and OpLOG interface with Telos and Gentner phone controllers and combine to give complete call screening for talk shows. MediaBGR handles network background recording needs, multichannel network long file feeds and news clip recording.

The **Orban** AirTime is based on Q-Nix — a form of UNIX — for power, speed and stability. The system utilizes an audio server to manage audio, a network server for control and individual workstations. Each control room unit is touchscreen-based and the screens are intelligently designed.

Pristine Systems handles unattended recording, satellite switching and voiced-tracked shows. The product line includes the Rapid Fire digital studio system, designed for simplicity and power. It is easy to learn and rivals systems costing much more. The company offers a digital audio editor that edits MPEG and Dolby AC2 files.

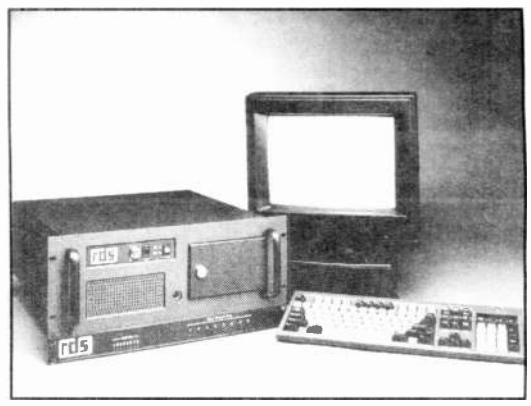
changes. The RCS Digital Console has one wire that connects all studios and can be configured differently for each operator or program.

RCS will offer AP NewsDesk as a module of Master Control. Corinne Baldassano, the general manager of the Associated Press Radio Division, said the alliance is the first such relationship for AP. RCS also announced the launch of SelectorREACH, the first add-on module for its Selector scheduling software. It is a new programming tool offered in cooperation with Arbitron.

Everyone has heard of the **RDS** Phantom, a DOS-based automation system that provides solid performance in almost any application. RDS also has the Replicator network store-and-forward recorder, capable of recording two audio programs while playing back a third. It also records and reproduces control closures with program content. Look for a new Windows 95/NT-based traffic and billing software package to be released later this year.

Scott Studios touchscreen-based automation systems allow voice tracking, multitrack recording and complete automation. Scott also has the PARIS pro audio multitrack recording system and offers a 32-bit PCI card that can simultaneously record while playing four streams of CD quality audio.

This year, **SMARTS** released The Spider, an Internet-based audio delivery system that transfers SMARTS audio files between any number of stations running Smartcasters. SMARTS also has "The Right Touch" Windows 95-based touchscreen allowing easy access to audio events and text such as news, weather and live copy. The screens can be customized for each air talent. The Smartcaster line of automation systems continue to provide a high level of functionality in walk-away broadcast systems.



RDS promoted its Phantom system.

From Italy, **Tiesseci** is a functional automation and live assist system that performs all necessary functions to bring a station into the digital age. The network-based system uses proprietary cards and has additional add-on hardware controllers.

RCS announced an alliance with the Associated Press Radio Division.

Salsa from **LPB** is Windows NT-based for 32-bit speed and power, linear audio and solid networking. The system can be run as a live assist device, satellite automation or music on hard-drive automation. Salsa allows multiple station operation, multitasking, networking and remote control capabilities.

The **MediaTouch** product roundup included the OpLOG on-air touchscreen controller for live assist, automation and remote control. The company's Link n' Lock synchronizes multiple touchscreen operation for full operational redundancy and multi-touchscreen interactive on-air operations. MediaDISK is a digital audio simultaneous playback-and-record system.

Cart replacement

OpLOG Pick n' Play is a digital audio cart replacement that loads playlists and daily logs or can provide manual picking of events. Omni Play, another cart replacement for IGM cart systems, also

Prophet Systems had a large presence on the show floor. The company introduced its Audio Wizard Voice TRAC visual waveform placement and automatic segue system, updated for 1998, and told attendees about its capabilities to support wide-area networks, an area of growing interest to radio stations.

Ireland's **Radiomation** is less well known in this country. The company has an integrated software suite including automation, live assist, digital production, news, traffic, billing, receipts and sales management. Radiomation systems are in all of the stations in Ireland; over 200 workstations are in use at the BBC. The system runs under Windows 95, supports nearly all audio formats, is easy to learn and is inexpensive.

RCS, the Selector folks, have a complete line of broadcast automation systems. Windows NT-based Master Control does "Real Feel" voice tracking and integrates perfectly with Selector. The "Living Log" allows last-minute log

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World Radio History

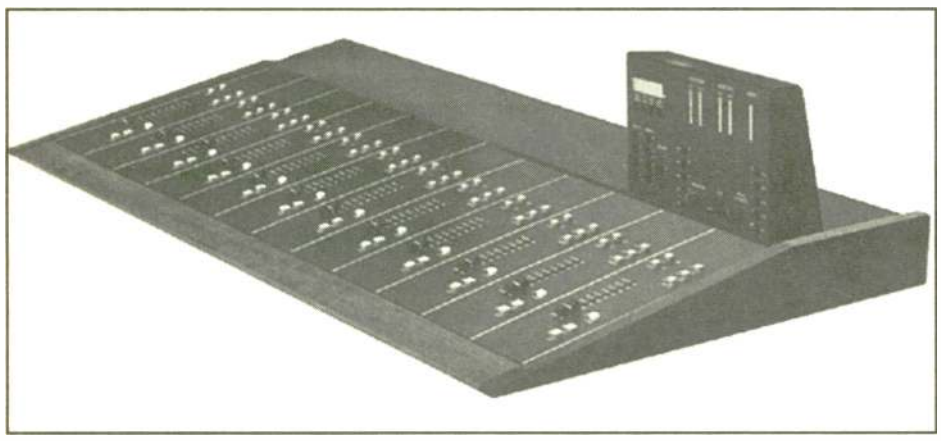
DIGITAL CONSOLES

Digital Consoles in Full Force

Loren Alldrin and Chris Nicholson

An unprecedented number of companies showed new digital mixers in Las Vegas, with prices ranging from four to six digits.

AMEK debuted its Soho digital production console, a direct descendant of the popular AMEK DMS console. Soho is equipped for DVD and surround production and post-production, offering a unique one-size control surface with eight or 16 faders. Soho will control up to 80 input sources with 48-channel mix capability and full mix and monitoring in stereo, LCRS and 5.1 formats. Soho boasts a virtual effects rack with reverb, delay, chorus, EQ and other effects; users can access up to 24 channels of reverb and delay without outboard equipment.



Fidelipac's BA1230

AMS Neve showed several hardware and software enhancements for the Libra Live digital production console. An enhanced IFB matrix now offers an output for every available fader, each with talkback capabilities. Split-console mode allows global changes to be made independently to the left or right of the console in both live and preset modes. New hardware options allow the console's remote I/O systems to be used as standalone units with MADI routers between Libra Live and its input and outputs.

Following the success of the original T-series analog consoles, **Calrec** unveiled the T-series all-digital production mixer. The new T-series console uses 24-bit converters and a 40-bit internal processing path for optimum audio quality. Calrec has made reliability a high priority with the T-series, with the ability to hot-swap cards and processing modules without taking the mixer offline.

Euphonix showed the latest software version of its CS-series digital console — Mixview Version 3.1 — which offers total automation for Euphonix Hyper Surround. Hyper Surround boasts dedicated panning for each fader in all DTV surround formats, including stereo, Dolby Digital and 5.1.

Cool stuff

The **Klotz** Paradigm on-air mixer was the latest offering from the German-based manufacturer. The mixer includes voice processing and HPF on all microphone inputs as well as sample rate converters on all digital line inputs. The eight-fader unit accepts 24 sources and provides both digital and analog outputs. The Paradigm won Cool Stuff honors from **RW**.

The Digital 8•Bus console displayed at the **Mackie** booth offers 48 inputs, eight busses and a control layout familiar to all Mackie 8•Bus users. The Digital 8•Bus offers an SVGA output, mouse input, expandable I/O cage, full automation, integrated three-way monitor bridge, built-in hard drive and Apogee UV22 encoding. Every channel has four-band parametric EQ, dynamic control and 12 Aux sends.

Ramsa showed the new DA7 digital mixer, a 32-input console with eight busses, six Aux sends and returns, snapshot recall, moving-fader automation and surround sound processing. Each input offers EQ, dynamics and delay. Main converters are 24-bit; 32-bit internal processing offers 192 dB dynamic range. Three expansion slots allow interfacing ADAT Lightpipe, TASCAM TDIF and AES/EBU. An optional meter bridge is also available.

Solid State Logic demonstrated its Aysis digital on-air console. The Aysis features 48 channels, hub routing architecture, on-board 20-bit A/D-D/A (24-bit ready), traditional-style mixer surface and accessibility of up to 2,000 sources and destinations. Settings, including routing assignments, fader settings, EQ, dynamics and effects, can be stored and instantly recalled.

The **Wheatstone** D-500 was touted to be an embedded digital solution. The unit is self-contained and is designed to work with current analog equipment while providing the flexibility to grow as digital products are added to the studio.

New from **Soundtracs** was the DPC-II digital production console, consisting of a modular work surface and outboard racks. Work surface frames are available with up to 96 moving faders; all sizes will control up to 160 channels and 224 audio interfaces. Each fader section of the DPC-II can have a dedicated LCD touchscreen display.

Harris promoted its new digital DRC2000. A linking capability allows broadcasters to combine consoles to add more channels or to add a separate control surface to provide more inputs in an existing console. The DRC2000 also has built-in digital reverb.

Spirit debuted the new Digital 328, an all-digital mixer offering 42 inputs with EQ, motorized faders, snapshot recall, two assignable dynamics processors, two on-board Lexicon effects processors and machine control. The Digital 328 comes standard with 16 channels of Tascam TDIF and Alesis Lightpipe digital I/O. An optional interface converts the TDIF inputs to 16 additional analog inputs. A third Lightpipe and the assignable S/PDIF and AES/EBU digital outputs function as digital effects sends.

The **Pacific Research & Engineering** Integrity console, a Cool Stuff winner in '97, is a 16-input digital console that can also handle analog input signals. On-board sample rate converters accept 10 digital inputs at any sample rate.

The **Fidelipac** BA1230 is a 12-fader, 30-input digital console featuring up to 12 interchangeable digital or analog input board modules and DSP designed in partnership with Graham-Patten Systems. The unit can accept sampling rates from 24 to 50 kHz.

Stage Tec showed the Cantus digital mixer/control computer and Nexus digital audio routing/interconnect system. Cantus controls over up to 480 channels from a seven-foot chassis with EQ, delay, dynamics and full automation. The Nexus digital router uses fiber optics in star/ring topologies, has optional DSP, GUI control from the Cantus mixer or a computer and built-in CPU for reliability.

Updated Nustar

Auditronics introduced the NuStar 3001, an updated version of its 3000. The 3001 is available in configurations of up to 36 channels and includes four additional modules on each side of the console and a new color scheme.

Studer introduced the modular On-Air 2000. This includes a central control unit and up to four channel control units, each containing up to six channel strips. The central control units are designed to operate in conjunction with channel-related touchscreens.

Logitek came to Vegas with its new ROC-5, a five-fader version of the ROC-10. The ROC-5 will provide a digital console to broadcasters require fewer faders. The unit is suited to newsroom, newsbooth, dubbing studio or automated station applications. It is available in a 16-channel configuration and is scaleable to up to 64 inputs.

Tascam showed two new digital production mixers, the TM-D1000 and the TM-D8000. The compact TM-D1000 console has 16 inputs, eight channels of TDIF I/O standard (expandable to 16), 128 scenes with recall, four Group/Aux outputs and AES/EBU digital output.

The larger MT-D8000 eight-bus console offers 16 analog inputs that can be switched to TDIF, three additional TDIF tape returns (for a total of 40 digital inputs), six analog Aux sends with stereo returns and snapshot automation. Each input channel offers four-band parametric EQ and digital dynamics can be assigned to any input channels.

Yamaha expanded its extensive line of digital mixers with the introduction of the 01V. Offering much of the processing power of the 02R console at the price of the original ProMix 01, the 01V boasts 24 inputs; six aux busses; six mix busses; 20-bit conversion; on-board dynamics, EQ and effects processing and an expansion card slot for eight-channel digital I/O. MIDI control output and link capabilities allow the mixer to control outboard processors or a second 01V.

■ ■ ■

Loren Alldrin is an audio engineer, producer and project studio editor for sister publication ***Pro Audio Review****. Chris Nicholson is the former associate editor of PAR.*

ANALOG CONSOLES

Analog Consoles Persist

Russ Mundschenk

Analog audio consoles were very much in evidence in Las Vegas, despite an impressive showing of new digital mixers. The more mature technology can still easily compete in performance with 20-bit digital boards, and some analog consoles use programmable digital control.

Broadcasters who wish to stay in the warm-and-fuzzy analog world until digital becomes more mainstream will take comfort in the fact that there were a few new analog boards introduced at the show. On the other hand, some traditionally analog companies such as Logitek no longer produce an analog console.

New approach

Autogram introduced a new approach to analog console configuration this year. The long-standing manufacturer of traditional "bulletproof" boards has devised a system that remotely controls all the functions of a rack-mounted analog audio mix matrix from a studio control surface. The Digitally Integrated Audio System (DIAS) console control unit sends packets of RS-422 data to the analog processing unit when a control is moved.

The system comes standard with 16 channels, 24 inputs and eight outputs. The DIAS control surface eventually will control a digital audio rack unit. Jim Lane of Autogram said the analog version will be available in time for the fall NAB Radio Show, and will be priced in the $10,000 to $12,000 range.

The **Fidelipac** MX series offers channel complements of six to 18, with linear or rotary faders available. The larger consoles allow the addition of an optional five-band EQ. The units range in price from $3,275 to $7,250.

AEQ of Spain showed its BC-300 series, which features a built-in phone hybrid. The unit is available in 10- or 20-input versions, with two mic or four stereo line inputs per module. Line inputs are unbalanced, and each channel's alternate action on-off button is at the top of the fader.

The **Arrakis Systems** on-air console line starts with the internally modular 1200 series. It can be purchased with 5/10, 10/20 or 15/25 channel/input combinations, with one mic input standard. The units range in price from $1,795 to $3,995. The big brothers are the 12000 and 22000 series. These consoles are fully front-panel modular, with available eight-, 18- and 28-channel mainframes. A number of channel cards are available for various mic or stereo line applications. These boards — fully loaded — range in price from $4,595 to $18,000.

See CONSOLES, page 39 ▶

World Radio History

▶ CONSOLES, continued from page 38

Radio Systems showed its new Millenium series. The console is internally modular and comes in six-, 12-, 18- and 24-input sizes. The units feature electronic switching, attenuation and versatile programmable microprocessor control of all functions. The A/B selectable inputs accept mic through line levels. Pricing is from $4,500 to $13,000.

The 7000 Series **LPB** consoles made it to Las Vegas. The 12- and 18-input internally modular mixers feature sealed military-spec switches rated for 5 million operations. Pricing for the two units is $6,995 and $9,295. The venerable Signature Series was on display as well, in a choice of six-, eight-, 10- and 12-channel rotary-fader boards.

Happy anniversary

Pacific Research & Engineering is celebrating the 20th anniversary of its BMX series of consoles. Marketing specialist Chris McKay said BMX console No.1 is still alive and well in Salinas, Calif. The BMX III and its siblings — the Radiomixer, AMX, PMX and ABX — make up the backbone of the PR&E line. The consoles share some mainframe configurations, and some modules are swappable.

Dave Pollard of PR&E showed the Airwave Console, introduced at last year's NAB convention. The Airwave retains most of the features and modularity of the BMX series in a more cost-effective package. The PMX and ABX consoles provide versatility to the production room. Multitrack support includes extensive routing grouping and control configurations.

Auditronics introduced the Comet Series this year. According to Bob Greenwald, the console has features unlike the company's other products. The Comet uses balanced bussing and a universal motherboard. Either electronic or gold-plated dry-contact switching as well as voltage-control or resistive faders are available. Mainframe sizes of 24, 30 and 36 position are available. The standard configuration features four mono mix-minus busses and five stereo busses. The mixer comes standard with a four-band EQ section on each channel.

Special alliance

At the show, Auditronics entered into an agreement with Broadcast Electronics under which BE will sell its consoles. At the same time, BE discontinued its MixTrak and AirTrak consoles, according to a spokeswoman.

AEV of Italy imported its Excalibur air/production console to NAB '98. Mainframes with 16 or 26 inputs are available to accommodate mic/line, line and telephone interface modules. The console features electronic switching and 16-bit multiplying D/A type attenuation. Modules are available with a three-band sweepable EQ section.

Ward-Beck mixed in with its Renaissance series. The console features a selection of eight-, 16- or 24-channel mainframes. Each removable module features programmable control, electronic switching and attenuation. Four mix-minus busses are standard.

The Radio Systems Millenium

ATI offered the Vanguard series consoles. These units range in channel/input size from 6/10 to 12/24, and are priced from $3,300 to $5,400. Each mixer comes standard with two mic preamps, with more available as an option. The consoles are internally modular, with sealed snap-action membrane type switches. Linear or rotary fader versions are available. Analog-type metering is standard, with LED displays optional.

Wheatstone exhibited the Audioarts R60, R16 and R5 series. The externally modular consoles boast 20- and 10-input mainframes, with a wealth of bussing and control options. Pricing for the three ranges from $4,000 to $9,000. The company's namesake consoles are aimed at medium to larger markets. The Wheatstone A300, A500 and A6000 series are rugged boards that fill the needs and take the abuse of a fast-paced radio format. The A300 and A500 are available in 25- to 36-position mainframe sizes, with the A6000 expandable to 42 slots. All units feature a universal mainframe that allows placing a wide variety of module types in any mainframe slot.

Production requirements are filled by the SP-4 and SP-8 series. The two consoles support four- and eight-track production respectively with a variety of signal routing abilities. Wheatstone products are designed with a "purist" approach, trading VCAs and electronic switching for high-quality faders and gold-contact switches. Pricing is subject to configuration.

A number of cost-effective sound-reinforcement consoles are available for production. **Mackie**, **Panasonic**, **Tascam** and **Yamaha** each showed lines of mixers. These consoles are not modular, and most have only mono mic/line input channels. Some of the Mackie products do incorporate four stereo input channels and are suitable for small production jobs.

Despite their small size, a number of these mixers have excellent audio specs and versatility. Expect to find three or four bands of EQ and a few mono sends on each channel. Most even have unbalanced patch points for processing insertion.

■■■

Russ Mundschenk is chief engineer of WBEB(FM) in Philadelphia.

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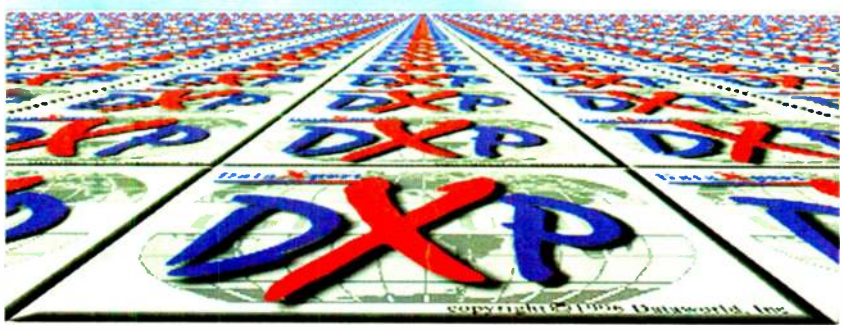

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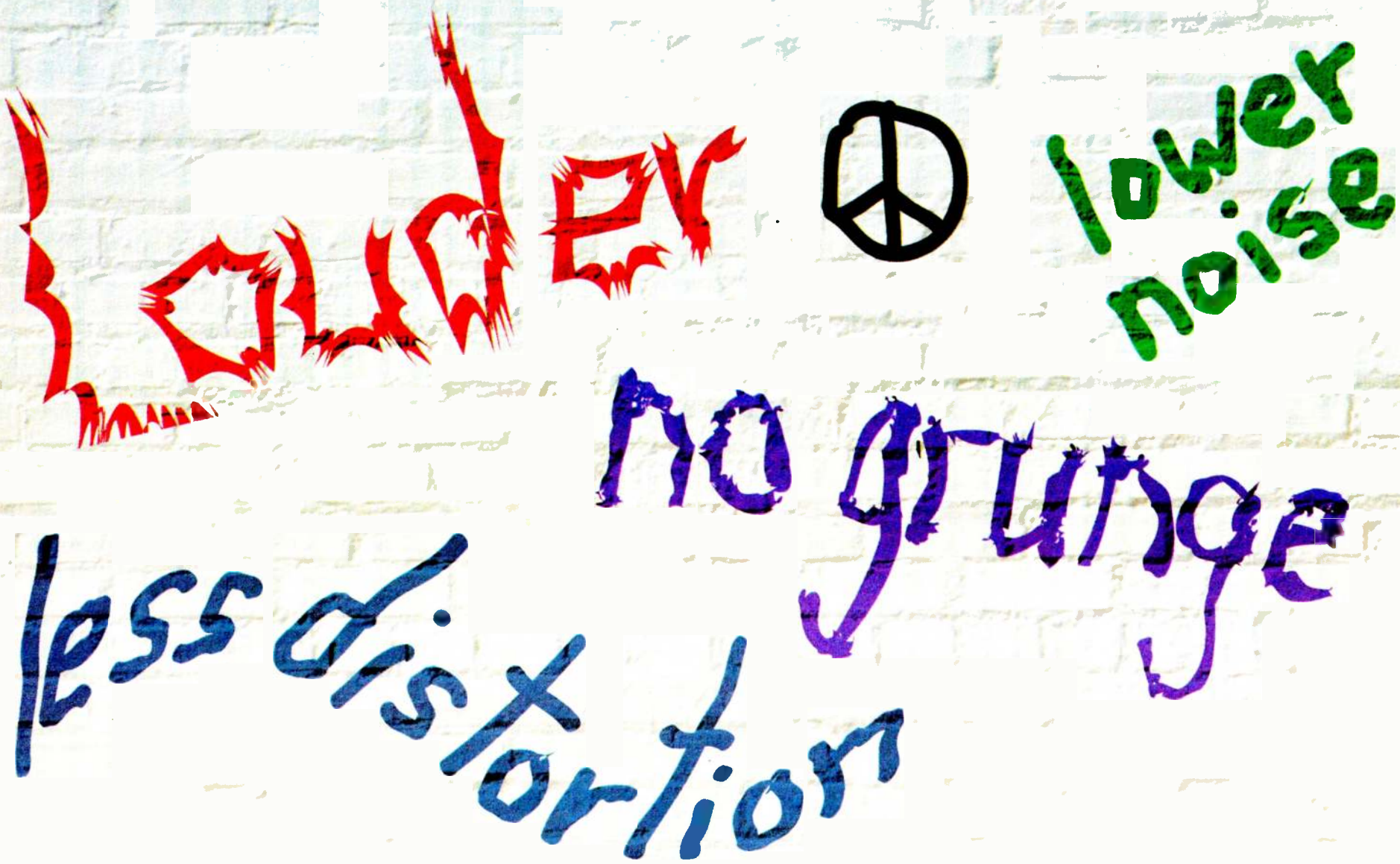
World Radio History



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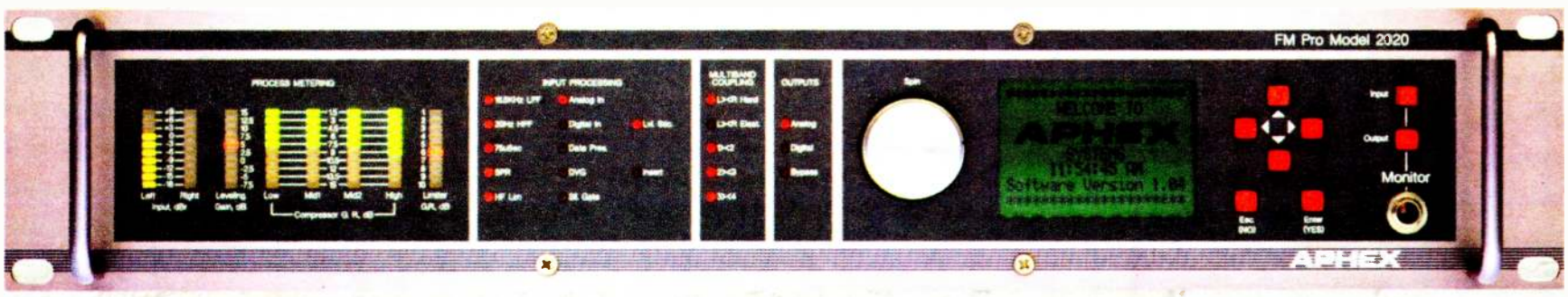

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World Radio History

DAB TRANSMISSION

DAB Systems Are Now a Reality

International Suppliers Bring the Digital Future to The Exhibit Floor at NAB '98

Marguerite Clark

As digital radio services come on stream around the world, an increasing number of manufacturers, in the United States and abroad, have begun to offer products for this new era of technology.

In Las Vegas at NAB '98, a number of companies boasted systems and products of interest. To a buyer based in the United States, they provided a peek into what could be the digital future. For thousands of international attendees, the digital question is more immediate.

On show at the **Harris** booth was the DAB encoding system from French company ITIS, which Harris acquired in June of 1997. Through ITIS, Harris is the largest producer of DAB coder products in the world. ITIS coders are in use at most of the DAB projects under way in Europe.

Digital wave

Harris also is weighing involvement in Eureka-147 DAB, but it is looking at the market. If Harris does decide to approach the European market, then it will do so either through its offices in Cambridge, England, or through ITIS.

In the United States, Harris officials say they are supportive of the in-band, on-channel (IBOC) approach, and are in consultation with both USA Digital Radio and Digital Radio Express. USADR has used the Harris DX10 transmitter for its experiments.

In the digital AM arena, Harris is working with Digital Radio Mondiale as a spectator and a consultant, keeping in touch with the issues, but not taking sides. (On March 5 in China, more than 20 research institutes, transmitter/ receiver manufacturers and broadcasters gathered to inaugurate Digital Radio Mondiale, a consortium to develop specifications for a worldwide digital AM standard. There are at least five approaches in the world to digital AM for the short-, medium- and long-wave frequency bands, but these efforts have not yet been coordinated. Among members of DRM are the Asian Pacific Broadcasting Union, the European Broadcasting Union, Telefunken, Thomcast, and the BBC.)

Among other companies at NAB showing DAB gear was British-based **GEC Marconi**. The company offers systems for band III (174 to 240 MHz), which include DAB multiplexers, network adapters/encoders, COFDM coders and amplifiers.

The DAB multiplexers feature WG1/WG2 input, Eureka-147 compatibility as well as dynamic allocation of ensemble contents. The network adapter/encoders convert ETI (NI) to ETI(NA) for transmission of DAB over telecom links and adds error correction for network synchronization.

The COFDM coders offer IQ output for high performance, and digital output. Band III linear amplifiers offer 250, 500, 700 and 1,000 W DAB power. They are also air cooled and hot pluggable.

Rohde & Schwarz of Germany introduced for the first time at NAB the DAB source encoder DMU. Depending on the required output interface and on the number of audio services per site, three dual encoder models are available: DMU-Basic, DMU-Extension and DMU-ISDN.

DMU-B is made up of one or two encoders, a service multiplexer and an interface card. With the DMU-B it is possible to combine up to 10 audio services by means of the integrated service multiplexer and via a 2 Mbps interface applied to the DAB ensemble multiplexer.

The DMU-E comprises a maximum of three encoders but no service multiplexer and no interface card. It is therefore connected to the DMU-B via the extension bus. The DMU-I, used when individual audio services from various sites are to be applied to the DAB multiplexer, comprises one or two encoders and an ISDN interface.

Italian company **Itelco**, which recently opened a manufacturing facility in Westminster, Colo., displayed its DAB LDMOS solid-state transmitter with DAB exciter, for L band (1452 to 1492 MHz).

Itelco also recently announced its first North American DAB transmission order, as reported previously in **RW**. Master FM and the Canadian Broadcasting Corporation chose Itelco to supply their DAB system in Toronto. Itelco will provide five 800-W L-band transmitters in a turnkey system. The transmitters will broadcast from the CN Tower.

CTE International, also of Italy, showed its solid-state DAB transmitters from low to medium power. The company can supply both band III and L-band systems, which consist of a COFDM coder and modulator, a precorrection and synchronization unit, an upconverter and an amplifier and power supply.

Aquila Broadcasting Sets, from Italy, showed a 400 W DAB transmitter for L

See DAB, page 42 ▶

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World Radio History

DAB a Reality at Show

▶ DAB, continued from page 41

band featuring a modular design, test point connector, individual power supply and linear precorrection.

German-based **Telefunken Sendertechnik**, exhibiting in the Continental booth, showed its third generation of DAB transmitters for band III and L band. The company also highlighted the Telekom/Telefunken Multicast System T2M for digital short-, medium- and longwave frequency use; it is being developed in collaboration with Deutsche Telekom.

Canadian company **Larcan** highlighted its Signature series DAB III transmitters, which feature power levels between 100 W and 1 kW. Designed for single, standard-size cabinets, the transmitters above 250 W permit module serviceability while remaining in operation.

Meanwhile, Spanish company **Rymsa** showcased its DAB omnidirectional antennas and DAB band III channel combiner. The antennas are top mounted and feature a vertical dipole array inside a fiberglass radome. Furthermore, the antennas, which are suitable for various weather conditions, are supplied assembled and tested to allow quick and efficient setup.

The DAB band III channel combiner from Rymsa offers adjacent channel combining possibilities, thermal stability, lightweight and compact design and high channel isolation.

Among products highlighted at the booth of the Italian firm **Co.El** were directional dipole antennas and collinear dipole antennas for DAB applications. The company also produces DAB bandpass filters.

Davicom Technologies of Quebec, a manufacturer of telecommunications equipment, featured its line of DAB antennas for both band III and L band.

New from **Thomson Tubes Electroniques**, of France, was the TH2484 klystron, which was designed for L-band applications. The system features a gain of 47 dB and is air cooled, thus allowing for easy installation.

Swedish company **Factum** showed the MAP100-E MPEG/DAB audio encoder. The system supports PAD applications and most bitrates as well as all MPEG/DAB sample frequencies. The MAP100-E also features 20-bit resolution, external or internal clock synchronization of the MPEG bitstream, automatic detection of external reference frequency and remote control and monitoring.

Teracom Components highlighted the DAB 1 kW combiner with six cavities for band III. According to the company, the combiner is very stable and easy to tune, and provides high isolation.

British-based **Castle Transmission International** was present, highlighting its range of services for both digital and analog services along with wireless communications.

■■■

Marguerite Clark is RW European Editor, based in Milan, Italy.

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SATELLITE

Satellite Digital and Analog

W.C. Alexander

NAB '98 offered a wide array of satellite products and services for the radio side of the industry, and a small number of alternative distribution service providers.

Digital made its satellite debut more than a decade ago, and continues to grow. Still, many analog audio satellite services are on the air, primarily on the C-band.

No matter what type of satellite service a broadcaster uses, he or she must have an antenna and an LNA or LNB. Among those supplying these products was **Vincor Ltd.** Vincor is an Andrew distributor that also sells Walton deicing systems, along with a full line of LNAs, LNBs and antennas, including DH Satellite and Comsat. In addition to equipment, Vincor offers services including site surveys, installation and maintenance worldwide. Dave Basile of Vincor said, "Vincor started as an installation-only company, but we have now moved into catalog sales and distribution as well."

Patriot Commercial Antennas was on hand with an impressive display of its C- and Ku-band antennas. Cindy Ruff of Patriot said the company recently purchased the tooling for Comsat RSI Patriot series of antennas. She said 4.5 meter and 3.8 meter antennas, which were on display at the show, are going to test for type acceptance this summer, and should be available shortly thereafter.

Crown showed two products in its SpectraCast line. The DTMX1000 transport multiplexer efficiently transfers multiple program streams at one time.

On the receiving side, Crown showed the DR2000, an integrated receiver/decoder. It demultiplexes and decodes the information from a satellite. The unit has built-in store and forward capabilities.

See SATELLITE, page 44 ▶

World Radio History

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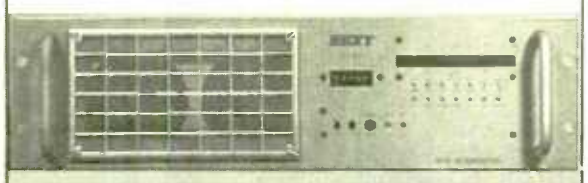

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World Radio History

TELCO PRODUCTS

Telco: From Landline to Airtime

Tom Osenkowsky

Virtually every radio station has at least one interface between the on-air, production and/or news audio board and the telephone landline system. In the "old days," a remote telephone interface was nothing more than a capacitor, an isolation transformer and a set of clip leads to feed audio into the telephone handset microphone. In the studio, audio was sent and received using the capacitor and transformer hung across the telephone line tip and ring wires.

Times have changed. Digital audio sent over dial-up telephone lines can produce near- CD-quality audio. Digital and analog phone interface devices on the market produce astounding audio quality without the need for digital phone lines (T1, ISDN, Switched 56, and so forth).

The newest entry into the digital audio telephone interface arena is the **Comrex** Vector. Debuted at NAB '98 and expected to ship in August, the Vector can simultaneously send and receive 15 kHz mono audio on a standard POTS telephone line. The demo was compelling: 15 kHz music was sent from Massachusetts to Nevada on a 24.4 kbps phone connection. The Vector is backwards-compatible with the Comrex HotLine, of which over 2,000 are in use worldwide.

The Vector features a low audio coding delay of approximately 100 ms, two contact closures, auto redial, internal peak limiter and automatic renegotiation in the event of line deterioration. It will operate with baud rates as low as 9.6 kbps, producing a response of 5 kHz. The unit utilizes a proprietary compression algorithm to realize these unprecedented audio specs.

The Vector has a built-in three-input mixer, three headphone outputs, LCD setup/status screen, keypad and mute buttons. The product will be available in a 2RU chassis or in a portable version. It earned 1998 Cool Stuff honors from RW's judges.

Telos Systems completed beta testing of the ZephyrExpress portable digital codec/mixer. The ZephyrExpress is a portable version of the Zephyr ISDN-based digital audio delivery system. The ZephyrExpress was beta tested at high-profile events such as Super Bowl XXXII, the Winter Olympics and the Grammy Awards show, and made its official debut at NAB '98. Also new from Telos was the Assistant Producer, a software-based telephone call screen manager for Windows.

New from **Gentner** is the DH-20 digital telephone hybrid, with features such as AGC to keep caller audio level consistent, caller ducking to allow the host to take priority over the caller's audio, and automatic mix-minus. The latter is a superb feature for consoles that do not have a built-in mix-minus bus. The DH-22 dual hybrid incorporates two DH-20 hybrids under one cover.

Also from Gentner is the TS612 On-Air Phone System. The TS612 can conference up to four callers, accommodate six or 12 phone lines, has two built-in digital hybrids and can be expanded to other studios by adding up to 10 mainframes and 30 control surfaces.

New Scoop

Harris Corp. debuted the Scoop Reporter Mark II. New features include a built-in Motorola Premier 33.6 modem with automatic rate adaptation to account for dynamic changes in phone line quality, friendly pop-up menu, front-panel XLR connectors and two low-delay error protections. The Scoop Reporter may be used with dial-up POTS or dedicated telephone lines.

Also debuted by Harris is the Vortex MixPak accessory for the Comrex HotLine. The MixPak attaches directly to the HotLine and provides a three-input mixer and battery pack for up to two hours of continuous operation with six alkaline cells. The MixPak can accept external DC power from a car battery. Harris is the exclusive distributor for the Scoop Reporter and the MixPak.

Broadcast Electronics showed the Marti line of remote broadcast and STL products. New at NAB '98 was the Smarti RKS-111 single-input remote broadcast unit. Utilizing MPEG compression, the Smarti can send and deliver 7.5 kHz audio quality over a standard dial-up POTS line. The Smarti has two relay contacts for triggering equipment or signaling the board-op back at the studio. The Smarti automatically adjusts for changing telephone line conditions and will redial automatically if the connection is lost. Also featured were the original Smarti RKS-411 four-input remote broadcast unit and the newly repackaged Cellcast cellular telephone remote broadcast unit. The Cellcast features four inputs, full 3 W RF output, built-in frequency extender for high-quality audio, optional external antenna and AC, battery or 12V auto power options.

Also available from BE are the TalkPort cellular/POTS telephone interface and the RPS-402 remote mixer with built-in dialer. The TalkPort has a heavy-duty battery capable of up to three hours of continuous transmit time, a three-input mixer, audio limiter and headphone amplifier. The RPS-402 remote mixer features four mic channels plus two auxiliary inputs, four headphone jacks, peak limiter and rechargeable batteries that can last up to 10 hours.

Innovative Devices Inc. demonstrated the Modular Integrated Telephone System broadcast telephone system. The heart of the MITS is the MS work surface, complete with handset, LCD status display screen and function keys. The call screener and host each have an MS work surface. The screener may enter caller name, city or comment for each telephone line, place the caller on hold, send to the host, back to the screener or dump off the line. For the Talkshow System, the screener enters pertinent caller information via a standard PC keyboard.

Want to take your talk show on the road? The Roadshow System from Innovative Devices will do it. Using the POTS telephone system, the host has the full flexibility of the studio system at his fingertips. This includes selection of any of the multiple call-in lines. The Talkshow System is available in a 10- or 15-line configuration. Either system comes with mainframes, hybrids and work surfaces.

Problem solvers

JK Audio debuted the InLine Patch, a device that connects between the telephone wall jack and telephone set. Essentially two back-to-back hybrids, the InLine Patch allows recording of both sides of a conversation, mixing of external audio to the output, caller voice on one stereo channel with local voice on the other or a mixed single output. A built-in switch allow you to seize the line if desired.

Another debut JK Audio product is the RemoteMix 3x4 multiline hybrid/mixer. The 3x4 has a three XLR input mixer, mic/line selectable. Up to four phone lines can be attached to the 3x4. The 3x4 has a built-in keypad, selectable VU meter, add/drop line buttons and 1 kHz tone generator. Expect up to 10 hours of operation on two 9V batteries; an AC adapter is included. Also new from JK Audio is the Remote Mix 3.m, which interfaces either with the telephone line or telephone handset. It features three mixer inputs, built-in keypad and VU meter. The 3.m operates on two 9V batteries or by the included AC adapter.

Sonifex demonstrated the DHY02

See TELCO, page 45 ▶

Radio, Up on the Bird

▶ SATELLITE, continued from page 42

Harris showed its S-12T transportable satellite uplink, for use with any ENG truck or minivan or as a fixed uplink back at the studio. Its can be controlled by a laptop computer.

The S-12T is available in C, X and Ku-Band versions.

Familiar names

There were several suppliers of radio-related satellite equipment at the show, and among them was a familiar name: **Wegener.**

The premier radio product on display at the Wegener booth was the Unity 2000 digital receiver. Wegener's John Scaggs said, "The unit's main strength is its ability to receive multiple channels of audio at once. The Unity 2000 is a certified DVB product, a claim that some other receivers cannot make." Wegener also has a full line of C-band SCPC and FM-squared receivers and demods.

A number of companies offering satellite program delivery were on hand. Among these was **StarGuide Digital Networks.**

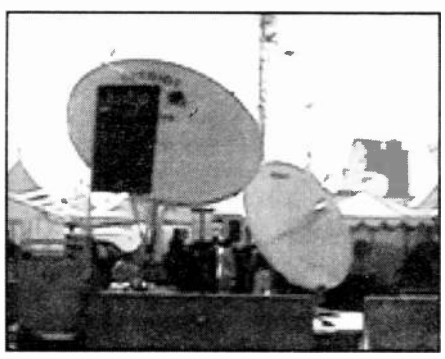
StarGuide's Don Laird told **RW** that he can offer his customers turnkey satellite audio and data delivery services, from codec to codec. StarGuide manufactures and sells the MX3 multiplexer, which is efficient and dynamic. Laird said configuration changes can be made on the fly without interruption of the data stream.

StarGuide also makes the versatile StarGuide II receiver.

Another satellite program delivery supplier at NAB '98 was **International Datacasting.** Company representative Andrew Leyton said, "Our FlexRoute system can put four channels of audio in one 256 kb channel."

He also said that International Datacasting can supply turnkey satellite delivery services on either the C- or Ku-band. The company features the DM-2000 modulator and SR-2000 receiver.

NSN Network Services is a familiar name to radio broadcasters. NSN featured Comstream's new



Patriot Commercial Antennas

ABR-202 QPSK receiver. The ABR-202 is the replacement for Comstream's long-time standard, the ABR-200. NSN's John Arnot said the ABR-202 would be shipping within the next few months and that its performance will be an improvement over that of its predecessor. Arnot said NSN offers a range of turnkey digital satellite services, including door-to-door program audio delivery.

Another familiar name seen at the show was **NPR Satellite Services.** Bruce Waters said NPR provides digital or analog SCPC transmission on all major satellites. NPR also is a vendor of digital satellite audio products, uplinks and downlinks, both fixed and transportable.

Dawn Satellite promoted its C-band LNB digital-ready amplifier, which mounts to the antenna feed horn, and a new 3.0 meter satellite commercial downlink antenna. Also on display: the Coversat snow and ice protection cover and 3.8 meter Comtech satellite antenna.

In addition to these suppliers and vendors, there were representatives on hand for several of the major telecommunications satellite operators. Among these were **Loral Skynet** and **GE American.** Loral operates the Telstar group of geosynchronous birds; GE operates the five new GE satellites.

Musicam Express was at the show, offering its array of satellite, electronic and local distribution services, sweeps deliveries, and dubbing and shipping services.

If your company provides delivery services or hardware for radio, and was not mentioned in our NAB wrap-up, let **RW** know about it. Send e-mail to *radioworld@imaspub.com*

■■■

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. He is a regular contributor to ***RW****.*

World Radio History

INTERNET SERVICES

Web Stations: 5,281 and Growing

Peter M. Zollman

Growth and progress were the two key points about radio on the Internet exhibits and presentations at NAB '98.

Executives of many exhibitors conceded there was little new Internet technology or content for radio stations at the show. But several major companies announced new affiliates.

Many vendors and Web users agreed there is no longer a question about "why" or "whether" radio stations and networks should be involved in the Internet. "How soon?" and "How?" were the main questions.

"There's no one here saying 'We don't think we should do this,' or 'Why would we want to put our radio station on the Internet?'," said Scott Frisoni, vice president of **Magnitude Network**, one of the few exclusively radio/Internet exhibitors at the show. Although Magnitude had a small booth in a back corner of the **RealNetworks** booth, a steady stream of prospects stopped by to see how Magnitude Networks could help put their stations online.

Only a handful of exhibitors had anything to offer radio stations for their Internet businesses. One major player in the industry, **Electric Village**, sent four executives to NAB '98, including president and COO Carl Koppel, but did not exhibit. Koppel said companies like his get lost at the NAB convention, because it is so big and attracts so many attendees from the computer industry, television and other markets.

The number of radio stations worldwide with a presence on the Internet is up to 5,281, up 286 percent from March of 1997, according to figures presented by Peggy Miles, president of **Intervox Communications**. The number of stations doing audio or Webcasts is 1,252, up 310 percent in that same time span, and there are 103 stations doing Web-only broadcasting, meaning no transmission over the airwaves is involved.

Dot-FM

One of the more interesting radio-on-the-Internet exhibitors was **BRS Media**, which has entered a partnership with the Federated States of Micronesia to license and market top-level Internet domain names ending in *.fm*, or "dot FM." This means that stations will no longer have to be known by their call letters or slogan followed by *.com*, but can be reached online at *power96.fm* or *smoothjazz.fm* instead.

"This obviously has an appeal to FM broadcasting stations, but anyone who expects to be in the Webcasting business can have a premium URL with dot-FM," George Bundy, president of BRS Media, said. "We've had a lot of requests for Internet-only stations, and a number of media companies as well."

Registering a domain name ending in *.fm* costs the same as registering with **Network Solutions Inc.**, which handles standard registrations for the United States, and can be done online at *www.dot.fm*.

It wasn't easy to establish the service. Bundy had to negotiate with the FSM Telecom Corp., the Internet service provider in the Federated States of Micronesia, a developing island nation in the western Pacific Ocean with a population of about 100,000. He then had to establish a connection to a primary server in Micronesia, which can be reached for Internet access only by satellite, and set up a mirror server in San Francisco to host the Domain Name Server. That way, users of the *.fm* URLs should receive the same speed access as other U.S.-based sites.

Next up for Bundy? He's discussing potential dot-am (*.am*) registrations with officials for the former Soviet state of Armenia. But he hasn't been in touch yet with the government of Tuvalu, a tiny island-nation in the South Pacific with a population of 10,000, about *dot-tv*.

AudioNet

AudioNet, the leading company in placing radio station Webcast signals on the Internet, is adding more video services and will soon change its name, President Mark Cuban disclosed at the Webcasting conference. He wouldn't reveal the new name or when it would be announced.

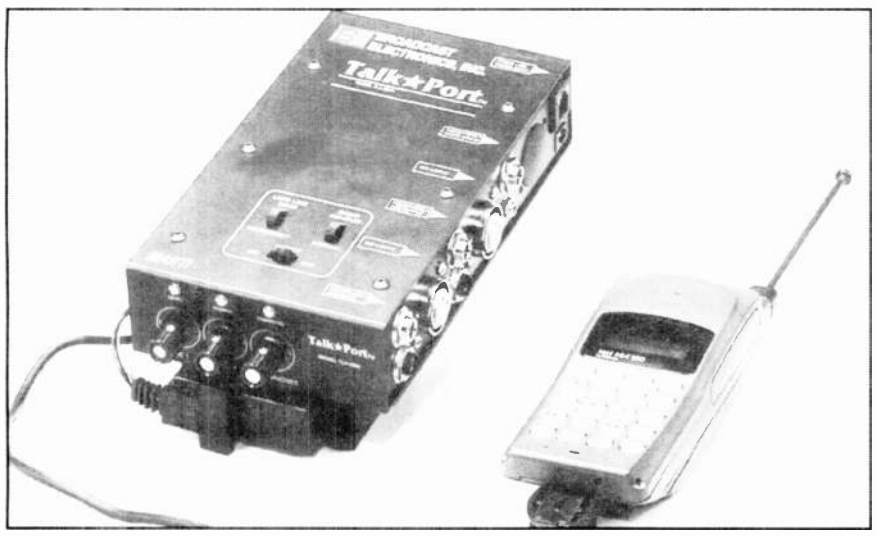
AudioNet has approximately 250 radio stations Webcasting on its site, with signed agreements for another 50 stations to go online during the next few months. Andy Collins, affiliate

See INTERNET, page 46 ▶

▶ TELCO, continued from page 44

digital hybrid. Sonifex is known for its HY02 analog telephone hybrid which has sold over 2,000 units worldwide. The DHY02 employs 16-bit DSP processing and features adaptive echo cancellation to 28 msec.

For stations wishing to interface an analog hybrid to a console with a mix-minus bus, consider the **Henry Engineering** MixMinus Plus. It produces a mix-minus output from a simple console. For applications requiring automatic message feed down a telephone line, the DigiStor digital message storage system may fit the need. The DigiStor comes in four models with various storage times and fidelity. DigiStor will automatically answer a telephone line and play a prerecorded message. The message always starts at the beginning, there is no "rewind time."



Broadcast Electronics TalkPort

AEQ demonstrated its TH-02EX Mk-II digital hybrid, which comes in either single- or dual-hybrid models. The TH-02EX Mk-II also features a frequency extender and can be used in the two-wire mode as a digital hybrid or in the four-wire system as a full-duplex intercom. The frequency extender function extends the LF response down to 50 Hz by limiting the HF response to 3,150 Hz instead of 3,450 Hz. AEQ also manufactures ISDN codecs, portable analog and digital mixers.

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systems are #1
with over 1,000 sold !

The Master Control Studio, shown right, is one of seven Arrakis studios in Sony's Manhattan network origination center for SNY Networks.

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Circle (57) On Reader Service Card

World Radio History

PROCESSING

Processors Pave the Way at NAB

Val Davis

The advent of digital audio has changed many aspects of broadcasting, and the field of audio processing certainly has felt the ripples. Digital technology has forced broadcast engineers to see the audio chain in a new light.

The digital **Aphex Systems** Model 2020 processor is fully programmable, remotely operable and can be automated to recall different settings for individual dayparts. Also available are the Aphex Model 109 Parametric EQ and Model 661 Tube Compressor/Limiter.

Benchmark Media is on top of the digital wave. The company promoted its AD2004 analog-to-digital Quad 20-Bit Converter, a winner of **RW** Cool Stuff honors last year.

From **Circuit Research Labs** comes the DP-100 all-digital FM processor. The device processes audio with a 32-bit floating-point DSP and 18-bit A/D conversion. Internal processing includes true stereo multiplex generation, AGC, five-band compression and three-band limiting. An improved digital version of CRL Dynafex noise reduction is also included in the DP-100.

The **Cutting Edge** Unity audio processors for both AM and FM are programmable and offer remote access, with a sound all their own. The Omnia FM and Omnia FM Jr. are the latest from Cutting Edge and offer state-of-the-art compression and limiting for the broadcast audio chain. Cutting Edge also took quality audio processing to the Internet with the creation of the Omnia.net and are looking to the future with the Omnia.dab, a digital audio signal processor that saw action during the Digital Radio Express IBOC demonstrations in Las Vegas.

This year, **dbx** unveiled the dbx DDP, a programmable digital signal processor with compression, limiting, gating, three-band parametric EQ, de-essing and 50 factory presets. The unit also functions as a 24-bit D/A or A/D converter.

Also shown, the DC66 stereo compressor, limiter and gate TDM plug-in, the 20 Series EQs , the upgraded Project 1 Series 266 Dual Compressor Gate and the Project 1 286 mic processor.

Eventide was on hand and introduced its DSP4500 "Limited Edition" Ultra-Harmonizer, which has more than 1,000 presets from the company's popular Harmonizer models as well as a new "Alchemy-101" preset library. The unit includes an HS487 sampler, and has AES/EBU and S/PDIF digital I/O.

The **Inovonics** Model 235 AM Broadcast Processor will be released this summer. The 235 is an AGC compressor, limiter and gate. Also new was the Model 520 AM modulation monitor with flash/off air alarm.

The Inovonics 250 is a versatile, comprehensive stereo audio processor. The 250 performs all signal conditioning required between the broadcast console and transmitter, and can schedule parameter changes throughout the day. The Inovonics 255 is a multifunction stereo audio processor with AGC and flexible three-band compressor/limiter. The Inovonics "DAVID" processor has been engineered to yield the dense, "hot" sound sought by contemporary music programmers.

New this year from **Lexicon** are the PCM 81 and the PCM 91 digital effects processors. The PCM 81 builds on the earlier PCM 80 with more effects, more algorithms, longer delays and full AES/EBU I/O. A complement of pitch shifters provides doubling, quadruple-tracking, chorusing and pitch correction within a range of up to three octaves. Three hundred presets offer access to pitch, reverb, ambiance, sophisticated modulators, 20-second stereo delays and dynamic spatialization effects for two-channel or surround applications.

The PCM 91, according to the company, provides Lexicon reverbs in a compact, affordable package with a powerful interface. The features of the PCM 90 are included, plus AES/EBU I/O, new dual reverb algorithms and new presets with dynamic spatialization effects for two-channel or surround applications. All of the Dual Reverb algorithms and presets — available for the PCM 90 on a PC card — are built into the PCM 91.

Digital audio has changed much of broadcasting. Processing has felt the ripples.

Also gearing up for digital radio, **Orban** has released the Optimod DAB 6200, an all-digital audio processor expressly designed for digital audio broadcasting and Webcasting. The company also is providing new software for the Optimod 8200 processor, with new format-specific presets. An urban/rap preset add a solid bottom end. AOR and country presets balance warmth and clarity; other presets target listener preferences for classical, instrumental and jazz styles.

T.C. Electronic promoted its DBMax five-band digital production limiter and optimizer, an extensive dynamics shaping tool.

Symetrix unveiled the 565E Dual Compressor/Limiter/Expander, a powerful piece of equipment with a clean, dynamic sound. Also new this year was the 552E Dual Five-Band Parametric EQ. If you have worked with the Symetrix 528 Voice Processor, you will appreciate the Symetrix 628 Digital Voice Processor. This features a mic preamp, 20-bit A/D converter, de-esser, downward expander/gate, compressor/limiter and parametric EQ, all under digital control.

■ ■ ■

Did your company demonstrate audio processors at the show? Let us know about them.

Val Davis is a producer and broadcast automation consultant.

Internet Services for Radio

▶ INTERNET, continued from page 45

relations manager, said the most important development at AudioNet for radio stations — besides the growth in use and stations participating — is the addition of a marketing group at AudioNet dedicated to helping stations make money with their Internet services. He said AudioNet, which operates on a barter basis, will help stations develop Internet revenues whether through the AudioNet site or not.

Some AudioNet radio stations are adding video to their Webcasts by putting a camera in-studio to broadcast the morning team or the talk-show hosts during the day. Collins said the radio/video/on-the-'net concept is spreading slowly among AudioNet clients.

"It's really funny. Some stations don't want anything to do with it, and some stations are very excited about the potential," he said. "I have music stations that love the idea, talk stations that love the idea. There are no boundaries at this point."

Audioactive tuner

One of the few pieces of new equipment for Internet audio broadcasts at NAB '98 was the Audioactive tuner by **Telos**. Described as "the world's first stand-alone Internet audio tuner/player," Audioactive incorporates a 20-bit digital-to-analog converter and allows users to play Internet audio without a PC. Available soon for under $1,000 with customized specs as chosen by the purchaser, to user specs, the Audioactive tuner can instantly play any MP2 or MP3 file or stream available on the Internet or an intranet, but requires at least a high-bandwidth connection, rather than a telephone modem.

Potential uses include multiple-station monitoring from a single location (for group owners, for example); monitoring news from various markets (for a national or regional network); delivery of high-quality audio to remote locations (for a network of stations and repeaters); for "lectures-on-demand" in a college or university setting; audio database browsing, or a remote public address system via intranet.

Audioactive has not been formally released, but is expected to be available "soon," according to Telos spokeswoman Miriam Carey.

The Telos booth also hosted four days of interviews and chat on the new Web site of **Radio World**, *www.rwonline.com*

Magnitude Network

One of the only radio/Internet-exclusive exhibitors was **Magnitude Network**, a small but growing company based in Chicago that helps stations build Web pages and put their audio on the Internet in an integrated site. The company, which put its first site, for WEBX-FM, online in late 1995 and its second station in September 1997, had six online in January and is up to 12, with another 14 stations signed to contracts with launches pending. Magnitude is up to 14 employees, and has signed advertisers including A&M Records, Hollywood Records and Disney for its small network, Frisoni said.

"When we are dealing with radio stations, we're creating a partnership because we don't sell them anything," he said. "We share in the (revenue from the) national banner ads, share in the revenue of the CDs sold (on the site) and other merchandise."

Magnitude supplies stations with a MagBox server to process the station's audio; a T1 or other high-grade line to the Magnitude Network server; templates for Web page development; design support and an online store. Stations pay a fee of about $50 per month, keep all locally generated revenue and are required to mention the site at least twice per hour. Stations receive quarterly payments for their share of revenue from the national advertising and purchases; checks so far have ranged from $50 to $250.

Electric Village

Electric Village did not exhibit at the show, but Koppel, its chief operating officer, met with executives of other companies there. He hinted at a pending announcement with Microsoft for an alliance regarding NetShow. Koppel said Electric Village has agreements with 300 stations for Web sites and is beginning to stream audio, a service it did not offer until recently. Electric Village provides extensive format-specific Web content and commerce for radio stations for a license fee of $100 to $250 per month on two-year agreements, and a number of tools for polling, news, air personality identification, contests, links, guest books and more at license fees from $100 to $300 per tool, per year.

Koppel has signed an agreement with **Premiere Radio Networks** to host sites for several of its syndicated programs, including Dr. Laura Schlessinger (but not Rush Limbaugh), and allow Premiere stations to use some of its online programming.

Although the NAB conference was too big for Electric Village, Koppel said, "We're trying hard to have attendance at every single focused radio (trade) show. That makes more sense for us than this show."

■ ■ ■

Peter M. Zollman (pzollman@aol.com) *is a consultant in interactive media services based in Altamonte Springs, Fla. His group helps radio stations and other media organizations develop profitable interactive services, and conducts training and business strategy sessions about and for new media.*

World Radio History

DIGITAL EDITING

The Latest in Digital Editing

Val Davis

"Digital editing" is a term that can apply to activities performed on PC-based devices or proprietary boxes, and there are many types ranging in price up to $25,000.

Plenty of these systems were on hand in Las Vegas. There are also digital editors built into many live-assist and automation systems. This piece will focus specifically on standalone dedicated software and hardware.

360 Systems, long an innovator in digital audio solutions, came back to the desert with the Short/cut. This is a two-track digital audio editor designed to replace reel-to-reel tape machines for fast and accurate editing. The self-contained recorder/editor includes an internal hard disk, speakers, mic preamp, digital and analog inputs and outputs.

Shortcut offers cut/copy/insert style editing with realistic scrub control. Ten hot keys provide quick access to specific cuts. Stations have found the Short/cut ideal for talk radio, contest call-ins, and news actualities.

Akai has been turning heads with its hard disk-based digital recorder/editors. Following the DR4, there was the DR8 and DR16 self-contained 20-bit digital recording and editing units. Both have built-in mixers, can cut, paste, copy, insert, move and even bounce audio from track to track.

12 tracks

The latest from Akai is the DPS12, a combined 12-track random-access recorder and a 20-track (at mixdown) MIDI-automated mixer for less than $2,000. The recorder section features 250 virtual tracks, can record eight tracks simultaneously and can record onto an optional JAZ drive or external SCSI drive via a built-in SCSI-2 port.

For those who love PC-based recording and editing, there was the **CreamWare** TripleDAT. This is an all-in-one hardware and software system, configurable from four-in/four-out to 10-in/10-out and sets up on any Pentium 200 or faster computer. Up to 256 tracks of clean digital audio can be recorded and mastered within TripleDAT.

Innovative Quality Software was among the first to bring PC-based digital editing to the broadcast community with SAW. IQS was exhibiting off-site at its own Las Vegas facility, and drew interest with its SAWPlus 32. The new program can play back up to 24 simultaneous tracks and supports up to eight stereo sound cards for 16 I/O channels. SAWPlus 32 emulates a typical multitrack tape recorder by allowing simultaneous recording of several tracks.

Akai DPS12

Gets better

Audicy was introduced last year by **Orban**. A year later, it proves to be another hit product for the company. The decorative and functional control surface of the Audicy has slide faders, function buttons and a jog/shuttle wheel for real-time scrubbing. The computer portion features RAM-based 10-channel, 24-track editing and mixing. All audio is linear without data compression. Studio effects from Orban and Lexicon are built into the Audicy. Automatic shadowing to hard disk or removable Jaz drive backs up all work. A direct "cart" file exports finished audio to popular digital storage and delivery system networks.

Another digital pioneer, **Roland**, introduced the VS-1680, a 16-track digital workstation capable of up to eight simultaneous recording and 16 simultaneous playback tracks. The VS-1680 24-bit internal processing boasts a wide dynamic range and massive headroom. Optional VS8F-2 processing cards offer four independent stereo multieffects processors or eight mono channels of independent effects. This product won a 1998 Cool Stuff Award from **RW**.

Tascam 564

Originally designed as a two-track editing utility, **SADiE** quickly proved to be much more. This year's SADiE system offers two physical inputs and four physical outputs, while internally playing and editing 10 streams of 16-bit audio. SADiE3 software is user- friendly and allows fast editing with instant real-time crossfading and automated mixing. SADiE hardware consists of two full-length ISA cards and an on-board SCSI controller allowing connection of up to seven SCSI devices.

MiniDisc-powered

The **Tascam** 564 digital Portastudio is a self-contained digital MiniDisc recorder and mixer. The unit has four XLR mic inputs with channel inserts on Inputs 1 and 2. The 564 features non-destructive editing with Undo capability, bounce-forward, cut, copy and move. The full-featured EQ has a sweepable midrange. A S/PDIF port allows a digital output for archiving and MIDI Time Code is used for synchronization, all for less than $1,300.

The folks at **Waveframe** were excited about their newest product, the 408. As the successor to the 401 and DAW-80, the 408 has more processing power and speed for recording and editing. Besides being a powerful audio editor for radio, the 408 includes features for TV and film, spotting ADR and Foley and including general purpose interfaces for triggering wipe generators.

Radio World Cool Stuff Award NAB 1998

Product: HR824 Active Studio Reference Monitor

Manufacturer: Mackie

Retail Price: $749

Features: Near-field monitor for critical pro applications. Compact. Wide sweet spot lets user move around a bit. Low-frequency driver 8-3/4-inches, HF driver 1-inch. Max peak SPL per pair >121 dB; rated power output 150 watts/woofer, 100 watts/tweeter. Acoustic space switch. Balanced female XLR and 1/4-inch inputs.

Shipping: Now

Judges' Comments: "The cost/quality line in the sand has been drawn with these powered monitors. They are that good."

Scott Garside and Diana Sergi

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World Radio History

SWAG: Freebies from the Show

Trade shows are a wonderful thing. Not only do you get to see the hottest new products from manufacturers, dealers and distributors, but you also get all sorts of free neato-torpedo stuff to take home with you! So we present to you this NAB '98 freebie photo feature — Stuff We All Got, or SWAG. It's not all radio stuff, but hey, free is free, right? Our apologies in advance for the puns ...

— Sharon Rae

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Photos by Alan R. Peterson

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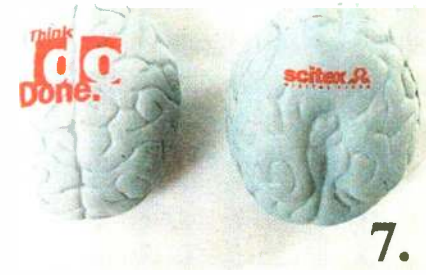

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9.

(1) ABC Radio stepped up to the plate with this cool giveaway.

(2) Digigram's CD opener cuts through the hassle of that pesky plastic wrap, and Informix's colorful give-away may come in handy for sketching schematic figures ... hmmm.

(3) Our friends at Inovonics certainly know how to get to the bottom of things.

(4) A plethora of promotional product pens, pencils, paper pads and penlights.

(5) Burk and Pacific Bell chose a great vehicle to push their goods.

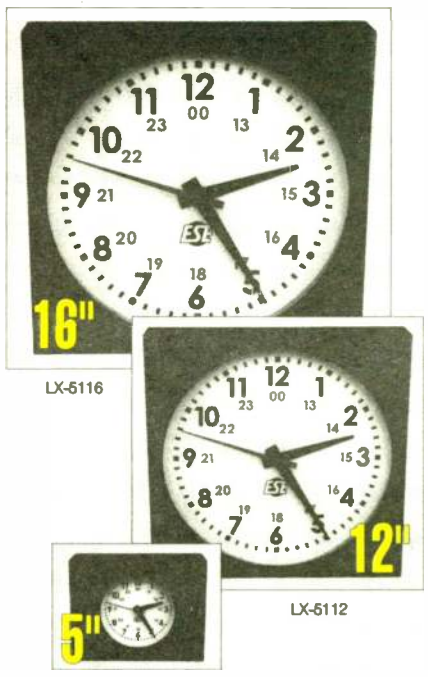
(6) Processing Orban's give-away took some technique.

(7) This promotion was the brainchild of the folks at Scitex, who really put their heads together to come up with this one.

(8) Various suppliers were clever enough to include little packets, like these from Advil, in their NAB "survival kits" for reporters.

(9) And we couldn't resist ... This, of course, is your brain on drugs.

ANALOG CLOCKS
"5100" Series



The LX-"5100" Series can read Time Code (ESE, SMPTE/EBU & ASCII), as well as operate as Stand-Alone or Impulse Clocks. These clocks are loaded with many features, here's just a few...

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World Radio History

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- CD management for up to 4000 CD's
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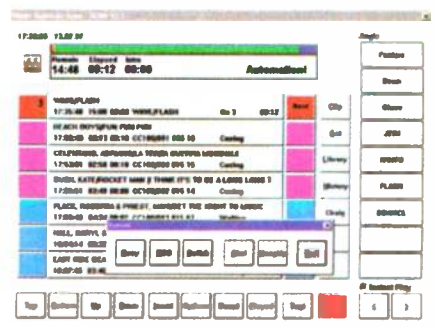

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STUDIO FURNITURE

Furniture's New Look at NAB '98

Michael LeClair

The trend among studio furniture manufacturers is away from pragmatic square boxes, toward more stylish layouts. Curved corners and edges are considered important, to enhance durability and usability. While many manufacturers still use standard modules as a basis, most can add elements of customization. Expensive materials such as solid surface plastics and stone are available for a high-end finish.

Manufacturers report strong demand driven by post-consolidation studio projects.

Other makers supply simple furniture that can be shipped flat and assembled in under an hour. This approach to production room furniture was also in strong evidence at the show.

Full-line makers

Showing three lines of furniture at the NAB show was **Arrakis Systems**.

Its top-of-the-line Radius system can be customized around any design requirement. The mid-range Modulux system is a modular system that can be combined in a variety of patterns. Custom features can be added, such as special counters and rack designs. On display was an optional below-counter equipment rack that had been mounted on pullout rails. "This is our most popular line, and about 90 percent of the time we are customizing it," Vice President Roderic Graham said.

Arrakis also offers the budget-oriented Deskstar line.

An interesting design feature of Arrakis furniture is the use of an aluminum superstructure to form the interior frame on which the finish wood panels are hung. A damaged panel can be replaced with the removal of the mounting screws. The user also can extend the base frame to add modules easily.

Also showing several lines was **Murphy Studio Furniture**. Ranging from the least expensive to the most are the Classic, Premier, Elite, Stealth and Avant Garde series.

Typical of the Elite series is the use of a basic line of modular pieces that can be customized to accommodate the station. Edges use wood trim for durability. Murphy can ship the furniture partially knocked down. Cabinets come with built-in levelers to allow simple installation on non-uniform floors.

Other features include non-chippable laminate on the bottom edges of cabinets. "This is where you see the most damage on furniture, down by the feet and the chair rails. You could hit this material with a hammer and it will deform, but it won't chip and break away," said President Dennis W. Murphy. Murphy also ships Plexiglas covers to fit over recessed rack rails, standard on all under-counter racks.

Pacific Research and Engineering demonstrated multiple lines of furniture, including Quikbilt and Primeline system cabinets. Both are based on the modular approach, with custom features available.

Intended as an entry-level system, Quikbilt furniture has oak edging, radiused corners and built-in levelers. Rear access doors are removable and mounted using recessed hinges for easy access. Passive air vents are provided, and the system can ship flat via UPS.

The mid-grade Primeline series from PR&E offers similar features. Custom cutouts for headphone and mic connections are provided in moldings below the counter edge. Also available is an optional mic boom mount in matching oak. This line can be modified to accommodate special requirements.

Pacific Research also offers design services, including 3-D renderings in color, to support the design of custom furniture. Featured at the show was a studio cluster with counter/table tops made of pink granite with curved cutout areas for three guest positions around a central console area. An accessory was a combo mic boom mount, headphone station and mic control panel. This unit was self-contained to mount on the granite surface. PR&E can also perform equipment installation and wiring.

Wheatstone Corp. showed its lines of furniture. The basic line is a modular system with a range of shapes and configurations. Standard features are oak edging, passive ventilation and built-in leveling. Also available are features such as recessed keyboard trays and racks mounted on slide rails.

Notable in the Wheatstone line is the use of countertops built to 1-1/2-inch thickness, eliminating the supports under a typical interview counter extension. The system uses a steel frame superstructure to support wood panels, allowing equipment rack rails to be mounted within cabinets.

New from Wheatstone is a premium line of custom radio furniture. On display was a setup with curved wood surfaces and single-piece, custom-shaped counters. Wheatstone offers equipment integration and on-site installation.

Studio Technology furniture was on display in several booths, demonstrating the capabilities of its custom cabinet shop. Owner Vince Fiola said the company will build to spec in a broad range of price and materials. "We do birch plywood, flakeboard, Melamine component

See FURNITURE, page 51 ▶

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Prices shown are published manufacturer's list prices as of 3/1/98

Circle (187) On Reader Service Card

World Radio History

▶ FURNITURE, continued from page 50

panels, whatever fits the bill. We can do Avonite and Corian type of counters. For that matter, we could do granite if someone wants us to."

Studio Technology offers delivery and installation of its furniture, and will cooperate with turnkey suppliers or competitors based on the client's needs.

New BE line

Broadcast Electronics, known as a broadcast equipment manufacturer, entered the market with a new line of modular studio furniture. Aimed at a mid-range market, it features a set of 17 base modules that can be combined in a variety of ways.

Studio Technology Furniture at Work

Modules are offered in a choice of any laminate color and a range of wood trims. Ventilation is standard on all cabinets, and wiring grommets are supplied where wiring penetrates the cabinetry. A variety of elements, such as built-in CD racks, cart racks and keyboard drawers, is available. All wood edging is curved; corners are rounded for durability and safety.

Arrakis has numerous cabinetry options.

Custom design, construction and installation are available from furniture supplier **Mager Systems**. "We provide full design services to work with the customer, including two- or three-dimensional drawings in full color, so that they can see what it looks like before it is built," said owner Mager Kizziah.

Mager furniture uses engineered lumber, a form of high-strength wood laminate that is stronger than solid wood or conventional plywood, and can work with solid-color surface materials such as Avonite. The furniture on display featured Avonite counters with an interesting recessed headphone/mic control station literally mounted into the countertop. Mager Systems can install, and warrants its cabinetry for 10 years.

DAW support

Several manufacturers offer products aimed at the computer workstation or small production studio environment.

On display at the **Bradley Broadcast** booth was the Multidesk Pro system from **Middle Atlantic Products**. It features a curved work surface with matching, adjustable-height monitor shelf. A series of detached racks, designed to mount underneath the counter or to stand alone, rounds out the system. The racks feature mounting rails and recessed casters.

At the Sands Expo hall, **Nigel B.** showed off its workstation furniture. Premier series workstations feature a large desktop work surface with equipment racks or optional shelving. The work surface is made of laminate with wood edging; the entire system is mounted on casters. Also featured was an extensive series of steel accessories to accommodate equipment needs, particularly computers.

Winsted Corp. showed a range of workstation products in a variety of styles and materials, including wood surface counters and racks. Featuring a heavy-duty steel frame, these workstations are offered with a range of computer accessories, such as monitor risers, and can be paired with matching racks.

■■■

Michael LeClair is chief engineer of WBUR-AM-FM in Boston.

REMOTE CONTROL

Remote Control Makers Look to the Internet

Michael LeClair

The use of remote control equipment to manage transmitter facilities is an almost ubiquitous approach at radio stations.

The trend in this line of products is toward more powerful and flexible systems that allow more than the simple operation of one or more transmitters. Indeed, remote control systems are able to accommodate the integration of many functions that required separate, discrete systems in the past.

Also apparent is a trend toward greater communications flexibility. In the environment of expanding radio groups, systems are built to accommodate regional, or even national, monitoring of transmitter operations at numerous sites. Multiple simultaneous communications paths can be accommodated beyond the traditional dedicated data circuit or dial-up modem connection, permitting centralized monitoring of many stations in addition to local alert notification.

Several manufacturers are planning to incorporate TCP/IP protocol to allow the use of the Internet for control and monitoring. In this regard there seems to be an emerging movement toward the network architectures developed in the computer industry. Also, greater flexibility has been added to failure reporting so that a number of individuals or computer terminals can be notified with varying degrees of priority.

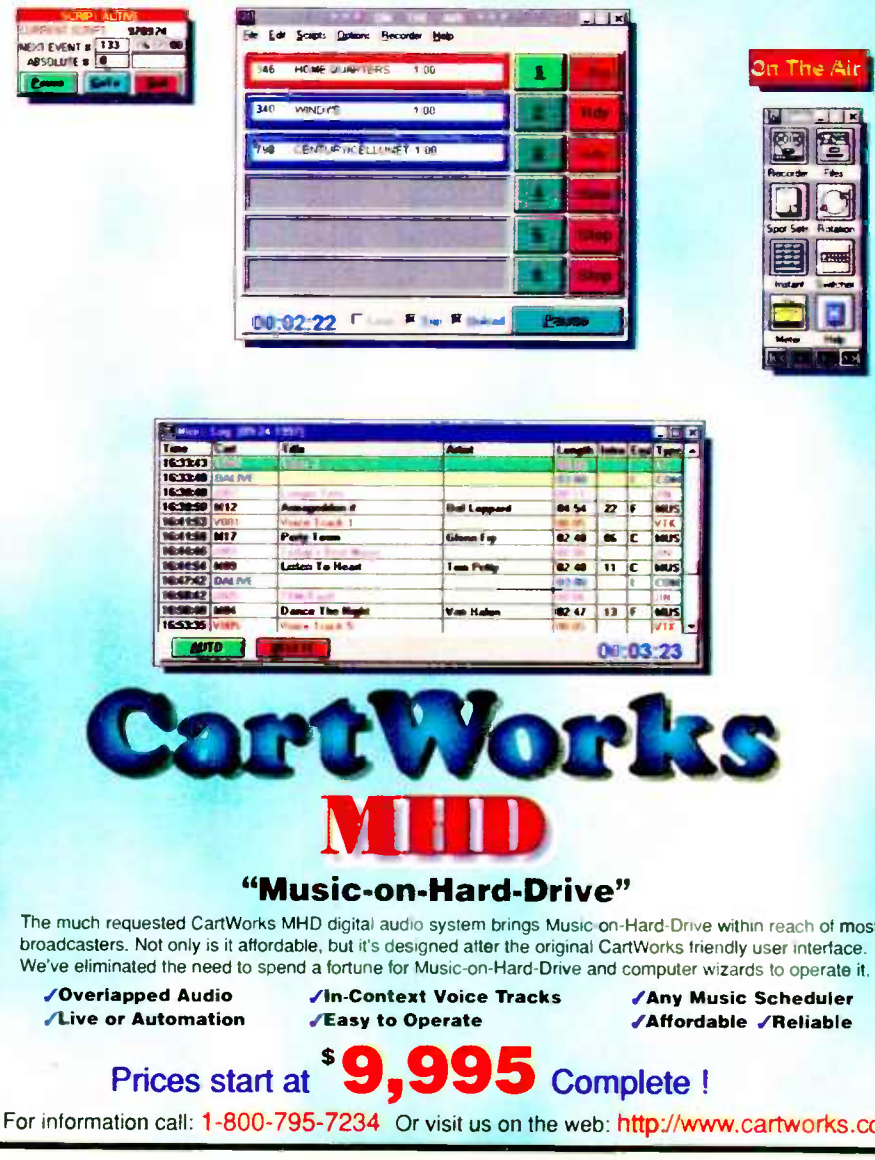
Gentner Corp. showcased its GSC3000 system at the show. With the ability to accommodate up to 256 parameters at up to 256 different locations, this system can handle very large station group requirements.

Similar to its popular VRC-2000 series remote, the controller in the GSC3000 system is located at the remote site and operates like a dedicated computer. All information about equipment operation is retained in this controller unit; a studio site computer is used to poll it via modem or other data connection. Its two serial ports can be used simultaneously to connect to the GSC3000 controller via separate connections.

To accommodate the range of access needs, the studio software can be used to create custom operator screens that show as little or as much information about the remote site as may be desired for a defined type of operator. Many different levels of access and control can be created, ranging from full supervisory rights to simple read-only. If only a few parameters are required, only these are shown, to help unsophisticated users. According to Gary Crowder of Gentner, development of TCP/IP communications protocol is proceeding with an eye to connecting remote sites in a kind of

See REMOTE, page 54 ▶

The Easy Choice !



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World Radio History

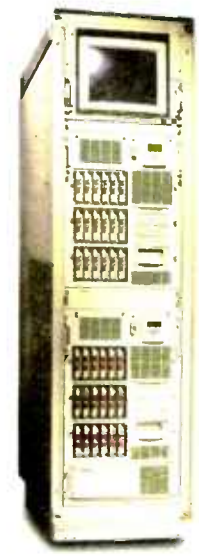
"WE CHOSE DALET" The Wo

Paul Sanchez and Jim McGivern at Emmis New-York (Hot 97, Kiss FM, CD101.9)

"Dalet has improved the way we do business. It's easier to maintain, and has changed the capabilities of the radio station. But as far as the on air product is concerned, we really didn't want to change the way it sounded. We had very good sounding radio stations before. This has been maintained using the system. And as time goes on, we're getting better at maximizing the use of the system."

Jim McGivern,
Chief Engineer, Emmis New York
(Hot 97, Kiss FM, CD 101.9)

Leading broadcasters all over the world rely on Dalet. Dalet has more installations than any other system.


Full Redundancy Servers

Reliability

Dalet has the proven expertise to assure that your station stays on the air. Choose from a wide range of security options (RAID array, mirrored servers, local backup) to meet your specific requirements. Dalet's digital audio system has been running on Windows and networks for eight years, at hundreds of sites – from stand-alones to hundred-plus workstation networks. It works for them, it can work for you.

Cost Efficiency

Whether you are a large or small market station, Dalet offers a completely integrated suite of software which allows the entire staff to work together. All departments – traffic, production, programming, news and on-air – have simultaneous access to all audio, copy and logs. With modular software options, the Dalet system can meet your specific budget requirements – growing with your business needs. Standard hardware also means cost savings. The system is not proprietary, and will grow with the industry. Finally, with Dalet's easy-to-use interface your staff will be operational in no time.

Partnership with long-term leaders in the computer industry helps us remain at the forefront of technological innovation.

Digigram POWERED

OPEN SOLUTIONS PARTNER SYBASE

Microsoft SOLUTION PROVIDER

COMPAQ

Broadcasting Solutions for

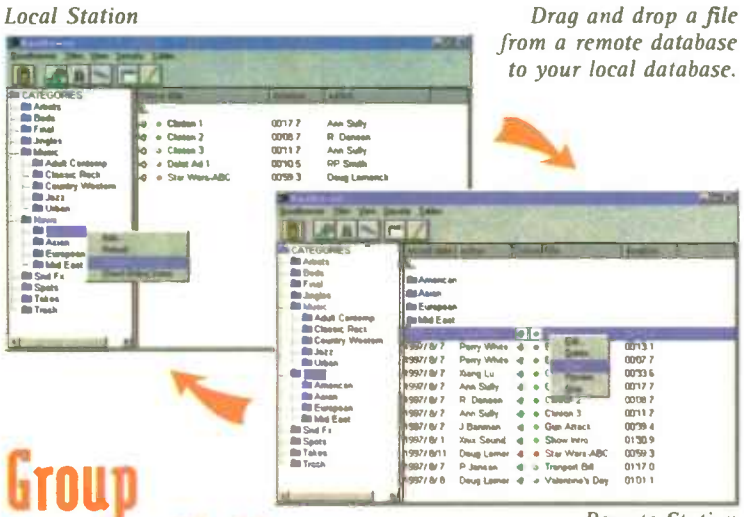
- Cart Replacement
- Live Assist
- Satellite Automation
- Multitrack Editing
- Music Automation
- Text and Audio for News
- Traffic
- WEB Publishing
- Archiving
- Group Connectivity

The World Standard

- Windows 95 or NT
- Full Redundancy
- Standard PC Networks
- ISDN and Internet Transfers
- Wide Area Networks
- Unlimited Storage/Users
- Client Server Architecture
- 24 Hour Technical Support
- Modular Control Panels

World Radio History

rld Standard in Digital Audio



Group Connectivity

Consolidation can generate huge productivity gains, provided groups have the right tools. Dalet is continuously developing new solutions to meet the evolving needs of our clients. With TeamRadio – Dalet's traffic and billing software – the business of over 1000 radio stations can be linked together. Intranet applications allow stations within a group to access each other's orders and audio remotely. The production work done by one station can be used by another, only minutes later.

Dalet On Air Workstation

Exchange Files through an Intranet Audio Server

Unprecedented Support

Dalet is a service-driven company. With more than 70 engineers, we guarantee your station stays on the air. Dalet's support experts are on call, 24 hours a day. Clients have on-line support over the Internet. We can also provide on-site visits to upgrade an existing system.
"Support on any of these systems, I think, is imperative... Dalet support has been excellent."
Jim McGivern

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World Radio History

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ANTENNAS & RF HARDWARE

Antennas, RF Hardware Abundant

Jack Layton

The in-vogue four-letter acronym at NAB '98 was HDTV. Every other booth had a sign or banner announcing a new product to solve an HDTV-created problem, whether you were a TV broadcaster or not.

Ed Edmiston of **SWR (Systems With Reliability)** summed it up quite succinctly: "Almost every broadcaster will be affected as tower owners move to make way for new DTV antennas on existing structures." Not only did SWR show its latest in UHF-DTV antenna technology, but the company's "old reliable" Challenger Series FM antennas were also on display.

The FM3 medium-power series, the FM10 high-power series and the FMP20 panel antennas — along with a wide selection of transmission line components — commanded prominent positions in the SWR booth.

Road case radio

A wide selection of **OMB Electronic Systems** low- and medium-power FM and LPTV antennas were on display. One could not pass the OMB booth and resist the temptation to check out the totally portable 10 W FM radio station in a road case. Plug in a microphone and antenna and you are on the air in an emergency situation.

Is power a problem? In addition to running off 120 VAC, the OMB radio station in-a-box has an internal rechargeable battery. When the battery runs low, the transmitter can be powered from your vehicle battery.

At the other end of the power spectrum was new transmission line from **MYAT**. When 6-1/8-inch rigid line is too small in terms of power handling capability, and 8-3/16-inch line causes too much wind loading on your tower, MYAT's new 7-3/16-inch rigid line is capable of handling more than 200 kW of average power at 100 MHz. This product is an ideal choice for multistation combined operation.

Looking for an antenna to accommodate two or more FM stations? **Jampro** introduced its JCPB Series. This is a broadband stainless steel version of the popular Jampro Penetrator antenna. The circularly polarized sidemount radiator will handle 5 kW per bay and exhibits a 1.2:1 VSWR over a bandwidth of 10 MHz.

RF design engineer Todd DeLuck was kept busy conducting tours of the **Shively** booth, showing the company's new low-cost, low-power FM combiner, suitable for merging two Class A FM transmitters into one transmission line.

At the other end of the coax, the new Lindenblad broadband very-low wind load circularly polarized antenna from Shively would fit well. It comes in configurations of four to 14 half-wavelength-spaced bays.

Another new Shively product is an FM/UHF combiner. Both FM and UHF television signals can be fed in at the bottom of the single feedline, and at the other end a splitter separates the two signals, feeding them to their respective antennas.

Bext displayed its BK-77/H, a 5 kW-per-bay broadband FM antenna, along with the new FMP-5 log periodic antenna for FM receive applications or translator use. The company also showed a full line of STL equipment and low-power FM transmitters and amplifiers.

Davicom Technologies had a wide range of antennas on display. The 1452-1492 MHz omnidirectional and sectoral DAB antennas proved interesting to European broadcasters. The company also showed its LPTV UHF antennas and FM dipole antennas.

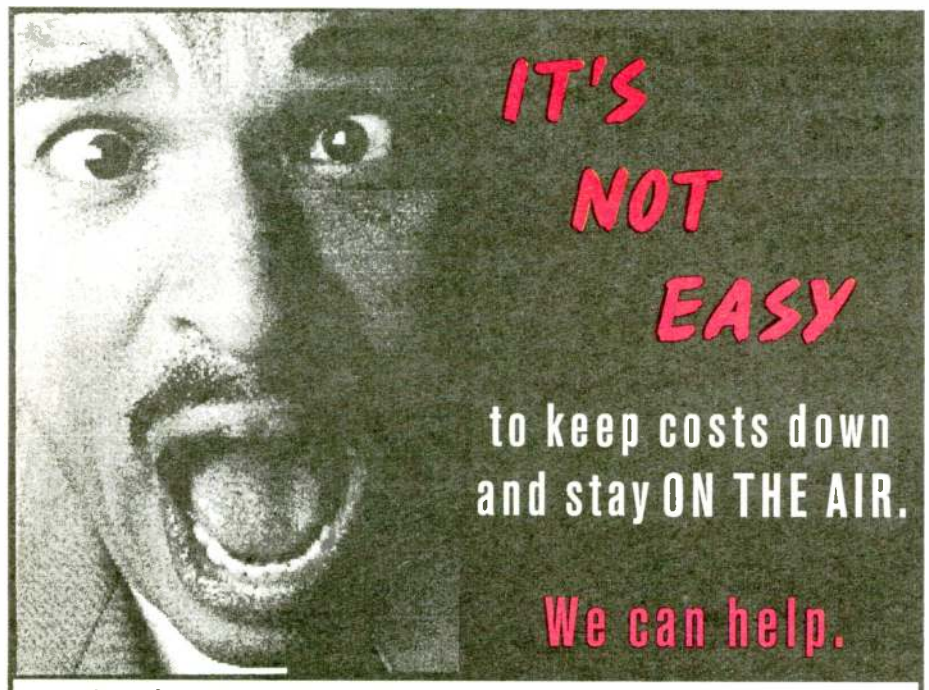
Antenna Concepts introduced the FM-1 ULTRA Series antenna. It employs a patented design which RF-isolates it from the tower, resulting in minimal tower influence on the radiation pattern. The ULTRA will handle 5 kW per bay, utilizes half-wave spacing and is broadband to 10 MHz.

Jimmy Joynt, president of **Superior Broadcast Products**, proudly displayed his company's line of FM and TV transmitters, frequency-agile FM exciters, STL systems and FM translators; along with the new FM-1 circularly polarized broadband antenna with a power handling capability of 2.5 kW per bay. Each radiating element consists of two half-wave dipoles. Radomes provide ice protection.

At the **Propagation Systems** booth, a line of medium- and high-power FM antennas was on display. New this year is the FL Series low-power FM antenna. It is available in half- or full-wave spacing in configurations of up to six bays.

Radio Frequency Systems/Cablewave had a multitude of rigid and flexible coaxial cables, elbows, connectors and other hardware from 3/8-inch to 6-1/8-inch on

See ANTENNAS, page 56 ▶



If you're still operating with an old tube transmitter, you're missing out on an opportunity to cut your energy consumption by over 50%.

You work hard to keep costs down, yet you could be giving your local electric company up to 50% more than you need to each and every month. And what about the high cost of tube replacements and repairs necessary to keep your tube-type transmitter alive?

It's time to replace your tired, cranky, unreliable tube transmitter and enjoy the high efficiency and dependability of an OMNITRONIX Digital Solid State AM Transmitter. We have a proven 10-year track record of unsurpassed performance, even in the world's most rugged environments.

How do we do it? Design savvy. Taking fresh, new approaches to long-standing broadcast problems and offering you transmitters with a conservative, modular, digital design that lasts longer and runs more efficiently, significantly reducing your operating and energy costs. And we back it up with the longest, most extensive warranty & service in the industry!

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Remote Control Offerings

▶ REMOTE, continued from page 51

wide-area network.

Moseley Corp. demonstrated its MRC-2 system, which can be used as a dial-up or full-time connection remote control. The MRC-2 system supports the control of up to 99 multiple transmitter sites with up to 256 channels of control, metering and status. Multiple data connections can also be made to the MRC-2 remote controller, such as dial-up modem or dedicated data circuits.

One demonstration by Moseley was Master Controller, a new Windows95 software package. Master Controller is designed to allow simple interconnection of multiple sites though the use of a Communications Server handling all intersite communications. The remote control of multiple sites is viewed as a wide-area network and the use of TCP/IP protocol is under development. Master Controller is not yet available for shipment.

At the **Davicom Technologies** booth, the Mini M-A-C system was on display. This system offers a range of features in a 1RU package, without the need for additional chassis for relays or communication links.

The Mini M-A-C features eight channels of control, status and metering; it is designed to monitor a single transmitter site. Also included is a built-in 14.4 kbps modem and an additional serial communications port for local control via computer.

Using the software provided by Davicom, it is possible to program the Mini M-A-C to report equipment condition via voice telephone, pager, computer or fax machine. Control via DTMF tones is possible. Adjustable delay relays and virtual relays to establish conditional responses are programmable via software, allowing for automatic response to emergency conditions.

"This remote control has everything you need for a small site in one chassis and is very economical," Elaine Jones, director of marketing and sales for Davicom, said.

Also on display at the Davicom Technologies booth was its larger M-A-C system which can handle sites with a requirement for more input and command channels. In addition, a line of remote monitoring accessories made by Scientel was shown.

Burk Technology exhibited a new software program designed to allow the control of multiple sites via a personal computer. Autopilot for Windows is a Windows95 program that is compatible with the existing base of Burk ARC-16 remote controls and is capable of controlling up to 512 different sites.

An interesting feature of Autopilot is its ability to control 16 simultaneous sites. This allows the creation of sites that are monitored continuously via computer, while also controlling many sites that are accessed only when needed. Autopilot also can upload new configurations to the ARC-16 to simplify programming of multiple remote controls with similar functions. Automatic failure responses can be programmed into the computer as well as changes on a predetermined schedule.

Ranges of remote

Burk Technology also had on display a range of remote sensing accessories to allow the monitoring of various site temperatures, such as indoor, outdoor or transmitter exhaust stack.

For directional AM stations, **Kintronic Labs** was showing a Programmable Logic Controller (PLC)-based antenna switching controller as an upgrade from traditional relay switching systems. This controller is designed for the control of complex or large multi-tower antenna systems.

Using a menu-driven, dedicated user interface, the PLC controller has an internal clock to control pattern switching and system diagnostic. Remote access to the controller is available optionally via dial-up modem.

Potomac Instruments was at NAB '98, showing its RC-16 relay-based remote control. Aimed primarily at high RF field environments, such as large MW or shortwave stations, the RC-16 is a high-end product intended to provide high reliability in difficult operating conditions.

World Radio History

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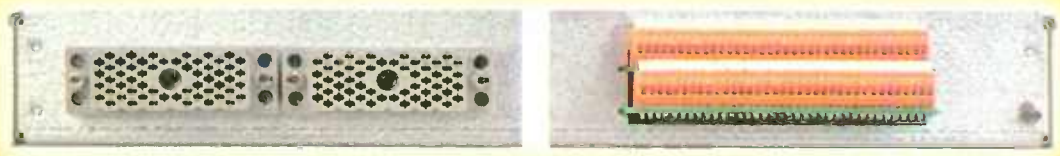
The Analog/Digital patch bays for today and tomorrow...from Neutrik®

Two choices to "wire up" Easy Patch for fast termination.

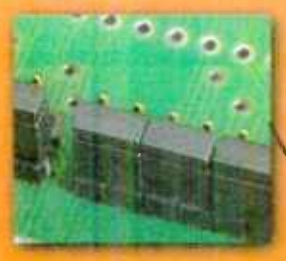


Elco/Edac connections

Spring loaded terminal blocks

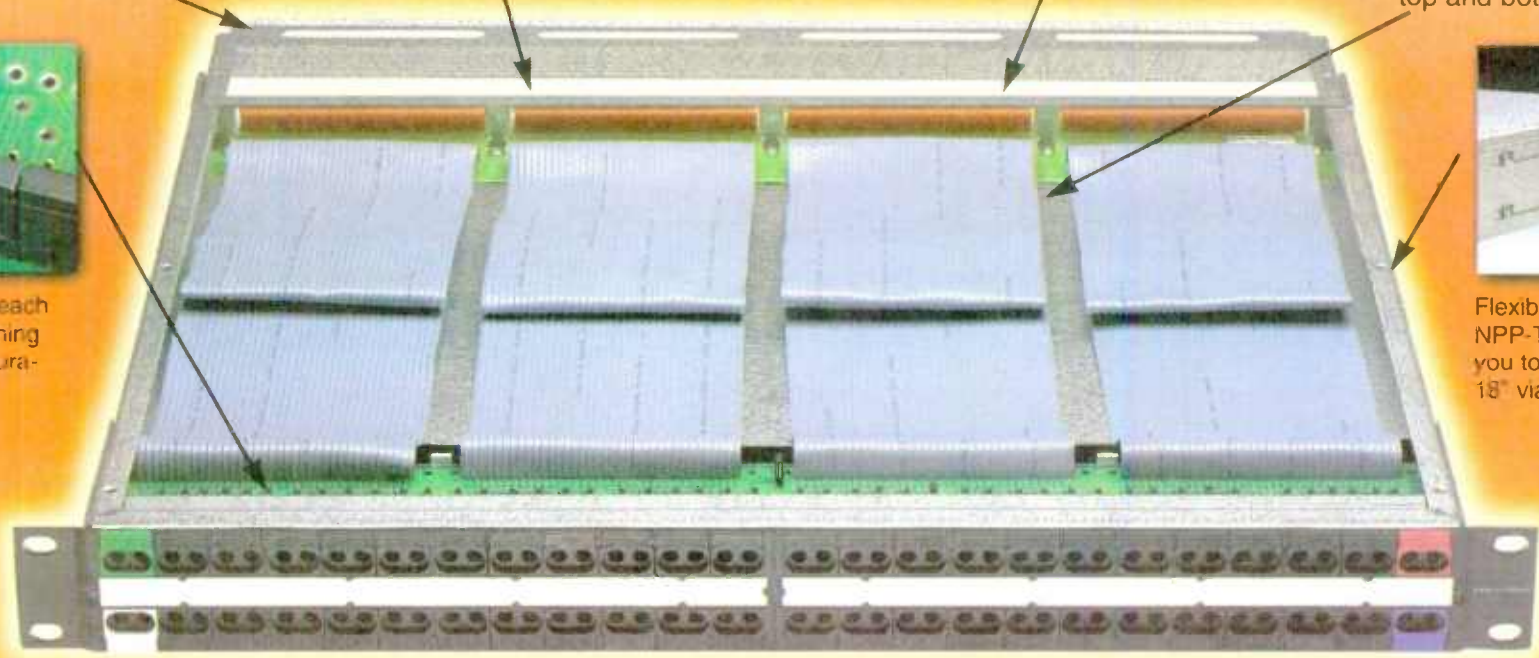
Heavy duty cable bar

Metal shielding between ribbon cables top and bottom



Jumpers behind each jack allows switching into 1 of 6 configurations, even after installation.

Flexible rack depth: NPP-TT/TB-14 allows you to go from 14" to 18" via built-in slider.



The Easy Patch series of easy to use patchbays eliminates signal degradation and offers excellent crosstalk performance required in today's broadcast facilities, mobile trucks, recording studios and audio installations.

Their analog/digital signal capability, reduced wiring time and quality workmanship are unmatched by competitors' patchbays.

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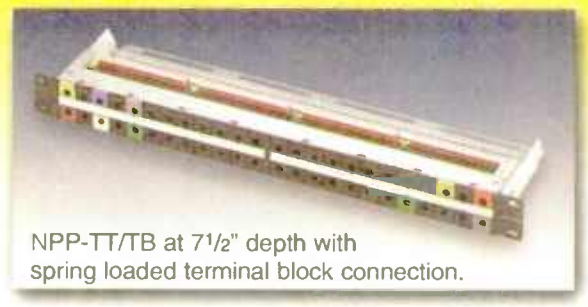

NPP-TT/TB at 7½" depth with spring loaded terminal block connection.

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Antennas at NAB

▶ ANTENNAS, continued from page 54

display. The company's popular 828 Series sidemount broadband FM antenna occupied a prominent place in the booth. This radiator is available in configurations of up to 12 bays with optional beam tilt and null fill. The company also showed a 2 kW-per-port low-power FM combiner.

John Ittel of **Coaxial Dynamics** was eager to answer any questions show-goers might have had on his company's line of high-pass, low-pass and band-pass RF filters, directional power detectors and the Watchman VSWR protection devices. Coaxial Dynamics also manufactures RF loads in a wide variety of power levels.

Kintronic Labs had just about any AM antenna item a broadcaster could want or need on display. Lightning protection devices, static drain chokes, meter switches, isocouplers and air-cooled RF loads are only a sampling of what was seen. One corner of the Kintronic booth was occupied by a 50 kW three-tower AM phasor with back doors open for all to examine and admire its construction. Kintronics also had the new Optilink on display, a digital fiber optic intelligent control system for AM directional antennas.

In addition to exhibiting a full line of coaxial cables, connectors and other RF related products, **Andrew Corp.** unveiled its new XT4500 DryLine automatic dehydrator. This membrane dehydrator was designed specifically for large volume systems requiring 100 to 2,500 cubic feet of pressurized dry air.

If a new tall tower is in your future, the **Flash Technology** booth was a must-see stop. Plant manager George Mandeville conducted a two-minute mini-seminar on the workings of the FTB-312 dual medium-intensity strobe lighting system. This newly patented device utilizes a xenon flash tube and fresnel lens made of high-impact acrylic. During daylight hours, the system illuminates the structure with white strobe lighting. As darkness approaches, the intensity is lowered and a red lens is positioned mechanically over the xenon flash tube.

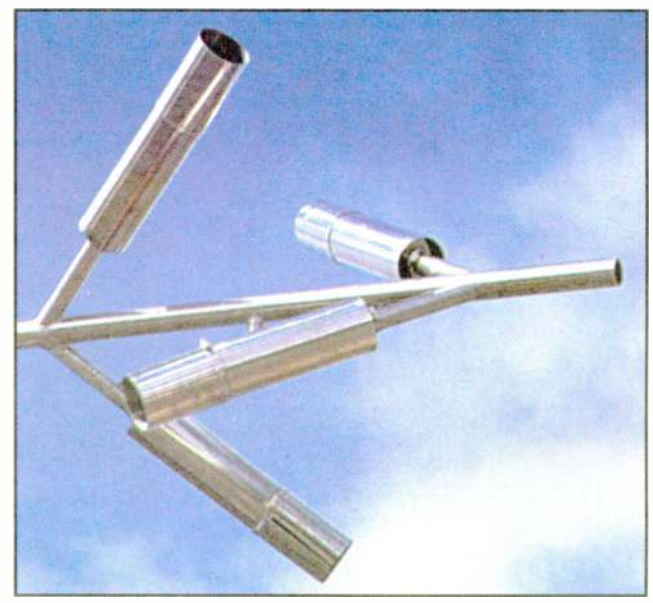
Also on display from Flash Technology was the new FTC-121 supervisory system, which continuously monitors the status of tower lighting and notifies the control point or the owner of any failure or malfunction.

DB Elettronica had a line of FM low-power transmitters and amplifiers on display. In addition, the company exhibited a new family of microwave parabolic antennas.

ERI displayed its field-proven series of FM antennas and lightning protection devices. Dave Davies, manager of the Professional Services team, was on hand to outline the installation and project management services now available through ERI. These include structural analysis of existing structures, fabrication of parts and the retrofitting of existing towers to withstand heavier wind loads.

Scala had its full line of STL and translator antennas on display. The company also domestically markets the Kathrein line of high-power UHF TV and FM panel antennas.

Dielectric Communications exhibited its TDM antenna. This is a high-power omnidirectional top-mount FM antenna with up to seven bays. Its horizontal pattern is ±1 dB of circular. The TDM grew out of a modification of a popular Dielectric existing TV antenna series.



RFS Radio Frequency Systems demonstrated its FM and specialty products.

The **LeBlanc Broadcast** booth was another place to stop for tower installation or repairs. The company also offered a complete line of structural inspection services.

Don Barlow of **Will-Burt** gave an impressive demonstration of the D-TEC safety package for telescoping masts. The device warns of danger — such as overhead power lines — when the mast is raised. The detection device mounts on the top telescoping section of mast. When the pneumatic pump is activated, a quartz halogen spotlight illuminates the area directly above the mast. An anti-collision system utilizes an ultrasonic sensing device to detect and to warn the operator of obstructions as small as 5 mm in diameter in the vertical path of the mast. A magnetic detector sounds an audible warning if the mast approaches the vicinity of an AC power line. If the warning goes unheeded, the extension of the mast is inhibited. This product earned Cool Stuff honors from **RW** judges.

After watching the demo, Don Sharp of KRON-TV commented, "In the event of an accident, even if you win the lawsuit, legal fees will still amount to far more than the cost of the D-TEC system!"

Dan Doty of **Doty-Moore Tower Services**, a provider of structural repair, modification and inspection services, was enthusiastic even a few hours into the convention. "The action here is great," commented Doty. "I've already signed two new clients."

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KMCG - San Diego

KXGL - San Diego

KXGL - San Diego

KOOL - Phoenix

Circle (54) On Reader Service Card

Radio World Cool Stuff Award NAB 1998

Four products earned Honorable Mentions from the panel of Cool Stuff judges. We present them here.

Product: CartWorks VIO Visually Impaired Operator option

Manufacturer: CartWorks / dbm Systems

Retail Price: $1,500

Features: CartWorks Live Assist, Satellite Automation, and Music-on-Hard-Drive digital audio systems now offer options specifically for blind/visually impaired radio operators. Speech-driven interface, braille display support, braille keyboard. VIO option does not affect normal visual operation of the system.

Shipping: April

Judges' Comments: "One more barrier is down. The vision-impaired can finally use a PC-based cart replacement system. Other companies should follow this example."

CartWorks

For information: (800) 795-7234, e-mail: *tmartin@cartworks.com*, visit the Web site at *www.cartworks.com* or **circle Reader Service 63**

Product: ProControl

Manufacturer: Digidesign

Features: The ProControl hardware control surface integrates the company's ProTools TDM systems. Gives the user hands-on interactive control of ProTools' functionality, with tactile mixing and editing, direct control for menu selection and alpha entry. Eight touch-sensitive, motorized DigiFaders.

For information: (650) 842-7900, fax to (650) 842-7999 or Circle Reader Service 89

Product: CDR-18 Professional CD-Recorder

Manufacturer: Otari

Retail Price: $2,195

Features: Affordable CD recording. Built-in sample rate converter, stable transport system, balanced analog inputs with selectable input level, digital interface with AES/EBU and S/PDIF I/O, digital synchro record mode, digital fader function, rack kit.

Otari CDR-18

Shipping: Now

Judges' Comments: "A modified-for-pro Pioneer consumer CD-R, extremely versatile for a broadcast studio, with the ability to use $2 discs and connection options via multiple digital I/Os."

For information: Call (650) 341-5900, visit the Web site at *www.otari.com* or **circle Reader Service 115**

Product: CDR 800 CD-Recorder

Manufacturer: HHB

Retail Price: $2,195

Features: Affordable CD recording. Flexible SCMS: No Inhibit, Inhibit or Once-Only. Sample rate converter. Balanced XLR analog inputs, AES/EBU input, S/PDIF I/O coaxial and optical. Rugged copper chassis. Comes with rack kit and 10 discs.

Shipping: Now

Judges' Comments: "Like the Otari, a modified-for-pro Pioneer consumer CD-R. Versatile, with many options."

HHB CDR 800 CD-Recorder

For information: Call (310) 319-1111, e-mail: *sales@hhbusa.com*, visit the Web site at *www.hhb.co.uk* or **circle Reader Service 141**

Circle (110) On Reader Service Card

World Radio History

SPEAKERS & HEADPHONES

Powered Speakers Big at Show

Brett Moss

This convention may not go down in history as a scene of major speaker and headphone introductions. But for those who came to ogle them, four days on the floor still seemed too short a time.

If any new waves emerged, they likely were the trends in powered monitors and the interest in something less familiar to the radio buyer — 5.1 surround sound.

Powered monitors were on display from traditional makers such as Genelec to newcomers such as Hafler and Mackie. For many broadcasters, powered monitors — with their portability, convenience and reputable engineering — would seem to be a solution to a problem that no one realized that they had until now.

Genelec was in Las Vegas showing off most of its line of powered monitors. Adding credibility to the company's presence, several other exhibitors throughout the LVCC and the Sands Expo were using Genelec 1029A powered monitors and 1091A powered subwoofers for their demonstrations, especially in surround sound multimonitor configurations. Genelec's Will Eggleston maintained a look of satisfaction. "Everybody's doing it," he said of the trend in powered monitors.

Also in force at many booths was **JBL**. The company showed off numerous powered and passive monitors including its new LSR 28P, a two-way powered studio monitor; LSR 12P powered subwoofer; and the LSR 32 three-way passive studio monitor. These speakers are part of the new JBL Linear Spatial Reference line, aimed at the recording, broadcast and post-production industries. JBL also demonstrated its popular 4400 Series of two- and three-way studio monitors.

Other monitor standards seen around the floor were several entries from **Tannoy**. The company showed off its new eye-catching red Reveal passive monitors. Also at the Tannoy booth, the Dual Concentric standards, the System 800A and the smaller System 600A along with the AMS Active Monitor Series of powered monitors.

Marc Bertrand of Tannoy summed up a lot of thinking on the sudden interest in powered monitors. "They're very affordable. For $1,200, you can get a great powered monitor. If you tried to buy an amp and speaker separately with the same quality, it would run you a lot more."

KRK was not about to be left out. The company brought several models of its popular powered and passive speakers to the LVCC. New to the **KRK/Group One** booth were the V8 monitors, but the Exposè and K-Rok speakers were also

Hafler TRM8

turning up at other booths. Neil Pedinoff of KRK pointed to the group of KRK monitors, all roughly the same size, and said, "This seems to be the right size for powered monitors."

KRK president Keith R. Klawitter is sold on powered monitors. "That's where the market is."

New to many of the crowd, although not new to Europe, were the **Spendor** SA300 powered monitors at the Sascom booth. In England, Spendor has had a long relationship with the BBC and hopes to make similar inroads with American broadcasters and studios. Curt Smith of Sascom said of powered monitors, "You have a constant in that the amplifier and speaker are perfectly matched and are consistent. It removes a lot of variables."

Alesis demonstrated several monitors, including the Point Seven Shielded Reference Monitor, aimed at the broadcast, recording and project studio communities. Also shown was the Monitor Two Studio Reference Monitor, a three-way system for recording studios.

Squeezed in between demos of the new VS-1680, visitors to the **Roland** booth could check out the MA Series powered micromonitors, popular with the multimedia computer and AV crowds.

First monitors

Two well-known audio companies making their first forays into the speaker world are **Mackie** and **Hafler**. Both chose the same route — powered monitors. The Mackie HR824 and Hafler TRM8 have already proven popular with studio owners and it would seem broadcasters may also succumb.

For Hafler's Rick Gentry, the move was a natural. "We have core strengths in amplifier technology," he said. "We knew if we could get the acoustics right, we'd have a successful product."

With all of the computer-based multimedia presentations and demonstrations going on, there was a significant presence of 5.1 surround systems and an

See SPEAKERS, page 59 ▶

AUDIO CODEC BREAKTHROUGH
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World Radio History

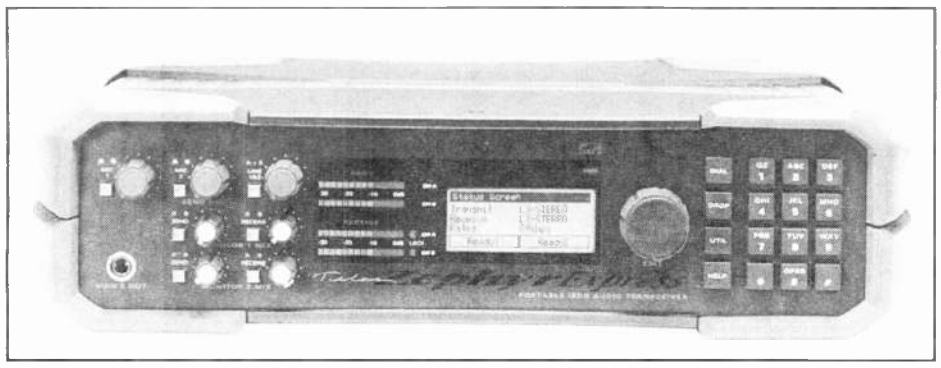
REMOTE GEAR

On the Road With New Remote Gear

Paul Kaminski

Portability, versatility and one-box solutions were the buzzwords in the remote audio choices at NAB '98. My criteria in looking was not only equipment for live remote broadcast but also to send soundbites and news "wraps" down the line.

Telos Systems had high-end ISDN technology covered when it rolled out the ZephyrExpress, an all-in-one ISDN codec, terminal adapter with mixer, and



Telos ZephyrExpress

monitor. The company hopes to build on the reputation of the popular Zephyr studio box with this field unit.

Another do-it-all digital box for radio remotes was the new **Sonifex** Courier, which uses a PCMCIA card as the recording medium. The Courier can record and edit audio, then transmit the edited product as a sound file over dial-up phones, cellular phones or ISDN. Files also can be sent via the "sneaker-net," or simply walking the PCMCIA card to another similarly equipped machine.

The **Nagra** ARES-C two-channel PCMCIA recorder made its debut on the high end, with time code, digital G7.11 and universal G7.22 standard plus MPEG II capability.

RoadRunner upgrade

MUSICAM USA had the RoadRunner Plus on display. Art Constantine of MUSICAM USA showed what made the Plus different from the original RoadRunner: an analog interface card replacing the ISDN interface card, and a Motorola 33.6 modem with appropriate adapters. The idea: should a promised ISDN installation fail to materialize or is otherwise unavailable, an engineer can still get 10.2 kHz remote audio back to the station with the internal POTS codec of the Roadrunner Plus.

Constantine also showed a new software-only audio codec from **Mayah** in Germany. The program, called SendIt, allows the choice of connecting to ISDN lines and codecs with a terminal adapter for real-time transmission, or sending and receiving files as a server or client in POTS mode.

The only system requirements for SendIt are a Pentium processor running under Windows 95 or NT and a sound card. The show demo was running on a fast Pentium laptop.

With the companion editing program EditPro and a companion server back at the studio, an edited sound file can be sent via the POTS modem. It is then received back at the station server, downloaded and ready for play.

MUSICAM USA expects to have both products available in the next 60 days. The published prices for the SendIt and EditPro programs are $800 and $400 respectively. It seems ISDN remote communication is now within the grasp of anyone with a Pentium computer and Windows 95.

Cool Vector

On the heels of its HotLine POTS codec, **Comrex** introduced a new iteration called the Vector, a winner of the RW Cool Stuff Award. With its own special algorithm, the Vector can provide 20 Hz to 7 kHz audio on a 14.4 kbps connection and a full 15 kHz at connect speeds as low as 24 kpbs, depending on phone line quality. The Vector also is backward-compatible with the HotLine.

The Vector includes a three-input mixer and headphone outputs. It can work with data rates as low as 9.6 kbps. If line quality degrades too far, the Vector will default to standard telephone mode so the broadcast can continue. These rates are still too fast for standard variety cellular telephones, but according to Tom Hartnett of Comrex, "We will do some experiments with digital PCS and the Vector in the future."

For HotLine users needing to mix more than one mic and tape, Comrex and Harris (among others) showed the Vortex Mix Pack, an outboard mixer that connects to the HotLine XLR jacks. The company's line of analog frequency extenders were on display as well.

AEQ introduced what might be called an ultimate all-in-one-box remote enhanced audio solution. The MPAC 02 Dual-Channel Portable Audio Codec is described as a multiformat communications unit. With a POTS or cell-phone on a standard RJ-11 jack, the digital telephone hybrid is backed up by a switchable frequency extender. The MPAC also has a built-in ISDN RJ45 jack and terminal adapter for two bearer and data channels. If you need to go to a V.35 interface, the unit will configure itself automatically for use of an external terminal adapter or modem.

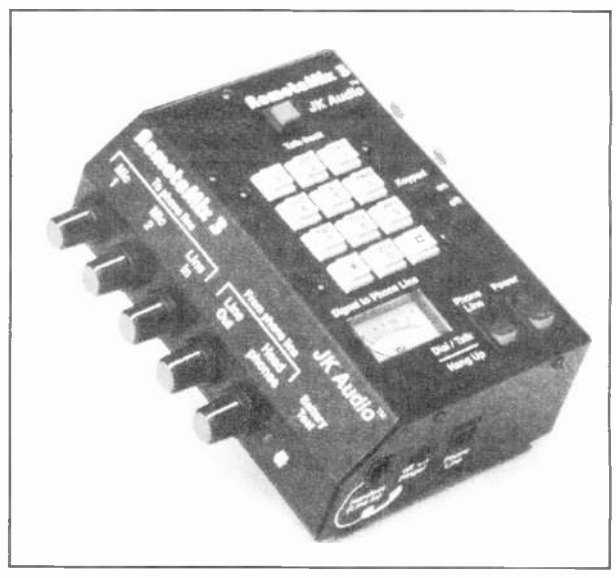
Want more? The MPAC has two DB-9 (RS-232) connectors. One is for upgrades and remote control, the other for an auxiliary data channel. With a four-input mixer, headphone amp, 12 V power or external power with emergency batteries, the MPAC becomes a formidable piece.

JK Audio introduced the third iteration of their RemoteMix product line, the 3x4. With the 3x4, an engineer can simultaneously feed a line-level input (codec, satellite audio channel, RPU, etc.) and a phone line, mix three mic/line signals, set up a monitor mix in three headphones and provide a master cue override input to all headphones all in one box that weighs less than four pounds.

Other features allow monitoring a second phone line. Four RJ-11 jacks are available, so a handset can plug in to let someone talk on the monitor line. The 3x4 runs 10 hours on two 9 V batteries. The rest of the JK line of handset interfaces, RemoteMix 3 and 3.m were displayed as well.

Broadcast Electronics introduced its newly acquired Telfax line: the TalkPort three-input mixer for hand-held cellular phones and the RPS-402, formerly the Telfax GX-440.

These products took their places alongside the Marti brand Smarti POTS codecs (four-channel RKS-411 and single-channel studio/field unit RKS-111); Cellcast mixer-cellular phone frequency extender combination and Marti brand remote pickup units.



JK Audio RemoteMix 3

Audio Technologies, Inc. (ATI) showed its micro-mixers MX-100 and stereo MXS-100.

The ubiquitous **Marantz** PMD series of portable cassette machines still drew interest at distributor and professional audio house exhibits.

The proliferation of studio MiniDisc units — covered elsewhere in this issue — and interest in the MDS-B3 and MZR-30 field recorders from **Sony** resulted in a sort of MD boomlet in the Radio Hall at the LVCC. More and more of these units are plugged into mult boxes at the auto races I cover.

Whirlwind Audio had its line of mult boxes (multiple distribution boxes with mic- and line-level audio outputs, used at press conferences) and passive mic splitters. Also present, last year's Cool Stuff-winning Qbox line tester, combining mic, tone generator, phantom power and headphone outputs in a small box that takes up very little space in a remote kit.

■ ■ ■

Did you see a remote product for radio that caught your eye at the show? Tell us about it.

▶ SPEAKERS, continued from page 58

awareness of the need to adapt current speaker offerings to 5.1 usage. And with seemingly unlimited interest in computer-based media and DTV, the surround sound market looks ready to explode.

JBL was passing out a paper on multichannel mixing for DVD and digital TV for the future. David Kimm of JBL tied the two trends together by saying, "People are realizing they need more than a couple of channels at least somewhere in the broadcast house with surround sound... the convenience of having amplification built-in to the speaker means those worries are over. Plug in and you're ready to go."

Less well-known than others, but demonstrating a strong presence at several booths promoting 5.1 surround sound products was **Miller & Kreisel**. At the top of its line is the MPS line of THX certified 5.1 surround sound speakers, popular for post houses and broadcast production studios looking to test surround mixes.

On the more utilitarian end, **Wohler Technologies** was demonstrating its vast line of rack-mounted built-in monitoring boxes. **Radio Design Labs (RDL)** showed its new RU-SP1 mini-monitor.

The 'can' scene

AKG brought its full headphone family, ranging from the studio standard K 240 and higher-end studio sibling K 270, to wireless models such as K 205. Also demonstrated were magnetically shielded headphones, the K 290 surround sound headphones and the line of AKG consumer headphones.

Sennheiser had its line of studio and consumer headphones on display. While the "studio" HD 25 cans were on display along with others, "home" favorites HD580 and HD600 cropped up at various booths for demonstrating high end digital audio systems.

Beyerdynamic brought several of its broadcast and comfortable consumer headphones, including the DT 831 Closed Back and the DT 931 Open Back designs.

Microphone companies such as **Audio-Technica** and **Telex** also brought representatives of its lines of broadcast studio headphones. **Benchmark** demonstrated its IFA-7 Stereo Headphone Amplifier along with its high-end digital audio products.

Shure demonstrated the SM2 professional headset, which ships with a cardioid dynamic microphone on a fully-adjustable boom.

Thinking smaller is better, **Garwood** showed its Radio Station TS and the Garwood IFB 1624, two UHF wireless in-ear monitor systems. Both feature multiple channels, and the buds are compatible with custom earmolds. The IFB offers split-channel control to compensate for level differences.

■ ■ ■

*Brett Moss is associate editor for **RW** sister publication **Pro Audio Review**.*

World Radio History

AM Hybrid IBOC DAB System

David C. Hartup, Daniel M. Alley, Don R. Goldston

The authors work for Xetron Corp. This is the final portion of a paper that describes the current state of the USA Digital Radio AM Hybrid In-Band On-Channel Digital Audio Broadcasting system. RW prints the paper as a service to the industry.

The AM channel presents a true challenge to the code designer. The channel is typically interference dominated with additional intermittent flat and frequency selective fading due to overhead or adjacent grounded conductive structures such as power lines and overpasses. In addition, impulsive noise from lightning and power line arcing also is present at times. The error correction for the system should perform well in each of these widely different scenarios.

The error correction is being designed for each of the three audio encoding rates: 48, 32, and 16 kbps. The design is being optimized for each of these three rates using traditional statistical modeling techniques as well as the channel characterization data.

Current investigations are centered around two techniques: segmented channel coding for embedded PAC algorithms [see reference 7] and coding techniques for periodically interleaved OFDM channels [8]. Results are promising for both methods, and the relative merits of each are being evaluated for several typical AM channel scenarios.

Blend with time, diversity

It is realized that, despite the best design efforts, there will always be occasions when the digital signal is not recoverable due to factors such as a severe fade or high-level interference. One goal of the system design is to minimize these outages. However, on the rare occasions when the digital signal is not recoverable, it is desirable to maintain audio service. The USADR AM Hybrid IBOC system can accomplish this by using the analog signal as a fallback mode.

The blend-to-analog function will have the additional advantage of time diversity. The concept is illustrated in Figure 12. The top part of the figure shows that for the transmitted signal, the analog portion is delayed relative to the digital portion. This delay at the transmitter provides the time diversity as the signal travels through the channel. The top part of the figure also shows an impairment that prevents recovery of sections 6 and 7 of the digital signal. The impairment also interferes with sections 2 and 3 of the analog signal.

The bottom part of Figure 12 shows the received signal. At the receiver, the digital signal is delayed relative to the analog and the signals are time-aligned. Part of the delay is due to the processing required to recover the digital signal, and the remainder of the time can be implemented as a direct delay.

As shown in the bottom part of the figure, sections 1-5 of the digital signal are recovered. Sections 6 and 7 of the digital signal will be marked as non-recoverable by the receiver. However, because of the time diversity, sections 6 and 7 of the analog signal are not affected by the impairment, and the receiver can smoothly blend to the analog signal, with the blend beginning during Section 5. When the digital signal can be recovered again, the receiver can smoothly blend back to the digital signal.

Experiments that blend from the PAC encoded signal to the analog signal have been performed by Lucent. It has been found that the blend can be accomplished without audible artifacts if the signals are properly time aligned.

The AM Hybrid IBOC system is being developed by USADR. The Hybrid IBOC approach simultaneously transmits analog and digital signals in the frequency allocation currently used by an analog station. The IBOC systems can meet the needs of consumers, broadcasters and regulatory agencies while providing a smooth transition path to digital audio broadcasting.

A channel characterization study has shown that the AM channel is nearly ideal a large majority of the time. Impairments typically are caused by overhead structures such as power lines and bridges. The AM Hybrid IBOC system can provide FM-type audio quality and additional data services. OFDM technology is used to transmit the digital information. Interference between the analog and digital signals is minimized through use of complementary carriers.

A computer simulation of the system has been developed and is being used in the trade-off studies. The measured channel data can be used in the simulation to model system performance with actual channel impairments. The forward error correction for the system is being designed. The error correction scheme will be designed to handle errors resulting from interference, channel impairments and impulsive noise.

A blend-to-analog feature provides a fall-back mode when the digital signal is not recoverable. Time diversity will be used to enhance the probability that the analog signal is not affected when it is needed.

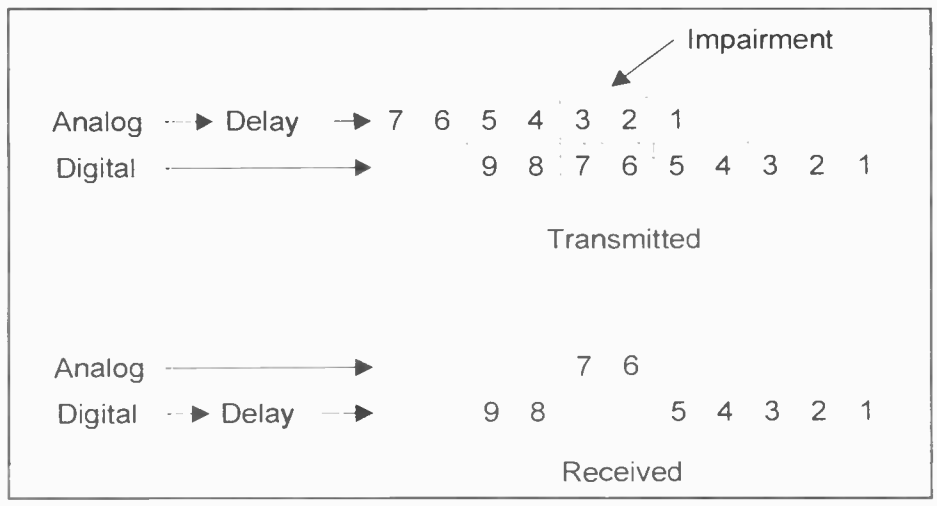


Figure 12: Blend-to-analog Feature

Acknowledgments

USADR thanks AM stations WNOP at 740 kHz in Cincinnati and WNFT at 1150 kHz in Boston for use of their facilities and their cooperation in obtaining the channel characterization data. The authors also wish to thank Hui-Ling Lou and Carl-Erik Sundberg of Lucent Technologies in Murray Hill, N.J., for their discussions regarding segmented channel coding for embedded PAC algorithms.

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7. Private discussions, Sept. 1997, with Hui-Ling Lou, Carl-Erik Sundberg, et. al., Lucent Technologies, Murray Hill, N.J, Sept., 1997

8. R. D. Wesel and J. Cioffi, "Fundamentals of Coding for Broadcast OFDM," Twenty-Ninth Asilomar Conference on Signals, Systems, and Computers, Oct., 1995.

WIRED FOR SOUND

More About Those X(LR) Files

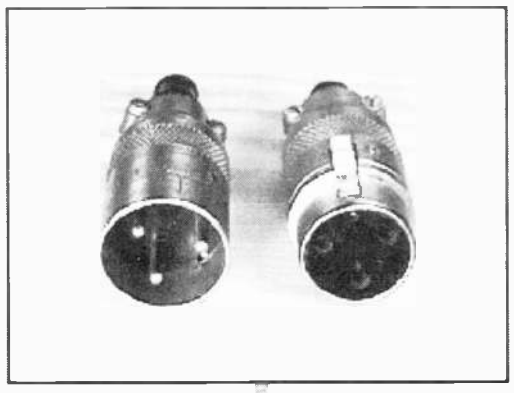
Steve Lampen

No sooner did I mention the initials XLR and their mysterious origin than I got a call from my old friend Bill Ruck. He is director of engineering for so many San Francisco stations I cannot remember them all. When I was in San Francisco recently he gave me a packet with the entire family tree of the XLR.

Large, rugged

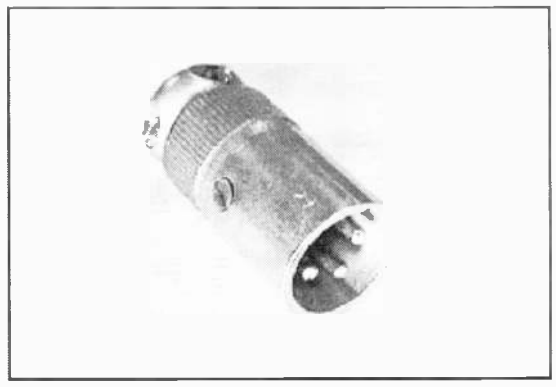
First is the Cannon P series, a very large, very rugged and very popular connector. As the 1950s approached, Cannon was asked to make a smaller version of the P. This was an experimental or X connector, which was, in fact, simply a scaled-down version of the P. This connector is quite rare. In fact, until Bill handed me one, I had never actually held one.

It is interesting to note that the pin size and spacing all came from the X, and all their descendants, including the non-Cannon versions (Amphenol, Switchcraft, Neutrik and many others) will fit perfectly into an X. But Cannon must have realized the limitations of the X and brought out yet another version, one that was easier to assemble, dubbed the XL.



The Original Cannon P Series

The twist-off connector was a great idea. Inside is a pressure-fit grommet arrangement as a strain-relief, but it only worked effectively if the cable run into it was the perfect size — big! Something like my company's Belden 8412 would be nice and snug. The spring-style boot added little in the way of strain relief.



The Rare Experimental Cannon X Series

The number-one failure point for all connectors of any description attached to any kind of cable is the point where the cable enters it. The final version, the XLR, had what many still feel to be the best strain relief: a neoprene tube and a metal clamp-down bar with two screws.

The other common balanced-line connector is the tip-ring-sleeve or TRS connector. This is the oldest style of connector in continuous use. Its shape, indeed its application, is little changed from the operator patch cord used for the first telephone.

In fact, I have seen photographs of early switchboard operators using what look like identical TRS cords. Or am I mistaken? Will all you phone company historians please respond!

The Bell System and American Telephone and Telegraph Co. (how many people today can tell you what AT&T stands for?) knew early on that balanced lines gave the lowest noise. They invented a connector to carry it and a shielded jack to accept the TRS. Shielded jacks were required because the twisted pair (a subject of a future column) could not be maintained through the various jacks in a switchboard.

The true TRS plug and jack design is a marvel of mechanical ingenuity, and many of its features seem positively modern. For instance, it connects ground before hot, making it almost noise-free. It features wiping contacts, which clean themselves. Connectors were brass (harder than copper) or nickel-plated brass. Nickel resists oxidation. Oxidation produces noise through poor conductivity or by making the connection intermittent.

The key reason any round tube-style connector has inherent noise problems is contact area. The ground sleeve (the entry to the jack) also is round.

See XLR, page 61 ▶

World Radio History

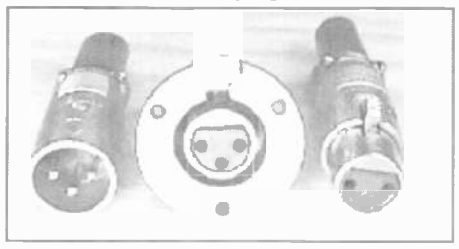
▶ XLR, continued from page 60

If you think about it, a tube in a tube will always have at least two points of contact. But inside the jack, the connections, at least historically, most often are flat pieces of metal. A tube touching a flat surface always has only one point of contact, and that point is small. It takes little oxidation, corrosion or dirt to foul the jack and make it useless.

Oxidation

Oxidation converts metal to metal oxides. Copper and brass oxide are semiconductors. This accounts for the "distorted" sound which can often be heard on a dirty jack. These oxides cannot simply be washed away but require specific chemicals.

Corrosion is the galvanic reaction between dissimilar metals that removes one metal and plates it on the other. This is why it is inadvisable to put, for instance, a brass TRS plug in a nickel-plated brass jack. The potential reaction between the copper in the brass (plug) and the nickel

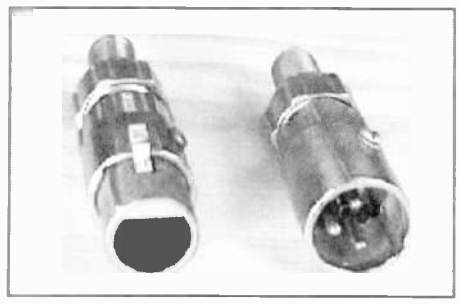


The Cannon XLR Series

(jack) is more than 1/2 V. Just add a suitable electrolyte such as humid smog-filled urban air, salt air or similar acid, and the reaction will start.

Once a plug or jack has been eaten away, there is no return. The reaction will occur at the very spot of contact. Rotating the plug will start the reaction in a different place. The best solution is to be sure that the plug and jack are of the same material. Then the reaction is zero.

Some patch panel manufacturers strongly suggest no chemical cleaners be used, because some coated metals such as gold can literally be washed away. Gold often is the coating of choice inside a jack because it does not oxidize. However, gold certainly can corrode. (How do you think they make



The Cannon XL Series

gold-plated jewelry?) Because gold, especially high-purity gold, is very soft, it is rare on TRS plugs. You can practically wipe it off with your hand.

Cleaning a jack with a gold-plated interior is easier than you might think. Simply reinserting a plug a few times will clean such a connection. Patch panel "burnishers" likewise should be avoided unless suggested by your patch panel manufacturer.

Miniature

There are variations on the TRS/Bantam theme: double plugs, special switching or routing versions, plugs with shorted or dummy sections. These all are available if you look hard enough. But the variation on which I will focus is the miniature version, popularized by Switchcraft as its "Tini-telephone" or TT, also called a "Bantam" connector.

The TRS and Bantam usually have a plastic shell that covers the area to be wired. If you ever have seen the inside of a TRS and realize how compact it is and how critical the wire spacing, then the Bantam will fill your heart with fear.

Some versions use small ring lugs that are crimped, not soldered, into the wires. It is no wonder that the vast majority of patch cords are bought assembled. Only those strong of heart, or possessing the rare tools to make them, attempt their own patch cords.

On the other hand, Switchcraft and Neutrik make solder versions of both the TRS and Bantam for the DIY (do-it-yourself) crowd. If you have to make adapters from TRS or Bantam to some other connector, you might find yourself forced to make them. Of course, you can always order a long patch cord, cut it in two, attach alternate connectors on the cut ends, and never have to touch the TRS or Bantam plug.

One word of warning regarding TRS. There are a number of equipment manufacturers who wire up non-mic or other auxiliary inputs with stereo phone plugs, wired for balanced lines, and call these "TRS jacks." Of course, these are *not* TRS.

We obviously need another term here. How about "balanced 1/4-inch" or maybe even "balanced phone jack"?

The difference in quality between these and real TRS jacks and plugs is huge. Confusing customers between a "balanced phone jack" and a true TRS jack is, to say the least, counterproductive. I have met more than a few of these confused customers, and when they finally realized what they have bought and the compromise in quality, they were none too happy.

■ ■ ■

Photographs by Jarod Quant.

Steve Lampen is a technology development manager for Belden Wire & Cable Co. in Richmond, Ind. His book, "Wire, Cable, and Fiber Optics for Video and Audio Engineers" is published by McGraw-Hill. He can be reached at steve.lampen@belden.com

RW welcomes other points of view.

Energy-Onix Roadcaster: A New-Generation RPU

Remote pickup units are wonderful for doing live remotes or reporting from fast-breaking news events. Until recently, two limitations of the technology have been the inability to conduct two-way communications with the talent in the field, and the restriction of being locked into one frequency.

Energy-Onix has changed that by creating the Roadcaster Series of multichannel, frequency-agile remote units.

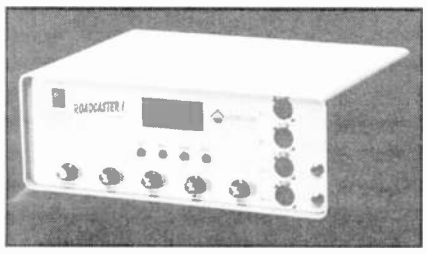
Two versions are offered. The Roadcaster 1 is an RPU system for one-way communication. The Roadcaster 2 offers full and independent two-way communication with a "secure" studio-to-remote audio link. A built-in duplexer allows simultaneous transmitting and receiving, using single antennas at the remote site and at the base.

Both Roadcaster units can operate on any one of 16 microprocessor-controlled channels, selectable from a front-panel main menu. This feature assures an available frequency in crowded RF environments. The frequencies in both the Roadcaster 1 transmitter and receiver and the Roadcaster 2 can be changed by computer via RS232 port.

Ernie Belanger of Energy-Onix said, "The most unique feature is in the transceiver mode. There is full-time IFB from the studio to the remote site for back-cueing, notification to talent and sending program audio back down the line — all the normal cueback features that we've watched TV ENG crews do for years."

Because incoming and outgoing audio are independent, the station can communicate with remote talent without the cue signal inadvertently going over the air.

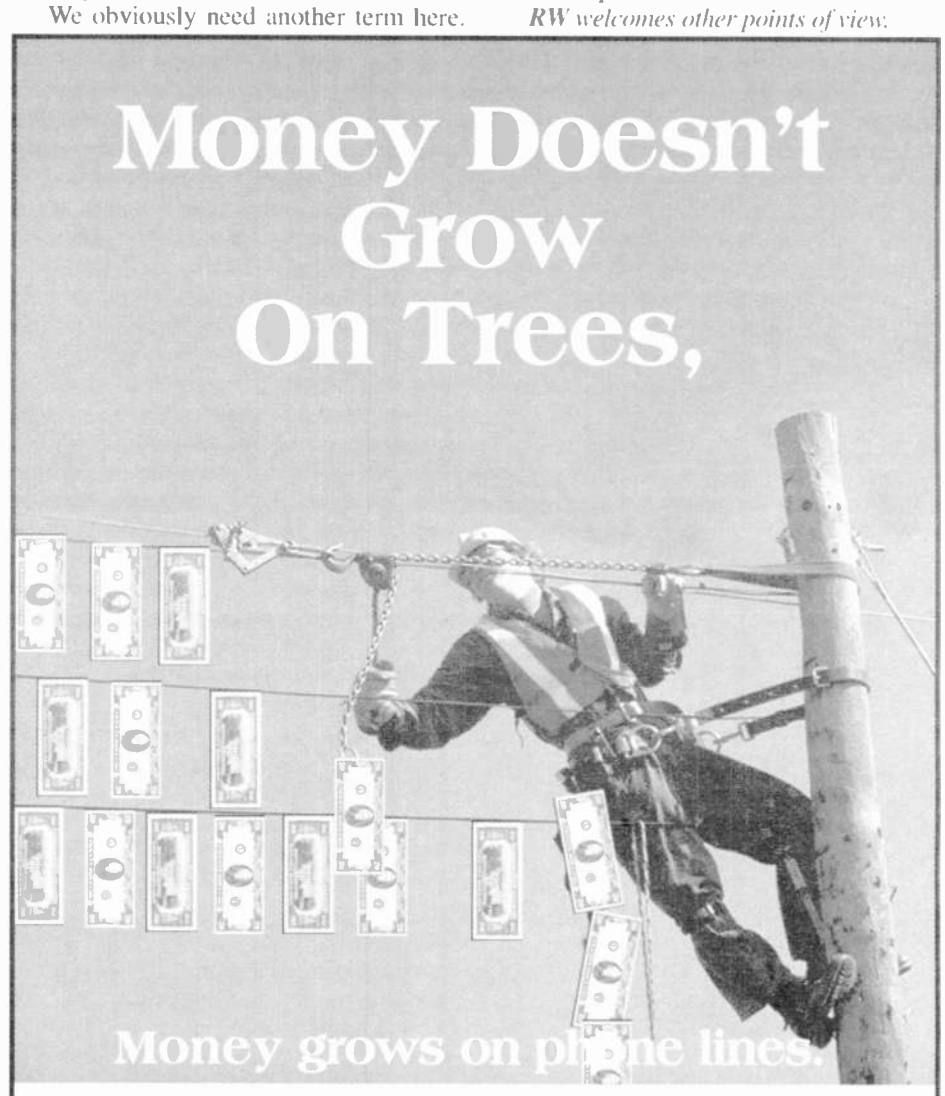
The Roadcaster Series works in the



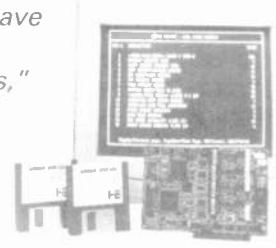
450-470 MHz UHF range and the 150-170 MHz VHF range. At present, the duplexing ability is available only in the UHF version of the Roadcaster 2. RF power is under digital control, with 2 to 45 W output.

The front panel is clear and uncluttered, with five pots (four mic inputs,

See ROADCASTER, page 66 ▶



It can with Audio OnLine from Henry Engineering. Audio OnLine is the easy way to turn an extra phone line into a money maker! *Audio OnLine lets you have multiple "information lines," with multiple sponsors while using ONE system!* Callers menu-select the information they want and hear your sponsor's message! Hundreds of messages can be stored on-line, each has its own call counter.



Audio OnLine is ideal for weather reports, ski conditions, concert information, traffic updates, sports scores, lottery results and school closings. The list is endless! Sell information sponsorships to local ski shops, record stores, gas stations, concert promoters, theaters, and convenience stores. Practically any advertiser will benefit from a sponsorship!

Audio OnLine installs in any DOS computer. It can answer up to 16 phone lines simultaneously without supervision. Just start it up and start collecting revenue!

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World Radio History

FEED LINE

More Antenna Tuning Unit Tips

W.C. Alexander

This is the 13th in a series of articles about constructing an expanded-band AM facility. The previous part appeared in our April 29 issue.

Setting the location of the skirt-to-tower short is more art than science, and each instance will be different. The final short location depends on the feed point impedance achieved at the different short locations tried. Ideally, a point is located that will produce 50 to 100 ohms of resistance with a not-too-high reactive component. The reactance, which will be inductive, will generally move up and down with the resistance.

A lower reactance is better than a higher one, so in most instances, the best way to tune the skirt will be for a 50-ohm resistance and a reasonable inductive reactance.

Tuning

Tuning the ATU network for a skirt-fed tower essentially is the same as for an insulated-base tower. Once the impedance of the feed point is known, calculate the ATU network leg reactances and set them, using the OIB to fine-tune as necessary.

In some cases, the ATU for a skirt-fed tower will consist only of a vacuum variable capacitor in series with the feed. This is sometimes the case if the skirt is adjusted to produce exactly 50 ohms of resistance at the feed point. The vacuum variable capacitor then is adjusted to tune out the inductive reactance of the skirt, thus presenting a 50-ohm non-reactive load to the transmitter.

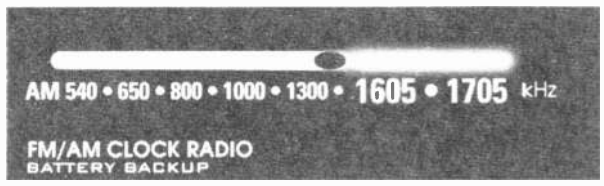
I do not recommend this type of ATU for a skirt-fed tower, however. If the resistance changes one or two ohms either way, it will be necessary to get a rigger to go up the tower and move the short point to achieve 50 ohms at the feed point. This is much more trouble and expense than simply readjusting a tee- or L-network and filing the new measured resistance with the FCC.

AM stereo

In its 1991 report and order establishing new technical criteria for the AM broadcast service (FCC 91-303), the FCC established that stations migrating to the expanded band must adhere to Model I standards. This refers to a standard of service described in detail in an earlier FCC release (see FCC 90-136, April 12, 1990). One part of this Model I standard is stereo modulation.

Modern transmitters generally make provision for external RF drive, so it is a relatively simple matter to connect an outboard C-Quam exciter and transmit in AM stereo. Attention has been paid to minimizing incidental phase modulation (IPM) in these transmitter designs, making their stereo performance very good indeed. Some of the current generation of AM transmitters offer an internal C-Quam exciter as an option.

Older transmitters may require some modification to operate in stereo. This may include adding a means of coupling external RF drive and modifications related to IPM reduction. With the exception of a few, even the oldest transmitters can produce acceptable AM stereo performance if properly modified and adjusted.



Once the antenna system is connected to the transmitter and it has been established that the load is acceptable, the C-Quam exciter can be tuned up properly. Much of the C-Quam performance of a station is determined by the load into which the transmitter operates, so optimum performance can only be achieved by adjusting the exciter while operating the transmitter into the antenna. Adjust the exciter according to the manufacturer's recommended procedure.

The next step is to adjust the processing equipment for good sound and for proper modulation levels. Use an oscilloscope to verify the accuracy of the modulation monitor you are using, at least the first time and then perhaps once a year.

With C-Quam, it is a good idea to always leave a little carrier present so that detectors will have something to lock to. If complete carrier cut-off occurs on negative modulation peaks, some detectors will unlock. The resulting sound is unpleasant. I recommend 95 percent maximum negative modulation when broadcasting in AM stereo. The positive peaks can be run up all the way to the 125-percent limit.

In the next part of this series, we will explore diplexer adjustment and performance.

For those that are using stand-alone antennas, all that remains is the paperwork.

As we wrap up our series in a few weeks, we will go over the required FCC filing and discuss program test authority.

■■■

*Tell **RW** about your expanded-band experience. Send e-mail to* radioworld@imaspub.com *or write to the address on page 5.*

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas.

BOOK REVIEW

Reference Book on the World of RF

Mark Parthe

"RF Systems, Components, and Circuits Handbook" by Ferril Losee is a concise book on the different types of RF applications used in the electronics industry. The book is a good mix of textbook and general information that can be read by any person who has some electronics knowledge.

The book includes diagrams that illustrate oscillators, amplifiers and matching networks. The author has made no attempt to make this a construction manual. The schematics are clear and the symbols are normal, not like the jagged CAD types found in other books.

Most of the illustrations, charts and graphs are nicely represented, but a few are so simple they would bore even the non-technical person. One figure shows a cell phone and an arrow pointing to an antenna, which is too basic for a book of this caliber. Other drawings, such as the one showing an Instrument Landing System, should be more elaborate.

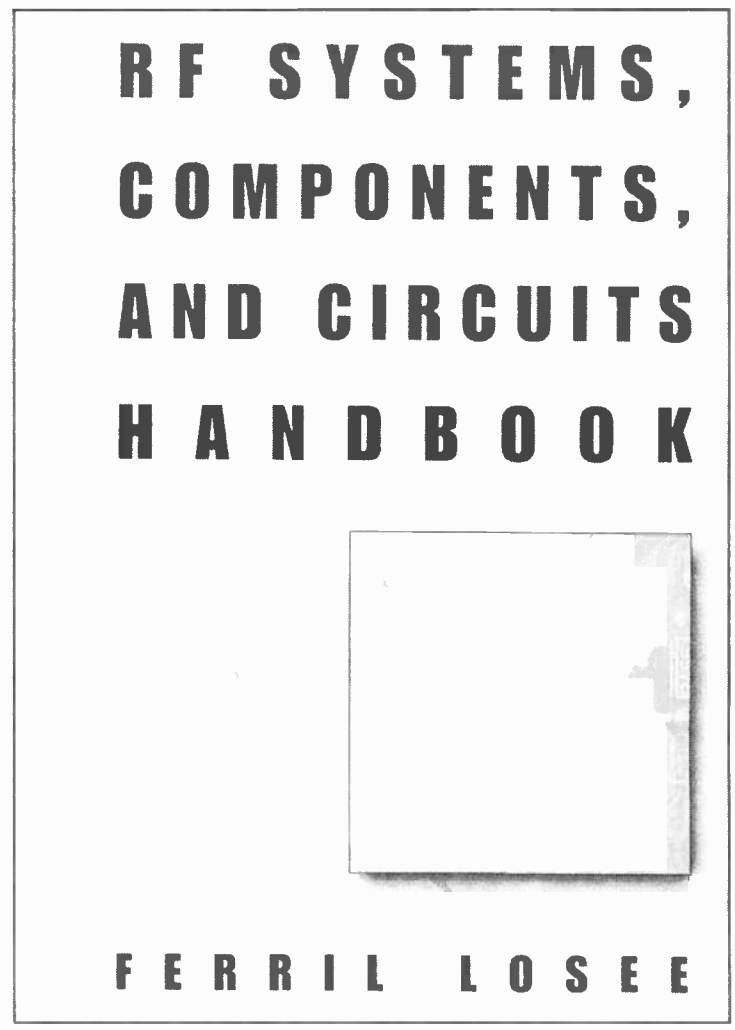
The author also has included a generous amount of block diagrams. I find these easier to teach and learn from than a schematic.

Some of the well-covered topics are radar, radar jamming, and cellular telephone and RF noise and link analysis.

Losee has taken complex subjects and written about them in a way that can be understood by any student or general electronics technician. I recommend this book for the average technical person who wants to know how things work without sorting through a lot of fluff. An advanced engineer who designs RF will find the book too simple, but for the other technical folks it is a good all-around information book. Worth having on the shelf.

■■■

Mark Parthe is an engineer at WCRZ in Michigan. Contact him at (517) 793-9103.



Topics covered in "RF Systems, Components, and Circuits Handbook" include:

1. Introduction to Communication Systems
2. Introduction to Radar, Navigation, Other RF Systems
3. Radio Frequency Propagation
4. RF Noise and Link Analysis
5. Modulation Techniques
6. RF Amplifiers, Oscillators, Frequency Multipliers, and Mixers
7. Modulators and Demodulators
8. Older Communication Systems
9. Current and Future Commercial Comm. Systems
10. Radar Systems
11. Transmission Lines and Transmission Line Devices
12. Waveguides and Waveguide-Related Components
13. Antennas
14. Lumped Constant Components and Circuits
15. RF Transformer Devices and Circuits
16. Piezoelectric, Ferrimagnetic, and Acoustic Devices and Circuits
17. Semiconductor Diodes and Their Circuits
18. Bipolar and Field-Effect Transistors and Their Circuits
19. High-Power Vacuum Tube Amplifiers and Oscillators

"RF Systems, Components, and Circuits Handbook," by Ferril Losee
Copyright: 1997
Published by: Artech House
Price: $79
To Order: (800) 225-9977 (ext. 4030); or circle Reader Service 168.

World Radio History

RADIO CHRONICLE

This promotional card for the radio program "The Smith Family," heard on WENR (The Voice of Service) in Chicago from 1925 to 1931, represents a more localized, independent broadcasting model that, though it had its adherents, ultimately could not sustain itself in the wake of the stock market crash of 1929 and the economic collapse that followed.

Though WENR itself was at least breaking even, by late 1930 the five utility companies that owned it were in serious financial straits. WENR was seen as an asset that could be turned into much-needed hard currency, and a buyer was waiting in the wings in the form of the National Broadcasting Company.

Broadcasting at 50 kW, WENR could be heard throughout the Midwest. "The Smith Family" was especially popular. The program is considered one of the earliest soap operas.

Two members of the cast who had left vaudeville for the greener pastures of the new stage of radio.

Marion and Jim Jordan (seated at the left) played Nora Smith and Joe Fitzgerald on the program. They became much better known a few years later as "Fibber McGee and Molly."

Photo and information are from the Library of American Broadcasting, which welcomes your questions, comments and donations. Call (301) 405-9160 or *bp50@umail.um.edu*. Visit its Web site at *www.lib.umd.edu/UMCP/LAB*

You Read It Here

Three Years Ago

"I think that RDS is a forerunner for future multimedia services. I think all our future will be digital ... where we can implement ... all the ideas that we have now encountered with RDS."

— Dietmar Kopitz
"RDS Innovator Predicts Technology's Success"
May 17, 1995

Eight Years Ago

Two separate proposals for direct broadcast satellite radio that would launch U.S. radio into a new digital era were ... filed within days of each other.

Satellite CD Radio of Washington, D.C., filed a petition to establish a new, digital, "CD-quality" radio service. ...

The second proposal is from Radio Satellite Corp. of Pasadena, Calif. ... for a "gateway" ground station for satellite access to provide audio and ancillary data services.

"Two File for Digital Radio"
June 13, 1990

Third Annual

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Don't concern yourself with expensive travel and shipping charges by going across borders; buyers from South America, Central America, Mexico and the Spanish-speaking Caribbean come to the United States for *Feria Mundial de la Radio y Television*, held in Miami at the Miami Beach Convention Center. Plus, you can tap into the Hispanic broadcast and production community located in South Florida.

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QEI

Meeting The Broadcaster's Present And Future Needs

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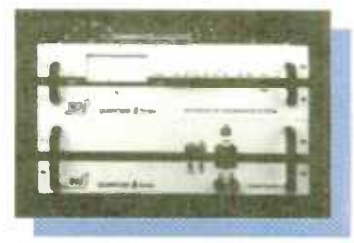
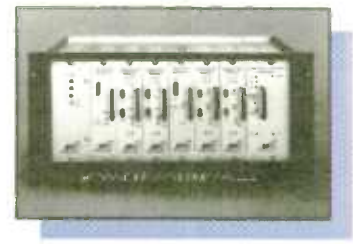
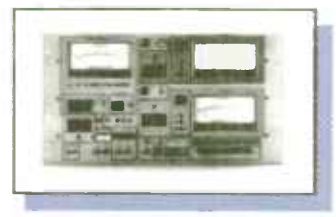

Low Power Transmitters


Digital STL / TSL Systems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World Radio History

Workbench

Radio World, May 13, 1998

Money-Saving Circuit for Your CVS

John Bisset

Much has been written about the power savings at a transmitter site. Ralph Winquist, a consulting engineer and licensed electrical contractor based in Lake Worth, Fla., adds a different twist to the issue of power savings, whether at the studio or transmitter site.

He posed the question, "Did you know that constant voltage sinusoidal transformers (CVS) using a Ferro-Resonant method of regulation could be costing you money?"

Ralph quotes from an instruction manual furnished by SOLA: "As the SOLA CVS transformer includes a resonant circuit that is fully energized whether or not a load is present, the input current at no load or light loads may run 50 percent or more of the full-load current."

In Ralph's example, he assumed a 1 kW CVS to operate a computer tied to a UPS. When the computer is shut off, the unit still draws 75 percent of its full load current. Power factor could be as low as 25 percent with no load, and Ralph assumes 50 percent — 120 V — so that the system is drawing 3.125 A or 375 kVA with the computer shut off.

That means the system at idle uses 2.667 kWH, or 9 kWH each day. Over a period of a year, there is a waste of 3,285 kWH. If a cost of 10 cents per kWH is applied, a loss of $328.50 per year would be noted.

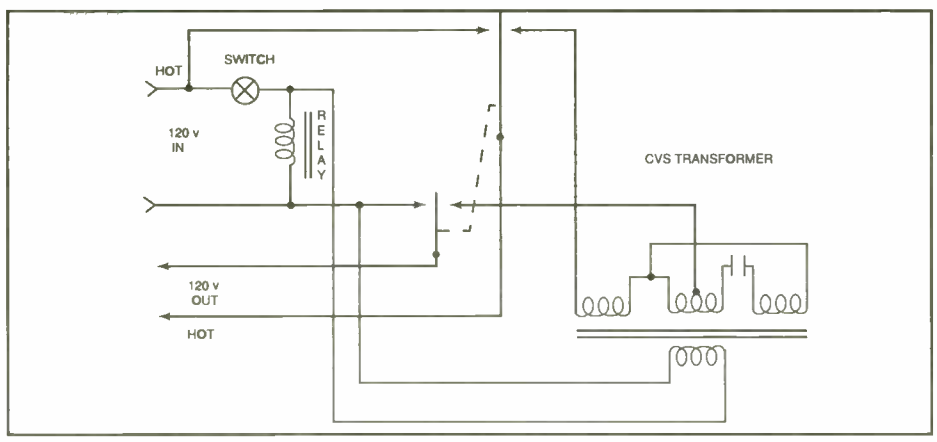

Figure 1: A relay circuit disconnects a CVS transformer, yet permits UPS charging.

That may not seem like much, but when you consider larger transformers, the cost can be significant.

Figure 2: Labeling circuit breakers takes a short time, and the payoff can be life-saving in an emergency.

Not to pose a problem without an answer, Ralph included a circuit schematic (Figure 1) that allows the UPS to charge while at the same time shutting off the regulator. The size of the wiring and the relay (a double-pole-double-throw) will be dependent on the loads incurred.

★ ★ ★

Speaking of transmitter sites, are your electrical boxes labeled? Figure 2 shows an example. During an emergency, finding the appropriate breaker can avert a disaster. Although DYMO labels were used in our example, the peel-and-stick P-Touch labels or even Avery labels run through your laser printer will suffice.

Not sure which breakers control what? This can be a problem, particularly in a studio complex with several breaker panels.

The AC Circuit Breaker Locator can help. I found this little gem in the SKY-MALL magazine flying back from the NAB show. It consists of two parts — a transmitter and a receiver — and costs only $30. You can locate breakers efficiently and identify them properly.

The system uses a 9 V battery to generate a signal that is coupled into the electrical system by plugging the transmitter into the electrical outlet in question. Its signal then is "sniffed" by the receiver at the electrical box, as you pass it over the circuit breakers. A red light and a "beep" identifies the breaker, which can then be easily labeled.

You may find this and similar devices at an electric supply house, but if you want to order by telephone from SKY MALL, dial (800) SKY-MALL and specify item #101444D. By the way, a packet of adhesive strips to identify your breakers is available for $3.99. Order item #127688D.

★ ★ ★

As more of us move to DAT recorders in our studios, keeping the machines operating in peak condition becomes a necessity. NXT Generation offers some maintenance tips for DAT machines.

First off, here are some typical symptoms that indicate your DAT machine needs service: dropouts, distortion, a high error rate, problems loading or unloading the tapes, tape damage and interchangeability problems.

To avoid these problems, NXT Generation has developed a service plan that provides periodic overhauls based on two general categories: a 1,500-hour servicing, and a 6,000-hour overhaul.

The 1,500-hour service includes a thorough testing and inspection of the transport. Normally, the pinch rollers and cap, belts and brake assembly may be replaced. After the mechanical inspection is complete, all electrical adjustments are checked and calibrated.

The 6,000-hour overhaul includes everything in the 1,500-hour servicing, with the following additional parts replaced: the head drum assembly, the supply/take-up motor assembly, the slide motor belt, and the control belt.

For more information, contact NXT Generation at (973) 579-4849. By the way, NXT Generation is a sister company to JRF Magnetic Services, located in Greendell, N.J. Circle **Reader Service 117** for more information.

Also be sure to read and save the articles on DAT machine service by engineer Jeff Johnson that have been running in **RW**.

■ ■ ■

John Bisset, a district sales manager with Harris Corp., can be reached at (703) 323-8011. Printed submissions qualify for SBE recertification credit. Fax submissions to (703) 323-8044, or send them via e-mail to wrwbench@aol.com

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World Radio History

A Greasy Job High Above Ground

Troy Conner

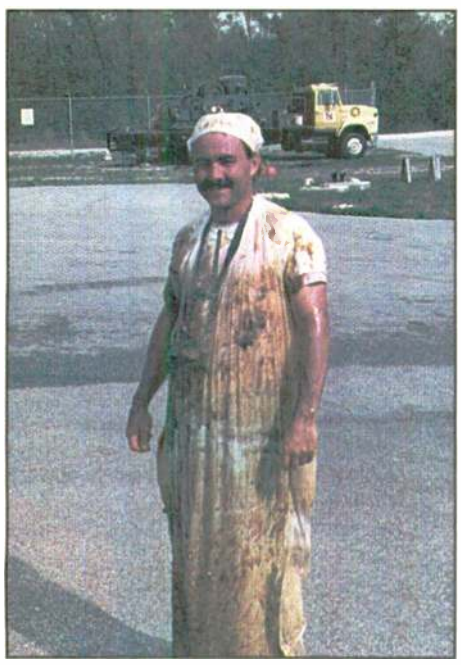
One of the more visually exciting tasks in the tower business is riding the wires. This task can look spectacular and dangerous from the perspective of the spectator.

Riding the wires also is one of the most psychologically challenging jobs a tower climber must perform. It is as close as a tower worker gets to working in thin air. Riding the wires is work you do not tell your mom, spouse or girlfriend about until the work is completed and can be reflected upon.

Getting greasy

Perhaps I should explain the photograph that accompanies this article. I am pictured in glorious repose after a thoroughly enjoyable day of greasing guy cables in coastal South Carolina. My attire includes a very fashionable gloss-white oversized garbage bag. The blob hanging around my neck is a plastic baggie-covered, tape-encased, two-way radio. As you may have noticed from the picture, greasing guy wires tends to be a bit messy.

A tower is rigged to enable access to its guy cables. Normally, the load line extends from the winch to the foot of the tower, up the inside of the structure and down the outside. The headache ball and load line can then be dragged to a guy anchor and the traveling block and platform hung on a guy wire.



Troy Conner

Pleasant ride

Once the system is rigged you can ride each wire. During my most recent job, two men clambered aboard the three-foot square "pan" (platform), loaded up eight or ten five-gallon buckets of grease and headed up to work.

The ride up each wire always is exhilarating. It is nice to be able to lean back for a few minutes in the cool breeze and just enjoy the ride, even when the rest of the day really stinks and the work is nasty.

After our brief sojourn while riding up to the top of a guy wire, the true work began. One man scooped handfuls of grease in big glops onto the wire, while the second man smoothed it evenly onto the wire, slowly applying the paraffin-based corrosion protection as we went.

After a few minutes I wanted to scratch my nose, but my hands were covered in grease. Get the picture? So, after about 30 minutes, both of us would were so thoroughly slathered in grease all we could do was laugh about our predicament.

Some of the wires took more than two hours each to grease properly. The work itself is pretty mindless; you do not have to concentrate a great deal, so we usually spend the day telling jokes, singing songs and generally cutting up, all in an effort to relieve our abject misery.

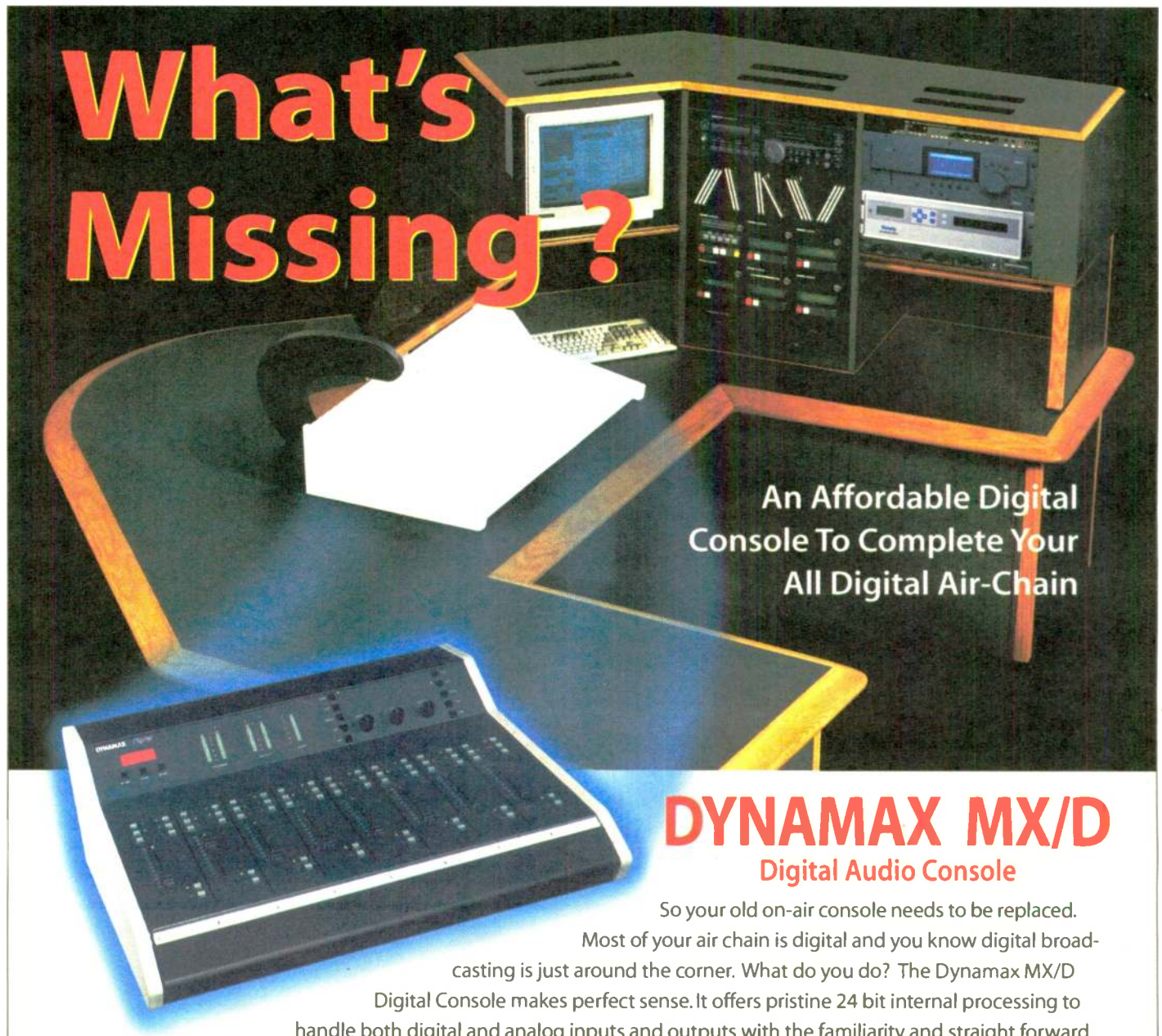
After working for awhile our boots became so slippery it was hard to board the pan. I remember finishing our last wire late one afternoon, with the pan hung about 15 feet above the ground. I slipped, crashed into Ron, and we both ended up hanging by our lanyards, laughing uncontrollably because we were both completely unable to reboard the pan. We had to be lowered to the ground by the winch, and we laid on the ground in a sandy/greasy heap until we could get untangled.

Belly button build-up

At the end of the day we grabbed a stick to scrape off some of the larger blobs of grease. Then a helper cut our shirts up the back so we could take them off like a hospital gown, without pulling them over our heads. Next, while standing in our skivvies, we wash off, alternating between gasoline, orange hand cleaner and water.

I normally wear two T-shirts when riding the wires, but even then I have to

See STICKY, page 66 ▶



DYNAMAX MX/D
Digital Audio Console

So your old on-air console needs to be replaced. Most of your air chain is digital and you know digital broadcasting is just around the corner. What do you do? The Dynamax MX/D Digital Console makes perfect sense. It offers pristine 24 bit internal processing to handle both digital and analog inputs and outputs with the familiarity and straight forward operation of analog consoles. A perfect blend of digital sonic quality, performance features and legendary Dynamax reliability, the MX/D is the right console to meet your current needs and take you well into the 21st Century!

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World Radio History

HAM RADIO

Reception Welcomes Hams

The story goes that Marconi once viewed an amateur radio exhibit at a World's Fair. The exhibitor apologized for the amateur status of his station, to which Marconi is said to have replied, "But I too am just an amateur."

At the NAB '98 convention, an estimated 850 people attended the long-running "Amateur Radio Reception."

The high point of the evening was a drawing for donated books, equipment, VCRs, handheld and mobile transceivers, coaxial cable and vacuum tubes to build the ultimate RF amplifier. About 95 prizes were donated by companies supporting ham radio. With this many prizes, everyone had a pretty good chance at winning something (my wife Louise won a Wavetek multimeter, donated by Broadcast Electronics).

Richard Lee, the new chief of the Compliance and Information Bureau of the FCC, spoke to the attendees. The crowd approved of his news that the FCC is stepping up enforcement of FCC rules in the amateur radio service.

On the amateur radio front, I recently ran a quick survey on a *broadcast.net* mailing list. Forty-two people responded that they were ham radio operators; 15 responded that they were not.

Of those who were not hams, some had difficulty with the Morse code, some thought it was more fun to play with a 50 kW transmitter at work than a 1 kW transmitter at home, and some thought their spouse would object to a 50-foot tower beside the house.

The hams started in ham radio as kids, then worked their way into broadcasting. One respondent said he had his first amateur license at 14 and his second phone by 15.

He got a tour of the new local TV station and met the chief engineer. With encouragement of the chief engineer, he had his first phone and first TV job by age 16.

—Harold Hallikainen

Circle (59) On Reader Service Card

Gasoline and Water Get the Grease Off

▶ STICKY, continued from page 65

pick the grease from my belly button. Needless to say, the clothes go in the trash at the end of each day. Even after a long soapy shower we feel sticky.

Looking back on this procedure, I have to wonder if it really offers the protection we hope it offers. Riding the wires, whether to treat them for corrosion or merely inspect them, is a time-consuming, tedious process. I have talked to old-timers who would ride the wires seated on a bosun's chair. Talk about hanging about in the breeze!

I wanted to scratch my nose, but my hands were covered in grease.

■■■

Troy Conner is the owner of Tower Maintenance Specialists. Reach him by phone at (704) 837-3526 or via fax at (704) 837-1015.

Agile, 2-Way Roadcaster

▶ ROADCASTER, continued from page 61

one headphone level), four function buttons and an LCD display showing key transmitter and audio functions. Twin headphone jacks allow more than one talent to monitor the performance. One side of the phones monitors the program bus, the other hears audio received from the base.

"A lot of engineers and managers who visited us at the NAB show were thrilled at the IFB capabilities," said Belanger. "And you can use both interchangeably: a Roadcaster 1 can feed a Roadcaster 2."

Back at the station, the rack-mountable in-studio receiver units — the Roadcaster 1R and Roadcaster 2R — include similar two-line backlit LCD displays, front-panel headphone jacks with volume controls, rear-panel audio outputs and RS232 ports for frequency programming. In addition, the Roadcaster 2R has a rear-panel audio input for mono, mix-minus or audition channel feed to the remote talent.

Belanger expects to ship the Roadcaster RPUs beginning in June. A portable or studio Roadcaster 2 will be priced at $3,995 retail. The Roadcaster 1 one-way system will cost $2,295 for the transmitter, $1,795 for the receiver.

For information, contact Energy-Onix in New York at (518) 758-1690; fax (518) 758-1476; Web page *www.energy-onix.com* or circle **Reader Service 195**.

— Alan R. Peterson

World Radio History

◆ MARKETPLACE ◆

Products for the Radio Broadcast Professional

Mail info and photos to: RW Marketplace, P.O. Box 1214, Falls Church, VA 22041

Telex UHF Wireless Mics

The USR-100 UHF wireless mic from **Telex** is microprocessor controlled, allowing for automatic self-tuning of exact factory-set frequency information. Microprocessor control also makes possible the retention and recall of those factory settings.

Chances of frequency interference are minimized; dual squelch is performed by a tone squelch at the frequency of 31.250 kHz and an RSSI amplitude squelch. The USR-100 operates on the 668.1 to 679.9 and 734.1 to 745.9 MHz frequency range.

The SH-100 hand-held version of the USR-100 is designed with vocal performers in mind, featuring the LT-100 belt-pack transmitter.

For more information from Telex, contact Debra Pagan in Connecticut, (516) 784-7865; fax (516) 784-7866; or circle ***Reader Service 220****.*

Panduit Mount System

A new mount system from **Panduit** automatically attaches to the wire harness during assembly with a single cable tie.

The Panduit THM1SC Cable Tie Harness Mount for single cable ties features an anti-rattle design and a barb configuration that inserts into a predrilled hole.

Panduit also offers HBUA Harness Board Adapters of molded 6.6 nylon that secure the THMF fixture to the harness board with M6 hardware.

The items are described in a new brochure. Ask for Bulletin SA101N324.

For information from Panduit in Illinois, contact Gary E. Everhart at (630) 990-0220; fax (630) 990-2556; or circle ***Reader Service 39****.*

CBSI Data Analysis

The new Clickthru Analysis feature for Advanced CustomReports from **CBSI** helps sales managers analyze more than one layer of traffic system data, simply by double-clicking on items of interest on the top-level report display.

CBSI supplies each client station with a questionnaire so it can tailor the Advanced Reports to each station. For example, CBSI has developed reports that include an executive summary for a broadcast group headquarters, showing station performance by region, market and station. The report can show the account and contract level.

Clickthru Analysis operates on Windows95 and Windows NT and is available to any station already using the CustomReports suite from CBSI.

For more information from CBSI in Oregon, call (800) 547-3930; fax (541) 271-5721; or circle ***Reader Service 65****.*

Euclid Protective Work Suit

Tower workers can protect themselves from high-intensity radio frequency electromagnetic fields with protective work suits from **Euclid Garment Manufacturing Co**.

The Nomex suits, which reflect RF energy, are an alternative to Naptex suits.

The Nomex suits include a unique hood design. Euclid says it has addressed the bulkiness of previous RF protective worksuits, incorporating knitted socks and gloves for a lighter feel.

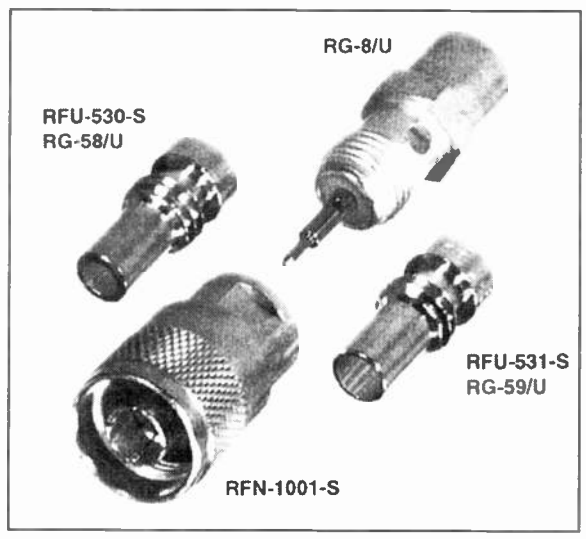
Technical marketing for the Euclid suits is provided by Maxwell RF Radiation Safety.

For more information from Euclid Garment Manufacturing in Connecticut, call or fax (516) 421-9507; or circle ***Reader Service 194****.*

RF Connectors Universal Plug

The newly designed RFN-1001-S N male plug from RF Connectors works with many widely available coaxial cables, including RG-8/U, RG-8A/U, Belden 8214 and Comm/Scope 0268.

The stripped cable is inserted into the connector body and the center conductor is soldered to the center contact. The simple installation process is completed when the body/cable assembly is then screwed into the N male interface housing.



RF Connectors

Made of brass, the RFN-1001-S is silver-plated, with a gold-plated center pin for enhanced conductivity.

For more information from RF Connectors in California, call (800) 233-1728; fax (619) 549-6345; or circle ***Reader Service 13****.*

Andrew Extended Antenna Warranty

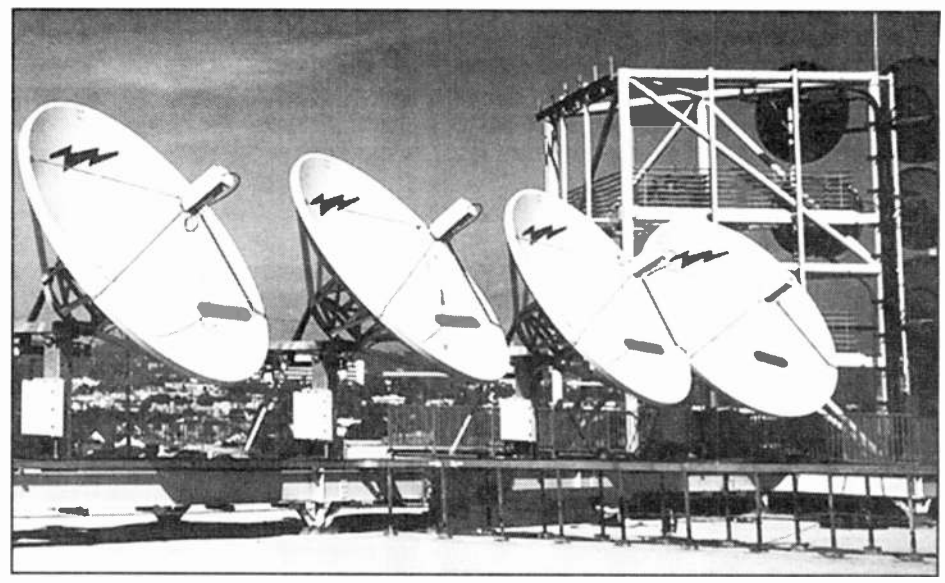
Earth Station Antennas from **Andrew Corp.** are under warranty for two extra years.

Andrew has increased the warranties on its Earth Station Antennas from one to three years, beginning with the date of installation. A 39-month warranty is available, taking effect from the date of shipment.

Components of the antennas, such as the electromechanical drive systems, heating systems and electronic control systems, are under warranty for 12 months from the date of installation or 15 months from the date of shipment.

The three-year warranty applies to C-, Ku-, K- and X-Band receive and/or transmit antennas.

For more information from Andrew Corp. in Illinois, call (708) 349-5661; fax (708) 349-5222; or circle ***Reader Service 91****.*



Andrew Earth Station Antennas

Digital Audio Options From Continental

Continental Electronics Corp. recently debuted a new version of its FM digital exciter. The 802ID is the newly redesigned adaptation of the 802D, allowing FM broadcasters to provide the best digital programming material.

Some new features of the 802D1 include: an ergonomically improved front panel with better color LCD clarity and more intuitive operator control positions, improved frequency agile synthesizer and new software features that make N+1 configurations much easier.

The Tkard option from Intraplex provides more program source options and built-in T1 interfacing.

The T1 option card for the 802D FM Digital Exciter enables the 802D to receive digital audio directly from a T1 line. The T1 option is compatible with Intraplex's leading digital STL solutions, keeping costs low and complexity minimal.

On the studio side of the operation, a standard Intraplex T1 interface unit converts a digital or analog program feed to T1. The T1 option card decodes the T1 data and feeds the digital stereo generator directly on the transmitter side. Also, no additional digital format conversions are necessary.

Because T1 is an industry standard for point to point telecommunications, broadcasters are allowed even more flexibility . The 802D automatically detects T1 errors and switches to a backup program feed in the event of a line failure, ultimately maximizing on-air time.

For more information from Continental Electronics Corp. in Texas, call (214) 381-7161; fax (214) 381-3250; visit the Website at http://www.contelec.com *or circle* ***Reader Service 68****.*

Equipto Heavy Duty Line

The "Heavy Duty" line of cabinets from Equipto include sag-proof door construction that allows rackmount gear to be attached directly to the door.

Frames are of a double-ledge construction and the doors mount flush with the frame surface. When closed, the doors are recessed within the perimeter of the frame for extra support.

Extruded aluminum hinges have a quarter-inch stainless steel pin and nylon anti-friction bearings.

The cabinet doors can accommodate quarter-inch see-through acrylic windows, tinted bronze for reduced glare or modified to insure EMI/RF shielding.

Viewing areas built into the door can be sized and located according to requirements during manufacture.

Products can be viewed at the company Web site *(www.equiptoelec.com)* and a company catalog is available in print or on computer disk.

For information, contact Equipto Electronics Corporation in Illinois at (630) 897-4691 or circle ***Reader Service 170.***

World Radio History

Running Radio

Radio World — Resource for Business, Programming & Sales — May 13, 1998

Spanish Radio Reaches Out
Page 71

KFWB Celebrates 30 Years of News

Bob Rusk

Through fires and floods, riots and earthquakes, KFWB(AM) keeps the people of Los Angeles informed. The station, which this year celebrates the 30th anniversary of its all-news format, consistently reaches about 1 million listeners each week, according to Arbitron.

Although sister station KNX(AM) airs a similar format, KFWB is the only 24-hour-a-day news station in Los Angeles.

Studios and offices are located just a block from the world-famous intersection of Hollywood and Vine, adjacent to the landmark Capitol Records tower. The KFWB building, a pale blue, one-story concrete structure, looks more like a warehouse than the location of a prestigious CBS-owned property.

The building, in fact, had been a warehouse. Day-Glo rugs, those floor coverings with fluorescent colors, once were stacked to the rafters in what now serves as the KFWB newsroom. Before that, the building — which had been owned by a group of stars including "Gone With the Wind" actress Ann Rutherford — housed sound stages for film and TV production.

The Yucca Street structure became the home of KFWB several years after the station switched its format from top 40 to news. Prior to that, KFWB had been located at 6419 Hollywood Boulevard. That building, hit hard in the 1994 Northridge earthquake, has since been demolished.

"Had KFWB stayed there, the station would have sustained severe earthquake damage," said director of engineering Richard Rudman. When he came to the station in 1975, Rudman convinced station management to move from Hollywood Boulevard to Yucca Street.

Photo by Bob Rusk

This neon sign is all that ties KFWB to its top 40 days.

"Even though it is just a couple of blocks away, we are on firmer ground than that part of Hollywood Boulevard," Rudman said of the Yucca location. Before moving in, seismic tests were done on the building, which has 1-inch-diameter rebar in the walls. The tests convinced Rudman the building would be a "pretty good facility."

If KFWB has been lucky in its seemingly "earthquake-proof" 1920s-era building, it was extremely fortunate to not be touched by the 1992 Los Angeles riots. As a precaution, National Guard troops were brought in and posted at the station's front and back doors and on the roof.

"A lot of the city was on fire. We did not know what was going to happen," Rudman said. "I got protection for us, KNX(AM) and KFI(AM). As the EBS committee chair, I wanted to protect the stations that were most involved in delivering information.

"As it turned out, we did not have any problems in the neighborhood. There were some fires set in Hollywood, but nothing got up this way."

Reporters out on the streets, however, literally put their lives in jeopardy as they covered the story.

"I came under gunfire twice," said KFWB field reporter Dirck Morgan, who was driving a new mobile unit when he was confronted by a pack of rioters. "There were four hits through the back window, one across the hood, and one in the front right fender when I spun the car around," he said. "The car was pretty well shot up."

> **I came under gunfire twice. The car was pretty well shot up.**
>
> — Dirck Morgan

Amazingly, none of the bullets struck Morgan, who used his cell phone to broadcast a live report as he fled the streets of South Central Los Angeles. Morgan did suffer cuts from the shattered glass and returned to the station, where his minor wounds were tended to. He then grabbed the keys to another mobile

See KFWB, page 73 ▶

Decades of Innovation

1920s: KFWB, owned by Warner Bros. movie studios co-founder Sam Warner, signs on the air with 250 W in 1925. The call letters stand for "Keep Filming Warner Brothers." Ronald Reagan and Alan Ladd, who would go on to star in Warner Bros. films, are among the stars who get their start at KFWB.

1930s: KFWB, the first radio station to cover the Hollywood Santa Claus Lane Parade, pioneers coverage of the Tournament of Roses Parade and the New Year's Day Rose Bowl college football game.

1940s: KFWB's call letters, reflecting World War II spirit, now stand for "Keep Fighting Warner Brothers."

1950s: KFWB becomes "Channel 98," the first top 40 format in the country. The lineup of disc jockeys is known as the "Good Guys" and includes a young Gary Owens, on his way to becoming a radio legend.

1960s: KFWB is purchased by Westinghouse and on March 11, 1968, becomes the first all-news station in Los Angeles. It joins sister all-news stations WINS(AM) in New York and KYW(AM) in Philadelphia, which went to the format in 1965.

1970s: KFWB debuts the slogan, "You Give Us 22 Minutes, We'll Give You the World." It refers to the average commute time in Los Angeles.

1980s: KFWB begins transmitting in AM stereo and pioneers the electronic news room, with state-of-the-art computer capabilities. More than 1.2 million listeners tune in each week.

1990s: KFWB becomes part of CBS when the network is purchased by Westinghouse, now CBS Corp. The station, which announces plans to boost to 50 kW, debuts the slogan "Southern California's Only 24-Hour News." KFWB celebrates its 30th anniversary as an all-news station on March 11, 1998.

Ten Stations Win Crystal Awards

Ten stations were honored with Crystal Awards during NAB '98. Winners are pictured: Back: Howard Schrott, WIBC(AM), Indianapolis; Bill Grady, KVFD(AM), Fort Dodge, Iowa; Mikki Hofferber, WUSY(FM), Chattanooga, Tenn.; Patti Payne, KIRO(AM), Seattle; Helen Little, WUSL(FM), Philadelphia. Center: Sylvia Cariker, KUZZ-AM-FM, Bakersfield, Calif.; Marc Kalman, KDWB-FM, Minneapolis. Front: Ted Hayes, WKVI-AM-FM; Mike Costanzo, KWSN(AM), Sioux Falls, S.D.; Julie Koehn, WLEN(FM), Adrian, Mich.

World Radio History

GUEST COMMENTARY

Innovation Beats the Competition

Marlin Taylor

To outdistance our competition, we have to out-innovate them!

Is this your approach to managing and leading? If your answer is yes, I congratulate you.

A plaque containing this statement has sat on my desk for years, since achieving early ratings success at former New York station WRFM, where we used several innovative concepts to roll past two long-entrenched head-on competitors in a matter of months. It was a gift from my boss at the time, the late Arch Madsen, president of Bonneville International Corp.

The Webster's New Collegiate Dictionary definition of "innovation" is the "introduction of something new ... a new idea or method." A secondary definition is to "apply creativity."

Ho-hum is a no-no

For a broadcaster, innovation means *seizing the moment* on a daily basis to effect an increase in listenership value to the benefit of your advertising clients.

Why are we discussing "innovation" in a progressive industry like ours? Granted, there are many creative people in radio doing a lot of innovative things. However, when you judge the industry based on its impact upon listeners, most commercial radio stations fall into a "ho-hum" category when a person tunes in. An innovative radio station should generate a "wow" reaction in a listener. It's to the "ho-hum" stations that I specifically target my comments.

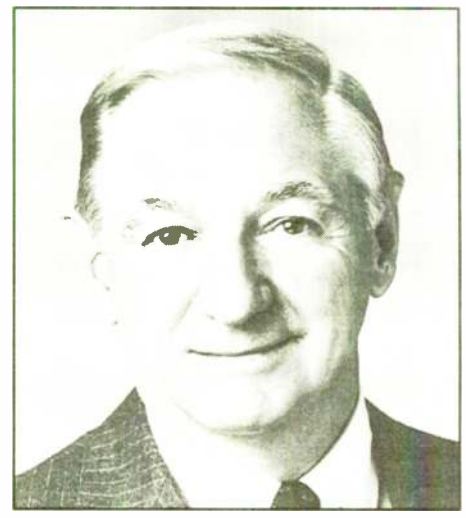
If you manage one of these stations, do yourself a giant favor right now. Raise your sights, muster the courage, pop a can of spinach and address the challenge head-on!

First of all, recognize that, with few exceptions, you can do things that make your station more "listener-friendly." Also, remember that the programming you think has lots of appeal might rate much lower with listeners in your community.

Where might radio be today were it not for Gordon McLendon, one of the greatest innovators this industry has ever seen? McLendon pioneered the top 40, all-news and beutiful music formats. Paul Drew said of McLendon, "He read the public taste and where it was going better than anyone. McLendon dared to be great and he was."

McLendon would never have been successful or be remembered if he had not been an innovative thinker and, most important, willing to risk taking his ideas to air. He was not afraid to shake up a successful format if he believed it was time for a change.

More recently, look at what radio might have missed out on if Jeff Smulyan had not been willing to risk the big bucks required to launch the innovative concept



Ed McLaughlin, Innovator

of all-sports radio on WFAN(AM) in New York. Or Ed McLaughlin going out on a limb, believing an audience would support daytime talk show hosted by an individual who was unknown, highly opinionated and had a definite conservative bent. Love him or not, we all know what Rush Limbaugh has done for talk radio.

Incremental innovation

Innovation should be high on the mind and heart of every management person. Most actions will not be as momentous as those mentioned earlier, nor do they need to be.

You never know if a creative change might turn out to be just as important to the future of your station. Maybe your idea will be copied across the industry. That happened with an idea we implemented at WRFM on the spur-of-the-moment.

We had restructured the format of a station and needed to generate word-of-mouth. Our goal was to take the station "from worst to second." Our promotional budget was smaller than that for office supplies, so innovation was our only option.

We had a shortage of advertisers. So, in true innovative fashion, we carved out a couple of commercial-free hours each day, creating the "Total Music Hour." We simply announced, "In the next 60 minutes, you'll hear 59 minutes of music." It gave the station a unique feature with a hook, to promote both on and off the air.

We told our audience to "be listening for the next Total Music Hour," but never announced when the next hour would come. The tactic generated great word-of-mouth for us.

Innovative thinking is not necessarily just for management. Involve the entire staff. Be open to ideas. Who's the most creative thinker on your station team?

Low-cost

What can you do that's new or different to make listeners sit up and take notice, possibly create word-of-mouth, cause the local newspaper or TV station to do a story on you or give your sales reps a new piece of ammo? That's what innovation is all about.

Innovation does not have to cost much. Just apply brain power to an existing situation or opportunity. In fact, I bet you can take action today to produce savings and create a better-sounding radio station.

Consider this: Your innovative step may not involve adding anything. Instead, it could be a return to the basics from which you strayed or removal of an irritant that serves no useful purpose.

■ ■ ■

Marlin Taylor is the founder and creative director of the former program syndicator Bonneville Broadcasting System. He is a consultant. Contact him at (215) 348-0707.

STATION FINANCING

Leave Business and Legal Issues to Attorneys

Dain Schult

This is one in a continuing series of articles on financing the purchase of a radio station.

Once the Letter of Intent (LOI) has been signed, the real fun in your life as a budding radio station buyer can begin. Now you can begin the serious negotiations to get the Asset Purchase Agreement (APA) signed. Between those two accomplishments lies either heaven or hell.

In a perfect world, the seller and you sign the LOI, you breeze through your due-diligence with everything checking out wonderfully well, everybody's on their best behavior and the APA gets signed a week or two afterwards. Everyone lives happily ever after, waiting for the FCC to approve the license transfer.

In this same perfect world, Santa Claus, the Easter Bunny and the Tooth Fairy hang out in their spare time.

In the real world, things have a tendency to bog down at this part of the program. The best-laid plans do not just run amok, they run away from you and you cannot seem to catch them. What to do?

First, take a deep breath. Then hand off the whole thing to your attorney. This is where you really do need legal representation. The APA is the final word in how you and the seller will deal with each other up to, and past, the closing.

If you want a fighting chance at living "happily after the closing," then you need at least a communications law attorney (also known as "FCC attorney") and possibly also a local attorney. FCC attorneys are, literally, attorneys licensed to practice before the FCC. You will need local counsel to handle real estate issues, among other things.

Why so much legal representation? Because there are two sets of issues regarding the APA.

The first set is business issues, decisions upon which you and the seller must agree. This category includes

contracts or leases the seller currently has on his station that you will or will not assume after the closing. For example, will you keep the current weather forecasting service after you take over the station? That is a business issue.

Business issues are best resolved buyer-to-seller. If you direct your lawyers to handle the business issues,

See PAPERWORK, page 75 ▶

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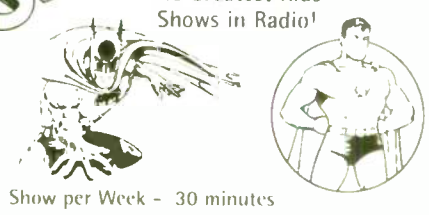

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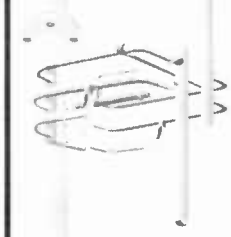

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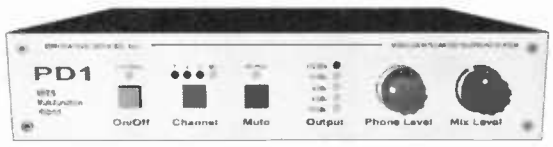

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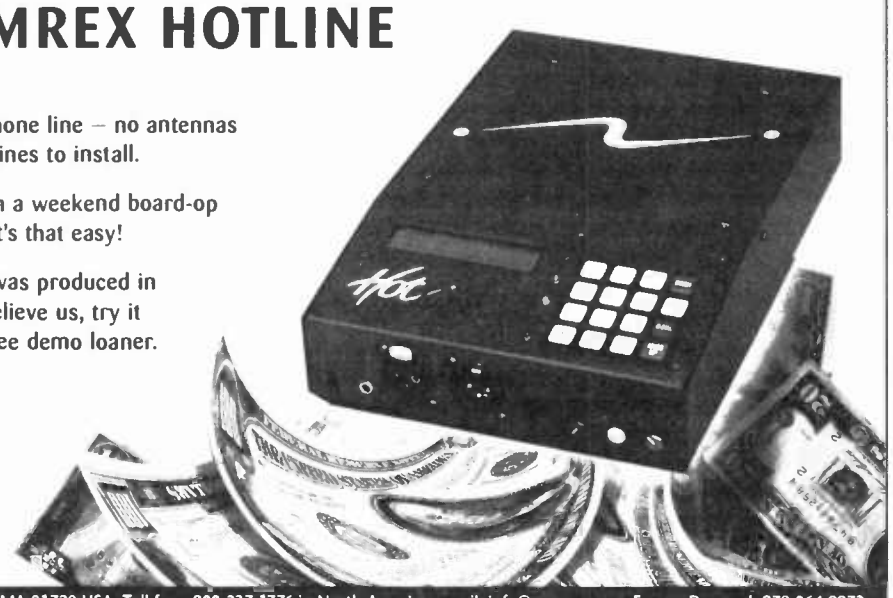

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World Radio History

Religious Stations, Secular Reach

Successful Spanish Stations Give Listeners 'What They Want and Really Need'

Kenneth D. MacHarg

Religious broadcasters are taking note of a Christian-formatted Orlando, Fla., radio station that tied its two major secular competitors in the ratings during the fall of 1997.

What makes this station even more unique is that it is a Spanish language outlet that is threatening to outstrip its competition by offering a full service of news, sports and information of interest to the non-Christian audience.

"We need to offer what they (the listeners) need to hear ... how to buy a house, how to finance a car, how to stay healthy," said WRLZ(AM) general manager Luis Hernandez, known on the air as Radio Luz. The word *luz* means *light* in Spanish.

Atypical

Melvin Rivera, the Miami-based Publications Coordinator for the United Bible Society and outgoing president of Hispanic National Religious Broadcasters, agreed. However, Rivera said, "Orlando is not typical. Hispanic broadcasting is like American (English-language) broadcasting. Most of the stations are preaching and teaching, some with quality, some without."

Rivera pointed to New York-based Radio Visión Cristiana, Orlando's Radio Luz and several Christian formatted stations in Puerto Rico as stations "changing the way that Christian broadcasting is being done by giving the listeners what they want and really need."

> **Most of the stations are preaching and teaching, some with quality, some without.**
>
> — Melvin Rivera

Along with its information format, Radio Luz fills 75 percent of its air time with Spanish-language Christian music, in contrast to other Christian-formatted stations that rely heavily on preaching and teaching programs. "As a result, non-Christians listen," Hernandez told a forum at February's National Religious Broadcasters convention in Washington.

Hispanic Christian-formatted stations are not limited to those areas traditionally thought of as Spanish-speaking strongholds. "In Michigan, for example, where there are small Spanish-speaking communities, programmers are starting with two- or four-hour blocks of programming," Hernandez said. "That's how most Christian stations in the U.S. start. ... In Miami right now there is a group of churches starting broadcasting with a block of five to six hours a day, with the goal of purchasing a station."

However, buying a radio station is not easy. Rivera said a radio station in Miami costs $6 million to $10 million, and he claimed recent government policies have made it difficult for minorities to buy a station.

"Commercial owners can now have more stations in one city, and that has put a liability on ministries which do not have the economic potential to buy a station," Rivera said. "The big corporations are buying all of the stations that they can buy. Those who have one small station are increasing the price and selling them to the groups that want more presence in the market. That makes it difficult for Spanish broadcasters to buy."

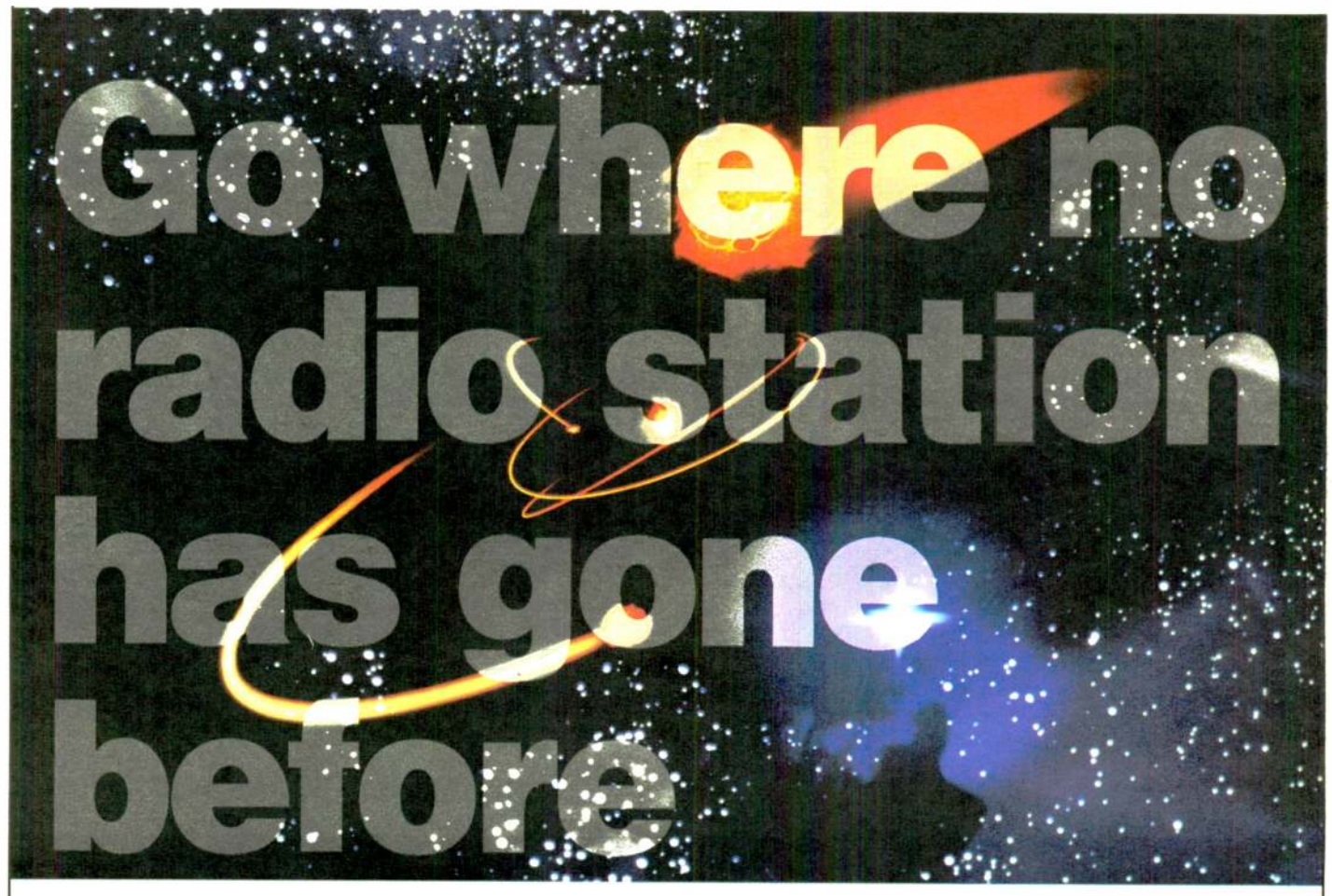
Rivera estimated that between 30 and 40 Hispanic Christian radio stations operate in the United States, including Puerto Rico, along with approximately 15 Hispanic Christian TV stations. The majority are owned by churches and are operated as ministries (as opposed to a number of English-language Christian formatted stations, which are operated by commercial entities as a profit-making enterprise).

Good value

Hispanic Christians are learning the value of religious broadcasting and becoming more involved in supporting the stations, Rivera said. "A good example is Radio Visión Cristiana in New York City, which was purchased for more than $11 million.

"Puerto Ricans have a tradition of giving to Christian broadcasting and have

See WRLZ, page 75 ▶



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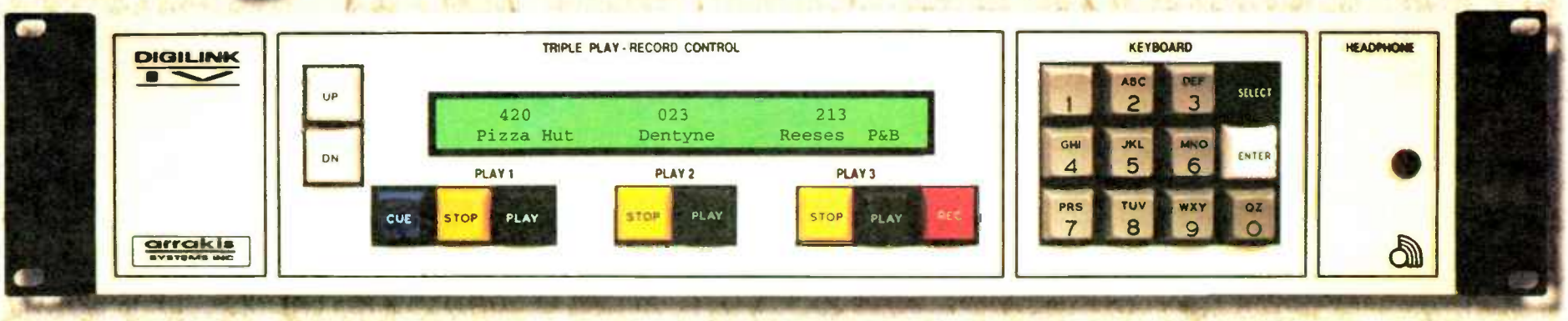

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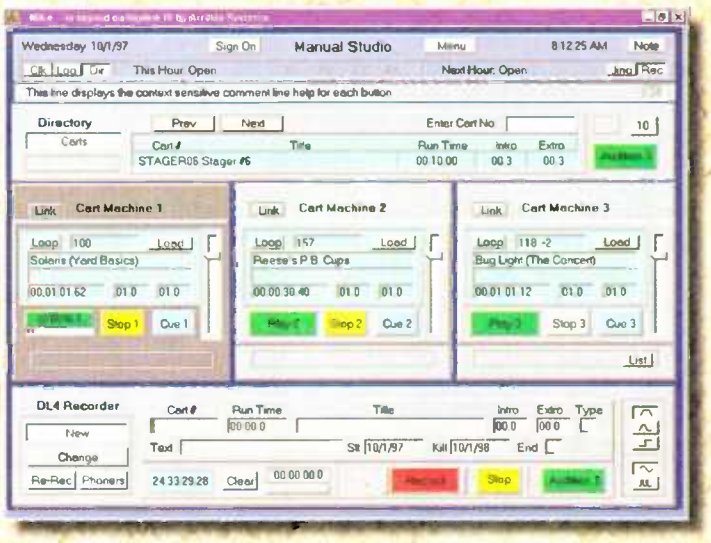

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World Radio History

All-Time Top Story: L.A. Riots

▶ KFWB, continued from page 68

unit and went back out to report the story.

With a death toll of 52 and property damage reported at $1 billion, the riots were the biggest local news story KFWB ever covered. But there was no shortage of stories in 1968, the year the station switched to all-news.

"That was an incredibly jam-packed year," recalled Mark Savan, a former KFWB news director and anchor. "On April 4, Martin Luther King, Jr., was assassinated. On June 5, Bobby Kennedy was assassinated (in Los Angeles). On top of that, it was also an election year."

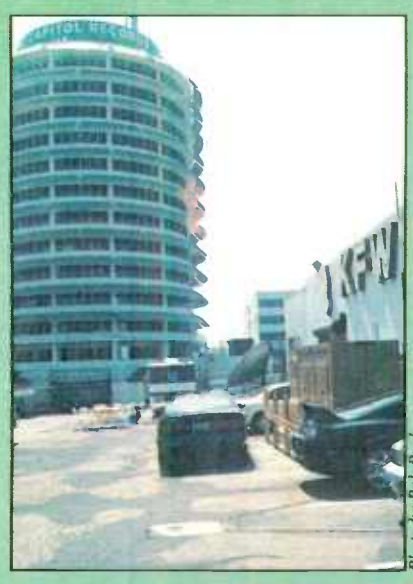


Photo by Bob Rusk

KFWB sits in the shadow of the Capitol Records building.

Today Savan is executive vice president of the Chuck Blore Co., which writes and produces radio and television commercials. Blore, a legend in the radio business, programmed KFWB when it was a music station.

Sign of the times

The only reminder of those days as a top 40 powerhouse is the circa-1950 neon sign of the call letters, framed by microphones, that graced the KFWB building on Hollywood Boulevard and was moved over to the Yucca Street location. The sign lights up the area every night.

As KFWB begins its fourth decade as an all-news station, the station plans to become an even stronger voice. The FCC has granted KFWB, at 980 kHz, a construction permit to increase power from 5 kW (non-directional) to 50 kW (directional) full-time.

"We are making further refinements on the way the upgrade will be implemented," Rudman said.

When the station makes the switch to 50 kW, KFWB — with a signal stretching beyond Los Angeles — will have the power to claim the title of "The Only 24-Hour News Station In All of Southern California."

Fries Touts Growth in Radio Sales

Marguerite Clark

Radio sales growth is booming in the smaller markets, while increases in the larger markets are beginning to level off. This according to RAB President Gary Fries, who delivered his annual "State of Radio Sales" address at NAB '98.

Fries said that for the first time since he has been in charge of the RAB, the largest markets are showing smaller increases than the smaller markets are. The dollar is starting to flow downward into the other markets, he said, allowing smaller markets to catch up.

Fries said radio does not dominate the marketplace. Although consumers trust radio more than other media, both newspaper and television get three times more advertising than radio does on the local level.

Fries asked what radio stations are doing as a whole to challenge this particular position.

"The radio industry has to learn how to sell its particular product and how it will be more beneficial than newspapers to consumers in selling their products," Fries said.

Most newspaper advertisers do not believe that radio gets results, so, Fries said, it is mandatory to present these businesses with documentation about the potential of radio advertising. Rather than just telling them that radio works, radio must provide proof of its power.

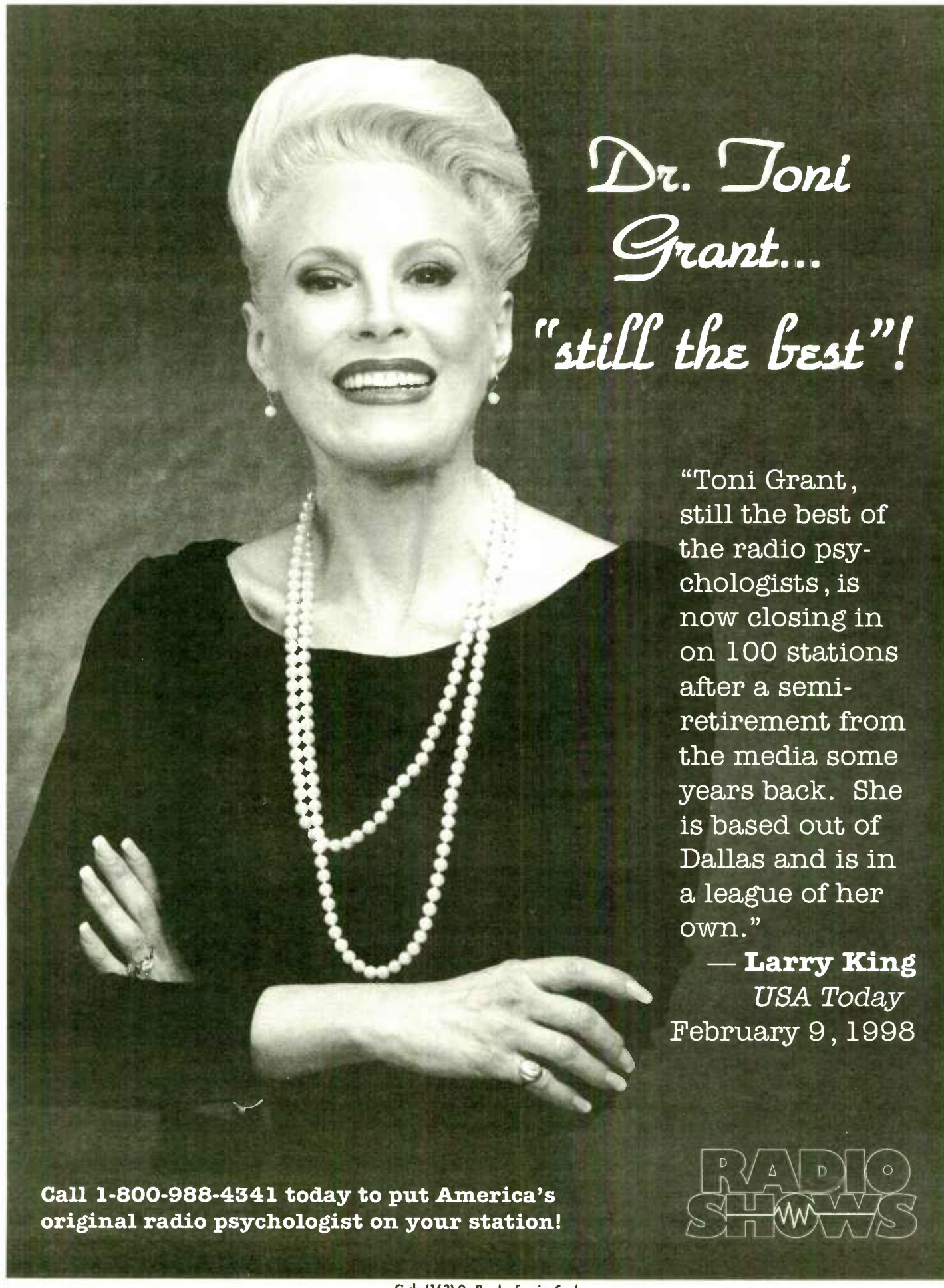
"The real target has to be not lip service, but a concentrated effort to position radio assets against the competitive media," he said.

Fries also said it is essential to stop considering the radio station across the street as the competitive target. Instead, radio broadcasters should join forces and understand that competing media are where the dollar is going.

"We have never made the concentrated effort on how to place the radio industry as a whole against the newspaper," he said.

This is a dynamic period, said Fries, but opportunity comes with obligation, and it is important to change the way radio is

See SALES, page 76 ▶



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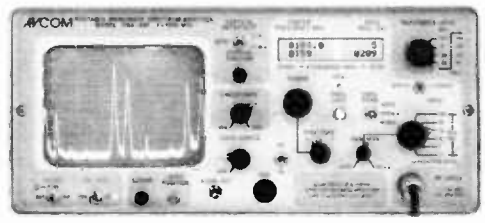

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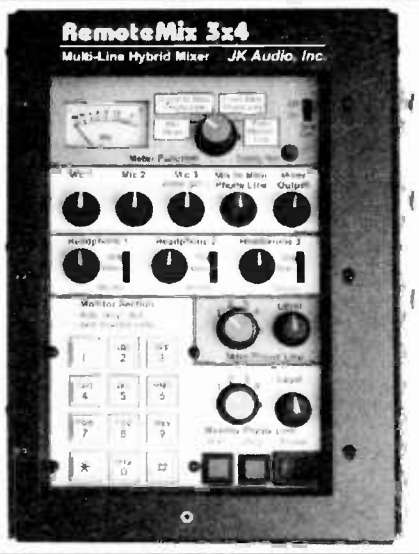

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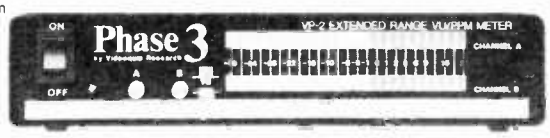

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World Radio History

Lawyers Protect You From 'Running Blind'

▶ PAPERWORK, continued from page 69

they will. They will represent your position to your seller's attorneys.

Normally they won't have any direct contact with the seller. They will only communicate to the seller through his or her attorney. In some cases this is like telling a story to someone at the front of a line of people, who in turn tells the next person standing in line, who tells the next person and so on. By the time the story gets to the end of the line, it bears little resemblance to the original story.

This is not to say that attorneys cannot relay messages, but it does mean that, for the best possible level of communication and to eliminate confusion, you should discuss any and all business issues calmly with the seller, then let the attorneys address what you and the seller agree to in the necessary legalese within the APA.

Legal issues are a different can of worms. This is where the legalese gets thick and sometimes furious. Your attorney is duty-bound to protect you in negotiations. The seller's attorney is bound, too — to the seller. Legal issues can include the length of time the seller or buyer is bound to certain representations or warranties made in the APA, or how a particular seller note is crafted.

Everyone is operating on the premise that "if you don't ask , you don't get," so a number of clauses may be inserted in the body of the APA to protect you in some manner, with the intention of seeing if the other side catches it.

Once again, this isn't to say that anybody is trying to take advantage of the other side, but protection is protection. Your attorney is looking for not just a pair of suspenders, but a belt and anything else that can be found to help you keep your pants up. Some attorneys are more "deal-makers" than others. Some are fiercely protective of their clients. It is an imprecise science trying to figure out who is whom. I still have not mastered the code.

Once the dust settles, you and the seller should have arrived at an APA both sides can live with and think is reasonably fair. If that is not the case, the odds are against the deal ever closing. "Win-win" deals are the only ones that ever really work.

Trying to do the APA by yourself without the benefit of either local or FCC counsel is like juggling vials of nitro in your hands. That is not to say that it can't be done. The FCC will accept your application even if you do not have legal representation, as long as you do have the proper forms filled out and the necessary information and fees included in your package.

There are so many places where things can go wrong that to run blind without representation defeats the purpose of this whole exercise. It reminds me of the motto I once saw at an auto body shop: "Good work is not cheap and cheap work is no good."

I trust that my battery of lawyers, should they see this particular article (and I won't tell them about it if you don't) will find that last line grounds for raising my rates, but this is an area where you can be "penny-wise and pound-foolish."

I use both FCC counsel and local counsel. My local attorneys handle the negotiation elements of the APA, while my FCC counsel handles all the pertinent FCC matters regarding each transaction.

Next time we will explore what happens if no one dies and the APA gets signed, moving on to the almighty closing, and the promised land of ownership.

■■■

Dain Schult is a 30-year broadcast veteran and consultant with experience as a DJ, general manager and group operator. He is based in Austin, Texas.

Got a question or suggestion for Dain to address in an upcoming part of this series? Send an e-mail to ***RW*** *at* chamaker@imaspub.com *and let us know.*

Stations Search for 'Adequate Programming'

▶ WRLZ, continued from page 71

brought that practice with them to the mainland. New York has a large Puerto Rican population, and those who came from the island have contributed in part to the success of Radio Visión Cristiana. We do not have that element in other cities where Christians do not have the history of knowing what a station can do."

Melvin Rivera

Hispanic broadcasters face other challenges as they attempt to program successful stations. Family problems are serious among listeners, according to Linda Martín Monroe, the program director of Spanish-language KHCB-AM-FM in Houston.

"We need to have programs which discuss divorce, abuse, unfaithfulness and a macho lifestyle," Monroe said. Her station provides talk shows that use trained Christian counselors to address those issues. However, Monroe said, the majority of listeners to her station are women, and she has not found any programs locally or from national producers that are aimed at men.

The lack of adequate programming is a concern to other Hispanic broadcasters. Rivera said that three networks currently provide programming, but sees a need for more. "I would love to see the day when we have satellite services for all the Hispanic Christian radio stations in Latin America and the United States. We need to have programming which is not just translating English into Spanish, but is produced by Hispanics (producing with the Spanish mentality, with more orientation to Spanish culture and needs."

There is an increasing need for networks to produce segmented programming, he said, with individual programs or day-long format services aimed at children, teenagers, young married adults and non-Christians. "The stations are there and are discovering that they need to grow, but they do not have the resources."

The Hispanic National Religious Broadcasters, an arm of the National Religious Broadcasters, provides a forum for Spanish-speaking Christians to work together, according to Rivera. "In the past, we have not worked together or learned from each other or done networking. HNRB has allowed us to be a forum to discover that we are not so different. We may have theological differences, but basically we are the same. We can learn from one another, we can work together and we can change the world together."

Rivera completed a three-year term as the president of HNRB at the February meeting.

■■■

Kenneth D. MacHarg is a shortwave broadcaster based in Ecuador.

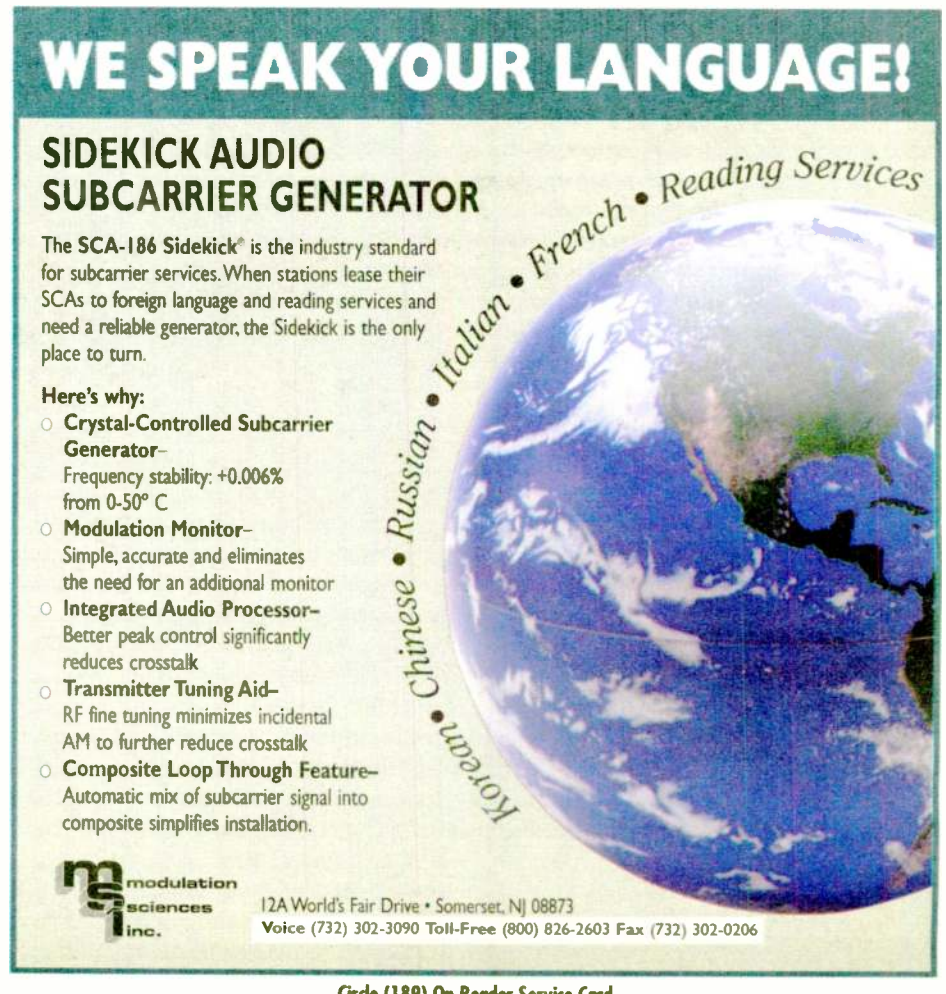
RADIO BUMPERS

It's a yellow and black attack, reaching to the back of the music rack.

WBZO(FM) in New York "buzzes along with the best and most Oldies," said Operations Manager Rick Martini.

The bee is the station mascot, but the call letter is tied to the city WBZO was originally licensed to: Bay Shore, N.Y.

What message does your station bumper sticker convey? Send the sticker, and a 100-word explanation, to: RW Bumper Sticker, 5827 Columbia Pike, Third Floor, Falls Church, VA 22041. Stickers sent without explanation will not be considered for publication.



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World Radio History

Radio for Better or for Worse?

Steve Lampen

Do the technical innovations in radio today have a downside? Steve Lampen takes a look at life of a fictional on-air personality.

Marilyn gets up early every morning to go to work. She walks downstairs to the kitchen table where her job will start. Usually she begins around 5:30 a.m., sometimes a bit earlier. Her main problem is the kids, who are making breakfast and heading off to school.

Oh, I forgot to mention that Marilyn is the morning drive-time jock for her local radio station.

What's in front of her looks suspiciously like a laptop computer, just a bit thicker for the extra hard drive and for the mic preamp and processing. When she powers it up, the unit automatically dials up and handshakes with the Master Server, which is in some building somewhere. She doesn't remember exactly where it is located. It certainly is not in the plush offices downtown, where the sales drones work.

Marilyn's usual schedule is to scan the newspaper, look at the notepad (electronic) which she carries with her during the day to jot down ideas, and pour herself a cup of coffee. She powers up her unit, which quickly displays the songs and commercial traffic. Her sections, outlined in red, are empty. She enters her password, adjusts the microphone and starts.

She usually opens with a funny story, and today is no exception. Something about this bachelor she met at the produce section yesterday and how helpless he was among the vegetables. She quickly eyes the screen and realizes her first break is coming rapidly to a close.

A weather blurb and a traffic blurb are already loaded up. She winds up her first piece and hits "Enter." The red square on the screen turns blue, and along the bottom she sees an icon representing the data traveling from her unit to the server. Today she is only running 28.8 kbps, but that's no problem. Her audio will only take a few more seconds than real-time to download. If she is late, the server might run the weather blurb before her opening, but usually it gets there in time.

Now she can relax because her next break is at 20 after, and it's not even 6 a.m. yet. But that story must have had quite an effect because the caller buttons at the bottom of her screen are beginning to light up. She touches the weather button and it shows a printed out version of the weather report. Two touches and it would have downloaded the audio, but that takes too long and slows her break going the other way. She just wants to know what is happening so she can work it into her next report.

As she reads it, she also takes note of the three songs in the set that follows. The last one is by Tony Orlando and Dawn. Who the heck are they? She touches the listing and some data comes up on the song. Geez! This came out before she was born!

She starts her next break. Says something funny about Tony Orlando and Dawn (even though she's never heard the record and probably never will), mentions how everyone better bundle up, it's getting close to minus-10 C. And hits caller button No. 1. It's that same pest who thinks he's live and says something really stupid. So she hangs up on him, backs up the hard drive to just before she hit his button and continues, seamlessly.

She hits caller button No. 2. Boy, she thinks, I can't imagine what it must have been like in the old days when they had to have a bank of phones around. Now the phone lines come into the Master Server and get routed to her as part of the data stream. It only has to send her one call at a time, and the server only sends her the call she has selected. (Oh, sure, she can conference up to four, but they start to sound a little thin at 28.8 kbps).

Since there is probably still data being sent back of her previous completed break, the phone calls get priority (at least to the bandwidth they require), and her break may require a few more seconds to download. No big deal. She's already into callers number 3 and 4. Her lines are lit up. It's no wonder she's the top-rated talent in her town. She's real, funny and local.

What she doesn't know is that they moved the Master Server months ago a thousand kilometers away. But Marilyn wouldn't care. The Master Server then downloads to a local server at the transmitter site. Music and commercials are generated back at the head office, where market penetration and survey numbers make happy executives.

What a stroke of genius, thinks one of the junior VPs in the organization. Keep the talent, weather and traffic local, and it's a local show. More local than ever before. Plus, there's that contest to find the perfect host. If Marilyn's numbers start to drop, heck, they have three or four good prospects for the job.

And the music is tailored according to demographic analysis. The Tony Orlando and Dawn record fell squarely into that demo. Who's playing records and loading spots? Nobody at this station. They're all too busy making money!

■ ■ ■

RW welcomes other points of view.

Best Asset: Listeners

▶ SALES, continued from page 73

doing things, as well as its position in the world advertising community.

Radio is all about its special relationship with consumers and that is why it is so successful. But until it can take full advantage of this aspect and understand exactly what the consumer needs, this is not enough.

"The biggest asset we have today is the listener. It is compulsory to understand that listener and translate what

Gary Fries

that listener needs to the advertiser," said Fries. "This is the key to our growth. If we do that, we will have a very dynamic future and we will therefore have to take advantage of the opportunities in front of us."

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Now there's an easy way to organize and protect your copies of Radio World, the industry's best read newspaper, keeping issues readily available for future reference.

Designed exclusively for Radio World, these custom-made titled cases provide the luxury look that makes them attractive additions to your bookshelf. Each case is sized to hold a year's issues (may vary with issue sizes), and is made of reinforced board covered with durable leather-like material in blue, with the title hot-stamped in gold. Cases are V-notched for easy access and free personalization foil is included for indexing the year.

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Knowledge Is Power

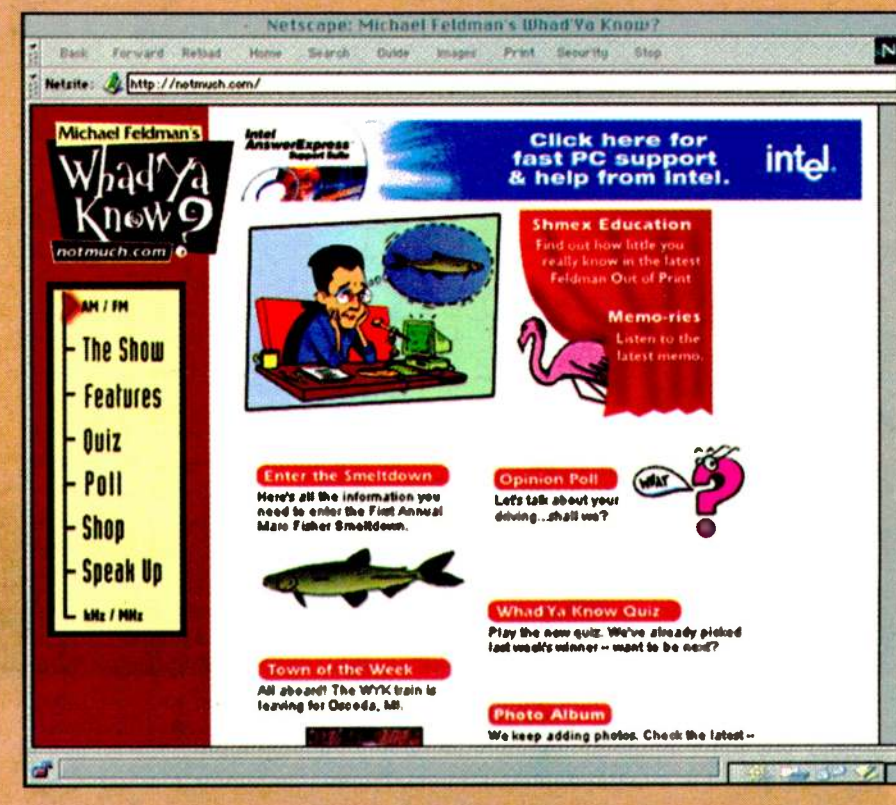
Fans of the PRI program "Michael Feldman's Whad' Ya Know?" can access a colorful new Web site devoted to the program (*http://www.notmuch.com*).

Surfers can partake of an electronic version of the "Whad' Ya Know?" quiz and are eligible to be chosen as on-air contestants for the program.

The site is the fruit of an alliance between "Whad' Ya Know?" and NewMarket Network, which designs, produces and markets online "branded communities," with particular focus on the public broadcasting space.

In addition to *www.notmuch.com*, NewMarket also produces sites for "Car Talk" from National Public Radio (*http://cartalk.msn.com*) and Byrd & Block's "Earth & Sky" (*http://earthsky.com*).

NewMarket soon will launch a site for "The Savvy Traveler," from Marketplace Productions.



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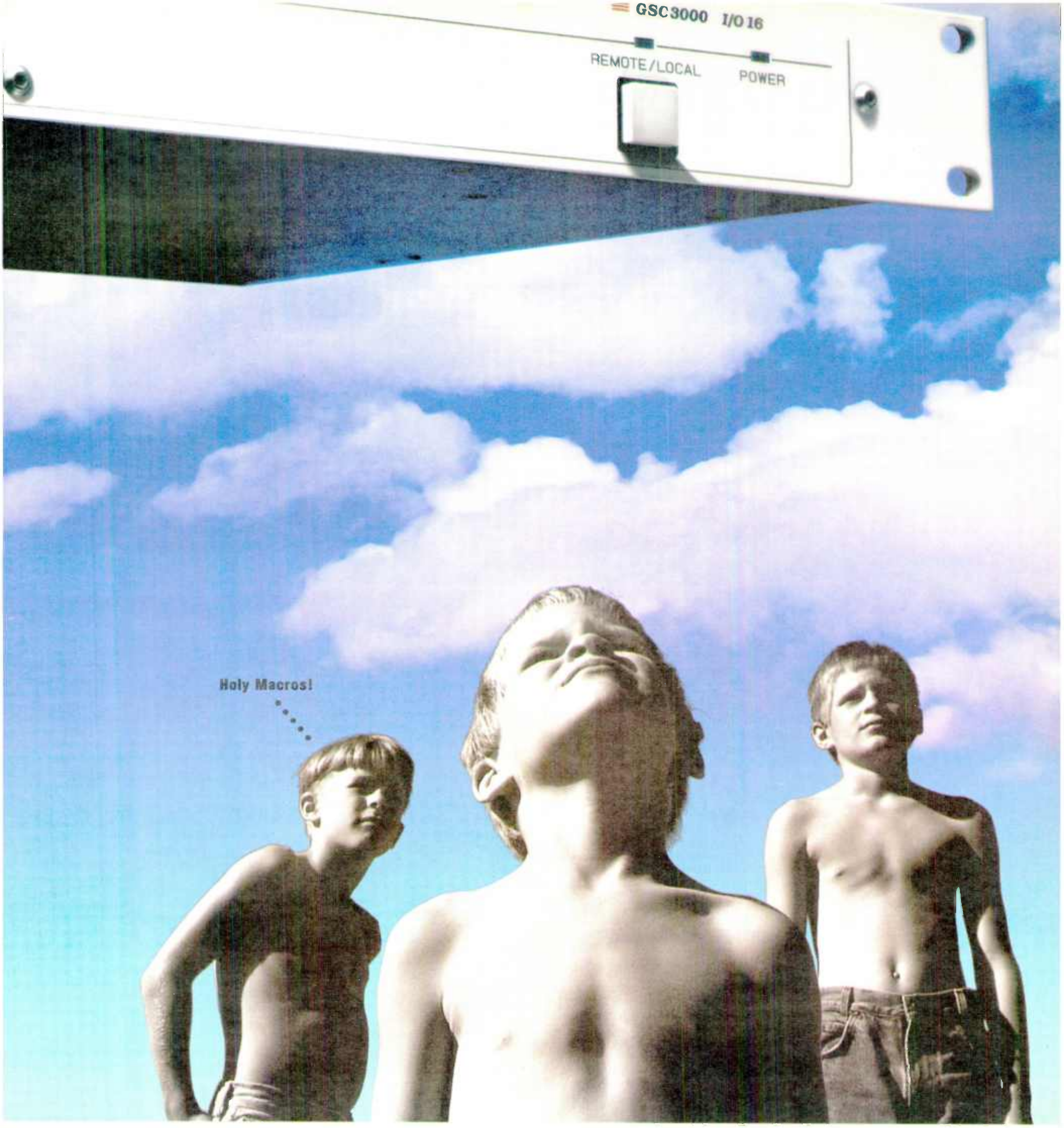

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World Radio History

Studio Sessions

New Radio Console from Studer.
Page 87

Radio World | Resource for Radio Production and Recording | May 13, 1998

Otari MO Makes Radio Inroads

Tom Vernon

With all of the recent media hype about CD-R and the coming of DVD, you might have missed the introduction of an intriguing new recording media.

Magneto-optical (MO) audio recorders first hit the broadcast scene a few years ago, courtesy of the Fidelipac DCR-1000 deck. Otari rolled out three new machines last fall at the AES convention in New York, developed originally for the Japanese broadcast market. One unit is designated "5050" after the company's legacy analog machine line.

The one we decided to look at is the PD-20, a 20-bit, 2-track machine that uses 3.5-inch MO discs as the recording media. All files are recorded in WAV format, making it easy to dump completed work into Macintosh or Windows digital workstations for final editing, even though extensive editing capabilities are built into the PD-20.

The MO medium is new to broadcasters, but it has been around as a mass storage option for computer users for about eight years. It is an interesting format, with some advantages over other digital media.

Otari PD-20 Magneto-Optical Disc Recorder

Unlike DAT or MiniDisc machines, there is no audio delay on startup with MO. Because no data compression is used in the recording process, the much-discussed degradation the process creates does not exist here. And of course, MO discs may be erased and used repeatedly.

Magneto-optical discs are available in 5.25- and 3.5-inch sizes, with the PD-20 and other Otari machines using the latter. Media is available in 230, 540 and 640 MB capacity, yielding up to 120 minutes of 44.1 stereo audio.

Discs are sold through most computer mail-order catalogs, but pricing can be erratic. One dealer had 640 MB cartridges priced at five for $16, while a 10-pack of 230 MB cartridges from another manufacturer sold for $130. With careful shopping and bulk purchases, media prices should be about the same as for CD-R. Archive life estimates for MO discs are about 100 years.

At work

As a stand-alone unit, the PD-20 can perform the usual record playback functions, much like a DAT recorder. By adding the companion CB-170 controller and a computer monitor, extensive editing capabilities are possible. These include assembly and insert editing, 16 levels of undo/redo, 100 locate points and five direct locate keys, or "hot keys." All locate points can be named.

Off-line DSP processing includes time expansion/compression, pitch shift and reverse. Shuttle, jog, and ±12.5 percent pitch control are available in record/play. Discs recorded on the PD-20 are compatible with Otari's 8-track MO machine, the PD-80.

The rear panel of the PD-20 contains XLR connectors for analog audio I/O, digital I/O and time code. There are also connectors for General Purpose interface (GPI), a video monitor, the CB-170 remote control and serial I/O.

A video signal may also be used as the reference; BNC connectors allow video loop-through. Additionally, BNC connectors are provided for an external word clock signal from another piece of digital audio equipment. Finally, there is a SCSI connector to hang your hard drive directly onto the PD-20.

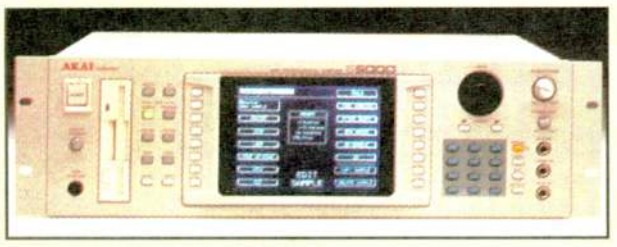
Removing the covers for a peek inside confirms that the PD-20 is up to Otari's usual high standards for construction. All circuit boards are silkscreened with component designations. High-quality components are used throughout, and are a

See OTARI, page 85 ▶

SHORT TAKE

Sampler Is Compatible With PC WAV Format

Before workstations, there were digital samplers. Instead of multiple cut, copy and paste commands to lay down a repetitive riff or repeat a block of bars to stretch a music bed, RAM-based samples were looped and played back for as long as one desired or needed.



Samplers and DAWs are by no means interchangeable devices. But for creating loop-based production music beds for broadcast use, a sampler still remains a clear favorite. A producer can record and manipulate audio and trigger it in real time via MIDI. Most first-time users employ samplers for the classic digital stutter effect on radio promos.

Akai Musical Instrument Corp. debuted two new digital samplers — the S5000 and S6000 — with definite applications in broadcast and music production, along with compatibility with PC-based editors and storage systems.

Many samplers store audio in proprietary formats that require translation or conversion when moved to another platform. The Akai S5000 (shown here) and S6000 use conventional WAV files as the native sample format, allowing direct exchange with any standard PC without format conversion.

Both models are capable of 64 simultaneous voices and are upgradable to 128 voices. A full complement of envelope generators, filters and low-frequency oscillators (LFOs) are accessible from the front panel soft-keys and large 320 x 240 LCD graphic display.

Earlier samplers normally had a RAM capacity of several MB. Both the S5000 and S6000 are expandable to 256 MB and feature stereo digital I/O as standard connectors. Multiple analog outputs are on the rear panel, as are two SCSI ports for additional storage.

The front panel of the S6000 is detachable, allowing full-function remote control from any convenient location up to 30 meters (nearly 100 feet). Storage options include standard 3.5-inch floppy drive or internal Zip drive.

Both samplers were introduced in Las Vegas at NAB '98 and are expected to be available domestically by late August. The Akai S5000 will have a suggested price of $1,999 and the S6000 will list for $2,999.

For information, contact Akai in Texas at (817) 831-9203 or circle ***Reader Service 167.***

— Alan R. Peterson

Roll the Tape And Hold The Mayo

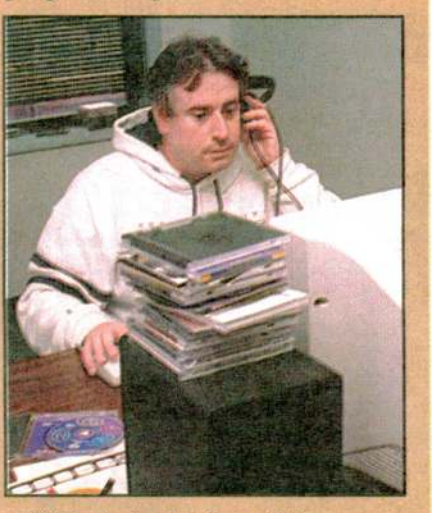
Small Space, Powerful Gear Helped Make RW Online a Success

Alan R. Peterson

Fancy trimmings and perfect acoustics aside, it is surprising to discover that an effective, functional radio production studio can be assembled almost anywhere. With computer-based recording and editing systems, and a little ingenuity, the world can become your own personal Abbey Road.

We should know. We built our own studio here in our offices.

For the April launch of **Radio World**'s new Web page **RW Online** (*www.rwonline.com*), we partnered with Telos Systems to create and produce several hours of original audio programming to be delivered via Audioactive streaming technology. The show segments would be streamed from the Telos booth at the Sands Expo Center during NAB '98 in Las Vegas.



RW Technical Editor Al Peterson massages the mix.

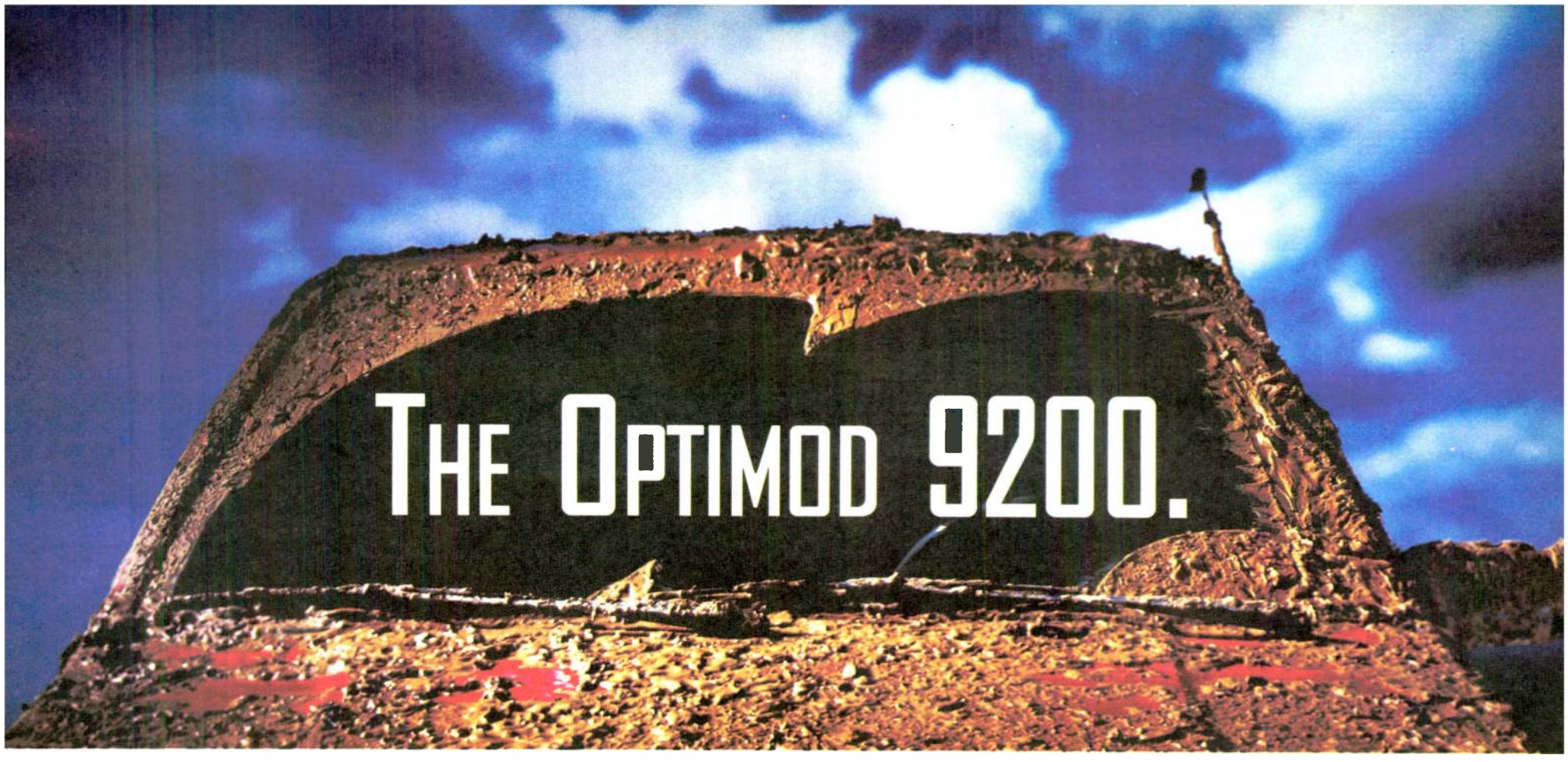
Photo by Sharon Rae

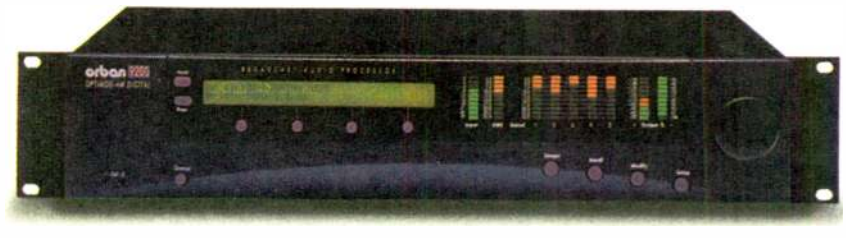
It was necessary to record the various shows to MiniDisc for playback, backtimed as close to 30 minutes as possible to accommodate other Webcast elements from Telos Systems. Each show would contain news, commentary, product information, conversations with our publisher and editor, and promos for the new **RW Online** Web site.

Rather than farm out the work, we took on a pioneer spirit and produced the entire project in-house.

See ONLINE, page 89 ▶

World Radio History





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Instead, announcer and telephone voices have true presence and impact. Music has real bass, with punch and warmth, not boom. Highs have FM-like clarity. All of which means you'll attract a bigger share of that lucrative drivetime audience, and keep it.

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Circle (8) On Reader Service Card

World Radio History

'Band' Together for Symetrix EQ

Steve Cunningham

I like simple analog tools that do their jobs effectively. Symetrix has produced such a simple analog tool that works quite well: the model 551E Five-Band Parametric Equalizer.

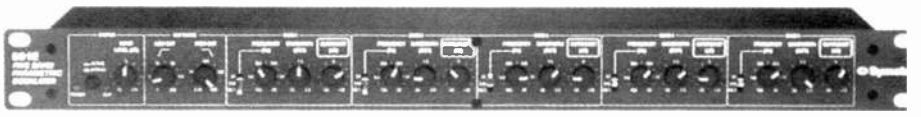
The 551E is a single-channel unit that features five identical bands of parametric EQ. Each band's frequency can be set anywhere from 10 Hz to 20 kHz, with a bandwidth of 0.05 octave to 2 octaves, and from 12 dB of boost to 20 dB of cut. The 551E occupies one rack space.

The left-most controls on the 551E are labeled System and include the Bypass switch and Input Level control. The Bypass switch controls a relay which, when engaged, shunts the input signal directly to the output. The relay also is engaged when the power is removed, so the 551E will pass audio when the device is turned off. The Input Level control can boost or cut the input signal by 15 dB, which provides enough range for most applications.

Make the cut

To the right of these are a low-cut and a high-cut filter, both of which have a slope of 12 dB per octave. The low-cut operates in the range of 6 Hz to 260 Hz, and the high-cut has a range from 3 kHz to 65 kHz. By the way, that is not a typo. I really meant *65 kHz*.

Filling the rest of the front panel are the five identical bands of parametric EQ. Each band has the standard complement of Frequency, Bandwidth, and Cut/Boost controls.



The Five-Band Symetrix 551E Parametric Equalizer

The frequency control has a three-position toggle switch associated with it that sets a frequency multiplier to x1, x10 or x0.1 (divide by 10). This arrangement does require one to note the switch setting and do a little quick math inside the head, but this is better than having the bands dedicated to a fixed frequency range.

Because the 551E is a mono unit, its back panel is somewhat spartan. The input and output jacks are balanced XLR and TRS quarter-inch connectors. These connectors can be run unbalanced if desired and the manual includes adapter wiring examples to illustrate this. Incidentally, the XLR jacks are gold-plated, a good indication of the quality of this unit.

Greenie check

What did you expect? Of course I took it apart. Inside I found precision surface-mounted capacitors, resistors and op amps all soldered to a heavy fiberglass double-sided PC board. Simple and effective. Taken together with its steel chassis, the 551E left me with the impression that the unit could take a considerable amount of abuse without impairing its operation.

The 551E worked as advertised on a variety of program material. In particular, I found that with the Cut/Boost controls set at their zero detented position, there was no apparent phase or frequency change with the 551E in the audio path.

The individual controls are smooth and nicely damped. The knobs are a bit small for the ham-handed, but they have a nice rubbery texture that offers a good grip.

It takes a good ear to use parametric EQ effectively. The graphic sliders found on home stereos are quite forgiving, but one of these EQs can really tangle things up if you don't know what you are doing. Equalization, like seasonings, works better in pinches than in gross amounts.

Symetrix claims better than 96 dB signal to noise and more than 114 dB dynamic range. While I did not have access to the test equipment necessary to verify these numbers, I did confirm that the 551E was extremely clean and quiet, with ample headroom. I did notice, however, the Bypass button produced a slight thump in the audio when switched.

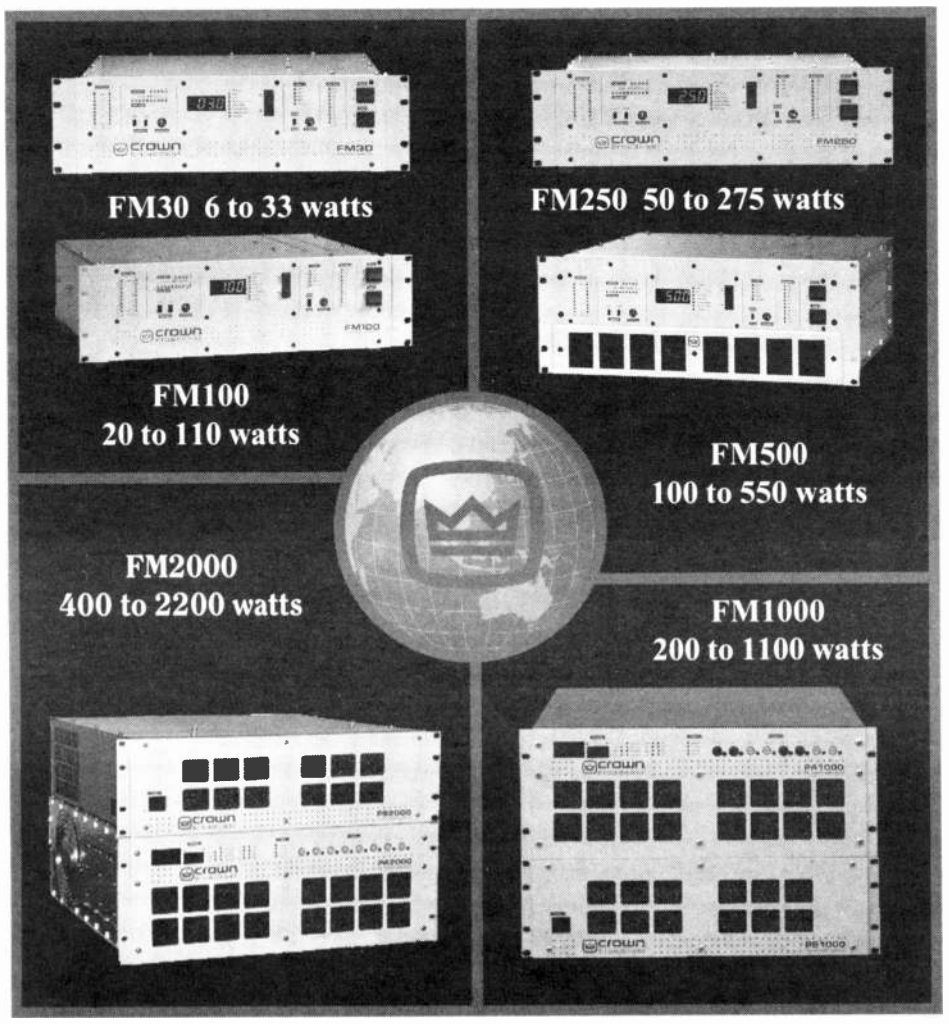
In today's world of programmable digital widgets for pro use and radio alike, it is refreshing to use a product that is unobtrusive and works well. The Symetrix 551E does just that. It is simple and effective. Working in stereo? Be sure to get a pair; the 551E is a mono unit.

■■■

For information, contact Symetrix Inc. in Washington state at (425) 787-3222 or circle ***Reader Service 40.***

Steve Cunningham calls himself a "professional marketing geek" as well as free-lance voice talent and keyboardist. Formerly with 360 Systems, he was part of the team that rolled out the Instant Replay and Short/cut digital audio devices. He can be reached at synthman@loop.com

A World of Possibilities. . .



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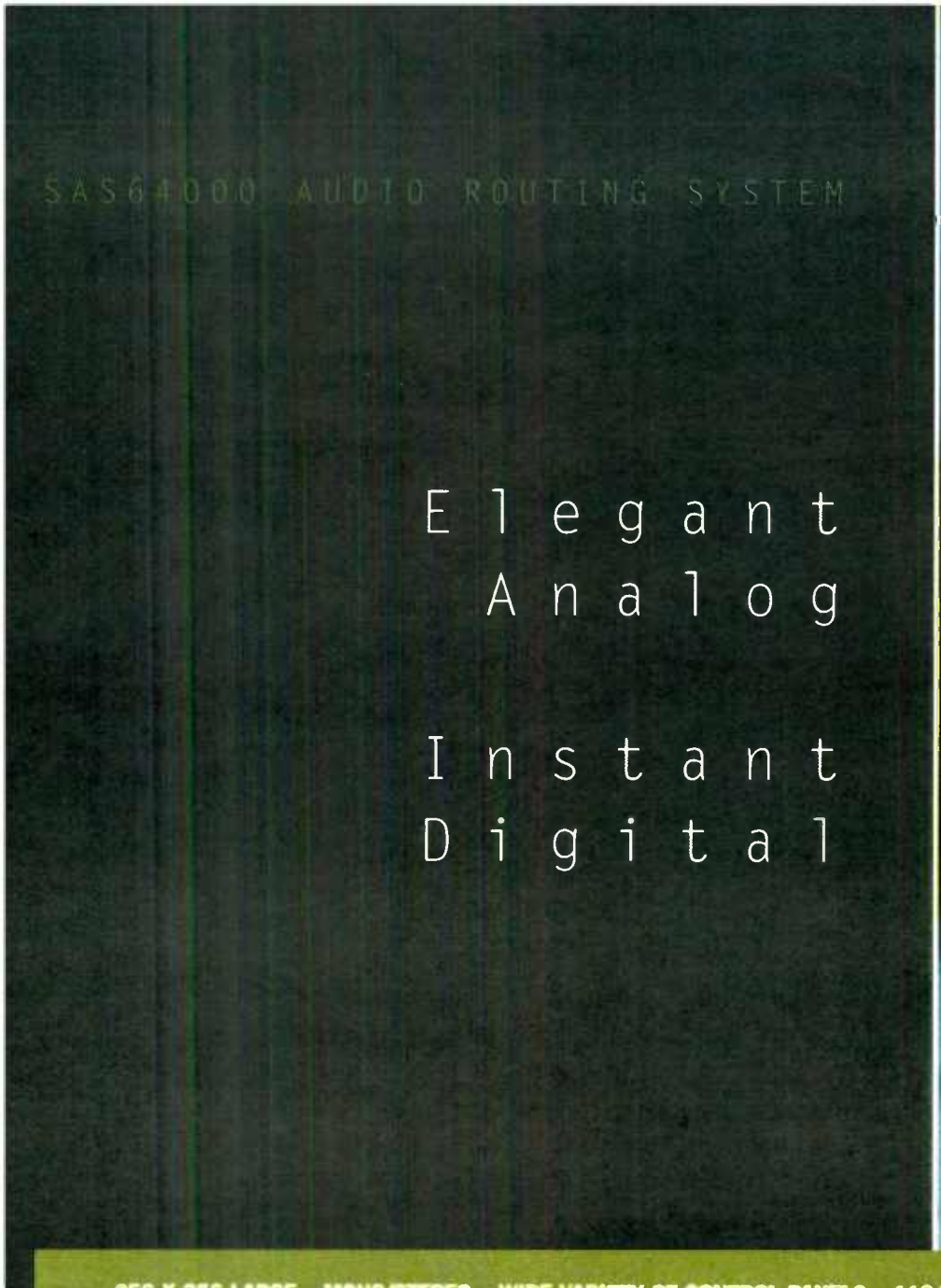

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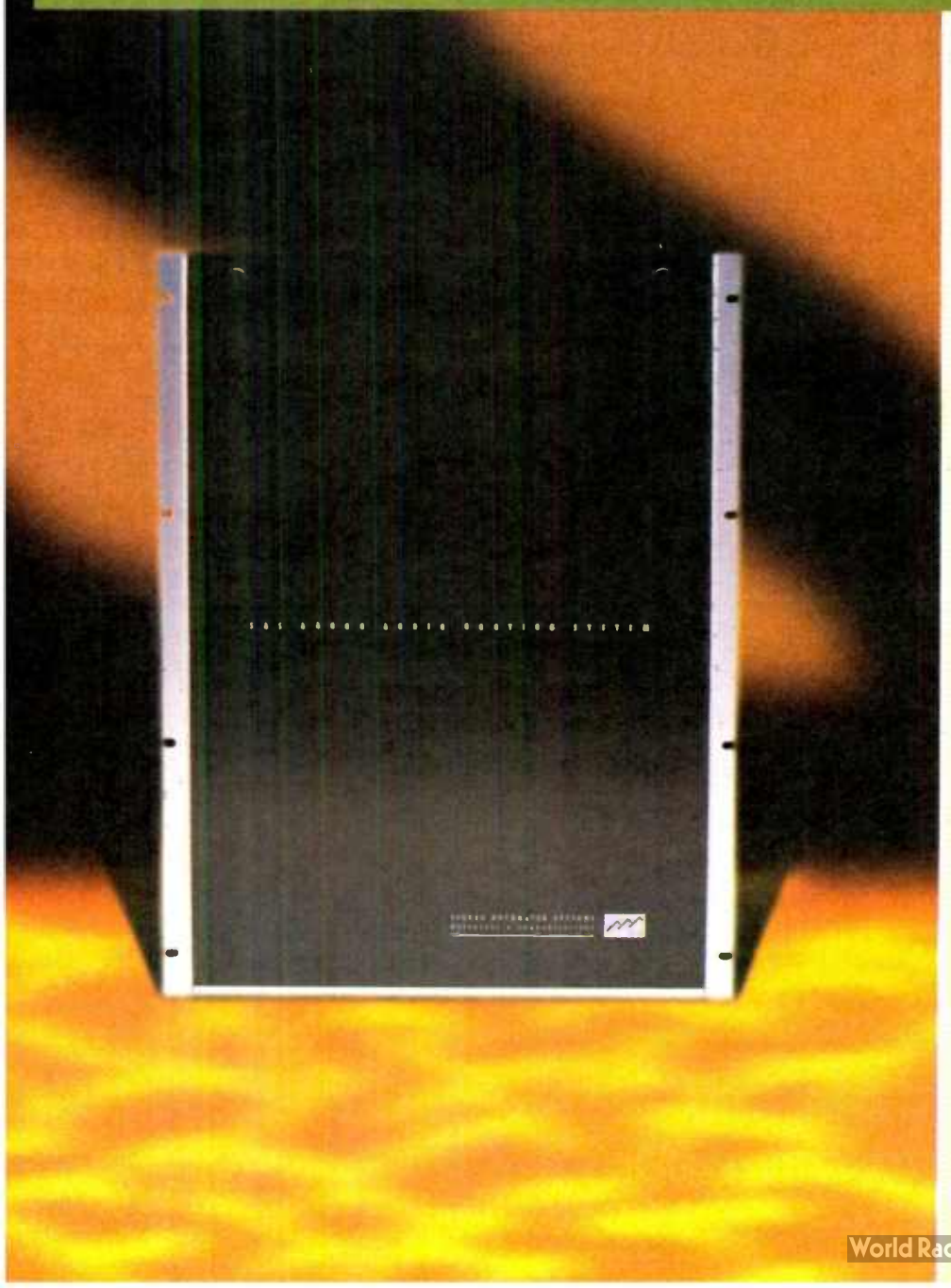

If the migration to digital is in your future, then this is the route to take. Introducing the large size, big performance analog router that also speaks fluent digital. A true hybrid that allows you to scale the number of analog and digital ports as needed, now and in the future. And even better, the SAS64000 creates a forward path to AES/EBU digital audio without creating analog obsolescence.

This means you can mix your analog and digital I/O in the same router frame. Go direct analog to analog, or digital to digital. Or mix it up with 24 bit conversion analog to digital and vice versa. Either way, this unique architecture sports flawless signal integrity and non-blocking flexibility.

And it's wonderfully simple, just plug in our new digital port expander and that's it. Welcome to digital! —co-existing richly with analog in the same framework.

There's lots more to tell. Call us: 818 840 6749. Fax us: 818 840 6751. E-mail us: sales@sasaudio.com Check the Web site: sasaudio.com And of course, snail mail: 2112 North Glenoaks Blvd. Burbank, California 91504 USA

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◆ PRODUCT GUIDE ◆

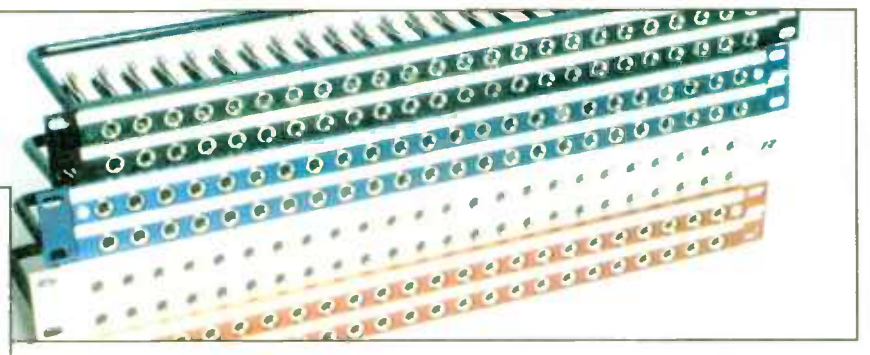
Products for Radio Production

Mail info and photos to: RW Product Guide, P.O. Box 1214, Falls Church, VA 22041

Re'an Panel Products

Re'an USA introduced a new long frame patchbay and three-color molded knobs.

The new quarter-inch LF (Long Frame) Series patchbay features 48 or 52 jacks and are available in four colors for instant color-code verification of connection. The assembly is mounted on a durable insulating panel and a rigid, heavy-duty aluminum frame.



The series is complemented by the company's line of 1/4-inch patch cords, with quad cores and twin conductors inside a shielded PVC cable jacket. Each cord is fitted with three-conductor nickel-plated brass plugs and come in lengths from 12 to 48 inches.

Re'an also has a new series of three-color molded knobs for customized consoles and panels. They can be molded in either hard or soft plastic.

For information, contact Re'an USA in New Jersey at (973) 808-0063 or circle ***Reader Service 142****.*

T.C. Electronic Mic Preamp/Converter

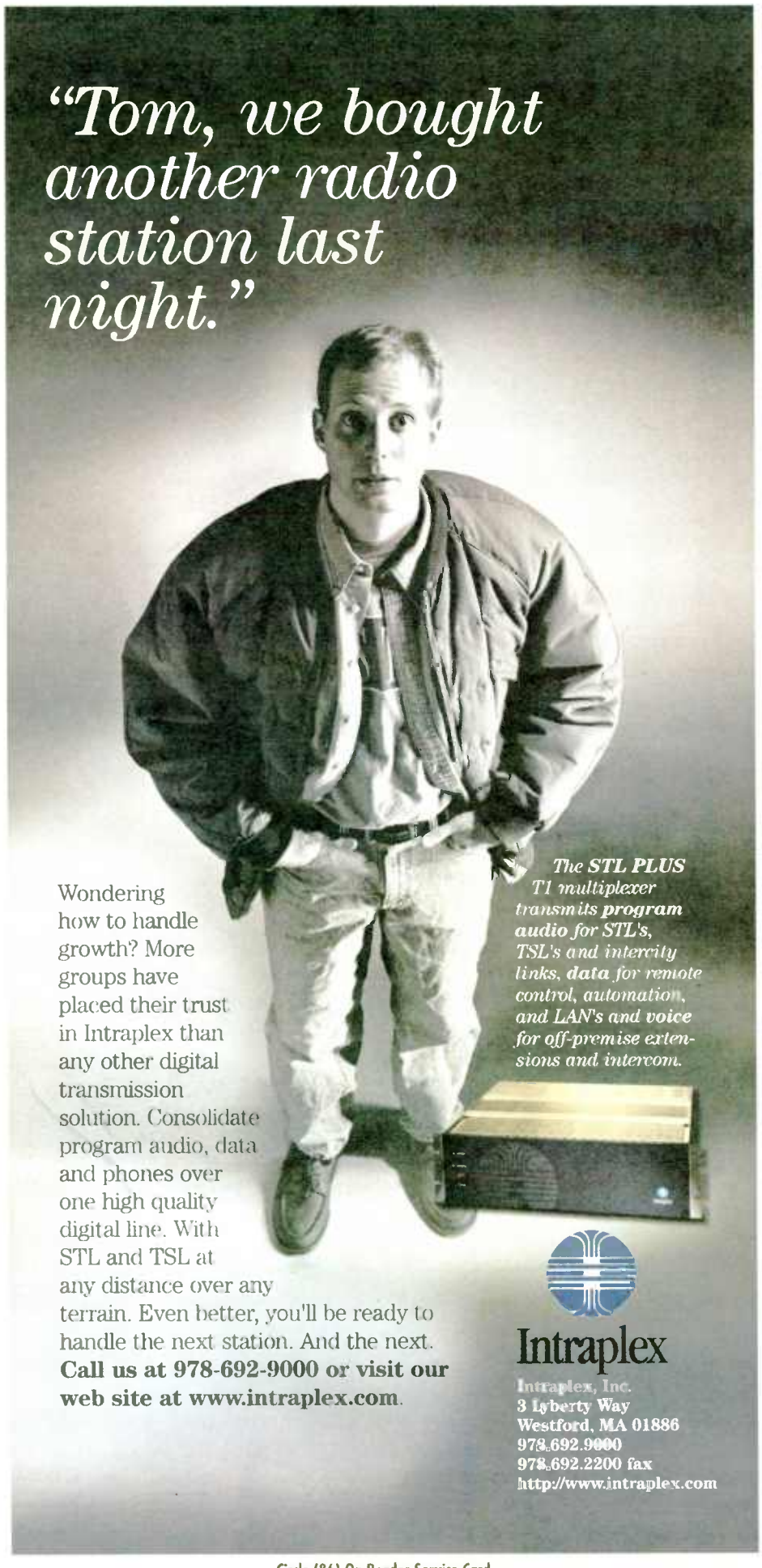
T.C. Electronic introduced the Gold Channel two-channel digitally enhanced microphone preamplifier.

The Gold Channel features an expander/gate circuit, a compressor/limiter, EQ, phantom power and phase inversion switches for both channels. High-resolution 24-bit A/D conversion provides multiple simultaneous digital outputs in AES/EBU, S/PDIF and ADAT optical formats. The Gold Channel also features 200 user preset memories for instant recall of custom configurations.

Suggested price of the T.C. Electronic Gold Channel mic preamp is $2,495.

For information, contact T.C. Electronic in California at (805) 373-1828 or circle ***Reader Service 116****.*

See PRODUCT GUIDE, page 83 ▶



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Our Customers Say....
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READER SERVICE 70

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World Radio History

◆PRODUCT GUIDE◆

Products for Radio Production

Mail info and photos to: RW Product Guide, P.O. Box 1214, Falls Church, VA 22041

Telex Digital Duplication System

In response to requests from radio stations, project studios and talking book producers, Telex Communications created the EDAT digital master editing and duplication system.

The EDAT system consists of a PCI soundcard and software designed to run on a Telex-optimized PC running Windows95. The system is compatible with KABA cassette duplication decks or the Telex 6120 XL and ACC 4000 decks. EDAT accepts RCA analog and optical digital signals from any source, and can accept WAV files directly from another sound card application.

Master audio is loaded into the EDAT 4 GB hard drive and can be spooled off to the duplicating decks in real time or at 2x, 8x or 16x real time. Track configurations include standard four-channel (stereo in both directions), two stereo configured mono tracks or four individual mono tracks.

For information, contact Telex Communications in Minneapolis at (612) 884-4051 or circle ***Reader Service 12.***

BSS Compressor

The BSS Audio division of Harman Pro North America launched its Opal Series of audio processors with the new DPR-422 dual compressor and de-esser.

The DPR-422 features broadband de-essing, variable from 800 Hz to 15 kHz. Four LED bargraph meters tracks gain reduction and output for each channel. A stereo link button straps the two VCA sidechain circuits together for overall compression via the left channel settings.

Inputs and outputs are on electronically balanced XLR jacks. Sidechain send and return connections are on 1/4-inch TRS jacks. Inputs and outputs can be switched between +4 and -10 levels. The DPR-422 has an internal power supply, negating the need for a wall-wart power block.

For information, contact BSS in Tennessee at (615) 399-2199 or circle ***Reader Service 38.***

ATI Digital Distribution Amps

New from Audio Technologies Inc., the DDA line of digital distribution amplifiers is available in several configurations and with XLR or BNC connectors.

Levels and connectors have been optimized for 110 ohm XLR cable or unbalanced 75 ohm BNC-terminated coax. Sample rates from 27 to 96 kHz are

decoded and cleanly regenerated. The standard sample rates of 32, 44.1, 48, 88.2 and 96 kHz are indicated by front-panel numeric readouts. Loop-thru inputs have switchable terminations and signal status and error messages in the AES/EBU data format are decoded and displayed.

DDA XLR units are available in 1x6, 1x12 and dual 1x6 configurations. BNC versions are available in 1x12, 1x24 or dual 1x12 configurations.

For information, contact ATI in Pennsylvania at (215) 443-0330 or ***circle Reader Service 64.***

Sound Ideas Cartoon Collection

Two collections now available from Sound Ideas place memorable effects from classic cartoons into your radio production projects.

"Rocky and Bullwinkle and Friends" consists of three full-length CDs, filled with 785 effects from the Jay Ward-produced cartoon series. Effects and voices from Rocky, Boris and Natasha, Mr. Peabody and Sherman, and George of the Jungle are all included in this collection. "Rocky and Bullwinkle and Friends" is priced at $395.

Augmenting the existing Hanna-Barbera SoundFX library is a single CD compendium called "Hanna-Barbera's Lost Treasures." This $99 compact disc has 350 effects from animated television shows produced during the '60s and '70s, and a number of effects originally produced during the 1930s.

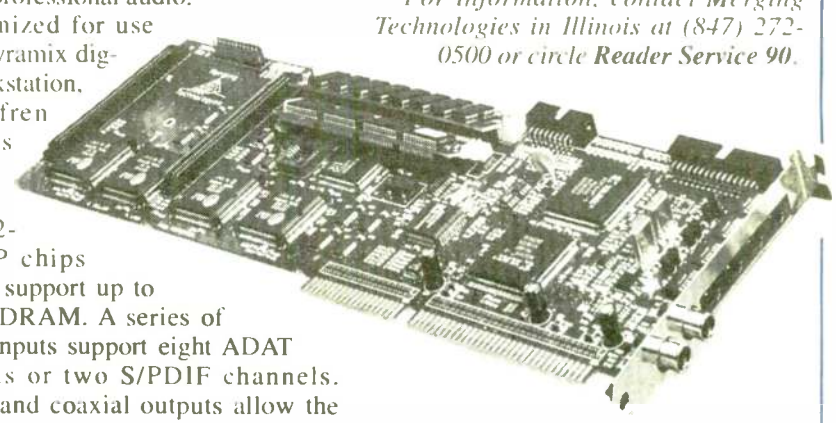
Other collections in the Sound Ideas lineup include Turner Entertainment, with effects from "2001," "Dr. Zhivago" and classic Tom and Jerry cartoons; Warner Brothers cartoon effects; 20th Century Fox movie sound effects and the quintessential radio favorite, the BBC Sound Effects Library.

For information, contact Sound Ideas in Ontario, Canada, at (905) 886-5000 or circle ***Reader Service 14.***

Merging Technologies Kefren Card

The Kefren audio interface card is an ISA plug-and-play soundcard for high-quality professional audio.

Optimized for use in the Pyramix digital workstation, the Kefren utilizes four AT&T 3207 32-bit DSP chips and can support up to 16 MB DRAM. A series of optical inputs support eight ADAT channels or two S/PDIF channels. Optical and coaxial outputs allow the Kefren card to interface with most digital audio mixers and recorders.



The Kefren is capable of eight channels of simultaneous I/O and supports sample rates of 32, 44.1 and 48 kHz in Basic configuration. Options allow support of 64, 88.2 and 96 kHz rates.

For information, contact Merging Technologies in Illinois at (847) 272-0500 or circle ***Reader Service 90.***

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World Radio History

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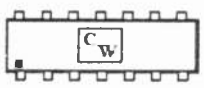

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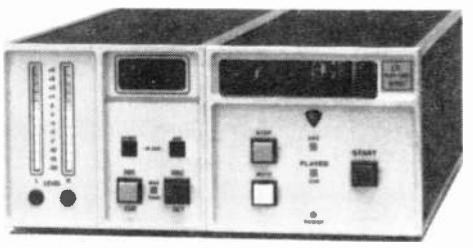

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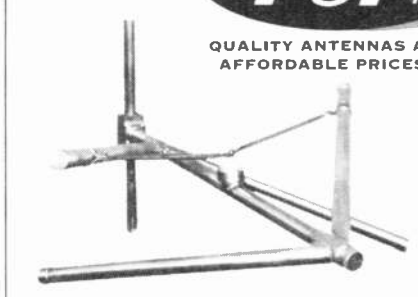

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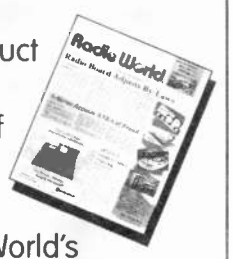

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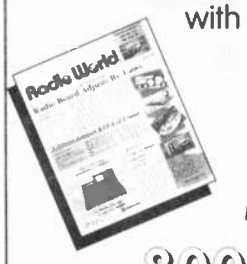

For rates and more information, call Michele Inderrieden at

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extension 159

World Radio History

Otari Brings MO to the Studio

▶ OTARI, continued from page 78

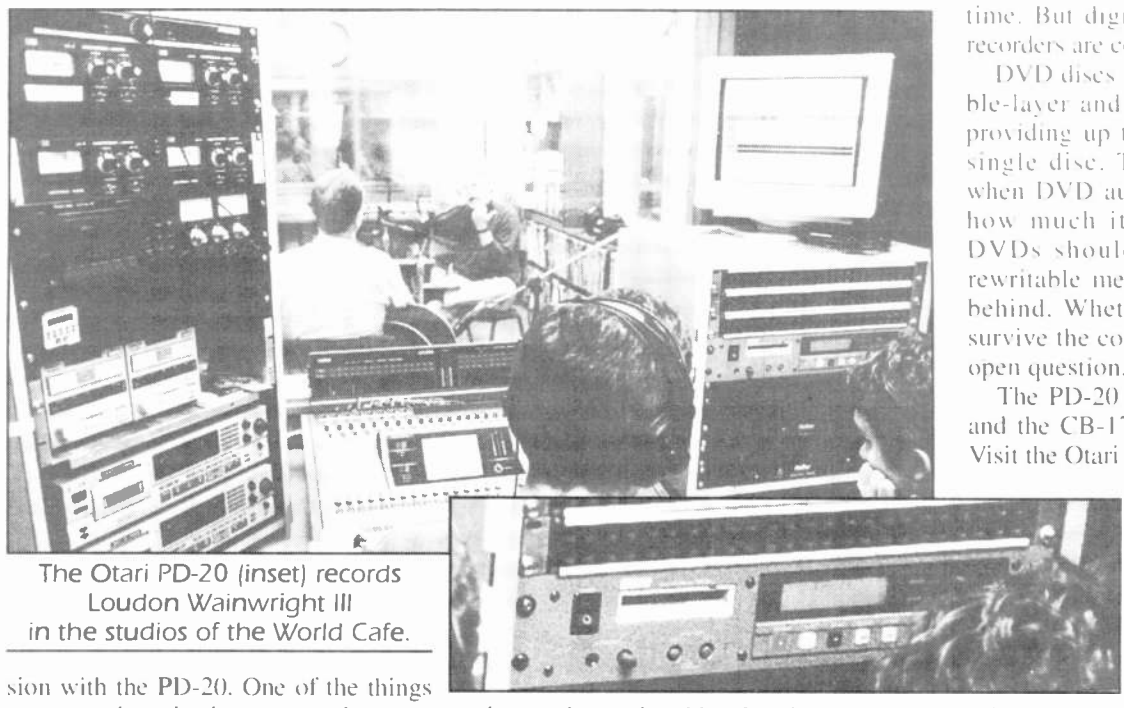
mixture of conventional and surface-mount devices. Wiring harnesses are numbered and socketed, so removal of PC boards should be no problem.

The most common reason for wanting to get inside the PD-20 would be to remove the MO drive. This quickly comes out by removing four screws and two cable connectors. Mechanical fit and finish of interior parts is very good.

The CB-170 remote control is a robust device. With an all-metal case and modular circuit boards, it looks as if it would hold up well in a harsh production environment. Our staff appreciated the headphone jack and volume control included on the back of the controller, making it easy work some distance from the PD-20 without tangled cords.

Another plus: a jack for an external PC/AT keyboard. This is a real help if you are adding titles longer than two or three letters, as the default system of scrolling and clicking on letters to create titles gets tiresome quickly.

The only regular maintenance that Otari recommends is cleaning of the lens actuator in the MO drive. For this you will need a head cleaner for 3.5-inch drives. These generally are available from the same sources as the media. For clean office or studio conditions, this procedure should be done every six months.



The Otari PD-20 (inset) records Loudon Wainwright III in the studios of the World Cafe.

First day at school

There is a lot to learn about with the PD-20, and the manual is up to the task. Included in the 50-odd page manual are directions for installation, basic operating instructions and a reference section. It describes the controls and connectors of both the PD-20 and CB-170 and shows typical screenshots from an editing session.

The instructions are written clearly and are easy to understand, although there is still no substitute for actually logging a few hours behind the CB-170's keypad. An appendix contains a parts list and exploded diagram for both units. No other servicing information is provided.

Loudon Wainwright III was our guest during the first World Cafe recording session with the PD-20. One of the things we wanted to check out were the rumors that uncompressed 20-bit media sounds audibly better than other digital medium. As usual, we rolled main and backup DATs on Sony 2600 decks in addition to the Otari MO. Afterwards, we did an A-B comparison between DAT and MO. We could hear no difference — "bits is bits," as they say. Theoretically, the optical medium should have a lower noise floor and better dynamic range, although the audible difference must be quite subtle.

Post-production with the CB-170 is a joy. The dedicated keyboard and slick interface promote a quick learning curve, definitely less than what is required for the SAW PC-based digital workstation. Like many, I started out editing many years ago with a razor blade and splice block and I was able to do fairly sophisticated cuts after about four hours.

Otari is targeting the PD-20 at the mastering and broadcast markets. While the sonic differences between DAT and MO are slight, the big difference probably will be in maintenance costs and equipment downtime. An occasional cleaning with the special disc is a significant reduction in maintenance time over the regular disassembly, transport cleaning, and occasional head replacement that are necessary for reliable DAT operation.

Thoughts

The arrival of the Otari PD-20 raises bigger questions than how well it works and sounds. The real issue for budget-conscious broadcasters is the longevity of magneto optical technology as an audio recording format. Sure, the large base of computer users for MO discs will ensure that the media will be available for some time. But digital versatile disc (DVD) recorders are coming.

DVD discs have the capacity for double-layer and double-sided recording, providing up to 17 GB of storage on a single disc. The only wild cards are when DVD audio will be released, and how much it will cost. Write-once DVDs should be out in 1998, with rewritable media and recorders not far behind. Whether magneto-optical will survive the competition from DVD is an open question.

The PD-20 has a list price of $6,950, and the CB-170 controller costs $1,000. Visit the Otari Web site at *www.otari.com*

As always, special thanks to World Cafe producer Joe Taylor for loaning his ears and expertise to this evaluation of the PD-20.

■ ■ ■

For information on magneto-optical decks and other Otari products, contact the company in California at (415) 341-5900 or circle ***Reader Service 119****.*

Tom Vernon divides his time between consulting and completion of a Ph.D. He can be contacted via e-mail at tlvernon@aol.com *or by calling (717) 367-5595.*

MOs More Than 'Fat Floppies'

From the outside, MO discs look a lot like 3.5-inch floppies, only fatter. But the similarity ends there, as the construction of the platter and the way data is written is completely different from traditional magnetic media.

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As with CD-Rs, MO drives write with a laser. But the process does not involve burning pits into the disc surface. A tightly focused laser beam heats the surface of the disc while a magnetic recording field is applied. Only the tiny area that is heated is magnetized.

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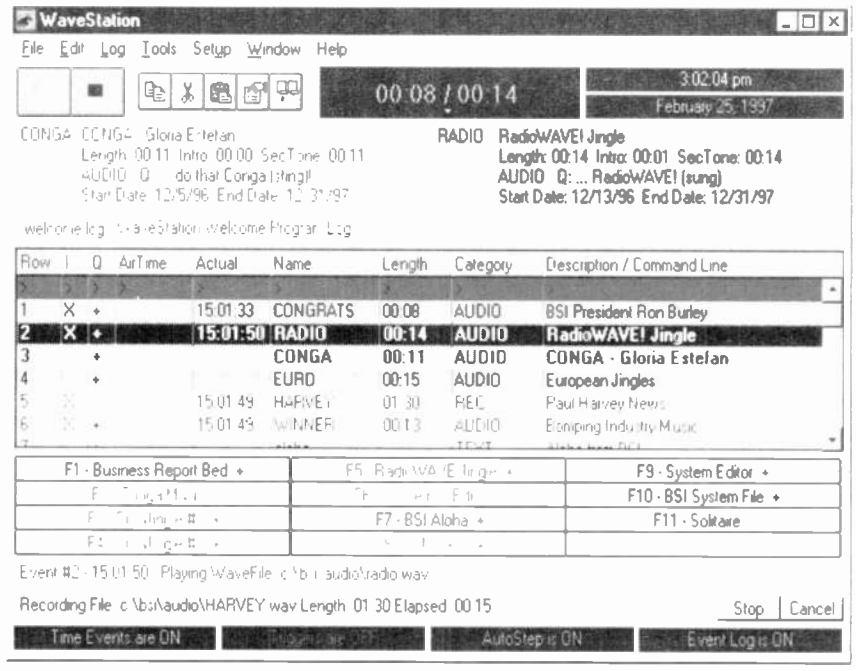

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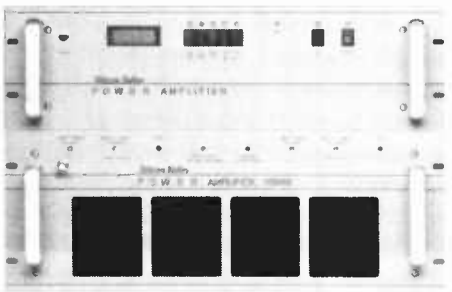

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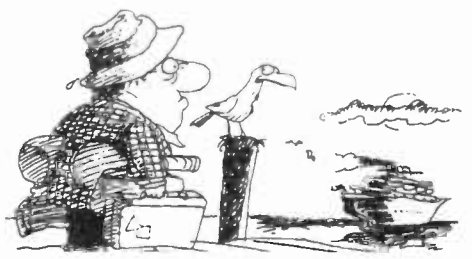

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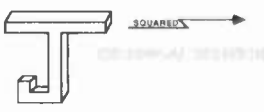

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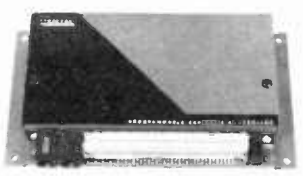

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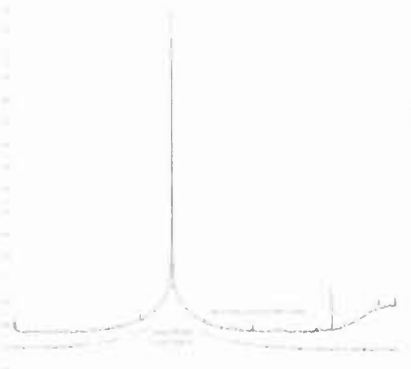

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World Radio History

DIGITAL DOMAIN

Studer Console Is Digital Answer

Mel Lambert

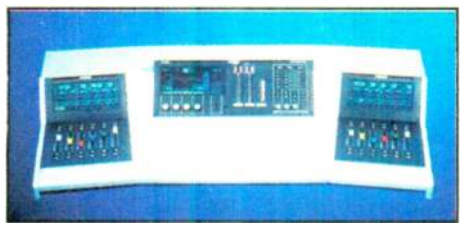
Of the many all-digital console designs being offered for on-air and production-studio use, only a few have had the radio industry falling over themselves with desire. Most are either too complex or too different from what we are used to, or they end up more expensive.

What most of us are looking for is a way to streamline signal flow from mic to STL, enabling all-digital sources from CD, MiniDisc and/or hard-disk replay systems to be incorporated into the composite signal. If the all-digital design also can offer some degree of automation and/or system recall, so much the better.

But if the control surface topology gets in the way or just becomes too dissimilar to what we are used to, then it is all too easy to pass by the design and stay with analog solutions.

But wait ...

One design that I consider worthy of a second look is the Studer ON-AIR 2000 console. This is a console designed as an on-air board, with additional applications within a production studio.



Houston, we have a console. The futuristic Studer ON-AIR 2000 is designed for live radio use.

Designed to integrate DSP and control into a single, modular chassis, the 2000 console offers broadcasters operational capability at a price that shouldn't break the bank. I understand final system costs are in flux, following the recent reorganization of Studer's North American operation; cost of a medium-format system is expected to be in the neighborhood of $35,000.

Available in a modular layout, the 2000 comprises a central control, communications and metering section, linked to banks of six input channel paths that can be placed either to the left or the right of the user. Each input channel features A/B switching and is supplied with an analog mic input module, an analog high-level input or a digital AES/EBU interface with integrated sampling rate converter.

Coming in

Maximum input configuration is 24 input-channel modules — two banks on either side of the central control section — with routing to stereo Program, Record and Audition outputs, plus mono clean-feeds and auxiliaries. Options include dual bargraph-style PPM or VU-style meters for monitoring Program Output; dual 30-segment analog PPM/VU meters; telephone hybrids; profanity delay; timecode and word-clock sync modules; plus serial interface for automation systems.

As well as accepting conventional mono mic sources via high-precision A/D converters, input modules can be configured to handle stereo line-level signals in either analog or digital form (both AES/EBU and S/PDIF) or multiple high-level sources also in analog or digital form.

In this manner, a station can configure a frame to accommodate as many on-surface controls as necessary and use whatever I/O modules are required to handle the number of analog and digital sources to be routed through the air or production board.

To streamline operation, only three switches and a fader are featured on each channel module: On, Off and PFL.

All system setups are handled from a touch-sensitive screen located above each bank of six input modules, in addition to a central screen with four companion shaft encoders. Each input fader is assigned to an area on the multifunction LCD screen, onto which is displayed channel status via touch-sensitive icons.

Using these icons, the central control screen can be used to set and modify parameters directly via the accompanying rotary controls. This is a remarkably simple function, and one that becomes quite intuitive after only a few minutes of use.

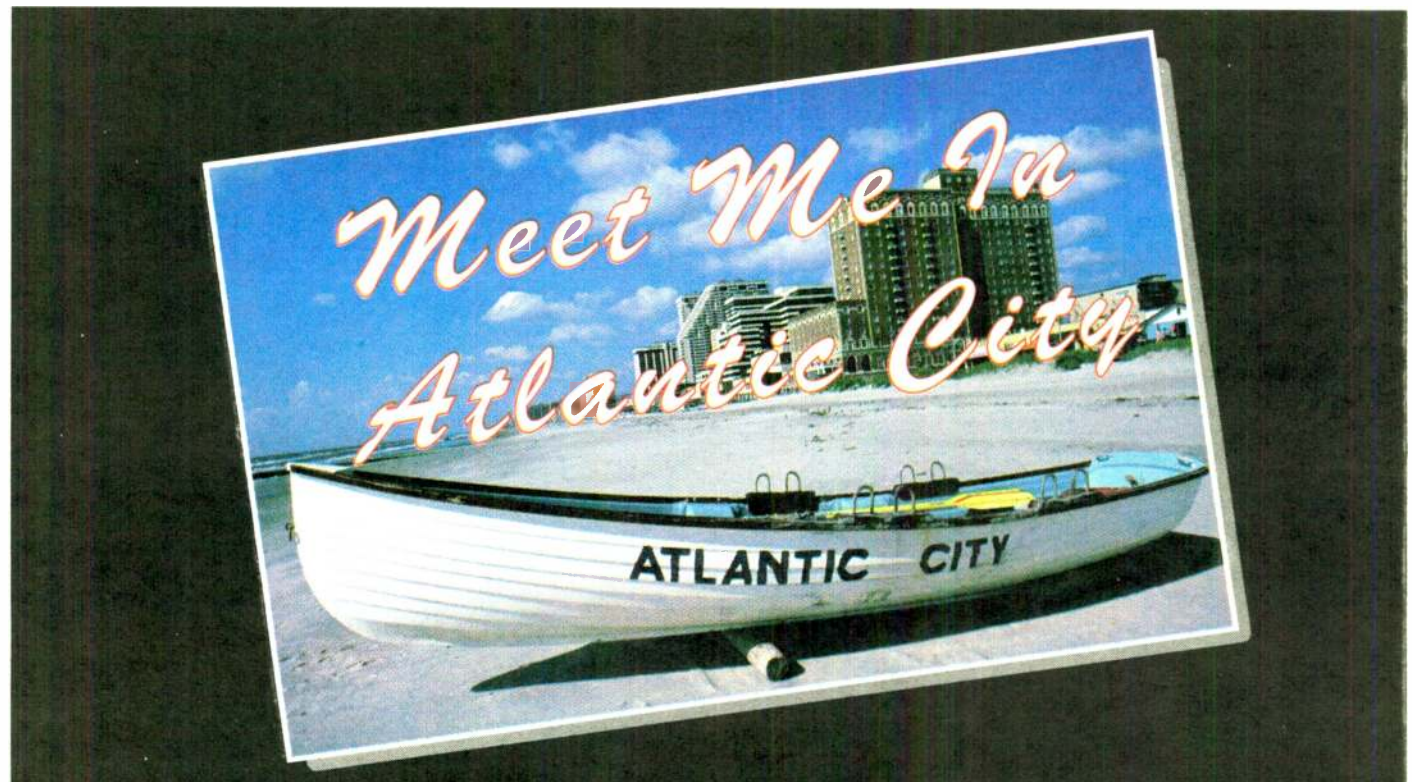
The snapshot automation of this all-digital device enables users to store and recall individual console settings. For example, it is possible to store personal three-band parametric EQ profiles for talent mics directly to a removable PCMCIA card.

Monitoring functions are comprehensive. Separate outputs for DJ/talent headphones, guest headphones, control-room/studio monitoring, studio headphones, talkback to five destinations, and more are possible.

About time

One standout feature — something I have yet to see on competitive products — is position feedback on the four assignable rotary controls used to adjust EQ profiles, auxiliary levels and other

See CONSOLE, page 89 ▶



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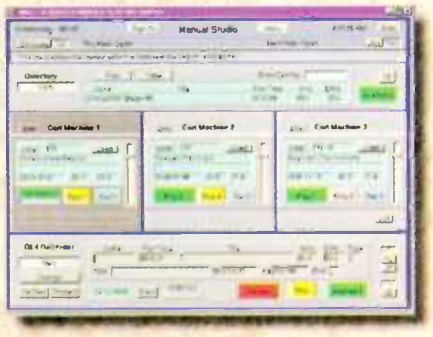

Live Assist $1,995

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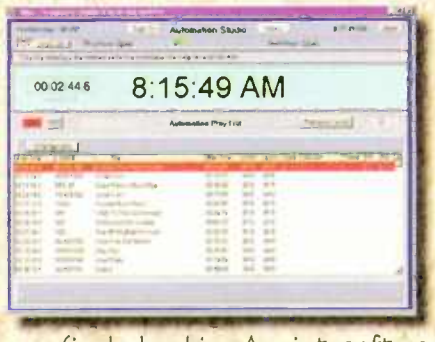

(includes Live Assist software)

Triple Play & Record

Cart Machine Control
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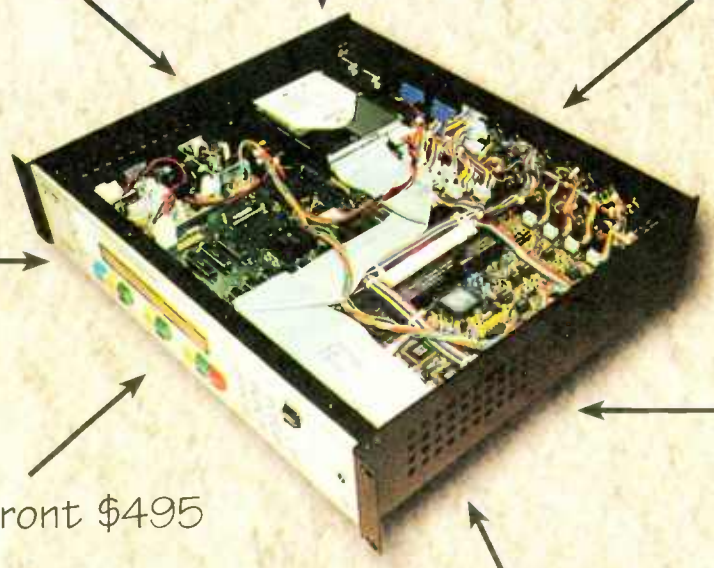

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Optional Front $495

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Circle (190) On Reader Service Card

World Radio History

Recording in Lunchroom Studio

▶ ONLINE, continued from page 78

As many of our writers and editors have broadcast backgrounds, we chose our voices for the project from in-house as well. That took care of the talent and source of copy. Next came the small problem of not having an actual recording studio.

Space became available in a small room adjacent to Room No. 406 — our lunchroom. It was approximately 12 feet by 8 feet, with a locking door and a window that faced a firehouse some blocks away. It was an acoustic nightmare, but it solved the problem of where to put everything. One-third of the room was set aside as an "announce booth," using — of all things — a heavy bed quilt hung from the ceiling and an acoustic office divider to isolate the space from the rest of the room.

Equipment became the next consideration. Loans from home studios yielded a Mackie 1202-VLZ mixer, a dbx stereo compressor and mic processor, a Rode NT-1 condenser mic and a portable Sony DAT machine. A surplus 486/33 PC from our MIS department would be our workstation.

Digigram loaned us a PCX 9 soundcard and X Track software, Groove Addicts and Who Did That Music? granted us a temporary license for music and production elements, and the jingle singers at Ken R. Music recorded two vocal jingles to give us a real *radio* sound.

With an extra lunchroom table as a console and a blue bed quilt as our announce booth, the facetiously named "Studio 406" was open for business.

Once some competence was achieved on X Track, it was time to bring in the announcers. Between writing assignments, deadlines and other distractions in the weeks leading up to the NAB show, staffers from **RW** and sister publication **TV Technology** came in to record their parts.

The quilt attenuated some of the flutter echo that would have resulted from the unbaffled parallel walls of the room. By noise-gating the Rode mic with the dbx mic processor, it was possible to compensate for some of the room's hollow acoustics. Naturally, whenever a fire engine went by, it became coffee-break time.

The Engineer's Position Inside Radio World's 'Studio 406'

The Rode mic had a nice round sound, helped along by dbx compression and a subtle amount of reverb provided by a 1986 Alesis MidiVerb and a Roland VT-1 Voice Transformer.

The Digigram card and software recorded audio to the hard drive as MPEG files, allowing us more than 11 hours of storage on a 2.1 GB drive. Even with decompression to analog audio and a subsequent generation to MiniDisc, the final product sounded superior to any tape project I had ever done at any radio station.

The extra hard-disk time came in handy, with flubs and false starts resulting in multiple takes. One three-minute segment ate up 25 minutes of drive and resulted in one of the best "blooper" tapes imaginable.

When the basic tracks were in place, it was time to edit. A few folks even sat down to splice out their own flubs, once they saw how simple it was to highlight and delete segments in X Track.

Writers know how to cut and paste copy within a story to make it clear. When they approached the computer as a *word processor for sound*, they understood the process completely. If someone at your station still refuses to learn the DAW because "it's too complicated," use the word processing analogy and witness the change.

A $49 Walkman-style compact disc player was patched into the Mackie mixer, and music and effects were dropped in from CD. This might have been a budget production all the way, but you would never know it by hearing the finished product.

The 486 computer had enough muscle to stream five dense stereo MPEG tracks without dropping out or locking up. Pretty impressive for a 33 MHz machine in a newspaper office. And remember, this was all being done in a company lunchroom.

While editing and mixdown was underway, the programming of segments for **RW Online** were being done on paper elsewhere in the building. This would be converted to a playlist, stringing the elements together for dubbing to MD. Meanwhile, in Hawaii, Fox TV network announcer Joe Cipriano was tracking our intros, outros and bumpers. These would be delivered via ISDN to Telos Systems in Cleveland, then dubbed to both DAT and MD and express-shipped to us.

End result

The mix was monitored through a set of Audix PH-15 powered monitors that had come to us in a most timely manner — for review and evaluation. The dbx compressor rounded off the corners of the final stereo mix, feeding the analog inputs of a Sony MDS-B5 MiniDisc recorder. A total of 16 MDs was carried out to NAB '98 and handed right to the talent running the live Telos Systems Webcast.

The studio was eventually stripped down and returned to its alter ego as part of the company lunchroom. But during its time as Studio 406, it proved a valuable point: Thanks to modern production equipment and some smarts, high-quality radio production really can be done *anywhere*.

■ ■ ■

***RW Online** wishes to acknowledge the following companies for their assistance in this project: Sony, Digigram, Groove Addicts, Who Did That Music?, Mackie, Audix, Rode, dbx, Ken R. Music, Alesis and Roland, with a special nod to Telos Systems. Sorry, but the blooper tape is not available.*

Futuristic Air Console

▶ CONSOLE, continued from page 87

system parameters.

Dependent upon the selected function, the 2000 console adds built-in end stops or center detents to the positional scaling. Now, as with an analog control, we know when the control passes through a center-pan location, for example, or reaches the end of its useful adjustment range. This is a great innovation, I would suggest, for those us who feel that endlessly rotating knobs without positional feedback leave a lot to be desired as intuitive control elements.

Last fall, Georgia Public Television (GPTV) in Atlanta, installed a 24-input ON-AIR 2000 console in one of its two control rooms. Both control rooms (the other is equipped with a Studer analog board) work with three on-air broadcast studios.

According to Aaron Allen, assistant director of engineering for GPTV, the new model 2000 adds a powerful combination of sonic quality and ease of use that greatly simplifies complicated switching scenarios.

"We're very impressed with the 2000's operation ease and high functionality," he said. "The console has loads of features all of them simple to use, yet incredibly powerful. For instance, the ON-AIR 2000 already has excellent ease of input assignability, and we'll be adding six mic-input channel extension modules. This will allow us to have all three studios feeding either or both digital and analog consoles simultaneously and in any configuration we need. We've already used the console on several broadcasts and are pleased with the results."

Information is available from Studer USA, 1449 Donelson Pike, Nashville, TN, 37217; call (615) 360-0465; fax (615) 360-0274, or **circle Reader Service 219**.

■ ■ ■

Mel Lambert is principal of Media&Marketing in Los Angeles and can be reached at (818) 753-9510.

SHORT TAKE

New Broadcast Mics From Audio-Technica

In response to broadcast and production interest in condenser microphones, Audio-Technica has developed the 30 Series line of high-performance mics, all priced at less than $400.

There are three inaugural models launching the 30 Series. Each is designed for a different purpose in the studio, while all three carry similar specifications: each has flat response from 30 Hz to 20 kHz, high SPL handling capability up to 148 dB, a switchable 10 dB pad and 80 Hz rolloff, and 48 VDC phantom power operation. All mics use a vapor-deposited gold diaphragm in the condenser element.

The mic shown on the left is the small-diaphragm omnidirectional AT3527. Factory application notes indicate two such mics would be appropriate for ensemble stereo miking. In the center is the similar-looking AT3528 with a cardioid pickup pattern.

To the right is the large-diaphragm AT3525 with a fixed cardioid polar pattern. The floating isolation mount and large-diaphragm construction suggest this mic is appropriate for studio vocal production and on-air use.

Audio-Technica has priced these microphones at $299 for the two small-diaphragm models and $399 for the large-diaphragm AT3525, including the shock mounting.

Audio-Technica mics were once called "a good mic for the price." With the introduction of the 30 Series, the company is looking to make a serious impression in the broadcast mic arena. Watch for reviews of these microphones soon in **RW**.

*For information, contact Audio-Technica in Ohio at (330) 686-2600 or **circle Reader Service 193**.*

— Alan R. Peterson

World Radio History

Time to Gas Up? Page 94

AM Alive and Well at NAB Show

W.C. Alexander

The return of AM radio was the topic of discussion among numerous broadcasters at NAB '98.

With a viable AM DAB system on the horizon, struggling AM stations may be within a few years of getting a new lease on life. This being said, the exhibit floor was filled with exciting AM transmission products, both new and established.

In This Issue

This month, *Buyer's Guide* takes a look at AM Transmission.

Cris Alexander walked the floor of NAB '98 and reports on the AM transmitters and related products he found there.

Ed Dulaney provides useful tips on maintaining your AM system.

As always, we provide news from manufacturers about their latest products, including useful contact information so you can follow up.

Please feel free to send ideas, comments and thoughts via e-mail to *bgalante@imaspub.com*

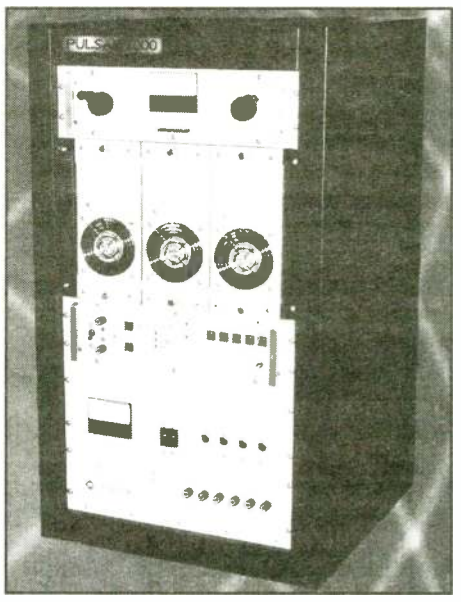
Transmitter central

AM transmitters were in evidence everywhere on the exhibit floor, with a clear emphasis on DAB compatibility.

Energy-Onix displayed its Pulsar 1000 1 kW solid-state transmitter. The company offers a line of solid-state AM transmitters, from 250 W to 100 kW.

Omnitronix showed its Omni 5000 5 kW solid-state AM transmitter. Dave Solt of Omnitronix said, "Our transmitters are all-digital, right up to the power amplifiers. There are no analog signals flowing through the transmitter's wiring right up to the RF stages of the output modules." Solt said his transmitters have no IPA stages and the output modules can be pulled "hot." Omnitronix also offers a line of solid-state shortwave transmitters.

At the center of the **Harris** radio exhibit was the DX-50 50 kW solid-state digital AM transmitter. This unique transmitter has been in the field for several years and is a proven performer.



The Pulsar 1000 from Energy-Onix

Ed Longcrier of Harris told RW that the DX-50 is DAB-ready, with the linearity and bandwidth needed for use with any of the AM DAB systems being developed. Harris also had its Gates Five polyphase PDM solid-state AM transmitter on display.

New look

Broadcast Electronics introduced its new 6 kW solid-state AM rig, the AM-6A, at NAB '98. The AM-6A is based on the same power module and controller design as last year's hit, the AM-1A.

BE engineer Jerry Westberg said, "The AM-6A has higher power modules and better air handling than the AM-5, which it replaces. It's cool." The AM-1A, which was also on display, is rack-mountable and UPS-shippable, and offers an economical solid-state alternative for AM stations at or below the 1 kW power level.

Nautel had its XL-60 60 kW solid-state transmitter on display. Jorgen Jensen said, "With all the talk of AM DAB, there has been a great deal of interest in the XL series of transmitters, which all are DAB-ready. We have been working with USA Digital Radio, and the XL series of transmitters has met or exceeded every performance requirement that USADR has presented us with."

Nautel also had its 12 kW XL-12 on

See AM, page 91 ▶

Routine Care Of Your AM Transmitter

Ed Dulaney

When was the last time you changed the oil in your car? How about the last time you went into the doctor's office for a checkup? The last time you took a shower?

If these things are routine to you, then you are already on the path to a better, more healthier lifestyle as an engineer! Only one more thing, and your life will be complete. That "thing" is *regular AM transmitter maintenance.*

For the engineer whose life centers around keeping his or her transmitters on the air at all times, there is nothing that is more important than proper maintenance of the equipment. I would like to share a few tricks, tips and hints that will make your job much easier.

Although these tips are meant to apply to AM transmitter maintenance, there are many fundamentals that apply to AM, FM and television — indeed to all aspects of transmitter maintenance.

Maintenance and manuals

A good plan of action for transmitter maintenance starts with good documentation. All transmitters are shipped with a manual, whether a simple owner's manual or a complex maintenance and repair manual.

Located within the manual is a template that can be used for logging important transmitter readings. If your manual does not have such a log, get the office computer up and running and create your own.

Every log should contain the basic readings associated with the radio station transmitter. To put it in the simplest terms: If it has a meter, it should be logged. Keeping a log of readings helps you track important events in the transmitter's past such as tube or transistor failure, voltage fluctuations, overloads, and so forth.

Within the AM broadcast transmitter are a number of smaller circuits that make up the entire unit. Each of these circuits requires varying degrees of maintenance. We will look at each circuit or collection of circuits, and point out the important areas of maintenance.

The first item in the chain is the power supply. You should check

See TRANSMITTERS, page 96 ▶

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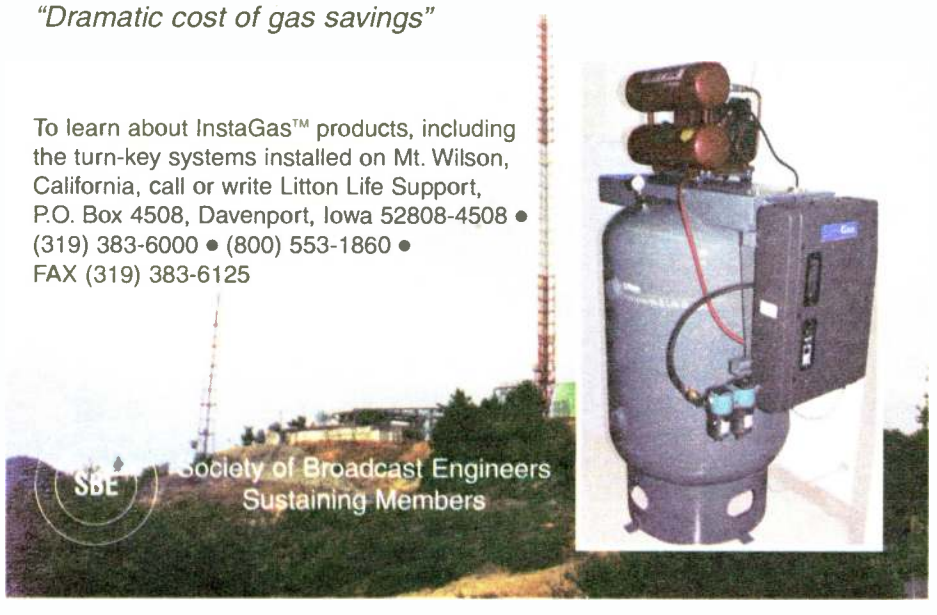

Circle (216) On Reader Service Card

World Radio History

▶ AM, continued from page 90

the floor, along with the tried-and-true ND-5.

Continental Electronics displayed its 317E 50 kW solid-state transmitter. Continental's Adil Mina said, "Our transmitter has twice as much silicon in it as other manufacturers' 50 kW solid-state transmitters, which is to say that it has more power capability. It is easy to operate, easy to maintain."

The transmitter features a diagnostic microprocessor that monitors every important transmitter function and allows remote troubleshooting via modem using Continental software. The company also showcased the 316D, a 10 kW version of the transmitter. Production models of this transmitter have been in the field for some time.

Kintronic Phasing Cabinet

Delta Electronics debuted a new wideband, wide-range digital RF ammeter built on the proven design of its TCA series of toroidal RF ammeters. The new meter is autoranging and will allow a station with widely different day and night power levels to operate with a single common point or base RF ammeter, whereas previously a multiscale meter or multiple meters were required.

Also on display from Delta was its line of AM stereo exciters and monitors as well as its line of RF test equipment, including operating impedance bridges, common point bridges, receiver-generator and Splatter Monitor.

COMING SOON
Coming in
Buyer's Guide
Audio Processing
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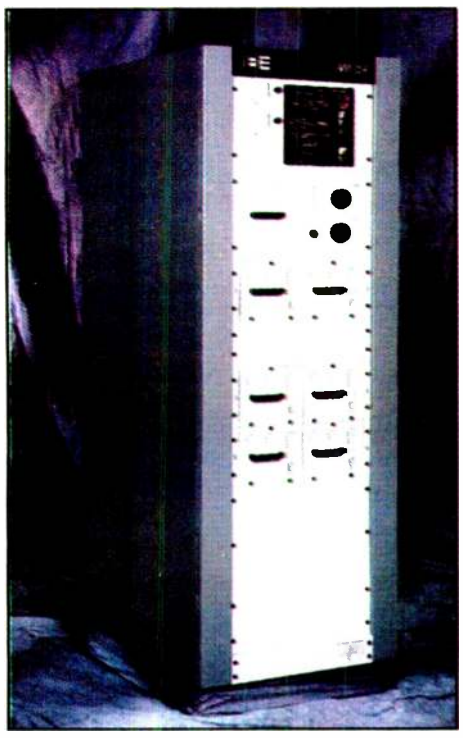
Supporting roles

In addition to transmitters, a number of vendors and manufacturers displayed other AM transmission products.



The AM-6A from Broadcast Electronics.

Among them was **Phasetek**, which had a 50 kW phasor on display. Phasetek also manufactures custom diplexing systems as well as folded unipole antennas, tuning units and other AM antenna components and systems.

Kintronic Laboratories had a 50 kW phasor and an expanded band diplexer on display, both of which were destined for transmitter sites after the show. There were also some new products on display, including a fiber-optic coupled PCL antenna system controller. The PCL controller uses a microprocessor to control the relays and solenoids in an AM phasing and coupling system for mode switching. This model achieves a high degree of isolation from the outside (and lightning-prone) world by connection to the towers and phasor with a fiber-optic cable.

The other new product is a transportable, tunable low-profile emergency antenna system. Tom King of Kintronics said, "This emergency antenna can be set up in about six hours on a 300-foot-square piece of land." The antenna is designed to get a station back on the air after a tower collapse or other catastrophic antenna failure.

Potomac Instruments, long-time manufacturer of antenna monitors and field strength meters, had its proven 1900 series of antenna monitors on display. Also shown was the FIM-41 field strength meter, which has long been the mainstay of AM signal measurements.

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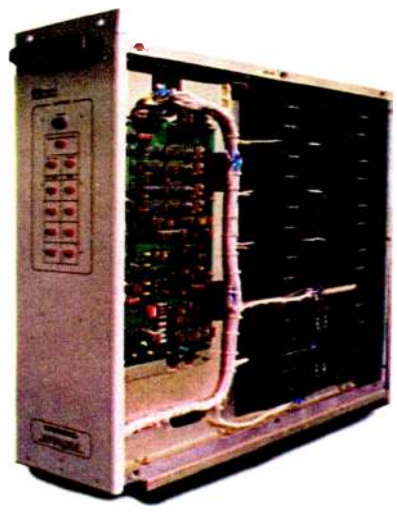

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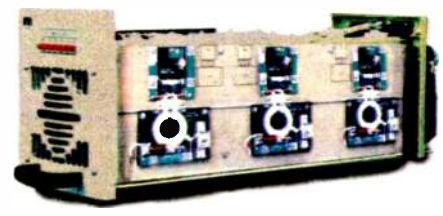

FM Power Module

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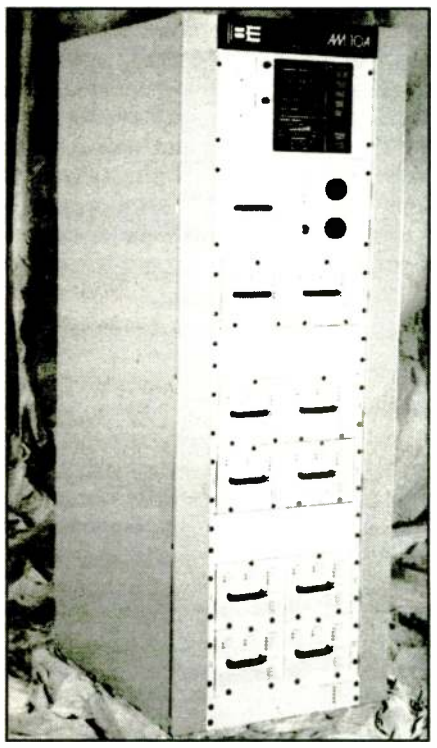
TARGET: AM TRANSMISSION

AM Transmission Products Abound

Broadcast Electronics

Three new models make up the **Broadcast Electronics** "A" series of solid-state AM transmitters. These 1 kW, 6 kW and 10 kW transmitters are among the smallest available at each respective power level. The 1 kW unit can be shipped via UPS and the 10 kW transmitter is packaged in a single rack.



The AM-10A from Broadcast Electronics.

The improved cooling provided in the BE "A" series reduces the operating temperature of the RF devices by more than 10 degrees Celsius, doubling the life expectancy of the components. Along with improved cooling, the devices now used in their AM transmitters have a higher power rating and are more rugged than earlier devices.

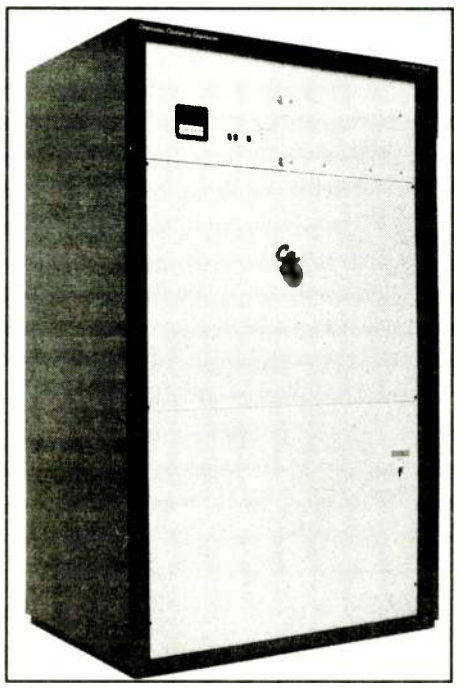
Switching power supplies provide reliability and allow the transmitters to operate at virtually any output power level. BE says you no longer need to purchase a nighttime-only transmitter or dump power into a load in order to meet required post-sunset or pre-sunrise power levels.

Audio performance of the "A" series is accomplished through the use of phase linear filters which eliminate ringing. Thus the transmitters can reproduce the original complex audio signal more accurately.

*For more information, contact Broadcast Electronics at (217) 224-9600; fax (217) 224-9625; or circle **Reader Service 15**.*

Continental Electronics

All **Continental Electronics** solid-state AM transmitters use the same basic module, capable of delivering approximately 2 kW with 100 percent modulation. This construction philosophy allows these solid-state transmitters to be conservatively rated at 20 percent higher than the nominal power level.



The 316D 10kW from Continental Electronics.

The Continental Electronics "D" Line of solid-state AM transmitters consists of several models. The 50 kW model 317E transmitter uses 32 identical modules; the 316D-1 version uses 16 identical modules for 25 kW.

Rounding out the Continental Electronics "D" line of transmitters are the 316D 10 kW transmitter with eight identical PA modules; the five-kilowatt 315D with four modules; the two-module 314D 2.5 kW transmitter and the one-module 314D 1 kW unit.

Although manufactured as the 317E, this transmitter is essentially an extension of the "D" Line. This is a higher-powered version of the "D" Line transmitters, but has the same modular, amps, control, metering and monitoring capabilities.

The 317E incorporates advanced engineering innovations resulting in low power consumption. It is available with an optional AM stereo generator.

Each of the 32 identical power blocks in the power amplifier consist of five RF amplifier assemblies and five PWM modulator assemblies. Each RF amplifier assembly can provide 390 W each for a total output of 1,950 W. Of the power blocks, 31 are used in the output PA and one is the driver amplifier for the output PAs.

All solid-state "D" line transmitters are modular and self-contained, requiring minimal floor space. Each model boasts a unique PWM generation technique which provides compensation for power supply sag at low modulating frequencies, resulting in essentially no droop.

Each module uses 40 transistors in the RF output section and 10 in the modulator section. When more than one module is used, series-combining allows equal load sharing by all modules while eliminating losses in balancing resistors.

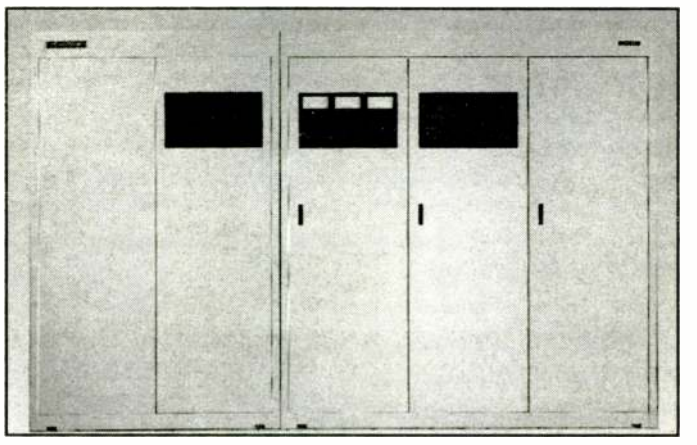
*For more information, contact Continental Electronics in Texas at (214) 381-7161; fax (214) 381-4949; or circle **Reader Service 66.***

Harris Corp.

The **Harris** DX 50 is a 50 kW AM transmitter combining digital and solid-state technologies to provide reliable performance in a medium-wave transmitter.

The patented digital AM modulator uses 128 identical solid-state RF power amplifiers, each controlled by low-level DC voltages.

The Harris digital modulator applies audio and a carrier level signal to a 12-bit analog-to-digital (A/D) converter. The resulting digital signal is applied to a modulation encoder which controls each power amplifier. The amplifiers are turned on and off with modulation to generate a high-level amplitude modulated signal. The individual RF amplifier outputs are summed in a series RF combiner.



Harris DX50

The DX 50 uses a patented lightning protection system that the company says virtually eliminates failures. Built-in surge protection is standard on AC main lines and internal power supplies. The DX 50 uses redundant circuit designs in critical areas. Soft failure and FLEXPatch reassignment ensure uninterrupted broadcasting without significant degradation in performance.

Simple user interface is another feature of the DX 50. There is an easily-accessible remote control interface panel; a front-panel ColorStat signal flow diagram uses status LEDs to monitor key operating stages.

*For more information, contact Harris in Illinois at (217) 222-8200; fax (217) 222-0581; or circle **Reader Service 41**.*

Inovonics

A single-package AM audio processing system, the Model 235 from **Inovonics** incorporates slow, "gain-riding" AGC, three-band dynamic compression, variable equalization and an integrated limiter/clipper.

NRSC-compliant, the 235 is also available with low-pass frequencies for European medium-wave and international short-wave service. It is easily

See PRODUCTS, page 94 ▶

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imas
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World Radio History

HARRIS DRC 2000 DIGITAL RADIO CONSOLE

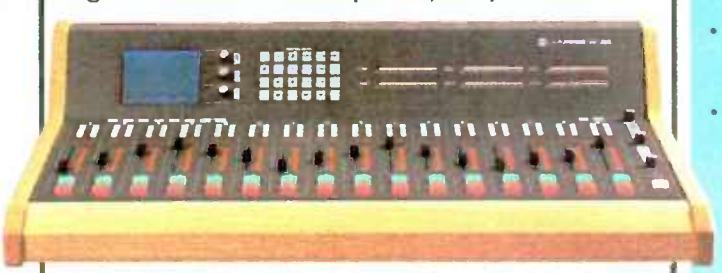
Future-Proof Your Operation.

Take your radio operation to the next level with the Harris DRC 2000 Digital Radio Console. It delivers the next generation in state-of-the-art capabilities.

The DRC is famous for not only meeting, but exceeding the expectations of broadcasters everywhere. It offers the world's best 5 band parametric equalizer per channel as a standard feature. Assignable per channel, the filters include: low shelf, notch, bandpass, peak and high shelf. You can even use one or all five EQs simultaneously on any input.

With the Harris DRC 2000, you get versatility beyond compare. Don't spend time reconfiguring hardware. It's completely user-configurable. With the DRC's powerful software, you can change the console to match your needs in literally seconds.

The console surface has a familiar design so that talent can learn to use it quickly. But, don't let its familiar controls fool you, the DRC provides the high level of sonic quality expected from today's broadcasters. Power comes from 32-bit internal precision floating DSP technology.



The Harris DRC 2000 Digital Radio Console now includes linking and reverb.

No matter what the future of your broadcast facility holds, the DRC 2000 will keep you "future-proofed" with its exceptional capabilities— all in an easy-to-use and install package.

Unique Harris DRC 2000 Benefits

- Linking allows expansion of the console or multiple studios to be linked together (optional)
- Reverb (optional)
- Dedicated "dump" button for use with delay option (optional)
- User-definable fader layout which allows any input to be assigned to any fader (optional)
- EQ, gating, pan and compression functions that can be assigned by channel and set-up (optional)
- Built-in mix-minus (optional)

HARRIS CORPORATION
BROADCAST DIVISION

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FAX: 765-966-0623

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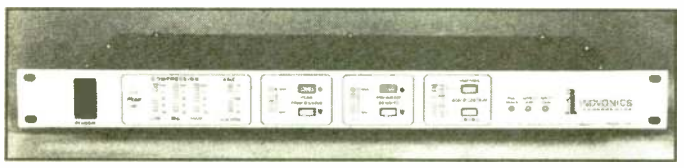
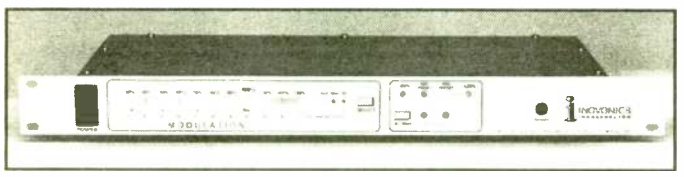
World Radio History

AM Radio Transmitters on Tap

▶ PRODUCTS, continued from page 92



Inovonics 235 AM ...



... and the 520 AM

set up from the front panel or by computer via a built-in RS-232 port.

Also new from Inovonics is the Model 520 AM modulation monitor, featuring a built-in tunable preselector for off-air operation.

The 520 gives an accurate, easily readable display of positive and negative modulation peaks and incoming RF levels. The unit has four peak flashers; two are user-adjustable, and the others are factory-set at absolute limits. The user is given remote access to the peak flashers as well as to loss-of-carrier and loss-of-program alarms.

For more information, contact Inovonics in California at (408) 458-0552; fax (408) 458-0554; or circle ***Reader Service 67****.*

Kintronic Labs

Optilink from **Kintronics** is a digital fiber optic intelligent control system for use in AM directional antenna sites. The Optilink system, combined with the Kintronic Labs model DAC-MOD-2-12 software-programmable controller, offers local or remote operation of a radio broadcast transmitter site via microwave or satellite link.

The Optilink system is easy to install, with only two optical cables required between the controller and each tower. The system operates up to three autonomous RF contactors at each tower. All together, there are six autonomous communication channels and six supervisory channels.

The system is well-protected from weather elements. A watchdog timer tracks sudden disruptions in processor operation. There are also transient suppression devices on all interface lines.

Optilink

Each Optilink system for fiber-optic control between the control rack and each tower of an AM directional array includes a DAC controller interface and RISC fiber-optic communication unit; an ATU RF contactor interface and RISC fiber-optic communication unit; and two direct burial optical cables with connectors. The cables can be cut to a maximum of 1.25 miles.

For more information, contact Kintronic Laboratories in Tennessee at (423) 878-3141; fax (423) 878-4224; or circle ***Reader Service 92****.*

Litton

The InstaGas nitrogen concentrator from **Litton** is designed to enhance the transmission quality of radio stations battling land and weather elements.

A feed air source of clean, 60 pounds per square inch air enables the InstaGas concentrator to deliver 99.5 percent pure nitrogen at flow rates ranging from 11 to 42 standard cubic feet per hour (scfh). The InstaGas is available in three turn-key models. If compressed air is not readily available, an 11, 22 or 42 scfh system comes equipped with its own compressed air source.

Litton InstaGas

If compressed air is available, four different InstaGas systems will concentrate either 11, 21, 31 or 42 scfh of nitrogen, respectively.

The InstaGas nitrogen concentrator offers many benefits over nitrogen cylinders and dehydrators. With adjustable pressure capability, the product is engineered for unattended use and continuous operation in transmitter facilities. Each turn-key system includes a concentrator; a Litton ceramic oxygen switch for guaranteed operation; a regulator for plenum output pressure; and a pressure switch to alert the user of a power interruption or a major increase in flow.

A storage plenum is selected to match the application of the user. The standard plenum sizes are 80 to 120 gallons, though other sizes are available. The InstaGas system maintains the plenum pressure between 40 and 50 pounds per square inch.

InstaGas concentrators can be built according to nitrogen requirements, and may be purchased as standalone concentrators or in configuration packages with various options. They must be located in a well ventilated area, with temperatures ranging between 38 and 104 degrees Fahrenheit.

For more information, contact Litton in Iowa at (319) 383-6000 or circle ***Reader Service 93****.*

Omnitronix

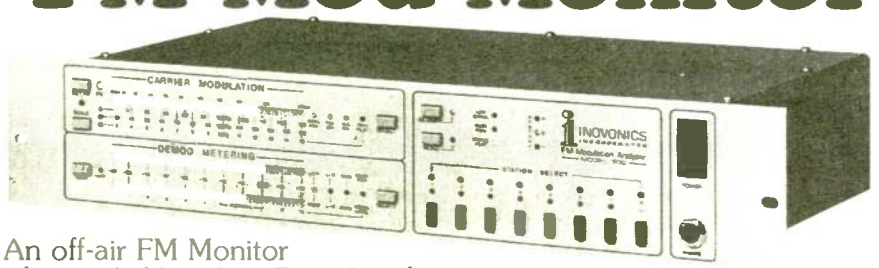
The new line of portable, frequency-agile AM broadcast transmitters from **Omnitronix** is the result of a request from the federal government, which wanted a portable modular transmitter that could fit in the back of a Hum-Vee military vehicle.

The transmitters have been designed to make the inner workings easily accessible. The power amplifiers and controller are in standard relay panels and can be slid out of the rack for access. The power supply is similarly accessible.

The transmitters have typical power outputs of 5 kW or less. Anticipating a potentially limited availability of power, all units use high-efficiency solid-state technology. The Omnitronix carrier frequency synthesizer can be set in 10 kHz steps for continental U.S. applications and 9 kHz for international use. Frequency changes can be quickly dialed in with front-panel thumbwheel switches.

See PRODUCTS, page 95 ▶

A Best-Value FM Mod-Monitor



An off-air FM Monitor of remarkable value. First-class features and outstanding performance have made the Model 530 a favorite the world over. Check these product highlights:

- Accurate, high-resolution bargraph metering of carrier deviation and demodulated program audio; pilot, subcarrier and residuals. Meter also displays signal strength and multipath distortion to aid antenna alignment.
- Pushbutton tuning with 8 station presets for "comparative market evaluations."
- Rear-panel outputs for composite MPX and balanced program audio; plus remote peak flasher, carrier-loss and program-loss alarms.

MODEL 530 FM MODULATION MONITOR

Inovonics, Inc.
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www.inovon.com

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Nautel

The **Nautel** XL60 solid-state 60 kW AM broadcast transmitter has reserve power for aggressive AM signal processing and up to 155 percent positive peak program modulation at 50 kW.

Actually capable of up to 66 kW, the transmitter is suitable for simultaneous IBOC digital transmission while maintaining full-power AM service. The Nautel Interphase Pulse Duration Modulation system provides wideband frequency response and linear phase response while satisfying all designated IBOC performance criteria.

The XL60 boasts 10 front-access power modules which are hot-pluggable and safely on-air serviceable. Full 50 kW transmission is possible while a power module is removed for service. Options include a direct digital synthesizer for future phase-coded transmission and a built-in AM stereo generator with selectable mono or stereo mode.

Duplication of critical low-level

Nautel XL60

circuits is unique to Nautel AM transmitters. Should problems develop in the RF drive circuits or the modulation encoding or drive circuits, automatic transfer to the standby system will maintain normal transmission without operator intervention. Overall efficiency of 84 percent results in low power consumption and cool reliable operation.

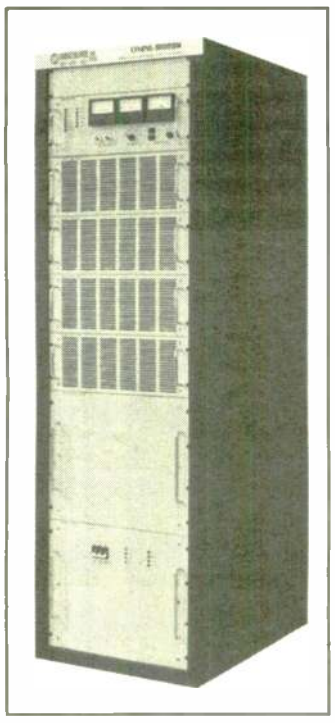
For more information, contact Nautel in Canada at (902) 823-2233; fax (902) 823-3183; or circle ***Reader Service 144****.*

World Radio History

NAB '98 AM Radio Friendly

▶ PRODUCTS, continued from page 94

The carrier frequency can be generated or changed by the frequency synthesizer in one second without the need to dial variable components into the harmonic filter. Omnitronix uses broadband amplifiers, which are capable of covering the entire AM spectrum without adjustment.



Onmitronix AM Shortwave Transmitter

For more information, contact Omnitronix in Pennsylvania at (215) 699-2400 or circle ***Reader Service 118.***

Svetlana Electron Devices

Svetlana Electron Devices has the new version of the 4CX20,000B tube, a plug-compatible replacement for the original model of the same name. It is

Svetlana 4CX20,000B

ideal for AM broadcast transmitters.

The 4CX20,000B power tetrode is used in pairs as Class B modulators and as the Class C high-level modulated RF power amplifier stage in AM broadcast transmitters. The updated model features a modern mesh filament design, ensuring mechanical rigidity and long-lasting concentricity.

For more information on the Svetlana 4CX20,000B tube, contact Svetlana Electron Devices in Alabama at (205) 882-1344; fax (205) 880-8077; or circle ***Reader Service 42.***

Warner Electric

An extensive line of voltage regulators for AM transmitters can be found under the **Warner Electric** STABILINE trademark.

Identified as the WHR Series, the regulators are designed for power systems up to 660 VAC and ideally suited for any broadcast applications requiring protection. Constant voltage to sensitive electronic and electrical systems is maintained, even when input voltages and system loads vary widely.

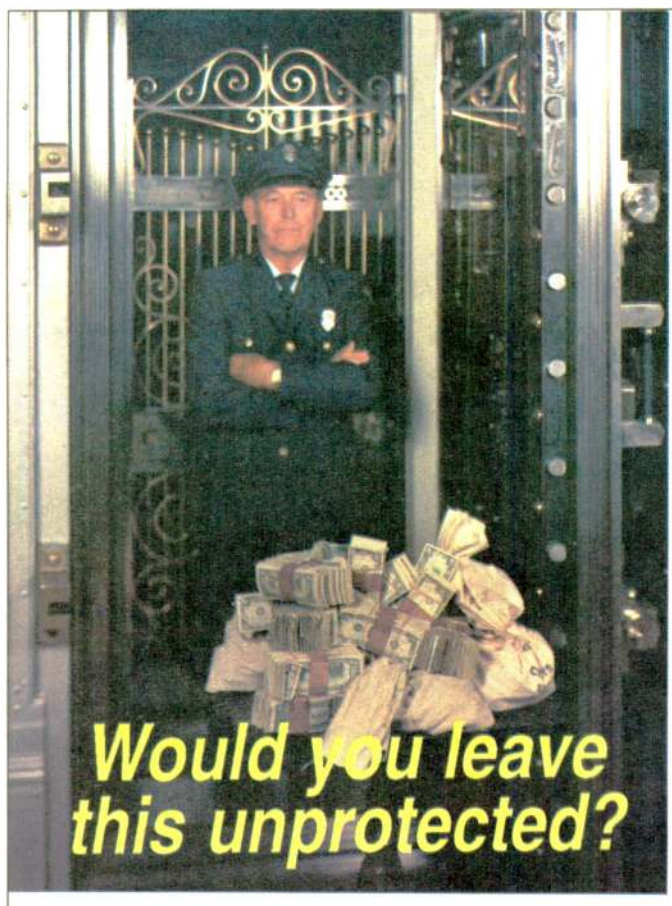
Various models are available with power ratings ranging from 2 to 1,680 kVA that hold output voltage to plus or minus 1 percent with 99 percent typical efficiency and no waveform distortion or power factor restrictions.

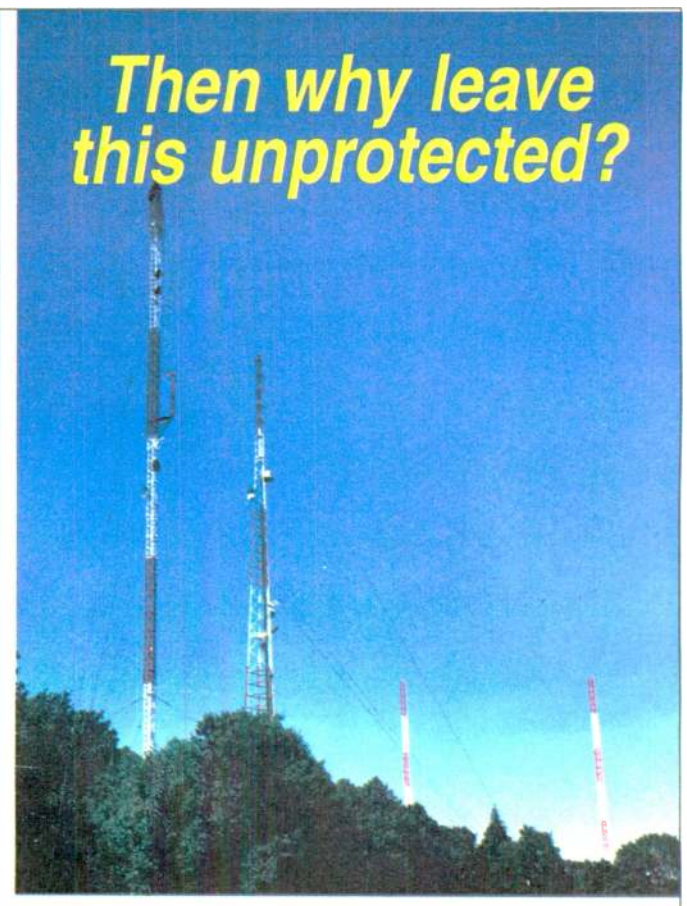
Warner Electric WHR Voltage Regulator

Numerous standard options such as analog or digital control, zigzag neutral generation, single or individual phase control, tropical treatment and more permit close tailoring to most applications.

A recently introduced low-profile model has been designed for mobile broadcast vehicle and studio use. This rapidly responding 3.6 kVA narrow-range unit is rated for single phase duty at 120 VAC, 50/60 Hz. It can be used in standalone or 19-inch rack mount installations with any type of load, and will handle high inrush currents, high crest factors or unusual load power factors.

For more information, contact Warner Electric in Connecticut at (800) 787-3532; fax (860) 582-3784; or circle ***Reader Service 94.***





WHR Series **STABILINE®** *Voltage Regulators for radio and television broadcasting installations.*

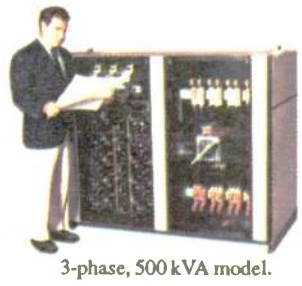
Superior power conditioning to safeguard your business investment.

All delicate electronic devices, including your station transmitters, are designed to perform within a certain voltage range.

More often than not, however, the voltage that reaches your critical operating equipment is highly inconsistent or "dirty" because of power line disturbances like sags, surges, spikes and brownouts. And dirty power can wreak havoc with your broadcast system, mobile production vehicles or remote transmitter sites causing equipment malfunction, hardware/software damage or reduced power tube life.

Don't become a victim of polluted power lines!

Cost-effective WHR Series STABILINE® Voltage Regulators prevent power quality problems from attacking your vulnerable electronics. The preferred choice of broadcasters worldwide for use with transmitters, receiving stations, studios and mobile production units, these high power regulators automatically feed voltage sensitive equipment a constant voltage level – even when the power line input voltage and system load vary widely. STABILINE® – the preferred choice of broadcasters worldwide.



3-phase, 500 kVA model.

The industry's most extensive list of standard options and features:

- Output voltage maintained to ±1%
- Power ratings from 2 to 1680 kVA
- 99% typical efficiency
- High overload capacity
- No waveform distortion
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- High energy transient suppression
- Zig-zag neutral generation
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- Frequency trip meter and ammeters
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For catalog or more information, call, write or fax Ted Gladis.

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World Radio History

AM Transmitter Maintenance

▶ TRANSMITTERS, continued from page 90

the supplies for proper voltage; the manual should give you the tolerance for each supply. If any of the supplies are out of tolerance, they should be diagnosed thoroughly to determine the reason for the problem.

Check all the connectors in the power supply for proper tightness. If you can physically wiggle a connection on a terminal, it is too loose. Connections that are not secure can cause a high-resistance junction to form that will cause the voltage to appear lower to modules and components downstream from the connection.

If you have an older tube transmitter rather than a solid-state rig, check for corrosion on all connections to the tube sockets. Make sure all the nuts and bolts are tight on the sockets as well. A loose connection on a tube socket can damage the socket, tube and wiring.

Attention to detail

On solid-state transmitters, give careful attention to the connections to each power module. This is an area that came back to bite me one afternoon.

I had always checked the connections in the high-power areas of the transmitter, but I never thought that a connection on a small terminal strip could cause any trouble. After all, on most modern transmitters, the power that flows through the connection for RF output on a module is around 350 W.

One afternoon, while servicing my Nautel ND-50, I discovered one of those "insignificant" connections had worked its way loose, causing so much overheating that the plastic around the terminal melted and the screw resembled a piece of charcoal. It drove home the point that there is no insignificant connection in a transmitter. They are all important.

Solid-state transmitters typically have some type of circuit that takes the output of each module and combines them to generate the high-power output. Each connection in this circuit needs to be checked for signs of overheating or corrosion. Correcting a problem before it happens will save the company tremendously in the long run. One small loose or corroded connection in the combiner can cause the breakdown of every module.

Connections and coils

Additionally, the combiner is an excellent place for arcing to occur. Check the walls of the combiner as well as the connections to any coils or capacitors in the circuit for signs of arcing. Clean all components thoroughly.

Dust has always been a major concern for engineers. Even though modern transmitters are not "dust magnets" like their high-voltage predecessors, it is still important to maintain a clean environment.

Buy a bag of dust rags and leave them at each of your transmitter sites. Whenever you go out to the site for any reason, you can grab a rag and dust off the equipment. There is no easier way to prevent problems with a transmitter. Also, grab the vacuum cleaner and give the filters a good cleaning. If the filters are a replaceable type, keep a good supply of them on hand and change them monthly.

The coaxial lines that feed the tower are easy targets for both vandals and varmints. If they are not hidden underground, inspect them monthly if possible. Look for damage to the lines and for any loose connectors or splices. Check the termination connections for corrosion and tighten them if necessary.

If the lines are pressurized, make sure the pressure is at an appropriate level. Have the gauges checked periodically for accuracy. If you have access to an air compressor, use a low-pressure setting to test the gauges, comparing them to a known reference.

Check the ball gaps at the tower base for proper spacing. The gapping formula varies, based on altitude and the base current for each tower. I have made available a simple program that can calculate the ball gap spacing for you. It runs on Windows 95 and Windows NT 4.0. The program is on the Internet at *ftp://members.aol.com/klzftp/pub/ETB.ZP*

KLTT Maintenance Log

Date _____ Time: _____ Engineer _____

Operating Mode _____ Nominal Power _____

XMTR Readings

ND50

FWD Power		Tower 1 Ø		Detuned RF Drive?	
REF Power		Tower 1 I		SWR Cutback?	
DC Supply V		Tower 2 Ø		High B-?	
Supply I - 1		Tower 2 I		High AC Power?	
Supply I - 2		Tower 3 Ø		Low AC Power?	
Common Point		Tower 3 I		Low RF Drive?	
Impedence		Tower 4 Ø		SWR Shutback?	
Frequency		Tower 4 I		High RF Current?	
Module Warning Lights?					

ND2.5

FWD Power		Tower 1 Ø		Detuned RF Drive?	
REF Power		Tower 1 I		SWR Cutback?	
B- VDC		Tower 2 Ø		High B-?	
B- Amps		Tower 2 I		High AC Power?	
+24 VDC		Tower 3 Ø		Low AC Power?	
+15 VDC		Tower 3 I		Low RF Drive?	
-15 VDC		Tower 4 Ø		SWR Shutback?	
PA Volts		Tower 4 I		High RF Current?	
Common Point		Impedence		Frequency	
Module Warning Lights?					

Monitor Points

Point #	Description	Limit	Actual Reading	Time	Comments
#1 - Night	58.5° / 3.53km	7.29 mV			
#2 - Night	88.5° / 2.87km	6.1 mV			
#3 - Night	301.5° / 3.97km	35.3 mV			
#4 - Day	334° / 5.45km	36.1 mV			

Make any additional comments on reverse side and initial here _____

Do not forget to check all the connections in the ATU. Once again, look for any discoloration related to overheating or arcing. Make sure that every connection is tight. If you have a tower with a high impedance, check and double-check the connections to the output leg of the T-network. The chances of arcing increase due to the high voltages present in a high-impedance system.

Finally, if you have a directional array, you should be checking the monitor points periodically. If they have proved stable, they should be checked annually. If there is any instability (even if the points are still within tolerance) then they should be checked quarterly at the very least.

Remember that the antenna monitor and base current meters are the weakest links in a directional array. If they show that the array is out of tolerance but a check of the monitor points shows otherwise, the problem most likely is in the monitor or sampling system and not an actual out-of-tolerance condition.

An AM transmitter site is only as reliable as the maintenance that is placed into it regularly. Just as our bodies work at their peak efficiency when properly nourished and maintained, the transmitter sites will work best when they are clean and adjusted properly.

Remember that, and you will save the company many dollars and save yourself many headaches.

■ ■ ■

Ed Dulaney is chief engineer of AM stations KLZ, KLTT and KLDC in Denver. For the past 20 years he has worked at radio and television stations in Colorado, New Mexico and Texas.

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Amateur Radio BTI 3-1000 tube, roller coils, variable vacuum capacitors, air variables, tubes, sockets, meters, dial turns counters, chassis, panels, cabinets, racks, power supply parts. F Yonker, 814-867-1400.

Harmon-Kardon Citation 12 pwr amp, $200. C Collins, 414-327-4141.

McMartin 10-15 W(rms) pwr amp, 25 V & 70.7 V output, 4-16 ohm output, gd cond. Ron, 732-469-0991.

Want to Buy

Crown amp, older model. M Miller, 812-448-8434.

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Cablewave A10R 50507 1-5/8" Coax, foam filler, (4) approx 250' folls w/connectors, $1100 per roll/BO. S Ross, 317-852-9119.

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New 12-4 speaker or AC cable, 1000', $225 +shpg; Belden 9192 15 awg 1000' double shielded, $500 +shpg. Stephen, 541-346-4091.

RCA FM antenna, 2 section, cir pol w/heaters, excel cond, BO; RCA BR 84 racks, $200; RCA BFC-2 2 bay H&V, power gain =1 w/deicer & trans for each bay, on pole w/3-1/8" input. J Natoli, 614-922-2700.

Rohn 80 350' radio tower, guide, steel, no rust, $16,000 at site, 209-447-2688.

Shively 6810 10 bay FM tuned to 92.5, cir pol, recently rebuilt, excel cond, $6250. J Mosher, 406-265-7841.

Shively 6812-2 FM, cir pol, 2 bay on 91.5 Mhz, excel cond w/radomes & center feed, 1500 W, boxed & ready to ship, $1000 +shpb. G Park, 304-822-5151.

3 bay CP on 97.7, 4 bay CP on 95.7, 8 bay CP on 94.3. JB Ingram, 601-563-4664.

Cablewave HCC-78-50J-120 7/8" foam w/N-type connectors (4), 300' rolls w/N-type connectors on both ends, $5/ft. M Seaver, 217-222-6200.

Dissipator 500 point stainless, $350; rigid 3" 5' flanger transmission line, $200; Magnum 18"x70' tower, $800; Scala FMO 1 bay all chnl 250 W, $250; Potomac AM-19 antenna monitor remote meter panel, $100. D Rose, 888-380-7423.

Fisher-Pierce PE control; Deltrol 30A relay & mechanical flasher. B Zellmer, 970-353-6522.

Kintronics AM isocoupler, used w/5 kW, gd cond, $250. C Jones, 803-854-6396.

AUDIO PRODUCTION

Want to Sell

Altec 1606A mixer/amp, 4 chnl mixer w/plug-in transformers & Altec table top rack, $250. J Borden, 414-482-8954.

ART DR-1 reverb w/wired remote, excel cond, $450. M Schackow, 605-374-3424.

Crown straight line two stereo preamp, excel cond, $75. P Russell, 207-725-3066.

Kahn SP58-1A Symmetra Peak, very clean & in gd cond, $150. D Heidner, 406-388-4281.

Koss/Optimus PRO-90 stereo headphones, new in box, will trade for an older, working pair of AKG K-141 or K-240 headphones; Fostex 3180 stereo reverb w/24mS pre-delay, rack mountable, vgc, will trade for an old UREI cooper time cube (920-16); AKG R-25 console, mountable, remote control for AKG BX-25 reverb unit w/30' cable & connector, trade for Teac RC-170 or RC-90 remote control. J Roper, 812-877-2663.

Orban DSE 7000 digital editor, less than 1 yr old, $14500; w/Audicy upgrade & new warranty, $18000. Bob, 903-577-7423 or email: phi@1starnet.com.

dbx II mdl 142 (2) stereo bdct NR system, excel cond; (2) dbx 3116 NR units, gd cond; CRL SPP-800 stereo preparation processor, gd cond; dbx 3/16 matrix, gd cond; Aphex 323A aural exciter, mono, excel cond, complete w/Orban plexiglass cover over controls; Technics SU-9070 stereo flat preamp with tape inputs, TT inputs, aux & tuner inputs, excel; RTS 424 audio dist amp, stereo, 19" rack mount, gd cond; RTS 416 audio dist amp, mono, 1 in & 6 out, gd cond. Ron, 732-469-0991.

Modulation Sciences Sidekick SCA-186, 92 kHz gen, excel cond. Ron, 732-469-0991.

AUTOMATION EQUIPMENT

Want to Sell

Arrakis Digilink 3, new in 1996, currently in use, year 2000 complaint. D Smith, 316-721-6161.

Arrakis GEM-600 Gemini System w/1.2 Gig + network board & software, w/cart wall; Arrakis TS-8C Trak Star workstation w/270 MG w/network board & software, 1 yr old, currently on air &

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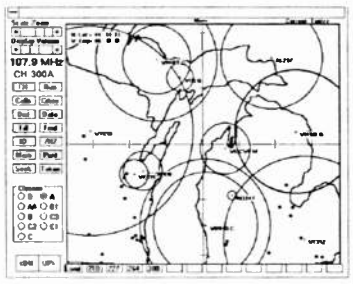

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working, $7500 negotiable. L Zeve, 717-249-1717.

Digital DJ system, CD and/or satellite, removed from service 11/97, other misc parts including audio cards, BO. C Webster, 601-843-4091.

Schafer 800-T automation controller, $650. J Bahr, 787-728-0364.

TM Century UDS I, 3 yrs old, excel cond, w/all system software, audio controller, Sony interface, manuals, 4 Sony CDK-006 CD Jukeboxes, $2000. T Marker, 619-320-4550.

BE AudioVault AV100 w/twin servers & (4) 96B hard drives, 1 yr old, excel cond, $20,000. M Litton, WLYR, 1 Campus View Dr, Columbus OH 43235.

SMC 3060, (2) racks, limiter, clock, 2 random select Carousels, remote control w/all documentation & spares, $500 u-haul. C Jones, 803-854-6396.

CART MACHINES

Want to Sell

ITC Delta PB mono 2 cue, gd cond, $450; ITC Delta R/PB mono, 2 cue, gd cond, $550; Audicord DL-RM R/PB mono, 2 cue, gd cond, $350; Audicord TDS-1 dual deck,. twin play, gd cond, mono, 3 cue, $450; Tapecaster 700-RP, R/PB, mono, 2 cue, gd cond, $250. R Chambers, 530-257-2121.

BE 3000 mono R/P in vgc, $375; mono PB in vgc, $150. D Kiker, 850-477-8500.

ITC 3-D triple slot (6), stereo, 3-cue; (9) ITC SP Series stereo, 3-cue; (6) ITC SP Series stereo, 3-cue; (2) ITC R/P, stereo, 3-cue; (2) ITC WRA stereo, 3-cue, cart record amps; (2) cart racks, 100 space, masonite dividers & walnut-grained laminate sides, excel cond; Henry Engineering audio message controller, operates cart machine into telephone line & counts incoming calls. Ron, 732-469-0991.

ITC ESL-IV splice finder, gd cond, $185; Spotmaster cart rewinder, fair cond, $95; Dynamax CTR 124 R/PB stereo cart machine w/splice finder & FFWD, excel cond, $495; (2) Harris single play cart decks, working, $350 ea or $600/both; ITC cart deck, working, $350; large assortment of cart hulls, cart racks (wall & floor). M Casey, 803-275-4444.

CONSOLES

Want to Sell

Arrakis 1200-10S, new, w/pwr supply, manual, all hardware, unused, 1 mic slider, 9 stereo sliders, 9 & 10 have push button selectable inputs, we ship COD UPS to you, $2200; Cetec Sparta A5-305 in excel cond, w/internal amps, 5 pots, 1 stereo mic & 4 stereo inputs, Pot 4 has 5 selectable inputs, we will ship COD to you, $800. B Mauldin, 336-632-9801.

Cetec 2007 8 chnl stereo, $900; Harris 80 8 chnl stereo, $900. D Rose, 888-380-7423.

Sound Workshop 1280-B, 12 in & 8 out w/double EQ echo ea chnl, gd cond, $1500. HL Sewell, 817-838-8001.

Arrakis 12 pot, $1500. J Arzuaga, 787-895-0000.

Cetec 2007 8 chnl stereo, $900; Harris 80 8 chnl stereo, $900. D Rose, 888-380-7423.

Gates Yard (tube); Collins F Series (2) tube type; Gatesway II (2) for parts; Russco 505 mono. B Zellmer, 970-353-6522.

McCurdy SS4370 control board, 8 chnl stereo rotary step attenuators, gd cond. Ron, 732-469-0991.

Pyramid PR 8800 stereo mixer, working, $235. M Casey, 803-275-4444.

Quantum QM-168 + QM-120 16x8 audio board w/patch bay & console, $1900; Gately 16x8 audio board w/quad monitoring, XLR on all in and outs, custom console, $400. A Baker, 317-925-7371.

Ramko DC-38-10S, 1- chnl stereo audio mixer console, gd cond, $3500. M Seaver, 217-222-6200.

Sparta AS-30 console stereo, (2) TT's, desk, (2) preamps, (2) monitor speakers, cue speaker, $500 u-haul. C Jones, 803-854-6396.

MCI/Sony 618, 24x24, $6.5K; Quantum 24x24, $4.5K; Soundcraft 600, 32x16, $5.5K, like new; Model 30, $295; 512, $950; 520, $1450. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Want to Buy

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CBS Volumax stereo 4110, $150; CBS Audimax stereo 4450, $150; Moseley TFL 280mono limiter, $100; Harris MSP 90 mono agc-limiter, $250; CRL Sep 400 mono processor, 3 chassis, $300. D Rose, 888-380-7423.

Optimod 8000 (2) both in gd cond, $1000 ea/BO. C Webster, 601-843-4091.

CBS 410 Volumax; CBS 111-S mod 445 level control; McMartin BFM-1514R processor; BBE 822A Sonic Maximizer; Harris MSP-95. B Zellmer, 970-353-6522.

CBS Volumax 4110 stereo, $150; CBS Audimax 4450 stereo, $150; Moseley TFL 280 mono limiter, $100; Harris MSP 90 mono AGC-limiter, $250; CRL SEP 400 mono processor 3 chassis, $300. D Rose, 888-380-7423.

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Bogen TP 160 tuner, $50; several single speakers, all working but not in pairs; ADC patch bay, excel cond, BO. M Casey, 803-275-4444.

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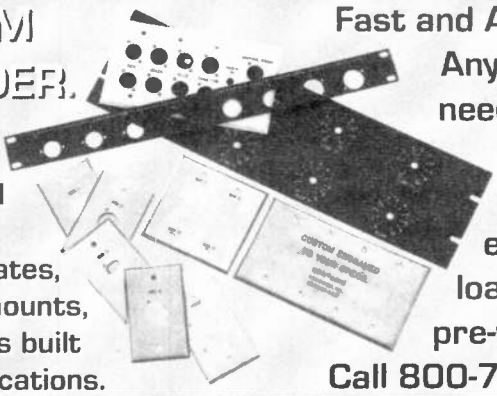
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Musicam Prima 120 digital transceiver, brand new Layer 3 motherboard, $3495 w/built-in TA, $2995 w/X.21 interface card. Steve Kirsch, 90 S Long Beach Rd, Rockville Centre NY 11570. 516-763-1776.

RECORDERS

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MCI JH-110B 0.50", 4 trk r-r in HP-4 cablinet, $1500; Scully 280 4 trk r-r w/3 spare audio electronics, $450. J Borden, 414-482-8954.

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Otari 5050B, rack mount, average cond, in working order, $750/BO. B Hawkins, 317-684-8411.

Pioneer CDR-5 CD rcdr, very little use, one owner, w/a few disks, $1400. K Pappan, 316-650-3629.

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Tascam 22-2 1/4" mastering rcdr, excel cond w/rack ears, $500. M Schackow, 605-374-3424.

Yamaha GC2020 stereo compressors (5), $100 ea; Radio System RS-1000 DAT's (3), 2 w/remote control, $500 ea; (2) Otari MX5050B II 2 trk r-r rcdrs, $750 ea; Magnafax 5-slave mono reel duplicator, 7-1/4", $500. M Jones, 501-329-6891.

Akai GX 646 r-r, stereo, gd cond, $500. M Casey, 803-275-4444.

Ampex AG-350 mono r-r, rackmount w/custom console & solid state electronics, $250; Ampex 350 r-r mono w/Inovonics solid state electr rackmount, $200; Ampex AG-440B 1/2" 4 trk r-r in custom console, $1000. A Baker, 317-925-7371.

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Otari MX-5050 2 trk r-r, mint cond w/remote control & shpg carton, $725. D Meyer, 805-962-8273.

Radio Systems 1991 RS-700 DAT rcd (2), gd cond. Ron, 732-469-0991.

Scully 280-B mono r-r in custom console, 7.5 & 15 ips, $400; Ampex AG-440 mono r-r in custom console, 7.5 & 15 ips, $400; Ampex AG-440 mono r-r in Ampex console, 7.5 & 15 ips, $400; Nagra 4.2 mono r-r, 7.5 ips only, $1400. A Baker, 317-925-7371.

Sony TC-880-2 pro tape deck, 1/4" 2 trk 7-15 ips, 10.5" reels, ferrite heads, $795 +frt. D Peck, 916-375-2300.

Marti M-3-60C/11RS-20 w/turner mic, $250. M Schackow, 605-374-3424.

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Marti STL-10 (2), xmtrs only, gd cond, $1000 ea/BO. C Webster, 601-843-4091.

Moseley 505/C, vgc, not FCC certified, $1500/BO. J Bahr, 787-728-0364.

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Comrex 2-line, used only 6 times, $1100. Tom, 1-800-860-9771.

Comrex LTX/R (2), $700 ea; US Audio Whirlwind Mix-5S stereo mixer, $225; SKB rackmount Case-4 unit, $120, excel cond. K Starks, 313-480-9981.

Gentner 1000A digital freq extender, excel cond, $850; Gentner EFT power supply, $100. M Casey, 803-275-4444.

Marti ATS-15E STL switcher, as new, BO; Marti SCR-8H 39 kHz; Marti SCG-8H 39 kHz; (2) Racom STL data link Morse code identifiers, excel cond, BO. M Casey, 803-275-4444.

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Interactive Hot Mix DJ avail for custom mixes, remixes, live & club mix shows. Formats include house, techno, disco, R&B, Top 40 & retro, 10 yrs radiol prod, freelance & club exper, have many remote & promo ideas. Dave, 888-981-5321.

Let me fill your Midday or Nighttime vacancy, 8 yrs on-air exper, ready to relocate. Drew, 330-633-5323.

News anchor/producer, AT & prod talent for all-new, adult standards, classic country available, experienced, but would accept entry level position. A McKuen, 513-777-8423.

News anchor/producer, AT & prod talent for all-news, adult standards, classic country. Experienced but would accept entry level position. Alex McKuen, 513-777-8423.

Semi-Fab A/T, mornings/MD, ready for phones 7 fun. Mike, 509-397-9176.

This CE makes FM worries go away, blowtorch clean audio & RF. 1-904-467-3122 or email: mychucky@funport.net.

Friendly, outgoing, & mature born & music bred recent radio broadcasting grad willing to relocate for on-air position. Gam, 405-236-3077.

Let me fill your Midday or Nighttime vacancy. Eight years on-air experience. Ready to relocate. Drew, 330-633-5323.

Need someone not only for sports but commercial copy, production & possibly sales? I can do it all. Don't hesitate to test me. Shaun, 405-682-2661.

Veteran talk show host w/excel writing, interviewing & reporting skills, currently in major market, will consider all size markets, will relocate anywhere, 216-398-6532.

ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name _____

Title _____

Company/Station _____

Address _____

City/State _____

Zip Code _____ — _____

Telephone _____

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a **paid** basis. Line ad listings & display advertising are available on a per word or per inch basis.

Are you currently a subscriber to Radio World?
❑ Yes ❑ No

Signature _____ Date _____

Please check only one entry for each category:

I. Type of Firm

- ☐ D. Combination AM/FM station
- ☐ A. Commercial AM station
- ☐ B. Commercial FM station
- ☐ C. Educational FM station
- ☐ E. Network/group owner
- ☐ F. Recording Studio
- ☐ K. Syndicators/Station Providers
- ☐ G. Audio for Video/TV Station
- ☐ H. Consultant/ind engineer
- ☐ I.Mfg. distributor or dealer
- ☐ J.Other _____

II. Job Function

- ☐ A. Ownership
- ☐ B. General management
- ☐ C. Engineering
- ☐ D. Programming/production
- ☐ G. Sales
- ☐ E. News operations
- ☐ F. Other (specify) _____

WTS ❑ WTB ❑ Category: _____

Make: _____ Model: _____

Brief Description: _____

Price: _____

*Closing for listings is every other Friday for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

Broadcast Equipment Exchange

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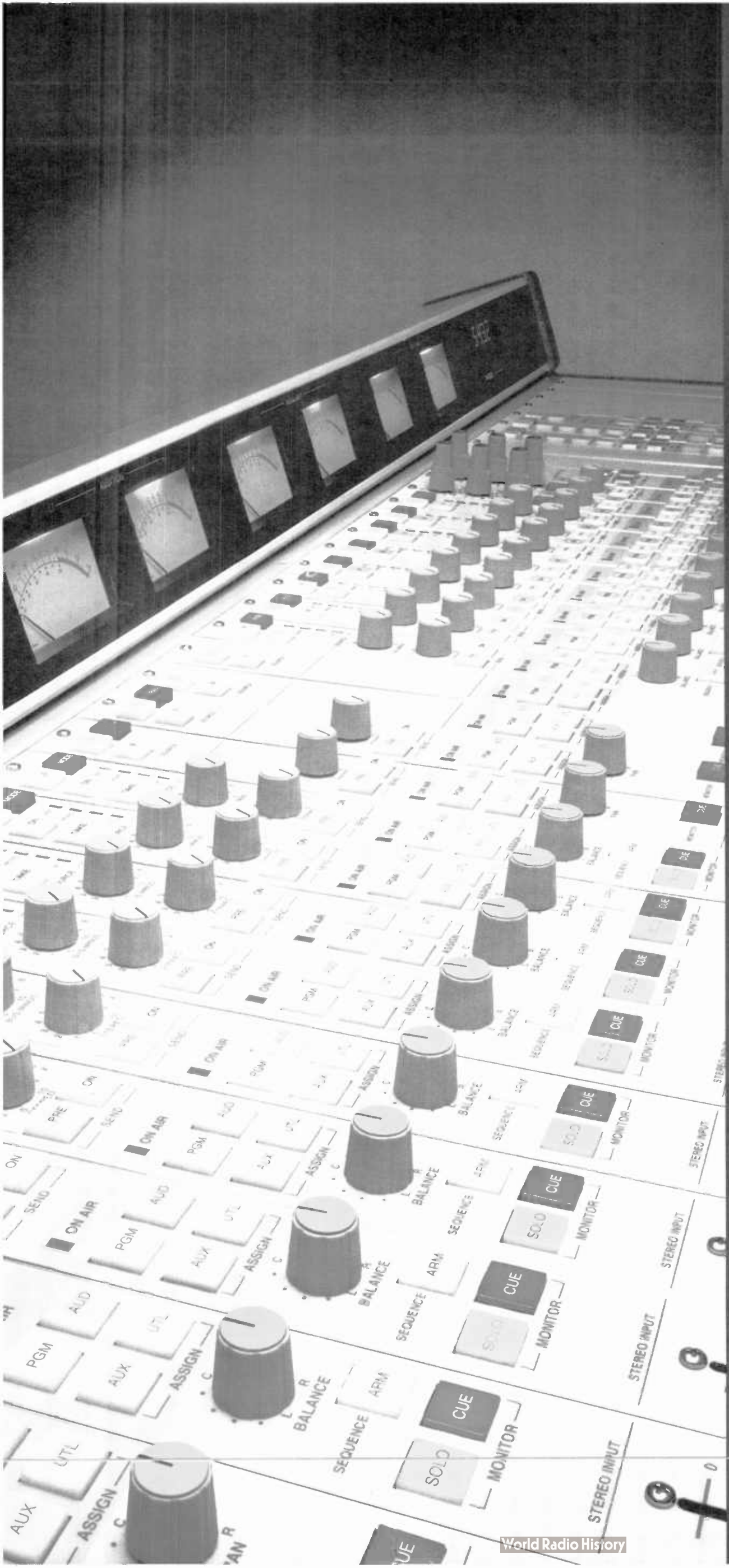

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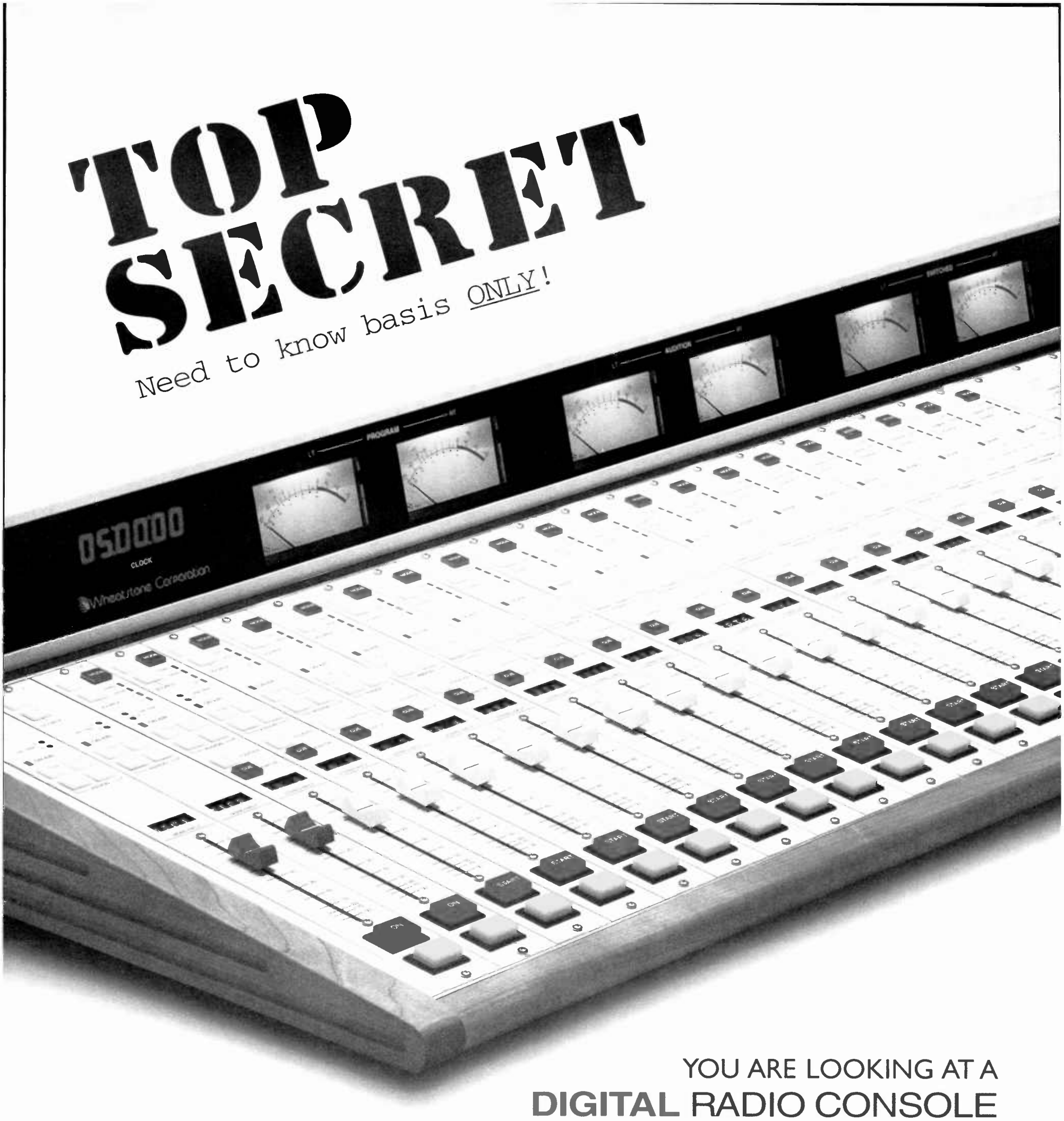

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