

Radio World



Studio Sessions
See pp. 25-41

Vol 19, No 8

Radio's Best Read Newspaper

April 19, 1995

FCC Looks at Increasing ISDN Subscriber Fees

by Thomas Pear

WASHINGTON Broadcasters could see an increase in their monthly Integrated Service Data Network (ISDN) rate if the FCC goes ahead with raising subscriber line charges (SLCs), a type of federally mandated user-tax earmarked for the continued modernization of phone services across the country.

At issue is a FCC claim that each channel in an ISDN line should be treated as a separate phone line, subjecting each channel to the SLC. A January 11 FCC order prohibits phone companies from charging less money for more bandwidth.

Broadcasters normally use Basic Rate Interface (BRI) ISDN lines that have three channels—two bearer channels (or B channels) that use a wide bandwidth that allows enhanced audio quality and a data channel (or D channel).

Local rates

Because broadcasters are charged for the two B channels, they could see their monthly subscriber fee increase to somewhere between \$7 and \$12 a month, said Bell Atlantic Spokesman Michel Daley. The exact amount, he noted, depends on broadcasters' local phone companies.

Radio broadcasters now pay somewhere between \$3.50 and \$6 a month in SLCs when they use an ISDN line, depending on their local phone companies.

There was some fear, though, that broadcasters could see their monthly SLCs jump to between \$10.50 and \$18 a month because D channel activation is required when using the two B channels.

But Bell Atlantic ISDN Product and Application Manager Pat D'Innocenzo noted that the FCC does not levy SLCs against the D channel and is not planning to levy tax against the channel. "There is no SLC for the D channel," he said.

Because broadcasters are charged for the bearer channels, theoretically their monthly usage fee should stay relatively inexpensive—the aforementioned \$7 to \$12 range.

"I don't think it is going to affect broadcasters that much," said Neil Glassman, the marketing director for Telos, an ISDN codec manufacturer.

"Compared to the Switched 56 and the clear 64 rate, it (ISDN) is still significantly cheaper, depending upon the usage," RE America Vice President of Sales and Marketing Andy Bosworth said.

On top of that, Glassman noted, long distance carriers are expected to soon lower their ISDN rates due to the rising use of the technology, a scenario that helps to offset costs.

Where the problem is exacerbated is with users of Primary Rate Interface (PRI) ISDN lines, where one line can use as many 24 channels to send graphics, data and video.

PRI line users could see a monthly increase somewhere between \$84 and \$144 per line. Some businesses use up to 600 lines that each have 24 channels. And "therein lies the problem," Daley said.

To prevent that scenario from happening, Bell Atlantic filed an emergency waiver petition a couple months ago asking the commission to continue the status quo. The petition, argues that without the waiver, "60 percent of the potential ISDN consumer market will disappear." The company also theorizes that as much as 25 percent of existing ISDN users will cancel their service.

"We predict the market demand would fall both in business and residence."

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Sabra Atlanta Aaron and Anna Maria de Freitas of the Soundprint Media Center Inc. (r) demonstrated how stations can use the Internet to stay in touch with their communities.



The National Federation of Community Broadcasters met in Albuquerque, N.M. For coverage of the issues and an interview with NFCB President Lynn Chadwick (l) see pp. 13-14.

Local SBE Helps with EBS

HOUSTON Alex Schneider, the vice chairman of the Houston chapter of the Society of Broadcast Engineers (SBE) climbed out of bed March 4, donned a favorite set of work clothes and spent the

perfect sunny South-Texas weekend adjusting EBS decoders.

A perfect weekend, indeed, for 67 Southeast Texas radio and television stations. They each saved about \$120 as the Houston SBE voluntarily modified their EBS decoders to receive an eight second emergency warning tone instead of a 22 warning second tone, fulfilling the FCC's July 1 tone conversion deadline.

Chapter member Dave Biondi said that the SBE reaped a lot of praise for undertaking the task of modifying the decoders. "The SBE is the hero of the thing," he said.

Biondi allowed the SBE to use his business, the Broadcast Service Company—equipped with five technical work stations—as the conversion site where technicians installed conversion parts donated by Electrotek.

Broadcasters were given the option of mailing in their decoders and the Houston SBE members then adjusted the decoders and mailed them back COD. One decoder arrived from San Antonio, about 200 miles from the conversion site.

But the majority of participants drove to the conversion site, decoders in hand. Some participants even drove as far as 120 miles "It was a great day to take a ride and get a unit modified," said Schneider, who is also the chief engineer of Houston stations KQUE(FM) and KNUZ(AM).

At the conversion site, a mixture of different types of broadcasting professionals

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NEWSWATCH

VirteX, IDB Deal Off for Now

RENO, Nev. The planned acquisition of the audio section of the broadcast division of IDB by VirteX appears to be off.

Keystone Communications, in mid-March, signed a two-year management agreement to operate the broadcast division of IDB for owner LDDS, according to Keystone President Peter Marshall. Keystone also has an option to buy the division.

While VirteX Chief Executive Officer Paul Donahue said he still has a letter of intent to purchase the division, he said he

is no longer interested under the original terms. VirteX can provide "better service at a lower price" without the IDB setup, Donahue said.

Marshall said discussions are still on going with VirteX.

VirteX was in negotiations to buy the audio division of IDB when VirteX announced its purchase of Corporate Computer Systems (CCS).

FCC Proposes Budget Increase

WASHINGTON The FCC will have to endure its fair share of budget cuts say

House Republicans sitting on the Appropriations Committee. FCC Chairman Reed Hundt recently told a House Appropriations subcommittee on commerce that the FCC needs \$223.6 million for 1996 Fiscal Year (FY) budget, but received no sympathy from Republicans who have promised to cut taxes and the deficit at the same time by reducing federal spending.

"We thought it was awfully high at a time when everybody has been asked to sacrifice," said Frank Maisano the press secretary to subcommittee chairman Rep. Hal Rogers (R-Ky.)

The subcommittee then told Hundt the commission will just have to tighten its belt like a lot of federal agencies undergoing budgetary process.

In its Fiscal Year (FY) budget request,

the FCC asked for \$38 million more than in FY 1995—with much of the increase due to the FCC planned relocation.

"Approximately two-thirds of that increase, about \$25 million, is for expenses related to the scheduled relocation of the commission's headquarters in 1997," Hundt said. The Portals lease is expected to cost taxpayers somewhere between \$250 million and \$300 million over 20 years.

More than \$8 million of Hundt's proposed budget would go to "personnel compensation and benefits, rent, communications and utilities, and travel and other services," to its 2,271 employees, Hundt noted. But the chairman said the FY '96 budget proposal does not include hiring any new employees.

In justifying his request Hundt made reference to the revenue the FCC brought into the U.S. Treasury. He noted that the FCC's recent PCS auctions pulled \$7.7 billion into the treasury and since 1993, when Congress granted airwaves-auction authority, the commission has pulled in more than \$9 billion through airwaves auctions.

continued on next page ►

When looking for a digital audio system for automation of satellite programming or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

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The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom



can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

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The commission annually collects about \$40 million in licensing fees, which "do not directly offset our appropriations," Hundt said. In FY '94 the commission collected about \$59 million in regulatory fees.

"Congress directed us to collect \$116 million in regulatory fees in FY 1995—a 97 percent increase—and our FY 1996 budget request is premised on collecting the same amount in FY 1996," he said.

The chairman also added that if Congress continues to finance the FCC's technology-based workforce, future budgets should decrease.

Congress Ends Tax Breaks for Minority Station Sales

WASHINGTON House and Senate members consolidated two separate bills that would end special tax breaks for the sale of broadcast and cable stations to minorities.

The conference between representatives and senators is merely a "formality," to iron out differences between the two versions of the bill, a Senate Finance Committee staff person said. Final passage of the issue was expected by early April.

Just prior to the joint meeting, the Senate Finance Committee approved ending the tax and the House passed its version of the bill in February.

If signed by President Clinton, revenue from the bill would help to pay for a 25 percent health care cost tax deduction for the self employed. Although some Senate staffers believe the President may sign the bill because of its health care measure, the White House had no comment at press time on the president's intention.

EAS Chief Mitchell Reassigned To OET

WASHINGTON The FCC has moved Emergency Alert System (EAS) Chief Dr. Helena Mitchell to the position of assistant to the bureau chief of the Office of Engineering and Technology. Mitchell was instrumental in helping draft the EAS rules that were approved last year to replace, by 1996, the current analog EBS

system.

Mitchell, who holds a Ph.D. in law and technology assessment from Syracuse University in New York, noted that most of her work as EAS chief was finished when the new rules were written.

"Once the new rules were written and new technologies were part of EAS, then I welcomed the new challenges that OET offers," she said.

In her new position, Mitchell is to establish dialogues with the developers of new communication technologies to help upgrade rules and standards governing their use. She might, for example, help allocate spectrum for newly invented broadcast technology.

"It was definitely a good move," she said. "I'm happily now at the Office of Engineering and Technology as an assistant to the chief. I was really happy that OET Chief Dick Smith invited to be his assistant."

Despite the job switch, some of Mitchell's EAS work will continue in OET, she noted. She will, for example, be one of the first to examine new EAS decoders because OET must first approve all broadcast equipment before manufacturers can market it.

The FCC has not named an official EAS chief at this point, but EAS Senior Engineer Frank Lucia was named acting chief.

Armstrong Foundation Mails Awards Entries

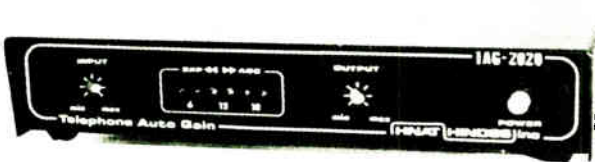
NEW YORK The Armstrong Foundation recently mailed entries to 8,500 radio stations and networks to launch its awards program for broadcast productions produced and first aired last year.

Entries will be placed accordingly into separate categories, including for commercial and non-commercial stations and networks. The non-commercial stations and networks includes college and university facilities. The foundation recently expanded the awards program to include recognition of technical innovation in broadcasting and telecommunications.

The entry deadline is May 1. For more information, call Pamela Walker at 212-854-8703.

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Circle (83) On Reader Service Card

IBOCs to Be Retested

by John Gatski

CLEVELAND The USA Digital and Amati/AT&T in-band digital radio systems were allowed to submit slightly modified systems for hardware testing at the NASA/Lewis Research Center last month—pushing the lab testing completion deadline now to June or July.

The digital radio system testing is part of an overall consumer electronics/broadcasting industry effort to eventually recommend a new digital transmission system for commercial radio broadcasting in the United States.

According to the Electronics Industries Association (EIA), whose Digital Audio Radio Subcommittee is coordinating tests along with the National Radio Systems Committee (NRSC), the request for retest of a modified system came from Amati/AT&T, based on a new "interpretation" of the guidelines, which had put a freeze on modification the systems once the testing started. USA Digital then followed with a request for retest as well, which was granted.

The hardware testing of the systems, that include the out-of-band Eureka 147, and USA Digital, Amati/AT&T, AT&T and NASA/VOA, was originally predicted to conclude by the end of 1994. The timetables were then pushed toward this month, with field tests slated to begin in early summer and completed by the end of the year.

However, with the modified systems approved and the testing underway, the completion should be concluded in June or July at the latest, an EIA spokesperson said. The end of 1994 predicted conclusion of the field tests is still the official timetable. Field test procedures were expected to be finalized at the NAB show in Las Vegas.

"There are things that crop up," the NAB's John Marino said of the testing schedule. "We expected there would be delays."

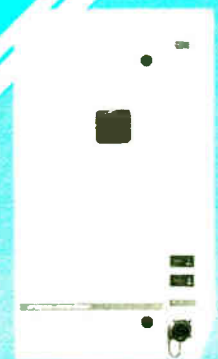
Once predicted that digital broadcasting would be ready for mass acceptance by the late 1990s, many in the industry now predict that the turn of the century is a more realistic timetable considering the pace of the systems testing, likely approval process and penetration into the broadcast and consumer markets.

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Circle (119) On Reader Service Card

Learning Begins for South African Radio

WASHINGTON South Africa has endured its share of problems, isolation and duress during the last few years. And, after often bloody and terrifying moments, the country emerged recently with new leadership, international status and a better charter of equal opportunity for its people.

It stands to reason then, that the country's radio broadcasting industry would somehow change as well. And it is changing.

Radio World International Associate Editor T. Carter Ross passed along some interesting information he found while

"surfing" along one of the many on-line services he navigates. As South Africa makes the transition to a "nonracial" democracy, broadcasting is making the transition from a centralized, government-owned system to a decentralized system of independent broadcasting ventures.



Ergo, South Africa's Independent Broadcasting Authority (IBA) was established in 1994 to grant commercial,

public service and community licenses. But what do the South African's know about running successful radio stations? Not much—yet.

A nonprofit organization that specializes in professional exchange programs, Delphi International, is preparing a proposal for a program to be sponsored by the United States Information Agency. "Professional Development of South Africa Radio Station Owners and Managers," is intended to help the owners and managers of the country's community-based radio stations to develop skills to manage their broadcasting operations and assist them in developing strategies to operate stations as successful business operations.

Delphi is looking to identify radio stations interested in hosting South African broadcasters for "professional shadowing." In other words, the South African visitors would pair up with American radio professionals for a few days, for the opportunity to observe the widest range of professional activities, including: pairing up with the general manager, the business manager, the program director and the news director.

Delphi is looking for recommendations of academic institutions that are noted for their radio broadcasting programs and

highly qualified specialists in station management and operation for on-site training in South Africa.

If this sounds like a project you are interested in, contact Robert Means at Delphi International, 1090 Vermont Ave., N.W., 7th Floor, Washington, D.C. 20005; or e-mail: rm@delphi-int.org.

★ ★ ★

Sounds like a worthwhile endeavor—you know, spreading some of our business acumen around the world. Closer to home, however, here at RW we sometime run into snags when trying to put together an issue. This time out, our *Buyer's Guide* Editor Whitney Pinion discovered there was not too much happening on the RF-line front.

Manufacturers do not seem too concerned yet about the advent of digital audio broadcasting and will "react to it when it happens." NAB '95 could be the wake-up call these guys need.

As Whitney found out, most of the attention these days seems to be focused on the digital television side of things, with digital audio a distant last on many manufacturers list of concerns.

★ ★ ★

Starting with the next issue of RW, Harold Hallikainen, who has for many years authored *Insight-on-Rules*, will begin an educational series of articles. Harold was inspired to do them when he read the articles on "noise-free radio."

Harold's idea is to take a close look at how modulation works. From there, he will write the series as a sort of

continuing education feature. He will also share some concise methods he has developed as a teacher at Cuesta College. These methods take the guesswork out of determining current direction and voltage polarity.



FCC Chairman Reed Hundt presented President Clinton and Vice President Gore with a check symbolizing more than \$7.7 billion brought into the U.S. Treasury from the FCC's recent broadband personal service license auctions. The event was the largest auction of government assets in U.S. history, and Hundt used the auctions as a selling point when requesting a 1996 fiscal year budget of \$223.6 billion from Congress.

Harold also plans to include Spice analysis of circuits using the demo version of PSpice from MicroSim—which is widely available on Internet.

★ ★ ★

Finally, no *Page Four* installment before an NAB show is complete without a look at how the business is doing. Radio revenues, according to the Radio Advertising Bureau's tabulations, gained 15 percent in combined local and national spot revenue for February 1995 versus February 1994. Local revenue rose 14 percent and national grew by 19 percent.

Revenue figures for the year-to-date versus 1994 grew 15 percent combined, 12 percent local revenue and 28 percent national spot.



WFOX-FM Atlanta delivered a 37-cent check to Atlanta Mayor Bill Campbell (not pictured). Fox '97's dynamic morning duo, Randy Cook (l) and Spiff Carner (r), equipped with bullet-proof vests and an armored truck, made the delivery as part of the station's Pay Every Listener Campaign.



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Careful broadcasters

Dear RW,
Just a thought or two about the UL Listing controversy.

Having been involved in construction of a number of high-power (50 kW) composite AM transmitters during the late 1950s and early 1960s, I remember well the safety precautions that were taken. Interlocking panels and doors and bleeders across capacitors were just two of the requirements.

The FCC inspections, required before "going on the air" were very thorough.

My question is whether UL Listing would make transmitters any safer than FCC requirements already in place.

RW is the only publication that I know that really relates to the world of radio... keep up the good work.

Cyril G. Brennan
Brennan VCR Service
Pike Road, Ala.

Just wondering

Dear RW,
I wonder about the cause of the fire at WTIM (RW, Feb. 22) and if equipment approved by the "toaster police" would have reduced the risk of the station getting toasted.

Harold Hallikainen
Hallikainen & Friends
San Luis Obispo, Calif.

Clarity please

Dear RW,
I work for a paging company and am closely associated with an FM station. Any time anyone experiences RF interference, paging transmitters and/or FM transmitters are automatically blamed. Your article and editorial in the March 8 issue both give the impression that the paging/cellular transmitters are causing

the interference. The problems caused to AM stations are from the towers being placed too close to the AM array, not the type or power of the transmitters. These problems are not caused specifically by paging/cellular towers, but by any tall structure close to the AM array.

Pat Fitzpatrick, Technician
A-1 Communications
Amarillo, Texas

Editor replies: The article and editorial in question clearly identify towers and their proximity to AM arrays as the culprits in AM interference questions.

Sell some ads

Dear RW,
I think your close proximity to DC is affecting your thinking. I must disagree with your editorial of Feb. 22, regarding Congress cutting funding for the Corporation for Public Broadcasting.

To suggest that any form of broadcasting should be subsidized, tells me that radio as a free enterprise is in trouble. Why should the broadcaster down the road receive any government money to pay for his programming while that very same government is now charging me spectrum fees. (Could it be that his programming might not be able to support itself?)

Government funding for public broadcasting has been a joke since its inception. Most of the public stations depending on CPB support, probably should not be on the air. Most of the successful public stations in this country take little if any CPB money at all.

Not to be without a solution—I propose that public stations be allowed to accept advertising just like everyone else. They could continue to maintain their non-profit status (like many in the commercial band), but pay their own way like the rest of us.

Most National Public Radio and PBS programming is of the quality and popularity that could easily support itself. Those shows that cannot support themselves should probably not be on the air.

And for those folks who feel they have to preach their propaganda at the expense of our tax dollars, let them get their own soapbox and find their own street corner without mandating my help.

Paul Montoya, President
Christus Broadcasting Inc.
Lakewood, Colo.

Clear channel thoughts

Dear RW,
I would just like to comment on a few recent letters on your opinion page that relate to the clear channel stations. These writers seem to indicate that all the daytimers on the clear channels should be allowed to operate at night by reducing the interference protection afforded to the clear channel stations.

I once read on this page a comment that fifty 1-kW stations were better than one 50-kW station. People seem to be missing the one major flaw in this argument:

Reaping Local Wisdom

On a national level, the Society of Broadcast Engineers tackles issues that improve the status of its membership—broadcast engineers—within the industry. Such efforts include the SBE certification program, forming global alliances with other engineering societies, and sponsoring seminars and conferences, to name a few.

On a local level, one SBE chapter put its money where its goals are and voluntarily modified EBS decoders to receive an eight-second emergency warning tone instead of a 22-second warning tone for 67 Southeast Texas radio and television stations. Each station saved about \$120 in fulfilling the FCC July 1 tone conversion deadline.

The Houston chapter, in one helpful day, demonstrated to radio and television management that engineers are bottom-line thinkers and should be part of the strategic-planning team at the station.

Fellowship among engineers, demonstrated by chapter member Dave Biondi allowing the SBE to use his business as the conversion site, is convincing evidence of the technical and financial benefits that can be brought to the management of a station—when engineers are allowed to participate in the decision-making process.

The national SBE applauds the Houston chapter's proactive approach. "It connects the engineers with the managers," said SBE Vice President Terry Baun of Criterion Broadcasting. "It goes to show that some of the best ideas come from the chapters—the people in the field."

The national SBE also started a new committee to help with conversion to the new EAS system. The charter is to help managers, engineers and owners make the best choice for their stations when selecting an EAS system.

Three cheers to the Houston SBE chapter for providing a valuable service to its area broadcasters and for singlehandedly demonstrating that radio needs its engineers for more than just tweaking a transmitter. SBE chapters across the United States should take note of the grassroots efforts of their Texas brethren and follow suit.

—RW

Allow 50 1-kW stations on the air at night, on any one channel and no one will be able to hear any of them. Allowing all the daytimers to operate at night would cause chaos on the band, and surely destroy what is left of that service.

One writer states that if we are serious about reducing interference on the AM band, then we must power down the 50 kW stations. He also indicates that after this power-down, the daytimers would be allowed to operate full time. This would have the exact opposite of the desired effect. Interference would not be decreased, but would be greatly increased.

The FCC has recently correctly recognized that if we are to decrease the interference on the AM band, we need fewer stations, not more. The commission has instituted several mechanisms to facilitate the reduction of the number of stations on the AM band. One new rule allows one station to buy another and shut it off, so the first station can increase its facilities. The commission has correctly recognized that one station with a good signal and becoming profitable is better than two stations interfering with each other and going broke.

It is for precisely this reason that the FCC has allocated so few stations to the expanded band, and has reserved the expanded band for migration of stations out of the existing band into the expanded band. They were trying to decrease the congestion (i.e. interference) in the existing band, but not move so many stations into the expanded band that it also would become a sea of interference.

There are less than 100 stations allocated to the 10 new channels, or less than 10 per channel. With 1 kW of power, and fairly low interference levels, these stations have a decent chance of being heard. Allow all the daytimers on at night

on their existing channels, and we will have a plethora of stations on the air, but few of them able to be received out of the view of their towers due to all the interference.

An incorrect point made by one of the writers states that daytime-only stations cannot get on the air early enough during the winter months to provide storm and school closing information to their local communities, when sign-on time in January is 7:30 a.m. The FCC does, and for many years has recognized this problem for communities with only daytime AM stations, or AM stations with poor night time coverage. 73.1250(f) allows AM stations to use full daytime facilities at night to provide this service when it is necessary.

Alan W. Parnau, P.E.
Director, Transmission Systems
CBS Radio Division, New York

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Vol. 19, No. 8

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Associate Editor (News).....Thomas Pear
Associate Editor.....Whitney Pinion
Contributors.....Frank Beacham/N.Y.
Bruce Ingram, Pamela Watkins
Nancy Reist, Alan Haber
Technical Editor.....John Bisset
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Editor (International).....Alan Carter
Editor (Radio World Magazine).....Charles Taylor



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INTERNATIONAL UPDATE

Mexico DAB: Waiting for Results

by Gabriel Sosa Plata

MEXICO CITY Mexico is considering all options for the implementation of Digital Audio Broadcasting (DAB), including the European Eureka-147 system and the American USA Digital Radio in-band system.

"Everything is possible," said Arturo Zorrilla Martínez, president of the Commission for New Radio and Television Technologies, or CIRT, an agency that represents electronic media license holders.

"We have not been able to make a decision, and we are in no hurry," he said. "Indeed, the current economic crisis that we, the Mexican people, are facing because of the devaluation of the peso against the dollar has made us aware of the fact that we have to be very careful in the way we use our resources."

Trying times

However, it is not only Mexico's trying economic situation that has delayed a decision by the authorities and radio broadcasters. Other factors include the recent change in government and, most of all, the differences of opinion still existing among CIRT officials.

In fact, there are two sides within the industry.

One group believes that the Eureka-147 system stands a better chance of being implemented in Mexico. Radio broadcasters in the center of the country seem inclined to choose this option.

The other faction includes broadcasters located close to the northern border who favor the U.S.-developed in-band, on-

channel (IBOC) USA Digital Radio system. These broadcasters target the population and businesses located in the neighboring United States.

This controversial situation is what caused CIRT to cancel its membership in the Eureka-147 consortium.

"The idea was to be a Eureka-147 B Partner. But this would mean an exclusive commitment with the consortium, and that was the reason why the partnership was terminated," said Jaime Robiedo Romero, technical manager of CIRT. "We would rather remain independent until we make a final decision."

Systems options

Because of the differences, a third option came under consideration—development of a combination system. However, this is an option that has only recently been discussed. Industry representatives said the first priority is to determine the viability of the IBOC system.

CIRT representatives are optimistic about tests on the IBOC system conducted by USA Digital Radio in Chicago on FM and in Cincinnati on AM.

Independent tests also are underway in Cleveland at NASA facilities under the direction of the National Radio Systems Committee (NRSC). The NRSC is a joint research standards committee of the National Association of Broadcasters and the Electronic Industries Association.

"We have received very good news concerning in-band tests," said Robiedo. "We see an outstanding difference between the

quality of analog and digital signals with respect to AM. This is not the case with FM, as the differences there are hardly noticeable—mainly because the technical specifications are very similar."

"The IBOC technology deserves our attention and scrutiny," said Zorrilla, "because it might be much more practical in the sense that it will allow us to use equipment that meets international standards with much better operational and manufacturing costs, and also, Mexico will be in a position to manufacture (such equipment).

"Not everything has been said yet," Zorrilla said, "because the technological race is subject to market response, and the support of the very same market when it comes to financing. And that is why we are being cautious, just as the United States did when it decided not to adopt immediately the Eureka-147 system."

License questions

At the core of the controversy

over which system to implement is something clear to the radio industry: The current licensees are the ones who have to operate the new technology, whatever it may be, and they have to take advantage of the L-band spectrum assigned to DAB at the World Administrative Radio Broadcasting Conference (WARC-1992).

While many countries can use L-band for DAB, specifically using the Eureka-147 system, the spectrum is not available in the United States because it is currently used by the military.

Initially, CIRT asked for the support of the secretary of communications and transportation, who heads the government agency in charge of regulating the technical aspects of communications. The organization sought backing for the issuance of a permit or license for each of the existing stations.

"The authorities, however, did not want at that moment to make any commitments or com-

mit anybody for this purpose," said Robiedo.

According to Robiedo, even though a decision has not been made, it is very important to request that the government guarantee the frequencies granted during WARC be assigned to digital radio broadcasting. The idea is not to assign frequencies to any particular company because the industry would not have the possibility to improve its technology.

Action is not expected until late this year or 1996 when Mexico is hoping to select the appropriate technology. However, nothing can happen until the first IBOC DAB test stations can go on air outside the United States. In the meantime, the "evaluation" continues amid uncertainty caused by the economic crisis, changes in government officials and internal disagreements.

□ □ □

Gabriel Sosa Plata is a Mexican journalist, specializing in mass media, who works as a coordinator of the University Branch of the Universidad del Claustro de Sor Juana in Mexico City.

Indictments in Stern Case

by Alan Haber

CLEVELAND Just over nine months after the plug was mysteriously pulled on Howard Stern's on-air "burial" of his Cleveland competition (RW, July 13, 1994 and Oct. 5, 1994), WMMS(FM) and WMJI(FM), WMMS Promotions Director Heidi Klosterman, and another individual, Greg Smith, are under indictment in connection with the incident, with a total of seven counts between them. Stern broadcasts in Cleveland on WNCX(FM).

Klosterman is charged with two counts of disrupting public service, and one count of receiving stolen property (both felonies of the third degree). She is also charged with one count of forgery, and one count of uttering (passing along a forged document), both felonies of the fourth degree. Smith is charged with one count of disrupting public service, and one count of breaking and entering. Smith is not an employee of WMMS.

Former WMMS Engineer William Alford, who has already pleaded guilty to disruption of public service, is still awaiting sentencing. When asked if Klosterman, Smith and Alford's actions were related, Craig Weintraub, assistant prosecuting attorney for Cuyahoga County, Ohio, said "Well, (Klosterman) is charged with disrupting public service on June 10th, and so is Greg Smith... so you can put it together from there."

Both WMMS and WNCX

released prepared statements reacting to the latest developments in the Stern case. WMMS, for its part, stood by Klosterman and Smith.

"We remain convinced that the named parties did not commit any of the alleged improprieties for which they have been indicted, and that they are innocent of all of the alleged charges," the statement said. "We are further confident that the individuals will be vindicated once the judicial system has been allowed to run its course."

In its statement, WNCX said that "As one of the victims in this unfortunate incident, we at WNCX are pleased that there is finally some clarity and accountability in the matter. We are very busy with running our successful radio stations and hope that this will bring to a close not only this incident, but will also end once and for all these outmoded guerrilla tactics pitting radio station against radio station."

The Stern saga began last June 10th, when the self-proclaimed King of All Media was on the air in Cleveland broadcasting his "burial" of WMMS's Morning Zoo and WMJI's morning man John Lanigan. Stern's satellite signal was allegedly jammed during the broadcast.

Alford was charged with

breaking and entering, disrupting a public service, and possession of criminal tools in the alleged wire cutting incident; he



Stern and crew on remote

pleaded guilty last September to disruption of public service (the breaking and entering charge was amended by Weintraub to criminal trespass, a misdemeanor, and the possession of criminal tools charge was dismissed).

Stern has talked about the incident on the air from time to time over the past nine months.

Klosterman and Smith were scheduled to be arraigned in Cuyahoga County on March 27, at which time their indictments were to be read in open court. Weintraub said that "Once we hook up with a judge and we get into our first pretrial, I'll disclose my facts to the attorneys, and we will probably end up having a trial date in the very foreseeable future. I anticipate that this case will be tried. I don't think we're going to get any pleas out of it."



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Shortwave Network Is Main Street Forum

by Alan Haber

YORK, Pa. Twenty-four hours a day, seven days a week, 365 days a year, contemporary, patriotic Americans are huddled around their radios. In the United States, they are contemplating the opinions being expressed by the cadre of personalities manning the microphones of the Main Street Radio Network.

Throughout the rest of the world, in places like Canada, Mexico and Europe, shortwave station WINB, which carries Main Street's programming, is beaming out to listeners by

way of a 50,000-watt transmitter with an effective radiated power of more than one million watts.

At one time, WINB's call letters stood for World In Need of the Bible, but today they stand for World International Broadcasters, the competitor company that currently owns and operates the shortwave station.

Live on shortwave

WINB, broadcasting on Galaxy 3, transponder 11, audio 6.2, first went on shortwave in October 1962, as a private-owned commercial shortwave station,

owned by Rev. John M. Norris. World International Broadcasters also operates an AM and FM station, a local television station, and a satellite television network, the Keystone Inspirational Network, from its headquarters in Red Lion, Pa.

The mass of opinionated talkers on the airwaves, comprised of quality verbalists as well as wannabe emoters, can hardly be dismissed by listeners seeking stimulating, topical banter at any given time of the day or night.

Seeking out the best informationalists can sometimes mean searching for new

sources of opinions, like those expressed on the Main Street Radio Network in the United States, or, on the shortwave dial, on a station like WINB.

The Main Street Radio Network and WINB talk to everyone in the world who wants to listen, according to WINB Executive Vice President Jeffrey Baker, who also is the managing partner of Main Street Media.

The leasing company

Main Street Media is the the York, Pa.-based company that leases air time from WINB for the company's Main Street Radio Network. The network, which operates out of Red Lion, Pa., came on line January 1.

Reverend Norris started WINB because he wanted to "take the gospel around the world," Baker said. In the old days, programming went out in several languages, including Spanish, German and French. Now, the format has changed to what Baker calls "Patriot Talk": "We talk about constitutional issues. We talk about the biblical origins of America as (they relate) to things political and social. It's not a preaching network. It's a news/talk network, the bulk of whose hosts just happen to see life from a biblical perspective."

Baker's brother, Rod, is program director for the Main Street Radio Network. Most of the Network's programming involves listener call-ins from around the world. The vast majority of the Network's audience, a 50-50 mix of males and females.

God and country

"God and country folks," according to Baker—are in the 35-60 age range, and seem "to be grabbing us on the way to someplace else."

Baker added that the biggest chunk of the audience seems to be in the United States. It is difficult to measure the size of the audience, but, Baker said, "We do know that there are somewhere in the neighborhood of 10-15 million regular weekly shortwave listeners across the United States, according to the Gallup Poll, so that gives us a pretty good size audience across the country."

Listeners who tune in to the Main Street Radio Network, whether here in the United States, or throughout the world on WINB, are looking for stimulating talk, but they're also looking for "the truth," according to Baker. "They're not looking for someone to agree with them... I think they're looking for someone who is going to be honest enough with them to say, 'Here's the way I see it, this is just my opinion, you tell me what you think.' Because they know that they were lied to by the mainline political news networks out there... I think what they're looking for is someone who'll be honest enough with them to tell them the truth."

Calls to the Network's programs are not screened, although the Network does use a delay.

"We believe the truth will stand by itself, and none of our hosts, that I know of, are so egotistical that they believe they've got it all figured out," Baker said. "Ours are, I think, sharp enough to

continued on page 12 ►

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Tempe, Arizona 85282
Contact: Valerie Hummer
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Reader Service 78



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3712 National Road West
Richmond, Indiana 47374

Modulation Sciences (Encoder/Monitor)
12A World's Fair Drive
Somerset, New Jersey 08873
Contact: Judy Englert
908-302-3090
Reader Service 210
modulation sciences

RDS Diagnostix (Test/Decoder)
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Mountain Lakes, New Jersey 07046

Audio Broadcast Group (Encoder)
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Contact: Dave Howland
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FAX: 616-452-1652
75371.144@compuserve.com
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67200 Strasbourg, France
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FAX: 33-88-30-90-99
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Westlake, Ohio 44145
Contact: Andy Bosworth
216-871-7617
Reader Service 26



Rohde and Schwarz (Encoder)
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SCA Data Systems (Encoder)
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Tectan (Encoder)
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England

RBDS Receiver Manufacturers (with current U.S. models)

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DCI (Global Positioning)
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Reader Service 199



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WOCL-FM	105.9	Orlando	WDBM-FM	88.9	East Lansing	KFNW-FM	97.9	Fargo	UTAH			
WUFT-FM	89.1	Gainesville	WKAR-FM	90.5	East Lansing	KNOX-FM	94.7	Grand Forks	KSOS-FM	106.9	Ogden	
WOWW-FM	107.3	Pensacola	WLAV-FM	96.9	Grand Rapids	OHIO			KSOS-FM*	92.1	Salt Lake City	
WFLZ-FM	93.3	Tampa	WKLO-FM	94.5	Holland	WOUB-FM	91.3	Athens	KSOS-FM*	96.7	Salt Lake City	
GEORGIA			WRKR-FM	107.7	Portage	WGUC-FM	90.9	Cincinnati	KISN-FM	97.1	Salt Lake City	
WDMG-FM	99.5	Douglas	MINNESOTA			WVXU-FM	91.7	Cincinnati	KSOS-FM*	98.3	Utah County	
WSTR-FM	94.1	Smyrna	KBEM-FM	88.5	Minneapolis	WWNK-FM	94.1	Cincinnati	VIRGINIA			
WABE-FM	90.1	Atlanta	KNOW-FM	91.1	St. Paul	WCPN-FM	90.3	Cleveland	WLTJ-FM*	95.7	Norfolk	
WCLK-FM	91.9	Atlanta	KSJN-FM	99.5	St. Paul	WGAR-FM	99.5	Cleveland	WNVZ-FM	104.5	Norfolk	
WKLS-FM	96.1	Atlanta	KTIS-FM	98.5	Minneapolis	WENZ-FM	107.9	Cleveland	WESR-FM	103.3	Onley	
ILLINOIS			MISSOURI			WKSU-FM	89.7	Cleveland	WKOC-FM	93.7	Virginia Beach	
WCIL-FM	101.5	Carbondale	KYYS-FM	102.1	Kansas City	WLTF-FM	106.5	Cleveland	WCDX-FM	92.7	Richmond	
WLRW-FM	94.5	Champaign	NEBRASKA			WLVO-FM	96.3	Columbus	WASHINGTON			
WBEZ-FM	91.5	Chicago	KESY-FM	104.5	Omaha	WDFM-FM	98.1	Defiance	KFAE-FM	89.1	Richland	
WXRT-FM	93.1	Chicago	NEVADA			WKRJ-FM*	91.5	New Philadelphia	KISW-FM	99.9	Seattle	
WLS-FM	94.7	Chicago	KKLZ-FM	96.3	Las Vegas	WGLE-FM	90.7	Toledo	KUOW-FM	94.9	Seattle	
WNUA-FM	95.5	Chicago	KNPR-FM	89.5	Las Vegas	WKKO-FM	99.9	Toledo	KMPS-FM	94.1	Seattle	
WNUJ-FM	90.5	DeKalb	KNPR-FM*	88.7	Boulder City	WGTE-FM	91.3	Toledo	KDRK-FM	93.7	Spokane	
WLLR-FM	101.3	East Moines	KNPR-FM*	91.7	Beatty	WKRW-FM*	89.3	Wooster	KEZE-FM	105.7	Spokane	
WAAG-FM	94.9	Galesburg	KOMP-FM	99.3	Henderson	WHIZ-FM	102.5	Zanesville	KRPM-FM	106.1	Tacoma	
WSWT-FM	106.9	Peoria	KNPR-FM*	88.7	Indian Springs	WOUZ-FM	90.1	Zanesville	WISCONSIN			
WDBR-FM	103.7	Springfield	KNPR-FM*	88.7	Laughlin	WGLE-FM	90.7	Lima	WIZM-FM	93.3	LaCrosse	
WGFA-FM	94.1	Watseka	KNPR-FM*	89.5	Laughlin	OKLAHOMA			WERN-FM	88.7	Madison	
WPGU-FM	107.1	Urbana	KNPR-FM*	88.7	Moapa Valley	KSYE-FM	91.5	Frederick	WUWM-FM	89.7	Milwaukee	
			KNPR-FM*	88.7	Pahrump	KIRO-FM	98.1	Lawton	WMYX-FM	99.1	Milwaukee	
			KBUL-FM	98.1	Reno	OREGON			WMSE-FM	91.7	Milwaukee	
			KNEV-FM	95.5	Reno	KYTE-FM	102.7	Newport				
			KNPR-FM*	88.1	Scotty's Junction							

*translator

SBE Chapter Helps Convert EBS Gear

► continued from page 1

dropped by and rubbed shoulders as they waited for an SBE volunteer to change their decoders.

Some stations even sent air-personali-

ties who told SBE volunteers "to do their own thing" while they touched base with some of their colleagues in the broadcasting industry. Schneider said. The result was an inadvertent social gathering of broadcasting professionals.

The Houston SBE voluntarily modified stations' EBS decoders to receive an eight second tone.

ties who told SBE volunteers "to do their own thing" while they touched base with some of their colleagues in the broadcasting industry. Schneider said. The result was an inadvertent social gathering of broadcasting professionals.

"It was probably one of the first times where managers were able to sit down and chit-chat with engineers," Biondi noted.

Presumably, the most significant beneficiaries of the weekend were the numerous so-called "mom and pop" stations, which, like many small businesses in today's economy, are just making it.

To them, \$120 is a large expenditure, and they lack the necessary knowledge to adjust their own decoders. "A lot of these stations do not even have engineers anymore," Biondi said.

Except for the philanthropy of the Houston SBE, the shipping and handling cost to send decoders to manufacturers for conversion would have added to the \$120 conversion expenditure, Biondi pointed out. Most likely, shipping would have left stations with a hefty overnight bill of some sort because FCC rules stipulate that stations can only disconnect their EBS decoders a short while.

The idea was the brain child of a few of the more active local SBE members, including Steve Lee, who works in the FCC's Houston field office. Lee was able

to obtain a list of 160 television and radio stations in the general southeast Texas vicinity and the Houston SBE then mailed each station a flyer promoting the event.

Depending on the unit brand, stations could get decoders modified to both receive and send the shortened tone.

The SBE volunteers were able to convert the TFT decoders and then install a switch that will also allow station operators to encode an eight second EBS signal when the time is right.

The FCC prevents stations from transmitting the eight second code until all stations in their market are EAS eight-second conversion- code ready.

Other units were rewired so station operators can adjust a screw-slot control when they are ready to transmit the shortened eight second tone. Schneider said.

The Houston program was so successful that other SBE chapters around the country are now planning their own

two-tone conversion days. The Washington chapter, for example, recently voted to set aside a Saturday sometime after the NAB convention to service the decoders of stations in Northern Virginia, Maryland and the District of Columbia.

If the Washington plan comes into fruition, WJYJ(FM), operating at 90.5 MHz out of Fredericksburg, Va., will be sure to send someone over with its decoder. Station General Manager Pete Stover said. "If somebody is willing to help us out, it would be a tremendous resource to draw from," he said.

Drawing from his personal-voluntary experience Schneider agrees that stations see the program as a "tremendous resource."

"People were very appreciative," he said. ☺

Shortwave Radio Forum

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understand that there are other people out there that have a brain and can think, and we trust that those people who call in have something worthwhile to say or they wouldn't have picked up the phone and taken the time to call in."

Toll-free calling

Callers in the United States can dial a toll-free telephone number; international callers dial a toll number. Right now, the Main Street Radio Network is about two hours shy of being live 24 hours a day. News is delivered at the top of the hour, the only interruption in the talk-oriented programming, portions of which are carried on about 11 stations in this country: the following shortwave bands carry all of the Network's shows on WINB: 11790 (6-9 a.m.), 15715 (9 a.m. - 2 p.m.), 12160 (2-4 p.m.), 11915 (4-7 p.m.), and 11950 (7 p.m.-6 a.m.).

Baker's goal is to have a hundred stations picking up the Main Street Radio Network's programming in the United States by the end of this year. All kinds of stations are being targeted: AM and FM,

music, secular and Christian—all across the board. Music stations are primarily Christian-type stations that pick up the Network's talk programming at night.

Because the network is not an affiliate of "the big three," NBC, ABC or CBS, and doesn't carry their news or have any contractual obligations with them, "we have a tendency to be a lot freer in that which we say," Baker said. "In other words, we don't have to toe the republican mark, or the democrat mark. We're equal opportunity bashers."

And don't call the Network's brand of talk "rebel radio": "That would give the connotation of anarchy," Baker said, "and that's not what this is about, but it is talk that is uninhibited, in terms of letting people talk about what government ought to be as opposed to what the republicans and democrats tell us that it ought to be."

Unusual compensation

The Main Street Radio Network's personalities receive advertising time in exchange for air time. Baker said that what the station is doing in this regard is unique, "in as much as nobody is paying

to be on our network at this point in time. You know, most of these stations sell you time. We don't do that. We didn't want to be a slave to collecting dollars for dollar-a-holler radio."

He said the Network works on a straight barter arrangement with stations.

The diversity of opinion expressed on the Main Street Radio Network is a reflection of the company that owns it. The company was called Main Street Media "because this is what used to be on main street," Baker said. "Everybody gathered at the barber shop and talked about things. This is what we've lacked in this country. We've become a plastic society, and the only thing we've got is what the slicksters and the spin doctors give us. We want to get rid of some of that. This is like sitting at the barber shop, being able to let your hair down and tell the guys sitting around you what you think." ☺

Main Street's Diverse Programming

Programming on the Main Street Radio Network ranges from Chuck Harder's "For the People" to "The Officer Jack McLamb Program," which deals with the police and the military, and features McLamb, who is "the most decorated officer in the history of Arizona," according to Executive Vice President Jeffrey Baker.

Other programs on the Network include "Taxpayers Party Line," sponsored by the U.S. Taxpayers Party (concerning New Party thought—as opposed to Republican or Democrat—and regarding such topics as taxation); "Citizens Forum," with Dr. Mert Pekrul and Dr. Carl Ferguson ("Almost a patriot open line type program," according to Baker, on any and all topics. "It's a get-it-off-your-chest program."); "Jewish Voice," with Louis Kaplan (for Messianic Jews—Jews around the world who have become Christians); and the "Grace Memorial Hour," with Preacher Joseph Brown (an old-fashioned type of religious program). Jeffrey Baker's show, "The Baker Report," also airs. ☺

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Lynn Chadwick Steers NFCB Stations, Efforts

The following is an interview with Lynn Chadwick, president of the National Federation of Community Broadcasters. Contributor Stan Barr conducted the interview at the recent NFCB convention.

RW: What defines a community radio station?

Chadwick: These are stations that are non-profit corporations whose main purpose is to run that radio station. The first community radio station was KPFA in Berkeley, Calif. And that started in the late '40s. That was a Pacifica station and that name emerged out of the peace movement. KPFA's purpose was to have non-commercial programming, focused to the community that would be supported by listener donations. Pacifica invented "listener support."

In the '70s, there was a growth of this whole idea. A lot of stations began. FM radio was big with the FM reserve band and there was that whole movement out of the '60s of "people power" and understanding the value of media.

We had a "Johnny Appleseed" in this industry. A fellow named Lorenzo Milam and his partner, Jeremy Lansman. They would go around the country to tell people about community radio, help them get the licenses and lend them money to buy the transmitter.

RW: What is the role of NFCB?

Chadwick: The National Federation of Community Broadcasters is now 20 years old. It began as a grass roots organization founded when some community radio stations that felt they were growing up in isolation, decided to get together and send somebody to Washington to represent their interest and to help them to communicate better among themselves.

As for my own role, I've been the president of the NFCB for the past nine years.

RW: As president, what are your responsibilities?

Chadwick: My job is to represent the members on the national level in Washington, D.C.

RW: Let's stay with the subject of money for the moment. Where does the NFCB receive its funding?

Chadwick: It's a miracle! I think of community radio as a miracle... period. But seriously, most of our money comes from station dues. The rest comes from a few small grants that we receive, i.e., one from the NEA. We also sell a textbook called "Audiocraft" that has become the international standard for engineers.

And we're now working on the digital version of that book. The author of "Audiocraft" is a fellow named Randy Thom who won an Oscar for the sound work he did in "The Right Stuff" and a nomination for the sound design of "Forest Gump."

RW: What about your own background?

Chadwick: I came out of a writing career. I worked for United Features. I was doing wacky political stories in Washington. One day a friend of mine went to

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NFCB Conference Tackles Community Radio Issues

by Stan Barr

ALBUQUERQUE, N.M. A prayer by Pueblo Native Americans highlighted the opening ceremony at the 20th Annual National Federation of Community Broadcasters (NFCB) Conference last month. The prayer called for the nearly 400 delegates to have a strong voice in their community and to encourage the voices of those without access to the radio media to be heard. Shortly after this invocation the three-day conference got under way with a series of workshops, lectures and discussion groups. The conference was capped off with the Golden Reel Awards.

Although not on the main agenda, the conference buzz focused on the imminent reduction in federal funding to the Corporation for Public Broadcasting, the agency that is in charge of distribution of millions of dollars to radio and television stations and producers.

Nicole Seway, program director at KZYX-FM in Philo, Calif., said: "The subject of funding cuts should have been addressed officially instead of leaving it up to individual station representatives to discuss it among themselves. However, I felt that the conference was, as always, extremely beneficial. It helps every station to know that it is not an island. All

stations have the same problems and the same successes. It is important for a small station such as KZYX not to get lost in the bureaucratic shuffle."

As one participant at the conference remarked: "The government still spends more money on military bands every year than it does on public broadcasting."

Leading the attack to cut CPB's budget is Newt Gingrich (R-Ga.) It was noted that Gingrich recently donated \$2,000 to his local public broadcasting station in Georgia. However, his example is not an easy act to follow. Membership fees for listener supported radio averages \$35.00 per year and stations must have at least one pledge drive every six months to keep their signal on the air.

In other activities, a live broadcast of Linea Abierta, the first and only national radio Spanish-language talk show took place from the conference with host Juan Arambula. The interactive phone-ins presented lively discussions on political, cultural and social issues.

D'Anne Hamilton, a producer from Alaska Public Radio Network said: "I was there to promote National Native News, a program that we distribute. A lot of reporters that file for us were there and so the conference afforded an opportunity to talk with them in person. Also, a lot

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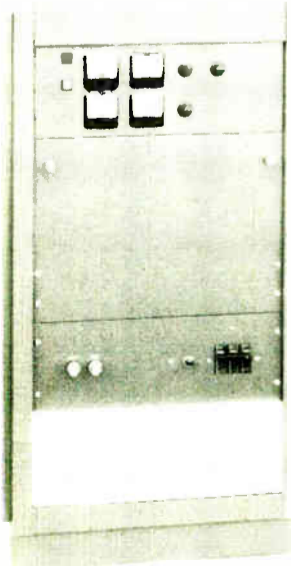
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Chadwick at Helm of Radio's NFCB

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the local co-op and brought back a little three by five card with a phone number and a note that read, "Women in radio wanted. No experience required."

I called the number. It was for the feminist radio network. I joined the network and we began producing and distributing half hour documentaries around the country. It was a volunteer position but great experience. Then, in 1979, I organized the first and only national conference on feminism in radio at the National 4H Center in Chevy Chase (Maryland).

RW: *The Corporation for Public Broadcasting has recently come under fire from some representatives of Congress and the Senate. What is your reaction to this?*

Chadwick: The whole idea of Federal funding for public broadcasting has always been a little uncomfortable for a lot of people. Robert Dole reminded us a couple of years ago that he voted against the public broadcasting act when it was first passed in 1967 and has always voted against it.

However, we've had support from both parties throughout the years although the level of funding has not been going up. There was a major cutback during the Reagan years, and it was during that major cutback that the decision was made that if they were going to reduce support for CPB, they would allow 'enhanced' underwriting. That is when underwriting messages began to change from being simple, e.g., this program is brought to you by X to this was brought to you by X, the company that... you know, message that make some people nervous and sound more like commercials. But that was the exchange so that stations and producers could get support from that sort of thing.

Public radio has gone through some bumpy times before, but it has always been a somewhat awkward relationship because we have this tradition of a free press here whereas other state systems, like the BBC in Britain did not have a commercial radio environment. And now around the world frequencies are opening up for commercial channels at the same time that funding for government channels is declining. We did it the opposite way. The founders of the NACB did not want to make a Voice of America Domestic and that is why the funds go to the stations not to NPR or PBS *per se*.

And that's a correction that I've got to make because I see it mis-reported so many times. The CPB money goes directly to stations. CPB is limited by law to only 4 percent of the appropriations for administration. So the decisions about what programs are on the air are made at the local level. And that was seen as the way to keep federal and political interference out of broadcasting in this country.

RW: *The budget that goes to the CPB is 280-plus millions of dollars. How much of that pie is devoted to radio and how much to television? And for the sake of clarification the NFCB only deals with radio.*

Chadwick: The way CPB distributes its money between radio and television is established by law; 75 percent of the money goes to television and 25 percent goes to radio—right now about \$50 million dollars in 1995 for all of public radio.

RW: *And this funding is going to cut by 15 percent next year and another 30 percent in the following year. In what way is this going to affect the community radio stations that your organization is so interested in supporting.*

Chadwick: The way I describe it, the money from the federal government is like the seed money for the operation. This is money that the stations can more or less count on (sometimes less). But what happens is they know that this money is coming in. It is divided among the stations by another formula. The stations can then plan on producing programming, subscribe to National Public Radio or what ever.

Then they can put that programming on the air. If the listeners like what they hear they can decide to send money to the station. So if that seed money isn't there, it's going to make it that much harder to start the machine that creates the funding cycle.

RW: *Does NPR receive funding from CPB?*

Chadwick: They receive it indirectly because the stations are given grants that are earmarked for NPR programming production and acquisition. Stations then can use that money to subscribe to National Public Radio. Or to produce their own programs that would be distributed nationally. The vast majority of money comes to NPR through member dues, just like us.

RW: *What are the stations going to do without this seed money? Are their existences going to be threatened?*

Chadwick: No. I can't imagine in the history of community radio and the struggles we've had that people would give up their licenses. What will happen is they may not be able to produce or invest in

the kind of programming that they like to.

RW: *Maybe they won't be able to buy NPR programs. Maybe they'll be back on the local grass root level with their programming.*

Chadwick: Right. There's a lot of different things that will happen like that. They will have to make the same kinds of decisions that any organization makes in their budget. Ideally they will learn to make it up from other sources. That's going to be the big challenge.

However I want to correct the notion that this money was ever used to build stations. In order to get CPB money in the first place the station has to reach certain qualification criteria which means being on the air for at least a year and having a budget of \$200,000 and having five full time staffers. That has to be funded initially by the community and to maintain the grant from CPB the community has to continue to support at least at this level.

RW: *I understand that now the NFCB is about to move its headquarters to San Francisco where it will join Western Public Radio. Tell me about this alliance.*

Chadwick: The goals of the NFCB and WPR are very similar. We both want to bring more voices into radio.

RW: *What about next year's conference?*

Chadwick: It's going to be in San Francisco next year because we're going to be showing off Western Public Radio's facility. We think we're going to have a lot more instruction going on, production workshops, digital production workshops, a multimedia demonstration, and we're looking forward to it. It'll take place in the spring. ☺

NFCB Helps Local Radio

► continued from page 13

of story ideas are pitched during the weekend. NNN is always trying to expand its coverage by encouraging stations to pick up our feed. We're especially interested in stations that have a com-

soon to go on line throughout the country. This emerging media represents a vital link for news and information in areas that are isolated, or without access to information. "Community radio is especially important in my country," Mr.



Spanish-talk host Juan Arambula

mitment for diverse programming."

Nathi Kheswa, media consultant, and Lumko Mtimde, advocacy officer with the National Community Radio Forum from South Africa reported on the changes in radio in South Africa since the dismantling of "apartheid" when people were unable to have their voices heard on radio.

Now South Africa's radio systems is expanding—with thirty-three new stations

Kesha said, "You see the illiteracy rate is very high in South Africa, and so radio provides people with a chance to hear what's happening in their area."

□ □ □

Stan Barr is a contributor to RW. His own nationally distributed radio program, "Innocents Abroad" will soon be airing a four-part documentary about Vietnam. ☺

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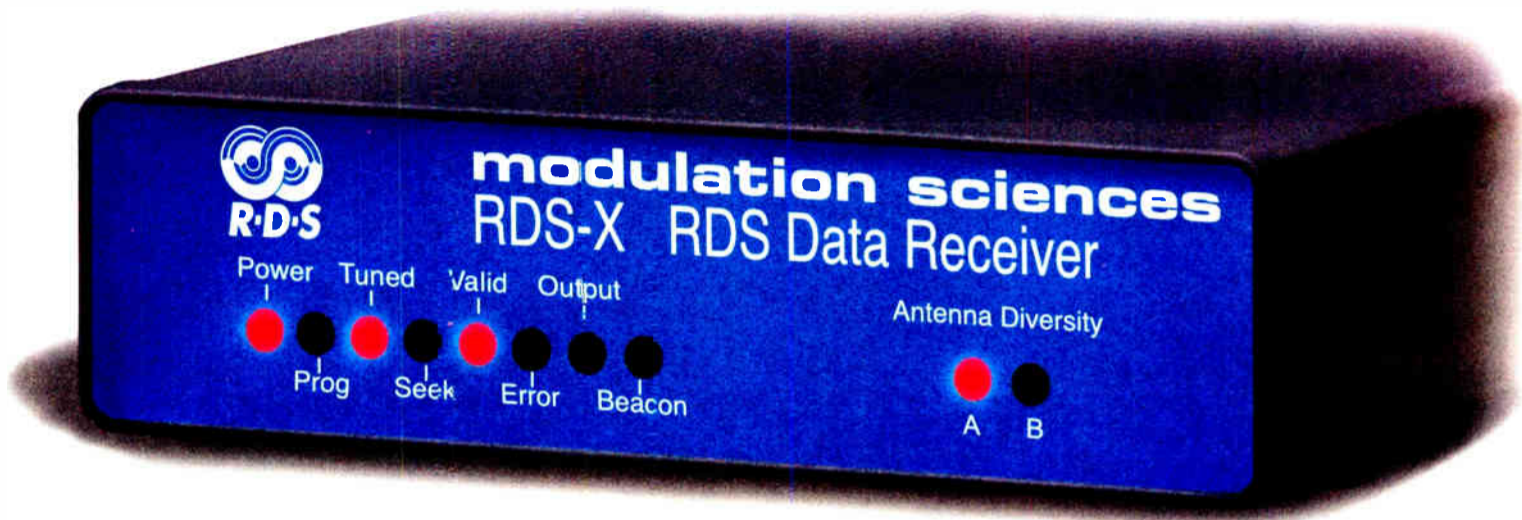


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INTERNATIONAL UPDATE

European EMC Regulations Lack Definition

by Lawrence Hallett

EVESHAM, England With 1996 now less than a year away, the subject of EMC—in official terms called electro-magnetic compatibility—regulations and how they relate to the broadcast radio industry should be clearly and completely defined.

Unfortunately this is not yet the case, much to the concern of equipment suppliers and manufacturers.

By the start of next year, so the theory goes, it will be illegal to place on the market just about any item of electronic equipment, imported or home produced, unless it has been rigorously tested. These tests are supposed to ensure electromagnetic compatibility, that is minimize interference to other electronic equipment and ensure resistance to interference from outside sources.

Tough fines

Banning products from sale in Europe, together with heavy fines and the possibility of prison sentences, await those that fail to conform. Importers, or end users of imported equipment, will be legally responsible for its compliance and could face similar penalties should it fail to do so.

Inevitably there will be cases of complaints driven not by problems of interference but rather by competing manufacturers seeking a dubious commercial advantage.

The excuse behind the introduction of yet more bureaucracy is "removal of barriers to trade." Ask broadcast radio manufacturers what they think and many will say its result is just the opposite.

Trading in a competitive professional market does not leave much room for extra expenditure on expensive third-party testing that, for example, in the case of transmitters may well be mandatory once the regulations are finally completed.

The same may be said of receivers. Some interpretations of current draft regulations suggest that as a receiver contains a local oscillator capable of radiating, these also will need mandatory third-party testing by an accredited test house.

One senior executive from a U.K. broadcast equipment manufacturer who wanted to remain anonymous said, "What's particularly upsetting is that the regulations are designed to ensure that we don't do something we never do anyway."

Adverse effect

Commercial reality and EU regulations may well be so incompatible as to force some companies out of business and thereby damage the overall ability of European companies to sell to the rest of the world.

The specifications relating to broadcast transmitters were not complete by mid-February; in fact, for AM transmitters they have hardly been started. It is quite possible that 1996 will be with us and the regulations become law before all the appropriate standards are in place.

This means that manufacturers will have to fall back on generic standards, some of which are unlikely to be published in time. In addition, such standards may be inappropriate when it comes to dealing with high-power broadcast transmitters or delicate professional audio equipment. The alternative is to agree a test procedure with a notified body, but this is likely to be time consuming and therefore expensive.

For studio equipment manufacturers things might be a little easier, as third-party testing will not be mandatory. This means that two other routes for compliance are available. The first is "self certification" done in house or in conjunction with a third party, where the equipment is tested to a recognized standard.

The second route for a manufacturer is to produce a technical construction file that must then be submitted for approval. This route is most likely to be appropriate where no relevant standard exists or where large "one-off" complex systems are involved. The question must be asked, however: Will a "competent body" accept in-house testing or will it effectively ask for mandatory

third-party involvement by an approved test house with all the extra cost this would entail?

Test houses also could be in for something of a surprise when it comes to evaluating broadcast equipment. Most such establishments can cope quite well with mobile radio systems or cellular telephones where

Banning products from sale in Europe, together with heavy fines and the possibility of prison sentences, await those that fail to conform.

equipment is modular and only produces a few 10s or 100s of watts output power. However, even fitting a 10 kW multiple transmitter and filtering into a measurement chamber could prove tricky—as could finding a suitable power supply for it and dummy load to dump the output into.

Assuming that testing can be successfully carried out at a specialist location, the next question that arises is: Is there any point?

Problems to come

Any experienced RF engineer will tell you that putting a perfectly functional system onto a site containing other perfectly operational equipment can lead to problems. Testing in the field is the only real solution and is what has been done by the industry and its regulators since radio began. Why are we reinventing the wheel?

A particular problem in relation to cost applies in the broadcast radio industry, especially for the smaller companies producing custom equipment.

For a multinational producing, say, mobile phones by the hundred thousand, the cost of testing can be easily offset against multiple sales. A broadcast company producing, say, three talk-back links with specialist interface equipment could see the costs associated with such a project more than double just by adding on the cost of mandatory testing.

Estimates for the cost of testing a simple FM transmitter range between \$12,500 and \$17,500 plus the extra "in-house" input in terms of manpower needed to prepare for such certification.

The problem seems to be that historically the need for type approval and testing stems from a radio communications background. This means that the various committees involved in setting the EMC standards tend to be populated in the main with representatives who come from a completely different background to that found within the professional broadcast industry.

Philosophical differences

It is a difference of philosophy. The committees struggle to understand the concept of professional competence that does not depend upon the technique of imposing detailed, tightly defined regulations. Freedom and responsibility of action that have always been part of the broadcast industry are being questioned from the outside.

This is due partly to the expansion and diversification of broadcasting that means regulators can no longer deal only with centralized transmission providers. Rather, they have to establish links with a diverse range of broadcast companies that may require new structures and methods of working.

Representatives from other industries that have historically developed a separate, often incompatible, operational ethos, stemming from the different nature of the telecommunications and domestic electronic equipment markets, sometimes feel that this could be a good reason for tighter broadcast regulation.

So when they are finally complete, will the EMC regulations stick or be effectively ignored?

Some U.K. manufacturers also are concerned that the regulations will not be evenly implemented across the

European Union. Could it be easier to get something approved outside the U.K. where testing might not be so rigorous? There are even questions as to when and if some less developed European Union member states will have the technical facilities to carry out some of the more complex test procedures proposed.

At the end of the day will these new regulations help the original intent—the prevention of electromagnetic pollution? They might go some way toward reducing interference from things like fluorescent tubes, monitor screens, industrial freezers, air conditioners and computers

that are the major interference culprits in the real world.

On the other hand, the cost of such improvements could be too high and they could just raise yet another barrier to trade by making European equipment far too expensive to compete in the worldwide marketplace.

□ □ □

Lawrence Hallett, who contributes regularly to RW, is a partner in the engineering firm Phoenix Communications. Contact him at telephone: 44-1386-40090 or fax: 44-1386-40160.

FCC to Hike ISDN Charges

► continued from page 1

Daley said. "There would be people who would be priced out of the service."

Exactly where the blame falls in all this is up for debate. The New York Bell company, NYNEX, petitioned the FCC for the single line ISDN rate in 1992. That is when the commission ruled each channel should be priced separately, so phone companies have known about this for at least two years. NYNEX in conjunction with Bell Atlantic then each filed a reconsideration petition, which the FCC did not rule against early this year.

Meanwhile, phone companies continued adding ISDN lines and expanded ISDN hookup opportunities through "ISDN Anywhere" programs, where they would hook ISDN users to the nearest ISDN switch if their local phone office did not have a switch.

It all adds up

For many broadcasters the rate hikes, which could add between \$84 and \$216 to a single line fee each year, are coming at a bad time. The FCC is proposing regulatory fee hikes and mandating stations to spend about \$120 to convert their EBS decoders to receive an eight-second tone instead of a 22-second tone.

The good news is that the FCC will review the issue a few more times before making a final decision. The FCC has yet to rule on the Bell Atlantic emergency waiver petition. Other companies with petitions before the FCC include Pacific Bell, GTE and Cincinnati Bell.

Jim Schlichting, the chief of policy planning at the FCC Common Carrier Bureau, said that the FCC is on the verge of issuing a Notice of Proposed Rule Making, which includes a public comment period and then a consideration of comments from petitioners.

In an interview with *RW* he said the FCC would consider modifying the proposed charges. "The commission is actively interested in considering all options, including lowering the fees under the current rules," he said.

Schlichting noted that whatever money the forfeits on SLCs would be passed onto consumers of long distance services.

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World Radio History

INTERNATIONAL UPDATE

Radio Canada International to Lose Funding

by James Careless

OTTAWA This year marks the 50th anniversary of Radio Canada International (RCI), the Canadian publicly-owned shortwave broadcaster.

However, the mood among the station's staff is anything but festive. Many of them wonder if RCI will be around to mark its 51st birthday next year.

Year after year

As with many government-funded broadcasters, the problem is money, or, to be more precise, the growing lack of it. Crippled by a soaring national debt, the Canadian government is slashing costs across the board, and RCI—whose budget has been reduced year after year—is no exception.

"We are uncertain about the future," said RCI Executive Director Terry Hargreaves.

Fifty years ago, the future looked a lot more promising as the International Service of the Canadian Broadcasting Service (CBC), as it was then known, signed on with two 50 kW transmitters at Sackville, New Brunswick, on the Atlantic

CBC maintains with the government. This, combined with low-key, quality programs, won it many loyal listeners over the years, estimated at about 10 million weekly by 1991.

In fact, the popularity of RCI outpaced that of much larger broadcasters like the Voice of America and Radio Moscow, said Larry Magne, editor-in-chief of the authoritative shortwave directory, "Passport to World Band Radio."

According to Magne, surveys conducted by the BBC consistently showed that the battle to be "Most Popular Broadcaster" was always "nip and tuck" between the BBC World Service and Radio Canada International, an incredible result.

Making this accomplishment all the more outstanding is the fact that the much-smaller RCI became progressively smaller over the years.

Smaller budgets

Starting in 1955, successive governments cut its budget, with each cut becoming progressively larger and more brutal.

As of April 1 of that year, the service was transferred to the Department of Foreign Affairs and International Trade.

This move did not affect the editorial independence of RCI, but it did result in its budget being slashed by a third.

Since then, the "stable five-year" funding promised at the time of the transfer also has been compromised, said Hargreaves. "The year we are currently in, 1994-1995, we had a 15 percent cut," Hargreaves said. "And the year before that we had a 10 percent cut."

To make the situation worse, the

CN\$18.5 million RCI budget is slated to be slashed by 20 percent in 1995-1996 and 25 percent the year after. These projected cuts were instituted by the previous Conservative government and, to date, not rescinded by the current Liberal administration.

Compounding concerns

To compound the concern, consider that RCI has committed to new transmitters at a cost of CN\$5 million over 2 years, plus other costs, and one can understand why

continued on page 21 ►



Fang He (left) and Oliver Irwin (right) of RCI discuss issues with Federal Trade Minister Roy McLaren (center).

coast of Canada. Currently, Sackville has three 100 kW and five 250 kW transmitters, switched by computer through a network of curtain antenna arrays.

The Feb. 25, inaugural broadcast came two-and-a-half years after the International Service was originally authorized, initially as an emergency radio link to England.

Ruler-in-exile

Back in 1942, World War II was going badly enough for Britain that a successful Nazi invasion of the home islands seemed possible. Hence the Sackville site was established to provide a Churchill government in exile with a reliable shortwave link to a conquered English population.

However, by the time Sackville began transmissions, the invasion threat had receded. So the International Service was retargeted at the hundreds of thousands of Canadian soldiers stationed overseas. As the Cold War took hold, the International Service was refocused once again to various language groups living in Europe and then to other parts of the globe as well.

Over the years the International Service, renamed RCI in 1972, gained a reputation for unbiased reporting, one enhanced by the arm's-length distance that the

The 1978 cut of 20 percent, for instance, was only surpassed in scope in 1991, when RCI lost a third of its CN\$22 million budget, 45 percent of its 200 employees, 40 percent of its 14 foreign language services and virtually all of its in-house-produced English and French programs, including the one consistently voted the most popular, the "Shortwave Listeners' Digest" hosted by Ian McFarland.

Voted Most Popular Broadcaster in numerous listener polls, McFarland well remembers the day the cuts were announced in the hallway outside his office at the Montréal headquarters of RCI: March 22, 1991.

"I call that 'Black Friday,'" said McFarland, "and it will always be Black Friday for me."

Black Friday occurred four months after the CBC announced it would no longer fund the service as of April 1, 1991.

The problem, as always, was money: CBC was faced with a disastrous CN\$108 million shortfall, the result of drastic budget cuts by the then-Conservative government. In a move to stay afloat, CBC shut down 11 local television stations, fired hundreds of employees and cut RCI loose.

However, it was not until March 22, 1991, that the fate of RCI was decided.

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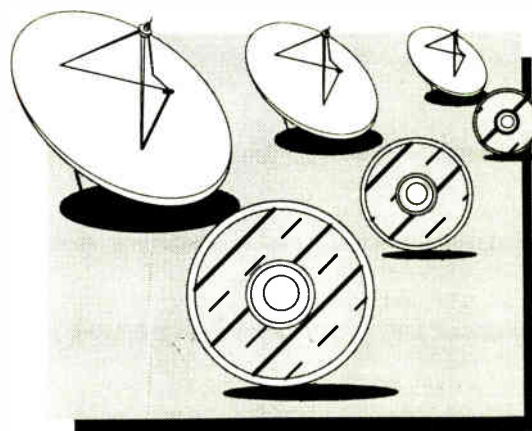
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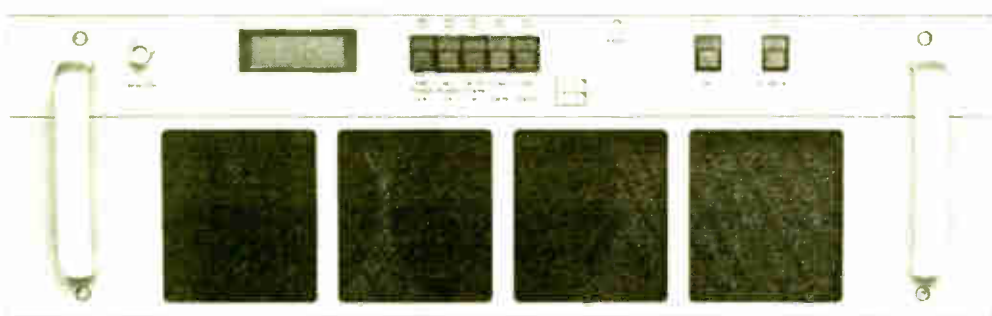
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READER SERVICE NO. 11

CRL and Tektronix Gain from Joint Effort

TEMPE, Ariz. Earlier this year, Tektronix's first royalty payment to Circuit Research Labs (CRL) was presented to CEO Ron Jones by Tektronix's Richard Baker. The check was the first royalty payment for technology licensed by CRL to Oregon-based Tektronix, that resulted in the Tektronix AM70, a hand-held digital analyzer/generator for diagnosing digital and analog audio signals in the field.

evaluate audio, and the VM700A Video Measurement test set is used for video testing as well as audio testing using the CCITT 0.33 test sequences.

Both are full-sized test sets intended for stationary use, but now with the advent of the new AM70, can extend their evaluation features throughout an entire audio path.

Said Bill Thompson, a product marketing manager for Tektronix, "We've recognized that more and more of our

The AM70 is the first joint effort by the two companies, that inked an agreement in May 1994.

"For all the support from CRL, and on behalf of Tektronix, I'd like to thank you very much for the work you put into this," Baker said to a group gathered at CRL's Tempe facility.

The AM70 was heralded as an exam-

ple of Tektronix's experience in test equipment and CRL's expertise in audio signal processing.

customers need portable gear. What we're doing is letting people in various levels and functions have products that are appropriate for the task at hand."

The 1.25-pound, hand-held AM70 is



From left to right, Ron Jones, president and CEO; Leon Peng, project engineer; Chuck Adams, research and development manager; Richard Baker, Tektronix TV operations manager

ple of Tektronix's experience in test equipment and CRL's expertise in audio signal processing.

CRL, a company known for its audio processors, manufactures the DAA-50, a digital signal receiver based on sister technology to the AM70. First generation technology for both the DAA-50 and the new Tektronix AM70 was presented at the National Association of Broadcasters convention in 1993. The new AM70 is the first joint effort by the two companies, who inked an agreement in May of 1994.

Sophisticated customers

The impetus for the collaboration, according to Tektronix's Baker, is a new generation of consumers who are demanding "new digital tools for audio."

The AM70 complements Tektronix's AM700 and VM700A measurement sets. The AM700 Audio Measurement test set uses multitone technology to

able to generate standardized test tones to activate the multitone evaluation functions of the AM700 and the CCITT 0.33 sequence tones of the VM700A from the field.

Using multitones

Multitone testing is a method of transmitting a group of tones simultaneously each selected for amplitude, phase and frequency in order to evaluate noise distortion and other characteristics in the audio spectrum; CCITT 0.33 is a sequential set of tones generated for the same purpose.

In addition to acting as a source of digital and analog test signals, the new hand-held test tool is capable of determining sample rates in the field, plus can perform light audio editing such as correcting a phase reversal or correcting minor problems with channel status data.

In the future, CRL and Tektronix may collaborate on other joint projects, according to the two companies. ☺

RCI Losing Funding

► continued from page 19

Hargreaves sounded fatalistic about the future of RCI during a Senate hearing last year.

"We must return to paying pension contributions, which run close to three-quarters of a million dollars per year, and take a 20 percent cut in the budget," he told the Senate. "This means in dollar terms, we will receive next year nearly CN\$3.5 million less than was originally forecast."

"This would mean dropping several language services and personnel layoffs, if no remedial action is taken, plus the elimination of rebroadcasting on domestic stations in target countries."

It also would mean, he speculated, that Canada would permanently lose international shortwave frequencies currently assigned to this country.

The Senate committee subsequently recommended restoring RCI funding to its pre-1991 level; however, its recommendations are nonbinding, and to date the Canadian government has done nothing to implement them.

Why has RCI undergone such serious budget reductions? The reason has nothing to do with government hostility toward the service.

In fact, most of the government does not even know or care that RCI exists, said McFarland, nor does the Canadian public. "The lack of profile domestically has, I think, always been the problem with RCI," he said.

The core of the problem, Magne

explained, is that "international broadcasts do not reach voters," the people politicians are most eager to please. "Even though they may do an awful lot of good—dollar for dollar it is probably the most powerful thing in terms of foreign policy that can be done—it does not reach voters," Magne said.

Lacking any real domestic base, save a handful of loyal shortwave hobbyists, RCI is an easy target for government cost-cutters. Realistically speaking, it could vanish tomorrow and few Canadians would notice.

Whether or not oblivion is the fate of RCI remains to be seen. The current Liberal government, faced with the free spending of its predecessor two decades ago, is under tremendous pressure to cut costs. Even sacred social programs such as publicly-funded health care is under attack, as cash-strapped bureaucrats search desperately for things to cut.

Given this, the future for RCI is, at best, uncertain. Despite its long-standing reputation of broadcast excellence, despite the esteem in which many shortwave listeners hold it, the 50th anniversary of the service is not a happy one.

In fact, perhaps the best thing that he said for the 50th anniversary is that, despite everything, RCI has managed to hang on this long.

□ □ □

James Careless reports on the industry for RW in Canada. ☺

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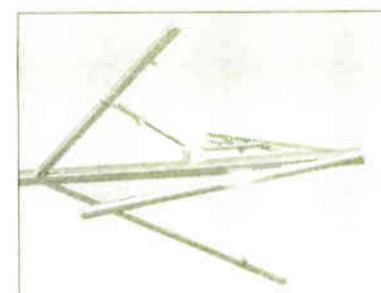
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KEYBOARD CONNECTION

New Software to Ease Radio Tasks

by Barry Mishkind

LAS VEGAS NAB convention-time is always appropriate for taking stock of what is new in the computer industry and how it affects radio.

Many of you have heard that Microsoft is nearly ready to release Windows 95, and as this is written, the "final beta" has been released to the field for testing. Microsoft claims its August general release date is still viable. Meanwhile, IBM's OS/2 Warp has been on the street for some time, and is selling well.

Both systems have strong proponents. During last year's COMDEX (the computer industry's major convention) here in Las Vegas, you could see both companies' "SWAT Teams" roving the floors trying to get attendees to commit to their respective system. While comparing the released OS/2 Warp with the still in-beta-testing Windows 95 is not totally fair, it is easy to see PC operating systems are now reaching a point where they can be called "mature." Should you buy one of them? Stay tuned, I intend to discuss that issue here.

Moving away from the operating system wars, new and improved products are all over the place. The processor wars are not only in broadcasting. Likely

you've heard of the Intel public relations disaster. Not only does this hurt Intel's image, but it has allowed some other manufacturers to catch up with product such as the new K-5 chip. Look for 586-class machines to start slipping in price this spring. Some may start to come equipped with dual CD-ROM readers. Meanwhile, the P-6 is in the wings.

Look for 586-class machines to start slipping in price this spring.

Another area deserving attention is ergonomics, covering chairs to keyboards to specially designed mouse pads, like Computer Expressions' Combo that is literally covered with suggestions on relieving stress and fatigue.

What's the buzz?

The biggest buzzword continues to be "Internet." From one end of COMDEX to the other, access to the Internet and programs to take advantage of the access were being shown off. They ranged from a series of built-in macros to turn DCA's Crosstalk for Windows into a front end

for net access to Spry's Internet In A Box. In between were many other products, including Phoenix Technology's Internet Express.

The telephone companies were also there, prompted by the eager demand for ways to improve data transfer over phone line. ISDN systems, system design and even informational packets are available to you from your region phone company. Many broadcasters are already familiar with the ISDN systems and their adaptation for audio links. The ability to plug computers into ISDN will afford a tremendous speed advantage to accessing remote networks.

Bellecore has produced a computer program to help users identify the services they need, so as to avoid expensive mistakes (800-992-ISDN).

Speaking of information access, you really don't need to be hooked into the Internet to have a tremendous amount of research and resource material on line. The new Grollier's Multimedia Encyclopedia continues the trend toward multimedia displays that richly illustrate the text.

Another product of interest is the updated Guinness Multimedia Disk of Records.

If you have a talk show or research project and need to scan a lot of varied topics, you should get a copy of the Library of the Future from World Library. This single CD-ROM holds more than 3,500 complete books, stories and poems from literature to religion to historical documents, and runs under DOS or Windows. Historical researchers will also appreciate The Story of Civilization complete on one CD-ROM, including video interviews of the Durants, also from World Library.

Other CD titles that caught my eye included several titles from Great Bear Technology's wide range of products. The All Music Guide contains ratings, reviews and bios of some 6,000 artists and 35,000 recordings. The sports department will like SportzFreakz, a compilation of bloopers and worst moments, narrated by Gilbert Gottfried. And health-oriented shows will like the Compete Guide to Prescription and Non Prescription Drugs and the Medical Dictionary and Family Health Guide.

Small businesses, such as contract engineers, will likely find the new DacEasy Accounting for Windows of interest. Designed for small businesses, the program combines contact and accounting software with fax capability, letter merging, call tracking, Internet access and much more.

Also worthy of your interest is Lucid 3-D, available for DOS, Windows, Sharp Wizard and Casio BOSS. And, if you want an alternative to Windows File Manager, try Rapid from Gazelle. This program actually makes many file handling tasks much easier in Windows, from archiving to searching for files or text inside of files across all your drives.

And, if you've ever tried to figure out how to properly "uninstall" a program, getting rid of "only the correct files," you will love MicroHelp Uninstaller, one of five great utilities in Phoenix's new Ultimate Utilities Suite. Also in this modestly priced package is Eclipse Find,

a text and file locator, a program launcher, a cache and a security program for Windows.

Of course, from time to time we all need a chuckle or three. Scott Adam's Dilbert Screen Saver will accomplish that and quickly rescue you from unwanted dark moments with with an appropriately wacky view of office bureaucracy.

Hardware Finds

The downward pressure on prices continues on several fronts. The newest notebook computers are getting even cheaper. Bigger hard drives and PCMCIA sockets are becoming standard, and some like the new Epson 650C feature color screens as big as 10.3 inches. Portable CD-ROM readers and detachable hard drives are now appearing in abundance, with prices making them affordable for carrying CD databases.

In the modem area, an agreement on standards for V.34 or "fast" class of 28.8 kbps modems has opened the floodgates for these models. Most major manufacturers are now starting to ship several new models at reasonable prices.

Still another area where prices continue to drop is personal laser printers. Models are now available for \$400, or sometimes even a bit less. With fewer features than their big brothers, they nevertheless make high quality printing available to virtually everyone. If you are considering moving up from a dot matrix printer, these prices make inkjet printers too expensive except for portable situations.

Sort of bridging the hardware and software are two areas of interest to broadcasters. First, the Ensoniq Soundscape promises to provide excellent sound for a very modest price. Stations that are starting the move to digital storage and production will likely find this a good place to start.

Kiikkuva Systems has taken the mapping software to a new plateau. Their RETKI GPS Land Navigation System mates map software with a GPS receiver that will plug into a PCMCIA slot and automatically display your location. Entering an address will allow the program to direct you to your destination. You will never be lost again. The future is here! (Reach it at 916-676-0690.)

Bookshelf

Finally, a quick word on new books to help you find your way on-line. From Sams Publishing comes Kevin Savetz' "Your Internet Consultant," containing hundreds of questions and answers on how to and where to find your way on the Internet. Sharon Fisher and Rob Tidrow's Riding The Internet Highway (New Rider's Publishing) will walk you through getting a mail and news connection on the Internet. It even comes with free software to make everything easy.

Correction

Several readers called or wrote to say that tape streamers can hold more than the 20 to 40MB mentioned in a previous column. That is true. A number "5" was inadvertently dropped; up to 450MB can be stored on one tape. Also, with hard drive costs coming down (a 420MB drive now is less than \$200), a spare one can provide very fast and safe backups. That is, unless your machine is stolen.

Thanks for all your calls and notes.

□□□

Barry Mishkind can be reached at 502-296-3797, or via e-mail at "barry@coyote.datalog.com".

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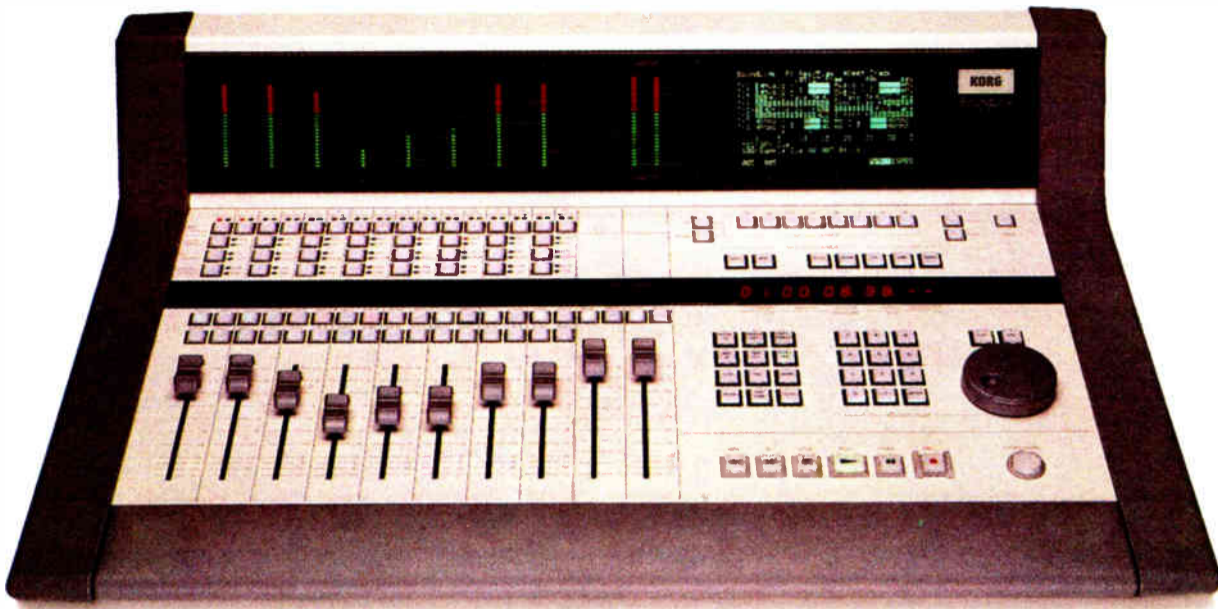
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Studio Sessions

Public Domain:
Recording Live at
the **White House**,
See page 29.

Equipment and Applications for Radio Production and Recording

PRODUCT EVALUATION

Hafler Targets Radio with P1500

by Tom Vernon

PHILADELPHIA After hearing rumors about the sonic excellence of the reasonably priced Hafler P1500 power amp (\$549 retail), I anxiously awaited its arrival for **RW** bench and user testing at the red brick mansion that is home to WXPX in Philadelphia.

The P1500, rated at 75 watts per channel, is one of several new professional amps that contain the Hafler's trans nova circuitry. The trans nova design has received kudos from a number of recording studios. I wasn't disappointed in the sound or features either.

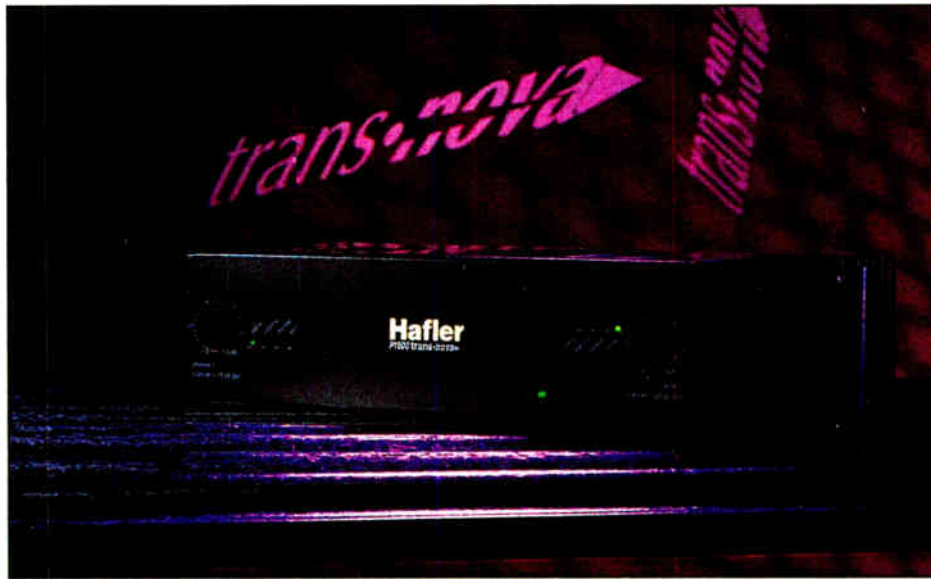
Features/construction

The P1500 is housed in a sturdy 3.5-inch rack-mount chassis. Heavy gauge metal is used throughout. The quality of mechanical construction, including sheet metal work and the black paint job are superb. The front panel contains the essentials: a power switch, controls for input-level adjustments, and four LED status indicators for each channel. The thermal and short LEDs come on when these protective circuits have been activated. A clip indicator shows when the amplifier is being overdriven. The signal indicator lights to show the presence of an input signal.

Rear-panel input jacks are the dual-function types that accept both 1/4-inch (tip-ring-sleeve) phone and XLR plugs. The P1500 will take either balanced or unbalanced inputs. Output connectors are

robust dual banana plugs. A switch selects either conventional stereo operation or the single-channel mono mode, that can produce 170 watts.

Internal construction is just as thoughtful. The large heat sinks facilitate passive



Hafler's P1500 will fit right into a production room rack.

cooling, so there are no fans to service, filters to clean, or dirt to brush out. Although Hafler's have a reputation for never failing, their design makes servicing easy. Each channel is a self-contained module. All that is required to swap out modules is to disconnect the heat sink and a few push-on terminals.

The pro audio market is already flooded with power amps, so why bother with

this one? What makes the P1500 unique is its patented circuitry. The trans-nova (TRANSeconductance NODal Voltage Amplifier) circuitry utilizes a MOSFET output stage connected in a grounded source configuration. This is said to have

the advantage of about 20 dB (ten times) gain over voltage follower designs.

Trans-nova

The output state is said to be ten times more efficient with the drive signal it receives. This added efficiency enables a topology that is more like quality pre-amps: Class A operation, wide band-

width, and good linearity. Whereas voltage follower designs might have five or more states, this trans-nova has only three. While the trans-nova circuitry is innovative, it is not complex. In fact, it may be simpler than some older conventional circuits.

Included in the design is circuitry to protect the speakers and amps without degrading audio quality. A soft start circuit eliminates destructive turn-on and turn-off transients which could damage your speakers. Output fuses have been eliminated. Instead, a sensing circuit instantly shuts the amp down in the event of a short circuit in the load. Heat sink temperature is monitored and the amp will also cycle down if things get too hot. Even with inept installation and operation, I think it would be difficult to destroy a P1500.

Impressive specs

The published specifications for this innovative circuitry are impressive. The P1500 has a full-power bandwidth of 0.15 Hz to 300 kHz. Signal-to-noise is greater than 100 dB A weighted. Distortion is less than 0.1 percent 20-20 kHz, but typically .01 percent at 1 kHz at rated power into 8 ohms. The power rating of the P1500 is 75 wpc into 8 ohms. Input sensitivity is 870 mV - 4.8 v for full 75 watt output.

The bench test pretty much confirmed Hafler's claims. In some areas, the amp exceeded the limits of our test equipment. Frequency response was ruler-flat within the limits of our 20 Hz to 200 kHz audio analyzer. Full-power distortion at 1 kHz was .026 percent. Signal-to-noise

continued on page 28 ►

NOTE

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CRL's digital audio analyzer will provide comprehensive analysis of your digital signals. The **DAA-50** is your hand-held passport to the digital audio domain!

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We've been advised that it's a total waste of time to advertise to broadcast engineers.

We're told that you folks are so conservative that you only drive beige, four-door 1978 Plymouth Reliants and wear polyester slacks with Ban-Roll waistbands. So conservative that you consider pocket protectors a new fashion fad. So conservative that 6-year-old, still-wet-behind-the-ears mixer company has very little chance of gaining any acceptance with an audience this demanding.

Call us overly optimistic, but we're still convinced that you'll appreciate our products. Someday. Hey, we HAD to be optimistic to get into this business. It wasn't like there weren't any compact boards already on the market.

In spite of the odds, our CR-1604 and MicroSeries 1202 mic/line have become widely accepted in recording, live performance and video production circles. Besides having more headroom than a Kenworth truck cab and less noise than a morgue at midnight, our mixers have a reputation for being incredibly reliable. Bullet-proof, even.

Now, we're not suggesting you make a Mackie compact mixer your main, on-air console or anything. In fact, the only place our current product line might get in your live signal chain is during a remote (The MS1202 12x12 mic/line mixer is getting quite popular for this application). But we've been around stations enough to know that reliability is a key factor anywhere, even in that broom closet they made you convert into a production room.

Finally, our mixers are incredible values. Buy a Mackie CR-1604 and you're getting a mixer that's regularly used to create major label compact discs and more commercial production work than you can shake an RE20 at... for just \$1099¹. Unless your GM as suddenly snapped and offered you an unlimited capital equipment budget, this is a major consideration.

So prove everybody wrong who says broadcast engineers are too conservative to call a toll-free number, or contact your favorite broadcast supply house.

IN SPITE OF RADIO ENGINEERS' LEGENDARY CONSERVATISM, WE'RE RUNNING ANOTHER AD.

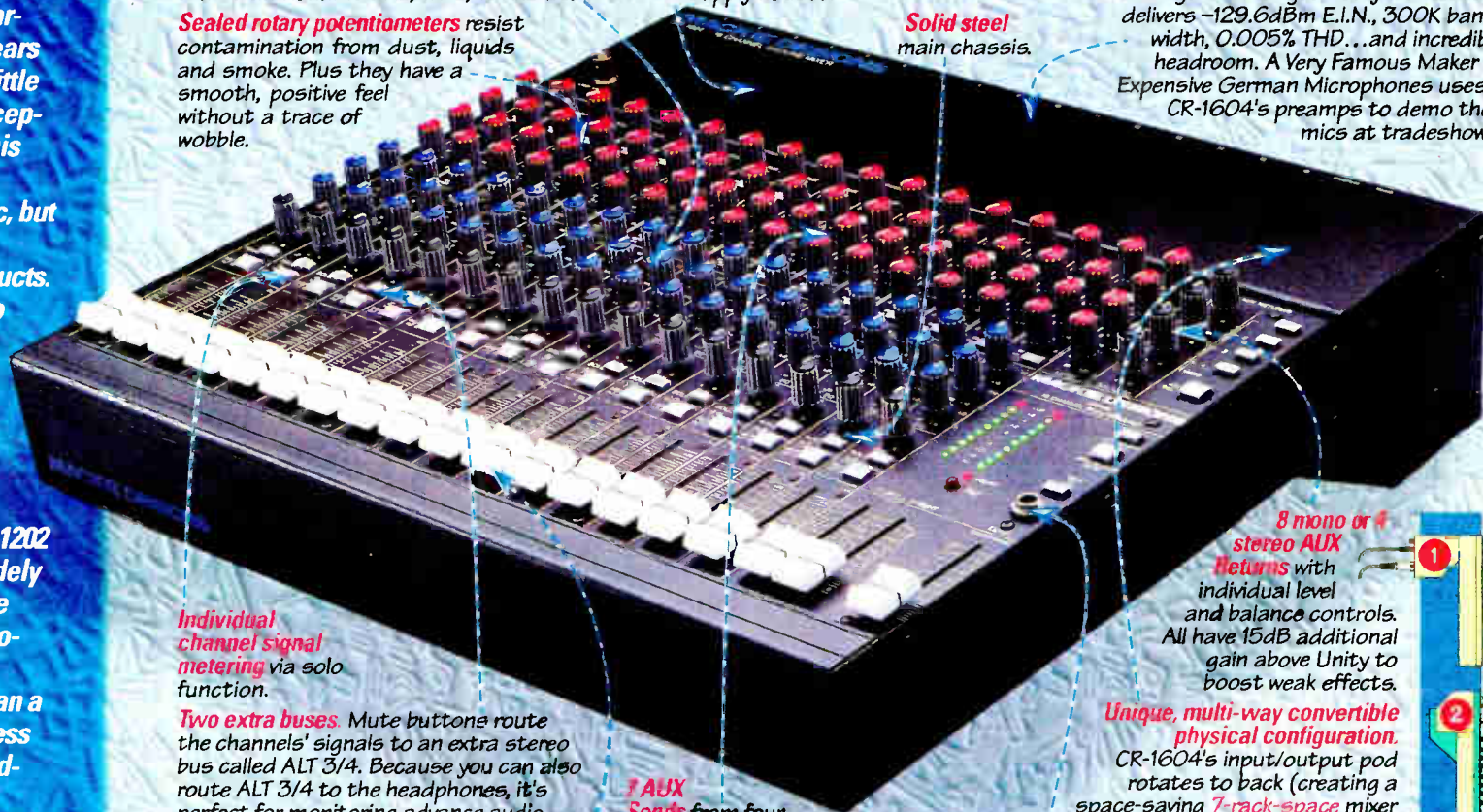


3-band equalization done right: $\pm 15\text{dB}$ at 80Hz, $\pm 12\text{dB}$ at 2.5kHz (perfect for voices), $\pm 15\text{dB}$ at 12kHz. Far more useful than traditional 100Hz, 1KHz, 10KHz EQ.

Sealed rotary potentiometers resist contamination from dust, liquids and smoke. Plus they have a smooth, positive feel without a trace of wobble.

The Mackie Designs 16x2 **CR-1604 Mic/Line Mixer**. Suggested retail price, \$1095¹. Available at America's top broadcast supply houses.

Six recording studio-grade microphone preamps with +48VDC phantom power. Discrete circuitry with four conjugate-pair, large-emitter geometry transistors delivers -129.6dBm E.I.N., 300K bandwidth, 0.005% THD...and incredible headroom. A Very Famous Maker of Expensive German Microphones uses a CR-1604's preamps to demo their mics at tradeshow.



Solid steel main chassis.

Individual channel signal metering via solo function.

Two extra buses. Mute buttons route the channels' signals to an extra stereo bus called ALT 3/4. Because you can also route ALT 3/4 to the headphones, it's perfect for monitoring advance audio cues: Preview a signal that hasn't been brought up in the mix yet...then add it by unmuting the channel.

UnityPlus gain structure gives high headroom and low noise at the same time. Set the fader to center-detent Unity Gain, press channel solo to monitor the channel via the CR-1604's LED meters, adjust the input trim ONCE, and you're ready. Because there's 20dB MORE gain available on the fader, you won't need to constantly re-adjust the trim.

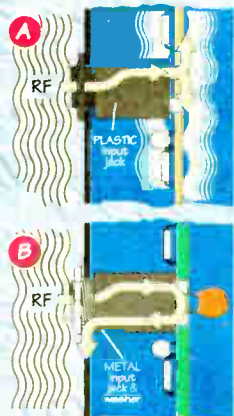
1 AUX Sends from four knobs. AUX 1 can be used as an effects send or headphone monitor cue via the MON. Sends 3 & 4 become AUXs 5 & 6 when the SHIFT button is pressed. All sends give you 15dB more gain above Unity so that you can get tons of effect even when the channel fader is pulled down.

Powerful headphone amp (with volume control) drives any phones to head-banging levels even an AOR production person will appreciate.



Rugged design and construction. Including mil-spec, double-sided, thru-hole-plated fiberglass circuit boards (horizontally-mounted on brass stand-offs for impact-resistance), double-parallel-wired faders for 2-times redundancy, and electronic protection against power surges, impedance mis-matches and static discharges.

Better-than-digital specs and headroom. The CR-1604 has a dynamic range of 108dB and an internal S/N ratio of -116dB (versus compact discs' 96dB dynamic range.) This means you're getting a mixer that can handle the output of digital workstations, CDs and DAT tapes without overload.



Maximum RFI protection. Most compact mixers use plastic jacks that transmit RFI to the main circuit board where it's re-radiated and picked up by anything that rectifies (A). The CR-1604 uses metal jacks and washers plus a shunting capacitor to de-rail RFI before it gets to any circuit traces (B).

A Radio World reviewer tested a CR-1604 on a transmitter hill with 3 VHF TV and 1 FM sticks plus several microwave repeaters and shortwave transmitters. When he plugged in a notoriously RF-prone microphone, he detected NO audible RF interference.

Not shown: Inserts on Chs. 1 thru 8, main left/right bus inserts, phantom power switch, balanced/unbalanced main stereo outputs and separate mono output. XLR10 Mic Preamp Expander connects to the CR-1604 pod to provide 10 more preamps complete with trims and phantom power.



A chip off the old block: Perfect for remotes, our MS1202 12x12 Mic/Line Mixer has 4 of the same superb mic preamps that distinguish our larger CR-1604, plus phantom power, 2 AUX sends/ch., 2 stereo AUX returns, channel patching, 2-band EQ, 3-way 12-LED peak metering, headphone monitor amp with level control, built-in power supply. Suggested retail is just \$399!



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¹ Price is slightly higher in Canada.

PRODUCT EVALUATION

Editing Made Easy with SV-4100

by Ty Ford

BALTIMORE Three features position the Panasonic SV-4100 DAT above the standard professional DAT machine: sync-to-digital or video sources, quick start, and machine-to-machine editing. These and a wide range of adjustment possibilities also account for a list price of nearly \$2,700.

First, if you plan on mixing digital audio bit streams any time soon, and if 16-bit linear digital audio and sample rates of 32 kHz, 44.1 kHz and 48 kHz are your normal domain, the word clock I/Os and Video Sync in ports (all via 75 ohm BNC connectors) on the back of the Panasonic SV-4100 DAT may make life easier.

With the SV-4100, you can choose between video sync rates of 25, 29.97 and 30 frames per second and Word Sync rates of 32, 44.1 and 48 kHz. Don't get the idea that this means that the SV-4100 can be used to chase and lock to SMPTE, it cannot. What it does mean is that the SV-4100

There are no dip switches on the SV-4100 for altering the configurations. Instead, all of those adjustments are done by accessing the appropriate modes via front-panel button combinations.

Mode No. 1 allows you to determine whether AES/EBU or S/PDIF format will be sent to the coaxial, optical or XLR ports. Mode No. 2 allows you to check the error rates of either digital head, or their combined error rate.

Mode No. 3 allows you to toggle between standard and Single Play mode. In Single Play mode, when a Skip ID or Start ID is detected during playback, the

tape will park in Pause Mode. This handy feature lets you program a series of cuts on a tape allowing them to be fired off in order. The problem is, you have to remember to pot down before the next ID number, because, if the audio on the next cut is tight-cued to the start ID, the SV-4100 passes that first bit of audio.

My "test tape" was recorded on a Panasonic SV-3900 in Auto Program mode. It was interesting to note that, according to the SV-4100, the start ID automatically laid down by the SV-3900 happened three frames after it first sensed the audio, even more if the audio was

below the -42 dB threshold the SV-4100 uses to set a Start ID. That was the "burp" of audio I was hearing at the beginning of each Quick Start cueing process.

Using Quick Start

Quick Start, one of the new features on the SV-4100, uses 8MB of RAM to store three seconds of audio. With this feature and the Single Play mode, the SV-4100 almost becomes a cart machine. You still have to "pot down" between cuts to prevent the first edge of the tightly cued audio from being heard.

If you can get used to the idea of not using the "PNO/Start ID Auto" mode, and revert to the tape-cart style of starting the SV-4100 in "Record" a split second before you start the playback source,

continued on page 39 ▶

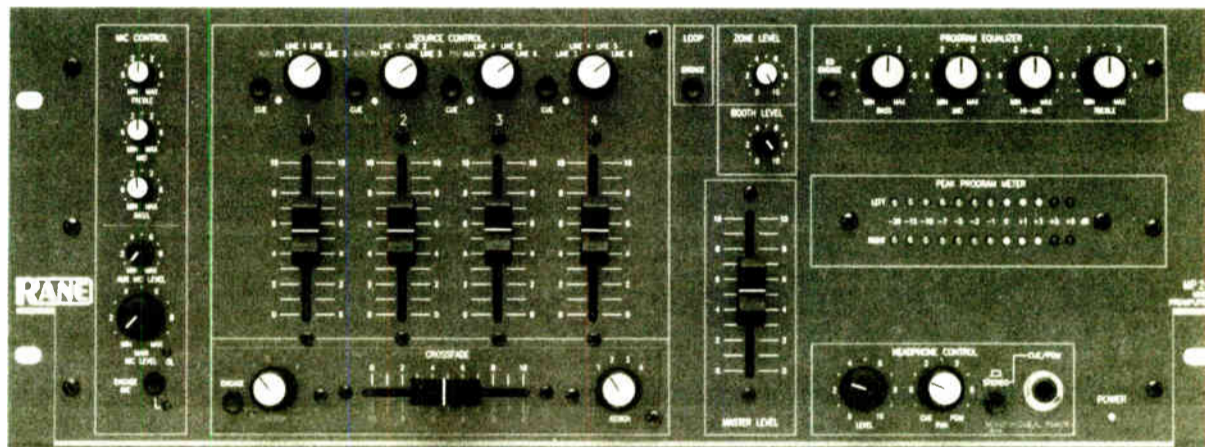
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ASSIGNABLE MIC You can configure the MP 24 to send microphone to tape for recording the show complete with talkover...or not.



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NEW COATED FADERS The Alps studio grade side-wipe faders in the MP 24 are now coated with a protective film for even longer noise-free operation under heavy use.

SWITCHABLE BOOTH DUCKER the MP 24 will either turn down the booth speakers during talkover, or leave them full bore. Your choice.

Seasoned professionals will continue to choose the MP 24, not just for its improvements, but for its most distinguishing combination of features: reliability, flexibility, and uncompromising sound quality. When only the best will do, it's still the MP 24.



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can be synched to a clock other than its own, thus eliminating the glitch problems associated with conflicting digital clocks.

Incidentally, Panasonic said there were some clock problems on the first one hundred and fifty SV-4100s that went out the door last year. According to Panasonic, the problem has been corrected and those units have been tracked down and made to work properly. If yours slipped through, contact Panasonic.

The features

The SV-4100 has AES/EBU XLRs and IEC, S/PDIF RCA-style I/Os, a consumer optical I/O and a standard balanced analog I/O with -10/+4 switchable outputs. Upon deciding which one you want, you punch a few buttons and... there you are.

As with the SV-3900, the 8-pin, DIN, parallel, remote port on the back-panel allows basic control of the transport: Skip, FF/Cue, Rew/Rev, Pause, Record, Play and Stop. It also serves a more advanced function. The manual includes a chart and digital key for implementing the entire range of operations for the SV-4100 through the DIN connector. Because of this connection method, you will not find any connections for the handy SH-MK390 Remote Controller and the RS-422 I/O ports like those used to control the SV-3900.

The wireless remote control that comes with the SV-4100 also provides extensive remote control. There is also a 1/4-inch TRS jack GPI (General Purpose Interface) that provides Play/Pause control.

The front panel sports a few more buttons than the SV-3700 and SV-3900, mostly to control the new Sync, Quick Start and Locate features. There is also the standard, robust headphone amp with front-panel jack and volume control.

Product Capsule: **Panasonic SV-4100 DAT Recorder**

	Thumbs Up		Thumbs Down
✓ quick start		✓ no confidence recording	
✓ sync			
✓ editing			
✓ memory play			
✓ very good audio quality			

For more information, contact Panasonic at 800-777-1146, or circle **Reader Service 50**.

FIRST IMPRESSION

Denon Adds Dolby S to Pro Cassette

by John Gatski

WASHINGTON It is amazing how the lowly analog cassette has managed to survive during the digital age despite DAT, CDs, MiniDisc, DCC, ADAT, Hi8, etc.

But with good quality blank tape prices at \$1.50 or less per unit, universal availability and almost everyone having some kind of playback machine, the analog cassette is still doing major business—even among the professional ranks. In fact, it sounds better than ever thanks to recent advances in tape quality and noise reduction such as Dolby S.

Recently, I spent a couple weeks playing with a preproduction sample of Denon's new Dolby S professional cassette recorder/player (and I mean literally new with Serial No. 1 on the label and handwritten copy editing marks still in the manual). The Denon DN790R is a rack-mount, full feature cassette that includes

decks claim about 75-78 dB. Frequency response, ± 3 dB, is rated from 20 Hz to 20 kHz. Very good specs indeed for a format that was invented for voice dictation.



Denon DN790R

In recording/headphone listening tests using TDK MA metal tape (Type IV), a Denon-provided metal tape and TDK-SA and Maxell XL-II chrome tapes, the Dolby S versions of CDs sounded more natural than Dolby C and, of course,

were significantly quieter than Dolby B—which is still preferred by many who use cassettes. Dolby S-encoded tapes also sound less processed than Dolby C when played back without any noise reduction switched on. When recording with no signal present at a high level—and switching back and forth between Dolby C and S—a low-end kind of grunge was apparent with Dolby C. But with Dolby S, that noise disappeared.

When recording jazz and pop music and monitoring through headphones with the DN790R, it is often difficult to tell the difference between CDs and the tape. Metal tape also allows deep "in-the-red-zone" recording before the onset of audible distortion. Dolby S alone, however, would not be worth the nearly \$1,000 price tag if it didn't have quality pro features. This deck is definitely feature-laden. First of all, the robust construction and the very quiet and quick shuttling transport make this deck a

cut above most consumer machines. Also, the pitch control is nice for playback

tweaking of those tapes that may have been made on off-speed machines.

Pro features

All the controls worked fine, but I am not partial to the two independent recording

New Hafler Power Amp

► continued from page 25

was measured at 107 dB. A weighted. A 20 Hz square wave showed virtually no degradation on the scope.

The manual is well-written. The installation, operation and technical reference sections of the manual each cover their topics well. Included are the pc board layout, schematic diagrams, and parts list.

The technical reference section includes theory of operation, and calibration procedures. Bias and common mode rejection are the only two adjustment pots. Although you'll probably never need to tweak these, alignment procedures using simple test equipment are fully described.

How does it sound?

All well and good you say. But how does this Hafler sound? It is really the subjective listening test that makes or breaks a power amp. I installed the P1500 in a studio where live music is recorded, as this is our most critical listening environment. The best way to describe the sound is like some of the classic tube amps, with a more open low end. We received favorable comments from musicians, who noted its natural and realistic qualities. This amp has all the sonic advantages of tube gear, without the frequent service needs of tube amps. (Plus, it has deep tight bass that tubes amps in this price range do not exhibit).

We did experience a component failure in our first test sample, however, a bum capacitor. But the second unit performed flawlessly. To date, there are about 1,300 P1500s in the field, with our first sample being the only failure, according to Rick Gentry, Hafler's national marketing manager. The Hafler P1500 comes with a full five-year warranty. This includes parts labor and return shipping costs.

While our criteria for evaluating this amp at WXPN was faithful reproduction, I suspect that the rugged construction

level controls. I like one control for both channels and a separate balance to adjust the channel levels independently, if necessary. The deck does not have a headphone jack volume control, which I prefer, but most pros monitor from a mixer or preamp headphone jack anyway.

I also liked the manual bias adjust better than the auto bias. Manual biasing made the tape sound closer to the source—especially on metal tapes. On production versions, maybe the auto bias feature will work better for metal tapes. On chrome tape, though, the auto bias worked fine.

Overall, the Denon represents just about all the features a production room needs, plus the sonic quality of Dolby S. There are certainly cheaper consumer cassette decks out there with Dolby S, mostly consumer, but they don't offer everything the DN790R does. There are also more expensive ones—many of which don't even offer Dolby S.

□□□

For more information, contact Denon at 201-575-7810; or circle Reader Service 118.

Analog cassette decks sound better than ever thanks to Dolby S noise reduction.

monitor head, Dolby S noise reduction, auto bias/manual bias, playback speed control, three-motor, closed loop dual capstan transport, balanced XLR/unbalanced RCA jacks, peak meters, music search. Suggested retail price is \$950.

Dolby S

Although there are numerous pro cassette decks available, I snagged the Denon for review because of the Dolby S feature. Dolby S is the consumer version of Dolby SR and is a very effective, multiband noise reduction system that eliminates some of the problems associated with Dolby C.

According to Denon, when used with a properly biased metal tape, the DN790R can deliver up to 84 dB signal-to-noise performance using Dolby S. Most Dolby C

would make this a reliable piece of equipment to lash into an portable rack case and take on the road for remotes. And we all know what really happens to equipment in the field.



Overall, if you are looking for a control room or production room amplifier that is reasonably priced and reproduces sound with audiophile quality, the Hafler P1500 will not disappoint.

For more information, contact Hafler at 800-366-1619; or Reader Service 160.

□□□

Tom Vernon, a regular columnist for RW, is chief engineer for WXPN in Philadelphia. He can be reached at 717-367-5595.

Product Capsule: Hafler P1500 Power Amplifier

 Thumbs Up	 Thumbs Down
<ul style="list-style-type: none"> ✓ good watt-per-dollar value ✓ tube-like sound without bass muddiness ✓ level controls ✓ XLR/quarter-inch combo jacks ✓ robust construction 	<ul style="list-style-type: none"> ✓ no RCA jacks (higher watt versions have them)
<small>For more information, contact Hafler at 800-366-1619; or circle Reader Service 184.</small>	

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Recorded Live at the White House

by Rich Rarey

WASHINGTON "I'm going to the White House for a site survey soon," NPR's General Production Technical Director Michael Schweppe told me back in early February. "And this looks like a difficult gig."

He had just gotten word from producer Bruce Scott that in three weeks and a day hence, a black-tie event commemorating the 25th anniversary of National Public Radio would occur, hosted by the president of the United States and presented in the East Room of the White House. The March 3rd program was one of a series of events for major contributors to NPR, planned by NPR's Development Division and the NPR Foundation.

"We knew from the onset that we would be dealing with two types of entertainment: music and theatrical vignettes, based on the 'White House' theme, and that there would be Hollywood stars aplenty performing at the event," Schweppe said.

Full-blown session

He told me that original plan was to record and mix to two-track from the East Room itself, but the producers began to realize the event had excellent potential as an NPR special. So Schweppe then got the green light to contract for a multitrack recording truck, which meant our task was to make make the best possible recording of the event.

We hired Big Mo of Kensington, Md., as the remote truck provider. On February 15, Schweppe arrived at the White House East Appointment Gate, where, after security checks were made and badges assigned, he was escorted to

the East Room and introduced to Chief Usher Gary Walters.

Here access to the room and proper setup time issues had to be worked out. Initially, equipment and technical people would only be admitted at 1 p.m. the day of the gig. With a sound check to start at 3 p.m., this meant that we had two hours to load-in, set up, test a 20-microphone complement, and get the equipment security checked through Secret Service.

A second site survey with the producer John Schreiber and director Murray Horwitz was taken, and two days before the gig, Michael Schweppe was appraised of the new, more favorable schedule. We were told to be at the White House at 6 a.m., on March 3 (the day of the gig), and hand-carry in all equipment between 6 and 8 a.m. After that, we'd be allowed to setup and test within the East Room until noon.

The NPR, PA and remote truck crews became, for a brief time, a stop on the White House tour, so folks from out of town were treated to the sight of eight people working in an intense, but relaxed atmosphere within the East Room.

Crew members had been informed that once they arrived for the setup, they were obliged to remain within the White House until tear-down that night, so all brought bag lunches and those working in the East Room brought their black-tie formal wear for the evening.

What about microphone selection? Schweppe said that a conference call between the PA company and remote truck people took care of that.

"Basically, I just asked 'What mics could you bring to the party?'" he said

with a grin. "I had some specific mics in mind. A Neumann U87a was specifically requested by Bette Midler, for instance." The remaining mic choices were culled from the vendors' inventory, he added.

White House policy dictated some microphone choices as well: since the Reagan years ("We begin bombing Russia in five minutes..." etc.), only the White House Communications Agency (WACA) is allowed to place a microphone for the President, and WACA provides the audio feed of his voice. Prior to President Clinton's remarks, the Neumann KM150 had to be physically unplugged and removed from the podium, and the president spoke through

WACA's two Shure SM57s. While it is no detraction to the fine products of the Shure company, discerning listeners can hear the difference between a mic that costs \$100 and one that costs hundreds more.

Schweppe's sound plot called for four boom-mounted microphones across the stage for the standing actors (Neumann KM150), four microphones at a table for a satiric presentation called "Backfire" (KM150s), a vocal mic at the piano (KMS150), three piano microphones (two Sennheiser MKH40s over the high and low hammers and an AKG414 in the "belly"), a MC microphone (KM150) and the U87a vocal mic.

Two AKG414 microphones were placed as audience-front left and right, and one Neumann RSM190 stereo

continued on page 32 ▶



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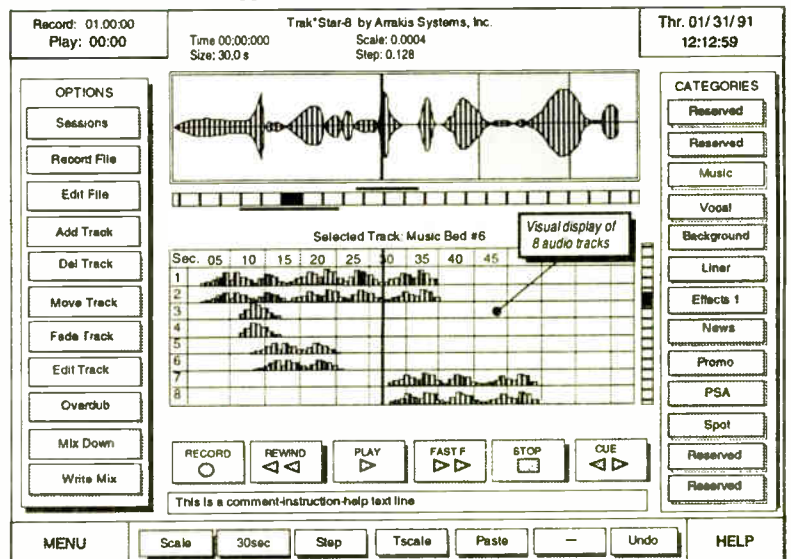
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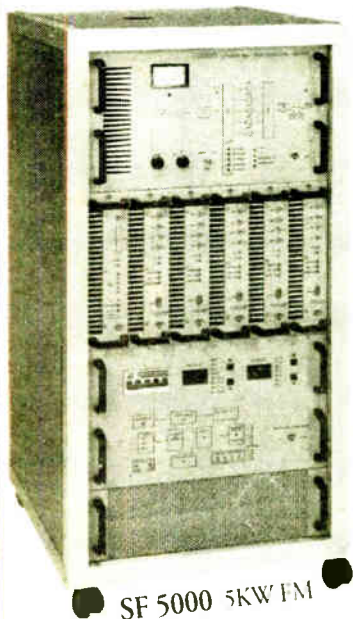
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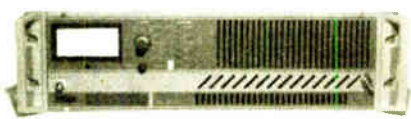
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ON-THE-SPOT

Dress Up Your Spots with More Sound Effects

by Ken R.

TOLEDO Have you ever heard a newspaper ad read on the radio? It may have been 60 seconds long, it may have been paid for by an advertiser, but it still wasn't a radio commercial.

What it probably sounded like is someone reading a bunch of products, prices and store hours as rapidly as possible. There probably was no single, attention-getting benefit, no cue for visual imagery, no final call to action. In short, a newspaper ad on the radio. Considering

we're well into the '90s, why do local retailers continue to waste radio budgets like this?

Let's go back to Radio Advertising 101, a class most continuity folks seem to have missed. The purpose of a commercial is to touch the listener, to get him/her emotionally involved with the product. In radio we have such a beautiful opportunity to create excitement in our advertising. We don't use a TV screen, but we can still create a picture in the listener's mind by touching all the senses. And sound effects are one tool in our kit.

But before we get to the sounds, let's start with the copy. If your client is a restaurant, use words like "mouth-watering," "tangy" and "charcoal-broiled." Those certainly paint a picture, don't they? But what if your product is something a little less tasty, like a car dealership?

Spark the imagination

Imagine the scent of a new car, the solid "chunk" when you close the door, and the feather-like touch of the wheel. Now, tie those emotional word pictures in with strong benefits such as safety and affordability and you have a spot that will bring people in the doors of that dealership.

People remember and respond to emotions they experience through their senses. No one can remember a school test from 9th grade, but everyone remembers a first kiss.

Now that we have some copy that involves the senses, let's add some sound effects. (By the way, you're not still using one of those old vinyl production libraries left over from the 1970s are you? Anything that says Pepper and Tanner should be banished from the production room. Now that CD libraries are so reasonably priced, you can pitch those scratchy old records.)

If two characters in a radio spot are talking, where are they? In a mall? In a bank? In the backyard? Ambient sound (background noise) helps place them in a believable space for the listener. And then there are those sounds that always perk up the ears of a listener: a phone ringing, a child's voice or an explosion,

2-1" count-off at the front of your spot. You can leave it out of your mix, but it'll be easier to start music and talent (and/or ambient sound) all at the right time.

And if you have a densely-layered spot (several effects and music), use a little compression on the voices. A ratio of 4:1 is about as high as you'll want to go... but

We have such a palette of beautiful audio colors we can use, but many radio spots are still done in black and white.

if appropriate. (And sometimes it is.)

I always find myself combining and editing sounds from CDs. All the "phone rings" in those libraries are too long. If you are using a hard-disk editor, it is easy to cut the middle out of them (you need the front and back to "define" the sound). Mixing a dropping metal element, splintering wood and a blast create a memorable crash. Sometimes rolling off the highs (anything above 10 kHz) helps keep ambient sounds in the background.

If your copy calls for a "man in the street" approach, borrow a cheap mic and cassette recorder from the news or sales department and go outside to record the voices. Then transfer from cassette in the studio.

Adding effects

We keep small crystal goblet and a knife in the studio to clink randomly for cocktail party simulations. I like to add that to a "small crowd" effect from a CD and complete the picture by playing a little tinkling piano on my Kurzweil K-2000. *Voilà.*

If you're using a multitrack reel-to-reel machine, use one of the edge tracks (one or eight for example) to record a short "3-

it really can help the message punch through.

But what keeps a listener interested is any change in audio. Music changes, varying speech tempos, the use of two voices (particularly if they are of differing sexes) or even sudden removal of music all serve to rivet attention to what is going on. You can even use a brief second of silence. It is free, it is dramatic and it can really heighten an important thought.

If you have a simple reverb unit at your disposal, or even better one of those handy-dandy all-in-one signal processors, use it creatively. A "large plate" setting can place your announcer in a huge warehouse. A long delay echo... and suddenly you're in the Grand Canyon. A sharp, tinny slap-back delay can stand in for a PA announcement in a stadium. A limited-frequency filter puts you on the phone.

Use a processor

Anything that can create a different sound will help focus all those jaded ears on your message. For under \$500, a versatile signal processor might be the best investment you can make.

There are a few dramatic sounds you must avoid: police sirens and ambulances for example (FCC no-nos). Some sounds can be used for humor (barnyard animals, honks, bonks, slide whistles, etc.). The new Hanna Barbara cartoon SFX CDs are excellent. Not only are certain sounds useful for punctuation, but they can actually evoke memories in the case of certain "famous" sounds. Fred Flintstone on tiptoes comes to mind for example.

Does your production room have those big, boomy monitors on the wall? Try a pair of smaller near-field monitors for mixing. They'll give you a better picture of how folks are actually hearing your spot. On the big speakers, you'll hear a lot of low overtones that disappear on the radio and you may find your music-to-voice levels will be way off. One trick we use in our studio is to try out a mix through a really cheap tinny speaker (like a speakerphone). If you can still hear every word above the music and effects, it's a good mix.

In short, use every sound technique and tool your station can afford to provide to touch the senses. I get frustrated because we have such a full palette of beautiful audio colors we can use, but many radio spots are still done in black and white.

□□□

Ken R. is president of Ken R Productions in Toledo, Ohio, a commercial production facility, and a contributing writer to RW.



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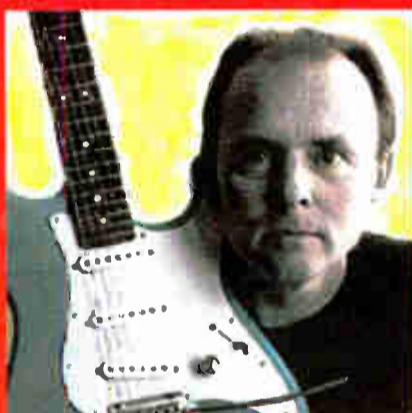
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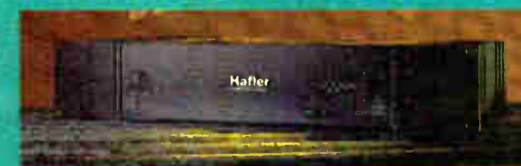


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NPR at the White House

► continued from page 29

shotgun was used for audience-rear ambience.

Schwepe said the three microphones within the piano offered the most flexibility to accommodate the broad range of musical styles that night Operatic, B'way, Blues, and Pop.

Several interesting things occurred during the mic setup and sound check: the crew noticed the shorter of the two

"sticks" that prop the piano lid open was too short to allow mic booms within the instrument, and playing the majestic Steinway with "full stick"—the lid fully open—was loud for the small stage.

As the producer, Andy Trudeau said later, "We propped the piano open to the full stick, and hoped the actors wouldn't complain—we hoped they would think the White House preferred

it that way, and fortunately, no one said a word."

As seven actors were to work three microphones, it became apparent that the preferred popper stoppers had to be swapped for the conventional foam windscreens, as the actors were of physically differing heights, and their P-pops emanating from different heights as well.

According to Schwepe, the gig was a success: each scene played well, starting with "NPR Playhouse, Live!," Dawn Upshaw performing Leonard Bernstein's "Take Care of This

House," a presidential version of "Car Talk" featuring the animated antics of "The Car Guys," Micheal Feinstein performing "In Our United States," followed by excerpts from "The White House" by A.E. Hotchner (performed by Edward James Olmos, Blythe Danner, Kathleen Turner, Martin Sheen, Roscoe Lee Brown, Lolita Davidovich, Robert Klein, Charles Dutton, and Jason Robards), "Inflation Blues," performed by Taj Mahal, and a charming performance by Bette Midler who professed to be an NPR fan: "So here I stand before you—the latest senseless assault on the White House. And, it's (only) a benefit. I was so hoping for a state dinner," she said. "But on second thought, I think I'm probably better off. Instead of chowing down, I get to celebrate something that I really love—National Public Radio—which I'm never on.

"I don't know why," she continued through the laughter and applause. "I'm as 'Woebegone' as the next guy. But does 'All Things Considered' ever consider me?"

After the performance, the crews had to wait until the guests left the room before striking, and then another hour and a half for the building to clear before the load-out. Schwepe recalls that while waiting to begin the strike down, the "did it really happen to me?" daze struck him. A recording—at the White House—taking three weeks and a day from technical concept to execution—and a warm handshake from the President.

This and that

Better than a host stand-up, more lyrical than acts and tracks... it is NPR in print, again.

Radio producer Thomas Looker has authored a hard cover tome about the inner production workings of NPR titled "The Sound and the Story: NPR and the Art of Radio" (Houghton Mifflin, 1995). This book is different from other NPR-centric works. It details the construction of the network's news programs from an outsider's point of view, and describes to a better degree than most books available—how the personalities, engineers, producers and production staffs work to put the programs on the air.

Industry veterans will recognize the inevitable last-second on-air "saves" that we've all encountered (and told around winter fires), but beyond that, Looker has crafted a finely detailed narrative that reads like a novel.

As I discovered passages about my colleagues, transcripts of memorable NPR pieces, and read about the essential spirit of National Public Radio, it refreshed the personal memory of why I chose a career in this business.

It's a readable, engaging look within NPR (no matter what you think about government funding), and reminds all of us within the industry: As the author states: "...in the midst of this tyrannically visual age, this age of cynicism and loneliness and abbreviated attention span, creative radio retains at its very core the ability to make us catch our breaths—and in that momentary silence, to place us, as Fitzgerald writes, face to face with something 'commensurate to (our) capacity for wonder.'"

□ □ □

Rich Rarey is the technical director for National Public Radio's "All Things Considered." He can be reached at rrarey@npr.org



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a message to am stations from frank foti

Dear Fellow Broadcaster,

My first job in radio was at WELW-AM in Willoughby, Ohio. I was the engineer, production director, morning disc jockey, sports announcer, and music director. Over my next 20 years in radio, I spent most of my time as an engineer at AM and FM stations and focused on improving the art of broadcast processing.

My first efforts in processor design were for FM and many of you are using my FM products today. But, it was AM that sparked my love of radio and I knew my range of Unity processors would not be complete until Cutting Edge designed a unit to fulfill AM's special requirements.

With the help of a couple of hundred radio engineers, programmers, and managers, I developed the Unity AM. This processor sets itself apart from other AM/MW processors in several ways:

- **Maximum modulation for maximum coverage.** Because loudness gives you the chance to reach more listeners, your processor must allow your station to be loud without coloration or grunge. And to be profitable, you have to compete not only with the AM station across town, but with CDs, FM, and even television talk shows. The Unity AM delivers loudness while keeping your program audio open and natural sounding.
- **Day-part processing.** AM stations are more likely to change programming format during the day than their FM cousins. That's why the Unity AM includes a day-part processing function that allows the system to change its processing settings automatically at specific times according to a schedule you create.
- **Unity Remote Software.** Whether you have a single station or a national network, you will appreciate being able to adjust the Unity AM's processing from virtually anywhere by computer modem. Processing can be evaluated in "real-world" listening environments rather than in a noisy transmitter room.
- **NRSC compliance.** The Unity AM complies fully with NRSC pre-emphasis and low pass filtering requirements.
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SIGNAL-TO-NOISE

SRS Process Expands Stereo Image

by Frank Beacham

NEW YORK Finally, after kicking around for six years in expensive "black box" hi-fi components and in some high-end TV sets, SRS—the analog 3D sound processing system—has come to the masses.

SRS, shorthand for Sound Retrieval System, is a patented psychoacoustic audio technology that uses two speakers to immerse the listener in a lifelike three-dimensional audio environment. Though effective in bringing new life to broadcast and pre-recorded sound, the process has traditionally been pricey.

SRS first arrived on the market in 1989 in components from Hughes Aircraft Co. and more recently was incorporated in certain high-end Sony and RCA television sets. Now, in a series of add-on components ranging in cost from about \$80 to \$150 list, a Southern California company called Nureality has brought SRS to the mass market.

SRS is effective because it overcomes a major limitation of all speaker systems, including those that deliver Dolby Pro Logic surround sound. That is the sound always seems to originate from speakers, as opposed to coming from the specific locations a listener would expect at a live performance.

No sweet spot

"Listen carefully to a multispeaker surround system," said Alan Kraemer, engineering director at SRS Labs, licensor of the technology. "Sure you can localize sound front, rear, left and right. But the

sound still appears to be coming from speakers. This is also true with conventional stereo reproduction. The room is not immersed in sound. This is because stereo or surround systems try to position sound by routing discrete signals to individual speakers."

The challenge was to get speakers to disappear as point sources and create a continuous three-dimensional sound field in the listening room. Fascinated by the problem, acoustical engineer Arnold Klayman sought a solution.

During research into hearing in the early 1980s, Klayman learned that a combination of the human head, the pinna (the outer projecting portion of the ear) and the concha (the curved passage leading to the ear canal) influence the direction, intensity and frequency of sound waves. Acting as frequency selective baffles, these body surfaces affect what we hear depending on the angle at which the sound hits the body.

In your ear

In combination, the head, pinna and concha process sonic information in such a way that the brain can detect the

Nureality's SRS Encoder

source of sound. This process is called Head Related Transfer Functions (HRTFs).

Essentially it means that as sound moves around the head, the brain is able to localize it through 360 degrees because the spectral characteristics or frequency response of the sound varies.

In an attempt to mimic this natural hearing process to make sound reproduction more spacious and lifelike, Klayman developed SRS. It works in several stages. First, SRS extracts ambience information from an audio signal. This is the sound that originally came from the rear and sides—the sound that creates a sense of acoustic space.

SRS then takes this information and uses HRTF-based corrections to cause the ear to perceive these sounds in their original spatial relationships. The technology simulates directional cues through frequency shaping, a process that applies a different amount of amplification to each of the sound's frequencies.

Because the SRS technology does not use time delay or phase shift, it has no "sweet spot" or critical listening area. This means that the full effect of the 3D sound can be heard from any location in the listening room.

As complex as it sounds, Arnold Klayman's invention delivers the goods. It brings new life and energy to a wide range of audio material including AM and FM radio broadcasts. It is particularly effective on older mono recordings. A Nureality-produced sampler CD demonstrates how SRS rejuvenated such mono rock classics as "Great Balls of Fire" by Jerry Lee Lewis and "Blue Suede Shoes" by Carl Perkins.

Nureality's sampler CD also demonstrates that if SRS is used in the production process the listener does not need an SRS processor to set the 3D effect. Even though SRS could dramatically improve the sound of many vintage recordings, a spokesman for SRS Labs said that to date no radio station has licensed the 3D technology for on-air use. However, he said, many multimedia production companies

are using the process to enhance sound for video games and CD-ROM programs.

We evaluated Nureality's top-of-the-line 3D Studio (\$149.95). The 3D Studio—which stands vertically and resembles an oversized remote control—can be incorporated in about any audio chain. It can be placed in-line between a VCR/CD player and stereo sound system or hooked through the tape loop circuit of a receiver.

In a Dolby surround configuration, the 3D Studio is designed to go before the surround sound decoder. This way, it

Because the SRS technology does not use time delay or phase shift, it has no "sweet spot."

processes the sound coming from all five speakers. The device also has an internal 35 W amplifier that can drive a pair of speakers.

As good as the 3D Studio is at enhancing the listening experience, there is one caveat: this is not a "set it and forget it" device. The unit needs to be manually optimized to fit different kinds of audio material. (This is why SRS could not be used to continuously process a radio station's on-air signal.) Though the adjustment is simple and quick, it still must be done or the 3D Studio might actually degrade the sound.

No set it/forget it

I found this especially true when processing broadcast sound. Though one-time setup is all that is needed for most music programs, newscasts and talk shows usually need a different setting. Material emphasizing the human voice often sounded muddled at settings that are perfect for music. Three main settings determine the sonic characteristics of the 3D Studio.

The "Space" control adjusts the width and depth of the sound image being processed. It lets you hear greater localization and movement of sound. The "Center" adjustment brings up the most prominent part of a recording, such as a vocalist or soloist, which are usually mono.

Then there's the mono-stereo switch. When in the mono mode, the unit provides stereo synthesis with SRS processing for incoming mono signals. This synthesis is obviously absent in the stereo mode. The problem comes when using the wrong setting. As Nureality states in the instruction manual, the wrong setting can produce "less than desirable results."

Always being conscious of whether a signal is mono or stereo is not so easy for a listener to do. Nureality needs to add an auto sensing device in future models to make stereo/mono switching automatic.

If a little "tweaking" is not a concern, the Nureality 3D Studio delivers stunning results at a bargain price. As a licensee of SRS Labs, Nureality also offers a line of less-expensive SRS processors for such applications as video games, multimedia computers and music systems.

Coming this summer is the Vivid 3D Theater (\$249.95 list), a full-featured, component-sized SRS processor, and the Vivid 3D powered speakers (\$199.95 list) with built-in SRS processing. Nureality is located at 2907 Daimler Street, Santa Ana, CA 92705. Telephone: 800-501-8086 or 714-442-1080.

□ □ □

Frank Beacham is a regular contributor to RW.



Nureality's SRS Encoder

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Roland S-760 Digital Sampler

The Roland S-760 digital sampler offers the same editing features made popular by the S-770 and SP-700, but in a single-rack space configuration. The sampling process includes 24-voice polyphony and 32-part multi timbral capabilities. The S-760 can deliver up to three minutes of 16-bit sampling at 44.1 kHz.

For more information, contact Roland at 213-685-5141; or circle **Reader Service 157**.



Alesis Matica 500 Amplifier

From the folks that brought you the ADAT, Quadverb and Monitor One nearfield monitors, comes a new power amplifier, the Matica 500. The amp is rated at 250 watts-per-channel into 4 ohms and features CoolSync thermal management (fan and heat sink configuration) and Link amp interface. Signal-to-noise is rated at 103 dB below full output and distortion is listed at .009 percent.

For more information, contact Alesis at 310-558-4530; or circle **Reader Service 117**.



Millennia Media Quad Microphone Preamplifier

Millennia Media has built four of its acclaimed mic preamps, found in the HV-3, into one single-rack space unit.

The unit includes 48V phantom power, signal and overload LEDs, Grayhill gold gain switches. The unit must be used with an external power supply.

For more information, call Millennia Media at 916-363-1096; or circle **Reader Service 16**.



TDK 74-Minute Blank MiniDiscs

TDK now offers a 74-minute recordable MiniDisc for the professional market. According to TDK, they are engineered for compatibility with all MiniDisc format recorder/players including the professional versions from Sony, Denon and Otari.

For more information, call TDK at 516-625-0100; or circle **Reader Service 215**.



KAB Turntable Speed Strobe

The KAB SpeedStrobe makes checking and setting turntable speed easy. The 10-inch digital readout disc and quartz-lock strobe light provides accurate readings of 16 rpm, 33 rpm, 45 rpm and 70-90 rpm. Speed indicated is rated to within 0.03 percent.

For more information, contact KAB Electro-Acoustics at 908-754-1479; or circle **Reader Service 190**.

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No other full-featured workstation is as fast to learn or easy to use. The next time the AE sells one of those "simple" spots for immediate release, don't panic. With the ADX, you can be home for dinner. And last-minute changes are no problem, since ADX remembers everything you do. Everything. A spot produced last month or even last year can be fully recalled/reset and modified in minutes. ADX is a workstation guaranteed to reduce your stress level while extending your creative reach.

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LINE OUT

Working with Spaced-Omni Mics

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. Some of the most popular techniques for stereo miking are MS, XY and ORTF. But it is also important to consider the pros and cons of spaced-omni mics.

How do spaced omni mics make stereo? Suppose a musical instrument is off-center to the right of the mic pair. Its sound reaches the right mic before it reaches the left mic.

This creates a delay in the left channel, which is a time-of-arrival cue. The farther off-center the sound source is, the greater the delay between channels. So the spaced pair works by delay panning.

Also, because one mic is closer to some sources than the other mic is, there may be small level differences between channels—another cue.

How far apart should the mics be? The greater the spacing between mics, the wider the

stereo stage between speakers. For playback over speakers, a

It is also important to consider the pros and cons of spaced-omni mics.

mic spacing between 18 and 36 inches tends to give accurate localization. This spacing is sufficient to place the right side of the orchestra at the right

speaker. If the mic spacing is 18 to 36 inches, an instrument at the right or left side of the orchestra makes a delay between channels of about 1 millisecond. This delay is enough for full stereo width.

On the other hand, two mics spaced about 12 feet apart (dividing the orchestra in thirds) gives a more even pickup of the entire orchestra—a better balance.

Unfortunately, 12 feet spacing gives too much stereo spread. That is, instruments halfway off-center are reproduced at the left or right speaker.

Monitor the effect

You could use a spacing of 12 feet for good balance, then mix in a center mic about 6 dB down. That way, you get a good balance, and the stereo spread is not too wide.

Coincident and near-coincident pairs give sharply focused images. Spaced-pair imaging is not so sharp. But the images are reasonably sharp if the spacing is less than three feet. Accurate imaging is needed for radio drama so you can tell exactly where the voices are. Contrapuntal music, such as in baroque music, is another situation where you want accurate imaging.

The spaced pair gives a warm, full sense of ambience due to the random-phase, incoherent signals between channels. The ambience is not necessarily realistic, but it is pleasant and spacious. It is a lush, sonorous effect. You could almost call it signal processing.

Spaced omni mics might be a good technique for a beginner because they make it easy to get a pleasing recording. While other techniques are more accurate, they need careful placement and experience to get an ideal sonic viewpoint.

An advantage of the spaced pair is that you can use omni condenser mics. They have deeper bass than directional condensers, so omni mics are great for pipe organ and deep bass-drum whacks. Omni microphones also tend to have less off-axis coloration than uni mics.

Some engineers like to use a main pair of near-coincident directional mics, mixed with a spaced pair of omni mics, that add warmth, spaciousness and deep bass.

Ear-spaced omnis

If the mics are ear-spaced, you may get enough stereo separation over headphones, but very little over speakers. Ear-spaced mics pick up the same intensity but different arrival times (about 0.45 milliseconds maximum). You need at least 1 millisecond delay between channels to localize a sound source at one speaker.

You can use a scope to look at phase differences between channels. Even the phase differences of six-inch spaced omnis will show up.

A baffle between ear-spaced omni mics improves their imaging. You can improvise a baffle by gluing a mouse pad on either side of a head-size board. Like a human head, the baffle adds intensity cues at high frequencies. It is direction-dependent filtering. Baffled omnis have an airy sound, deep lows and sharp

continued on page 38 ▶

Move Up from Carts to Touchscreen Digital Audio

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Nothing else makes radio as fast or easy as having all your spots, sounders and sweepers start with your fingertip—**always on-line and ready** to play from hard disk. And **nothing else** makes your station sound as good or as exciting as touchscreen digital and creative talent with the **new Scott Studio System!**

Here's how it works: Six buttons on the left of the 17" computer touchscreen play what's on your program log. Scheduled spots, promos, PSAs and live copy come in automatically from your Scott System Production Bank and your traffic and copy computers. You see legible labels for everything, showing full names, intro times, lengths, endings, announcer initials, outcues, posts, years, tempos and trivia. Your jocks can rearrange anything easily by touching arrows (at mid-screen), or opening windows with the entire day's log and lists of all your recordings.

On the right, 18 "hot keys" start **unscheduled** jingles, sounders, effects, comedy or promos **on the spur of the moment**. You get 26 sets of 18 user-defined instant "hot keys" for your jocks' different needs.

Large digital timers automatically count down into times, and flash at 60-, 45-, and 30-seconds before endings. You also get countdowns the last 15 seconds of each event.



The Scott Studio System is your **best** way to make the move to digital audio and eliminate troublesome carts. Each button on the touchscreen plays whatever you want instantly. All scheduled spots, jingles, promos and scripts come in from your traffic and copy computers.



The World's Fastest Playback!

Touch either of the two buttons at the top right of the main screen to see our "Wall of Carts" with all your audio **on-line!** Touch the sound, spot, jingle, promo, PSA or comedy you want and it plays **instantly**. Or, you can put it anywhere you want in the day's schedule. Audio is displayed any five ways you like.

The Scott System also gives you a "Make Good" button so it's quick and easy to reschedule missed spots or promos.

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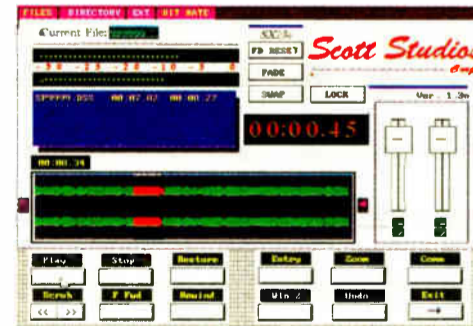
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Live tags, weather, promo copy, music trivia, contest copy and winners' lists automatically pop up on your Scott System's screen.

The Best Digital Audio

When spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in **all** your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

One question you **don't** have to worry about with the Scott System is "What if it breaks?" The Scott Cart Replacement System comes complete with **every** spot and jingle stored **redundantly** on **two** hard disks with a **split-second** switch to the "hot standby" computer and its own backup audio outputs! You get touchscreen convenience, digital quality, and backup redundancy for no more money than cart machines and commercial carts.



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DIGITAL DOMAIN

A Look at Philips Sound Enhancers

by Mel Lambert

LOS ANGELES Not wishing to abuse the English language too much, I would suggest that the expression, "familiarity breeds contempt," might be better expressed, in terms of certain emergent technologies, as "familiarity breeds acceptance." Quiet often, if we are exposed to a piece of technology for long enough, we begin to find a use for it—if only because of the fact that our curiosity gets the best of us!

Take for example, a unit that I have been taking a close look at for the past several

weeks. Philips is well known as a developer of the Compact Cassette, Compact Disc and DCC technologies, and as a major supplier of broadcast equipment to the European and Asian marketplace. Less well known, perhaps, is the firm's newly established Key Modules Division, that distributes several interesting products, including the Model IS 5021 and 5022 Series Sound Enhancers.

Both units offer the same basic DSP functions—scratch suppression (de-clicking), noise reduction, stereo enhancement, noise reduction, simple EQ, jitter removal

and pitch change. The IS 5021 features a "semi-pro" package design, with -10 dBV analog interface levels and S/PDIF ports, while the IS 5022 is designed for rack mounting with 0 dBV analog and AES/EBU-format I/Os.

Nice price

What has aroused my particular interest in these units—aside from their price: about \$1,100 for the IS 5021, and approximately \$2,000 for the up-market IS 5022—was their potential within air and production studios.

With the increasing use of mixed-format recorders, digital editors and complex workstations, such a universal "toolkit" offers a great deal of functionality in a small amount of space. And while it might not be readily apparent at first glance that the IS 5021/22's features exactly match your "immediate" requirements, I would hazard that either of these units would soon become indispensable.

Consider the number of discrete functions that each of these feature-packed units can achieve:

- Scratch suppression, for removing random and repetitive clicks and pops from, for example, a damaged vinyl pressing or a noisy recording.
- Single-ended noise reduction, comprising a low-pass digital filter with an adjustable cut-off point adjustable between 5.5 and 16 kHz, to remove excess noise from a signal, including tape hiss, background wind noise, etc.
- Stereo enhancement, an effect that produces a realistic stereo results from a single mono input.
- Digital compression/expansion, with

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Spaced Omni Mics

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imaging.

Here are some examples of the baffled-omni pair:

- Schoeps KFM-6 sphere
- Neumann KFM-100 sphere
- Crown SASS-P MKII stereo PZM microphone
- OSS (Optimal Stereo System) or Jecklin Disk by Josephson Engineering
- Core headworn binaural mic
- Sonic Studios DSM headworn binaural mic

Other tips

To check the localization of your mic technique, set up the mics as you prefer, and record yourself speaking from various points on stage: center, half right, far right, half left, far left. Announce your position. Play back the tape over speakers. You will hear how accurately the mic technique translated your positions, and you will hear how sharp the images are.

If the musical ensemble sounds too much in the middle, widen the angle or spacing between mics. If the ensemble sounds too spread, reduce the angle or spacing.

What if the hall has poor acoustics or background noise? Mic close with directional mics to reject the acoustics and noise. Add artificial reverb.

You can experiment with mic placement at rehearsals. Set up various arrays, record them, and take notes as you listen to the playback at home. Learn what each array sounds like.

The spaced-omni method is just one of many tools. Each method has its benefits and drawbacks. No one technique is the best.

□□□

Bruce Bartlett is a microphone engineer and technical writer for *Crown International*, and the author of "Practical Recording Techniques," published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

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Panasonic's SV-4100

► continued from page 27

you'll be in good shape as long as you don't need absolutely tight playback.

For the more demanding user, there are two methods of tight cueing while in Quick Start, using the Shuttle/Search wheel and using the Skip/Setting buttons. While both allow the user to scan the three second window of stored audio, cueing with the Shuttle/Search wheel passes audio to the outputs, cueing with the

mode is disengaged, the machine skips to the next programmed Start ID when it encounters a new Start ID or Skip ID.

Having Quick Start, Blank Skip and Single Play modes all working together would have given the SV-4100 the ability to be used as random access, tight-cued, instant start machine, which would have been a really useful set of features.

Unfortunately, Quick Start is disabled when the other two modes are enabled



Panasonic's flagship SV-4100

Skip/Setting buttons does not. In both cases, the output meters show the held audio level.

To cue to the front edge of the audio, all you have to do is toggle back until the display shows no level. The 8MB RAM buffer allows for the storage of ±50 DAT frames. If your on-the-fly, efforts to locate a point put you outside of that window, you'll have to hit STOP and PLAY, then shuttle to a more desirable point.

Mode No. 4 allows you to access Program Playback Blank Skip Mode and allows you to choose the way the SV-4100 recognizes the end of a program. When blank Skip Mode is enabled, the machine moves on to the next programmed selection when it encounters audio that falls below a -42 dB threshold for more than two seconds. When the

together. And when in Quick Start mode, you have to wait until the program playing ends before punching in a new program ID number into the wireless remote control. If you don't, the audio drops out momentarily, sounding like a bad edit.

Three choices

Mode No. 5 gives you three choices of SCMS (Serial Copy management System); Copy-free, Copy-restricted (one copy) or Copy-prohibited (no copies). The choices are only reflected when using the analog or AES/EBU digital inputs. Mode No. 6 allows the analog outputs to be set at 0 dB, -2 dB, -4 dB or -6 dB via four presets or one recallable level anywhere in between. As the manual points out, this feature when combined with the -10/+4 dB output switch on the back panel provide an

adjustable output range of 28 dB.

Mode No.7 shows the number of head-rotation hours and Mode No. 8 lists the error codes, tech codes and software version.

There are five LOCATE buttons on the face of the SV-4100 (although not on the wireless remote control) that can be used to store four random locations plus the last location. While they do work with the Quick Start feature, and allow you to cue very tightly to the four points, this feature does not work in concert with the Blank Skip or Single Play modes.

So after you've played one cue, you have to hit the next locator button or the transport rolls through the next Start ID.

Cue time

The cue time, while not instantaneous, is relatively fast. It took the transport just

over 15 seconds to recue from a Start ID at 5:02 on the DAT to a new Start ID at :42. The trip between the same cues in the forward direction took just over 12 seconds.

As with most DAT players, once Program ID numbers are recorded and exist in proper sequence on a tape, locating to them is as simple as entering the number via the remote control and hitting play or pause. In the Quick Start mode, if the tape has Absolute Time recorded in the subcode, you can also punch in any Absolute Time address on the remote.

If you then hit Pause, the machine will go to that location and cue up. If you hit Play, the machine will locate to the address and begin play. Up to four of these locations can be stored as presets.

In addition to duplicating almost all of

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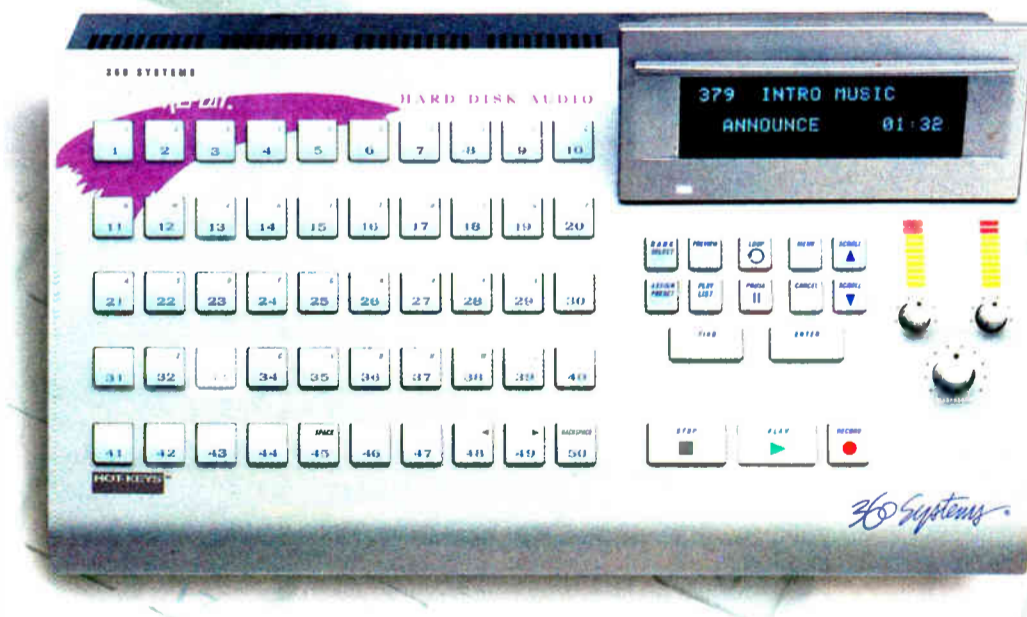


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Philips Sound Enhancers

► continued from page 38

variable threshold, compression/expansion slope, attack and release times.

- Spatial stereo, an additional effect that widens or narrows a stereo soundfield.
- Quantization noise imaging, which shifts the quantization noise present in 16-bit digital signals outside the audible frequency range.
- Digital EQ, Stereo Balance and Level Controls, comprising simple low- and high-frequency equalization, L/R balance and overall gain adjustments.
- Jitter Removal, which reduces the amount of clock jitter present within a digital input source, thereby enabling, for example, a DAT recording to be improved.
- Pitch Variations, allowing up to ±12 percent of pitch change to be made to a signal without affecting its output sample rate.
- Accurate, Multisegment Digital Level indicators, for monitoring left- and right-channel signals.
- Sample Rate Conversion, between the conventional rates of 44.1 and 48 kHz.

Synch-source lock

In addition, both units can be accurately locked to an external synchronization source—either a word clock input, or a digital (AES/EBU or S/PDIF) input—and are transparent to sub-code data within digital bitstreams. As an added bonus, the two-channel analog-to-digital input and digital-to-analog output conversion stages can be accessed separately.

In this way, a user can directly connect a

line-level analog source to a workstation that lacks such functions (or in cases where their quality is suspect), or to monitor the digital output from an effects unit or similar device that lacks D-to-A converters.

As can be readily appreciated, even one of these digital signal processing and conditioning functions is going to prove useful in many circumstances; the fact that the IS 5021/22 offer such a wide and flexible feature set is remarkable. Consider their potential in the air studio. EQ profiles can be set up on individual units and then switched into the circuit as necessary; or a single unit readjusted to suite the overall response of the talent's voice.

Because the processing is implemented entirely within the digital domain, sonic

integrity can be maintained, without the group delay and other artifacts often associated with conventional analog circuitry. And what about all-digital compression, without the pumping normally associated with current designs? Or maybe phase-linear stereo generation from a centrally-panned mic source?

And as broadcast-production facilities continue to transition from analog- to digital-based technologies, engineers require leading-edge tools to process signals, and convert between the analog and digital domains. While, in the medium-term, such functions will find their way into all-digital consoles, editors and mixing systems, I predict that there exists a need for standalone units capable of performing a myriad of functions.

Just as current analog consoles are often augmented by high-quality outboard microphone preamplifiers and equalizers,

so many chief engineers are sometimes of the opinion that digital systems might benefit from the addition of a custom-developed signal-processing units, A-to-D or A/D converters.

And some workstations and editing systems are also being supplied without DSP functions and/or digital converters. Since the majority of material to be edited, mixed and processed will almost certainly be input via digital ports from an external storage medium, there will often be occasions when analog material will need to be input to such systems and then processed. Here, as in other situations, a device like the IS 5021 or IS 5022 might be just what the doctored ordered.

□ □ □

Mel Lambert is principal of Media & Marketing, a Los Angeles-based consulting service for the professional audio industry. He can be reached at 818-753-9510.

Panasonic SV-4100

► continued from page 39

the front-panel buttons, including open/close, the wireless remote control also allows the SV-4100 to be programmed to play up to 32 cuts in random order. You can stop restart sequenced playback without dumping the memory by using the Recall button once the transport has stopped.

The remote control also has a Repeat button that allows the entire tape or a programmed series of cuts to be repeated up to 16 times. A third-party hard-wired remote control is still in the planning stages for the SV-4100, but no shipping date has been announced.

According to the manual, the SV-4100 also performs simple assemble and insert editing. However, because I didn't have two SV-4100 machines, I couldn't try the procedures described in the manual.

The SV-4100 also allows the user to post-stripe a recorded DAT tape with absolute time without over-recording the audio.

In conclusion

The ubiquitous Panasonic SV-3700 has placed a high mark on the wall for other DAT machines over the years, but now along comes the SV-4100. Sure it is more expensive, but if the features make life easier, it makes sense to go for it.

□ □ □

Ty Ford can be reached on AOL at Tford1010.AOL.com. When time permits, he patrols the rec.audio.pro and rec.broadcasting.radio newsgroups for audio surfers in trouble.

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14:16:09	NEBRASKA TIRE (GEORGE L. WILLIA	00:00:00	00:00:00	00:00:00
	NEBRASKA TIRE (GEORGE L. WILLIA	00:00:00	00:00:00	00:00:00
	MARLS APPLIANCE 2 (P. LAOMET)	00:00:00	00:00:00	00:00:00
	ICI CABLE VISION	00:00:00	00:00:00	00:00:00
	JACKS PLACE	00:00:00	00:00:00	00:00:00

PLAY	STOP	STOP/END	SKIP	record off
A HRSWFLDS 00:03	B WAGON WHEEL 00:10	C A BETTER MAN 00:08	D ADDED TOUCH 00:14	E HILL TOP CAFE 00:09
F APRIL BLOSSOM 00:16	G BAKERY CAFE 00:19	H DENNY MOGIS CH 00:31	I BOB SPADY BUC 01:00	J KARL S APPLIANC 00:58
K BLUE SHY NINE 00:14	L KING OF PAIN 00:52	M RADIO SONG 04:00	N NOTHING'S NEWS 02:50	O DAYBREAK 03:41
P FORGOTTEN YEAR 00:19	Q LOSING MY HELI 00:25	R LINDAS FASHION 00:19	S L E S REAL TY 00:00	T PS PRESENTS 00:57
U LARRYS RV 00:21	V ICI CABLE VIB 00:10	W ADDED TOUCH 00:14	X DRUDENS 00:46	EXIT

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GUEST EDITORIAL

'Saving AM' Easier Said than Done

by **Cris Alexander**

DALLAS Whatever happened to the Expanded Band, anyway? It seems like it was not that long ago that the headlines in the trade press were full of Expanded Band happenings. Last fall, all the predictions were that the first Expanded Band stations would be signing on the air about right now. The allocation list was published and many stations were ready to go.

Then some petitions for reconsideration were filed—most probably have at least some merit—and everything ground to a halt.

Now I wonder if Expanded Band will happen in time to do any good.

Thinking back over the past decade, I can think of a couple of significant events other than Expanded Band that were going to "save" the AM band.

First was AM stereo

Of all the things that could have really given AM a shot in the arm, I think AM stereo had the greatest potential. We have the FCC to thank that it did not happen. It was not until October of 1993 that the FCC finally got around to adopting a single standard. The marketplace approach

was a disaster. It dealt a mortal blow to the "stereoization" of AM.

Stations were reluctant to convert to stereo without a standard in place to protect their investment. Receiver manufacturers would have been way out on a limb had they produced and marketed AM stereo-capable receivers with no standard in place and so few stereo signals out there in the ether. Still, broadcasters and receiver manufacturers are not totally without fault.

Broadcasters could have helped, maybe even tipped the scales, had they plowed on and converted to stereo even without the standard or receiver proliferation.

Receiver manufacturers could have created a demand by building the receivers and marketing them aggressively. Those few that did (and some that still do) produce stereo-capable AM receivers did virtually nothing to market them as such, nor were the people selling them educated about AM stereo. Most that I talked to either said that all their receivers were stereo, or "there is no such thing!"

I do not think AM stereo is dead, not by a long shot. My hat is off to those transmitter manufacturers that are now incorporating C-QUAM exciters into their AM transmitters. I do think it has come too late, however, to have a big impact on AM listenership.

NRSC standard

Next in line to save AM was the NRSC standard. Admittedly, the implementation of the NRSC standard—first voluntarily and then by rule—has done a great deal to reduce interference on the AM band, particularly second adjacent channel interference. In our group (in which 10 out of the 15 stations are AM), we have seen big improvements in interference received from second adjacent channel stations.

Did the public notice? Perhaps a few did, particularly those with wideband receivers. By and large, though, the average listener could not tell the difference on his radio with a 2 kHz-wide IF filter.

Then the Expanded Band came along, touted as a place where we could put several hundred of the worst interferers from the existing band and thus greatly reduce interference (and improve service and quality) on the existing AM band. In its new AM technical rules, the FCC set forth a model for expanded band service.

This model was a good one, probably what the model should have been all along for the regular band. The trouble is that it permitted only about 80 stations onto the new band from coast to coast!

Non-technical people and radio station owners/managers screamed, "How can this be?" It is difficult to explain to these people the highly leveraged relationship between interference caused and service rendered.

FCC shock tactics

I lay the shock of so few stations making the final migration list at the FCC's doorstep. The expectations of the industry were raised too high by the FCC's early estimates of an Expanded Band capacity of several hundred stations.

Now, with petitions for reconsideration pending, Expanded Band has been pushed onto the rearmost burner, behind all the other issues on the FCC's table these days. I have been told that only recently—months after these petitions were filed—has the FCC's legal staff begun to look at them.

Will Expanded Band ever be implemented? I am sure it will, probably later rather than sooner. Will it be "in time"? Probably not. The interest of those stations eligible for migration is, no doubt, waning after so long a period of inactivity on the issue. In this company, we had laid careful plans, including the leasing of tower space for an expanded band station, so that when the window was opened we could almost immediately file the appropriate paperwork.

Others doubtless did the same, but were forced to focus their energies in other directions when the process stalled out. You guys on M Street, wake up. Do not forget us AM folks out here. Again.

□ □ □

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. He can be reached at 214-445-1713.

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WORKBENCH

Helpful ISDN Techniques on Remote

by John Bisset

SPRINGFIELD, Va. As the remote season looms right around the corner, I ran across a nifty idea to ensure your 9 volt batteries are as fresh as possible. Rummaging through a station's remote kit, I noticed several 9 volt batteries tossed in the mess.

What made these stand out was the red electrical tape that someone had stuck over the terminal end of the battery. The idea brought back a memory of sticking a spare 9-volt in my pocket on the way to a remote. Several hours later, I noticed this really warm-becoming-hot feeling on my leg. You guessed it: the battery had worked its way around so the terminals were in contact with the change in my pocket. Nothing like a copper penny to demonstrate Ohm's Law! Placing the electrical tape over the battery terminals will help to guarantee a fresh battery when you need it.

★ ★ ★

If you plan to do any ISDN remotes, here are some things to keep in mind. In the Bell Atlantic territory, the National ISDN SPID will end in three zeroes. Some of the telco test sets only display one zero. This leads to confusion on the part of the tech and the engineer, especially if the system will not work. One technician insisted the SPID only had one zero, and it took a call to his supervisor to change his attitude. Generally, the ISDN techs have been helpful. Understand, though, that this technology is new to them, too. We're all on that learning curve together.

There have also been instances where the telco test set will indicate that an ISDN line is good, yet when you connect your terminal adapter and try to pass data, you will lose sync at the Central Office. It has been our experience (and that of Telos—the Zephyr manufacturer) that the problem can be traced to bad Brite cards. These cards are used to extend service. The telco installer will typically quickly test the line, using a low data rate. When your equipment is connected, utilizing the full 64 kilobits, the problems begin.

A good test is to leave the telco test equipment connected for 20 minutes. The tech may tell you the problem is with your equipment. Before you get into a finger-pointing match, ask them to change the Brite card. If you are using a Zephyr, and you are sure you are using the right SPIDs, but can't get beyond INIT, or you are getting a lot of line errors on your NT-1, suspect the Brite card or some Central Office problem.

ISDN supports a hand-shaking scheme that compares the number dialed to the number that answers. Generally, this is of little use to broadcasters, but the feature can cause problems completing incoming calls. We have found that if you do not enter the local directory number (LDN) when programming your terminal adapter (just leave it blank), the Central Office will pass any incoming call of the appropriate data rate. By omitting the LDN, you get rid of the hand-shaking, permitting any

call to be received.

While there are other long-distance providers (other than AT&T, MCI, and Sprint), they don't offer connectivity for voice, data, and packet to every Central Office unless specifically requested. If your local provider lets you make a call to its switch, there is no guarantee that you can make an ISDN or Switched 56 call to the same place. The advice here is to ask questions. These ISDN tips are

If you find yourself missing EBS tests, it may be that the station you are monitoring has already modified its equipment.

courtesy of my associate, Ed Bukont, and Don Coulter at Telos in Cleveland.

★ ★ ★

Ed showed me another trick I wanted to share with you. You've probably run into the problem of mounting a tape machine on rack rails, only to find that the rails are recessed and the 10.5-inch reels scrape the sides of the rack. You can go to a machine shop and get some aluminum shims cut and drilled to build out the machine so the deck plate clears the rack sides, but this is somewhat time-consuming, and also costly. Washers can work, but trying to keep them on the bolt as you juggle the equipment into the rack can be frustrating. When you're talking about a heavy tape machine, there's a much simpler and cheaper way.

Remove the machine and screw in four rack screws into the rack rails. The screws should be placed evenly, two on each side, and care should be taken that they aren't screwed into the holes used to mount the machine. Now set the machine in place, and using four more rack bolts, bolt it in place. You may need slightly longer bolts, because the thickness of the deck plate and the build-out bolt heads might not work with shorter rack bolts, but the net result is a deck plate even with the sides of the rack, and with plenty of clearance for the 10-inch reels. Total cost—four additional rack bolts.

The machined rails look prettier, but you cannot beat the cost saving to your station or client. We mounted two older ITC-750 playback machines using this technique. The key is to ensure that the mounting bolts are long enough to screw completely through the rack rails.

★ ★ ★

Ed Burkhardt is a frequent contributor to this column. Ed's frequency monitoring service, based near Richmond, Va., serves a number of broadcasters up and down the Eastern Seaboard. In addition to measuring frequencies of stations, Ed periodically includes a client update card with the station's frequency measurements. A recent client memo outlined some of the changes to comply with the new EBS rule changes due July 1st. For the Gorman-Redlich old and new EBS encoders, adjust the Activation Internal Adjust (L-M pot) across the abort switch until eight seconds are obtained. On the

decoder, change the 47mFd/16 volt cap located at the junction of D-3 and D-4 to a 22MFD/16 V tantalum.

For the McMartin TG-2 Encoder, adjust R-11 time pot for eight seconds of tone. On the EBS-2 Decoder, make R-37 (470K) approximately 220K for three to five seconds. The MTS 1000.3000 requires a software upgrade kit, available from Cindy Edwards at Audio Broadcast Group. Call Cindy at 800-369-7623.

The TFT 760 Encoder board needs more involved work. On the bottom of the p.c. board, cut the trace going from IC-Z3 pin one to IC-Z4 pin four. Jumper a wire from IC-Z3 pin 1 to IC-Z4 pin 9. This will give you an eight-second tone. On the Decoder board, change C-13 to a 22MFD/25 V Tantalum, change R-26 to 182K, 1 percent. This will yield four seconds.

TFT's newer 886/887 models have an

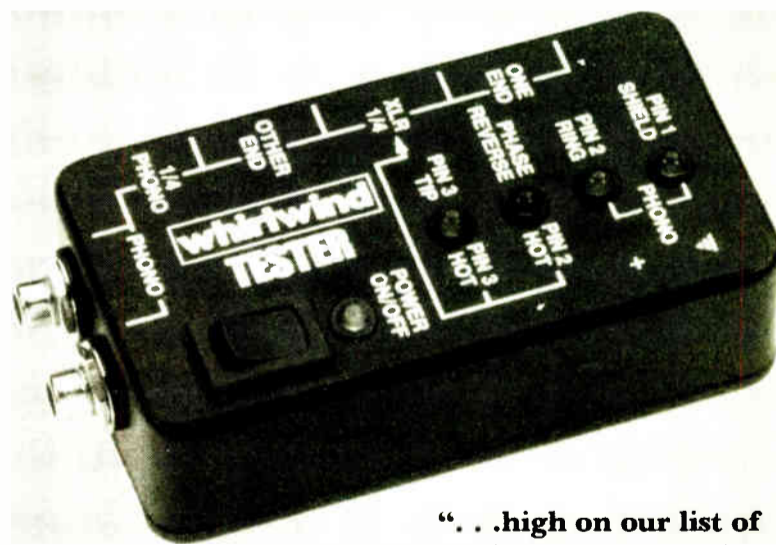
inexpensive modification kit, part number 7100-4274, available from the factory for \$37 (including shipping). Consult the equipment schematics and check the timing, and perform a self-test before and after making the changes. Ed simply compiled this information. It was supplied by others, and neither Burkhardt Monitoring nor **RW** can assume any liability. You may want to consider the age of your internal components as you make the modifications. Although the changes are due in July, if you find yourself missing EBS tests, it may be that the station you are monitoring has already modified its equipment. It might be useful to coordinate the changeover of CPCS-1 stations to the shorter tones through your local SBE chapter, to ensure that no one misses the test.

The issue of EBS changes was a part of several SBE chapter presentations provided by Darryl Parker at TFT and organized by Cindy Edwards at the Audio Broadcast Group 800-369-7623.

□ □ □

John Bisset is a principal with Multiphase, a contract engineering and special projects company based in Washington, DC. He can be reached at 703-323-7180. Fax submissions for the Workbench column to 703-764-0751. Printed submissions qualify for SBE Certification credit.

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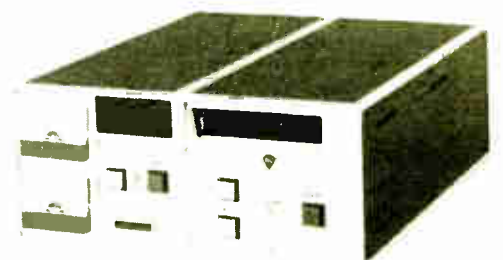
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STATION SKETCHES

Tips for Turntable Maintenance

by Tom Vernon

HARRISBURG, Pa. What a complete surprise! When I put the previous two columns on turntable maintenance

on the reasons behind the equalization curves.

When records are recorded with cutting heads, preemphasis is applied. There are two reasons for this. First, low

may still confirm the RIAA response of your tone-arm/preamp system. Simply unplug the cartridge from the tone arm and connect the audio generator in its place. Use care to avoid ground loops, and keep the leads short to avoid stray capacitance. Using 1 kHz as a zero reference point, plot the frequency response from 20 Hz to 20 kHz, taking care not to overload the preamp. A good starting point is 8 mV at 1 kHz.

Your response should compare favorably with the curve and values shown on the back cover of the CBS STR-130 test record, and reproduced here as Figures 1 and 2. Without a test record, this is about as much as you can do. Stylus wear and cartridge alignment cannot be assessed. My practical experience, however, is that most high-end problems are cleared up when cartridge loading is properly set.

Once you are close to the proper value, you may want to install a trimmer capaci-

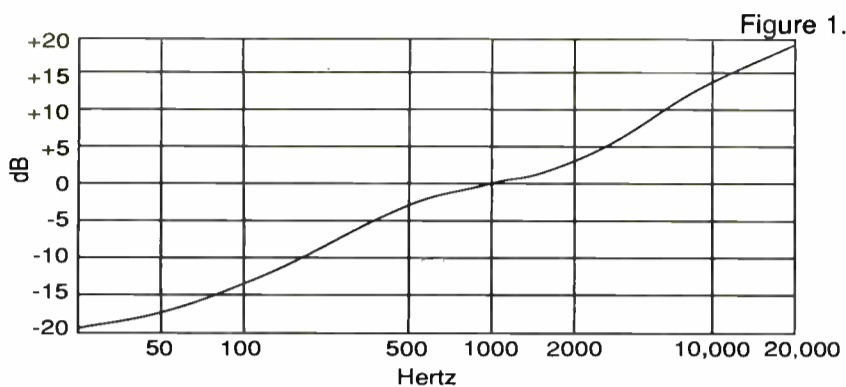


Figure 1. The RIAA recording characteristic boosts highs and attenuates bass. Preamp (playback) response must be the opposite of this curve for an overall flat frequency response.

together, I had no idea of the interest in this topic. Reader response was enthusiastic, to say the least. Thanks to all of you who called. As one DJ from a New York club reminded me: you cannot

Figure 2.

Frequency	Recording Characteristic	Reproducing Characteristic
15000	+17.17	-17.17
14000	+16.64	-16.64
13000	+15.95	-15.95
12000	+15.28	-15.28
11000	+14.55	-14.55
10000	+13.75	-13.75
9000	+12.88	-12.88
8000	+11.91	-11.91
7000	+10.85	-10.85
6000	+9.62	-9.62
5000	+8.23	-8.23
4000	+6.64	-6.64
3000	+4.76	-4.76
2000	+2.61	-2.61
1000	0	0
700	-1.23	+1.23
400	-3.81	+3.81
300	-5.53	+5.53
200	-8.22	+8.22
100	-13.11	+13.11
70	-15.31	+15.31

Use the reproducing characteristic values in this chart to trim capacitor loading for the best HF response. See text for details.

scratch mix with CDs. Good point.

I will continue this time with some ways to (partially) get around the lack of test records. First, some information

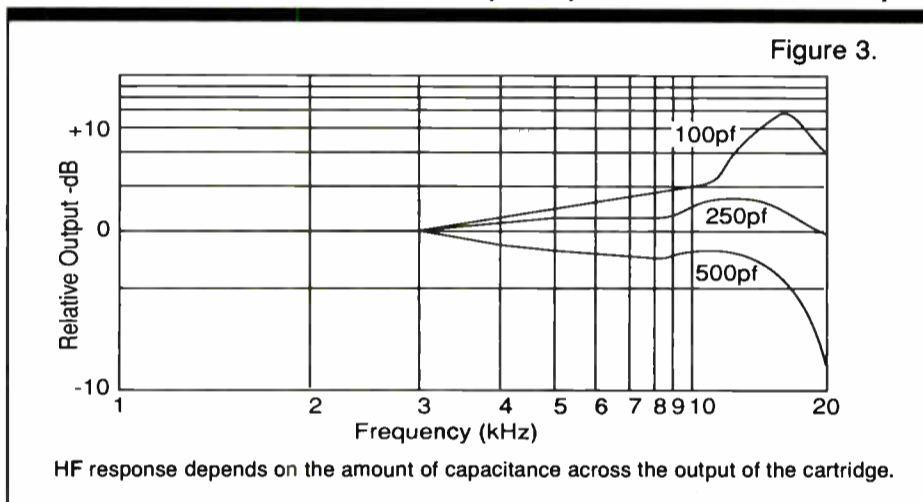


Figure 3. HF response depends on the amount of capacitance across the output of the cartridge.

frequencies are attenuated to prevent what is known as cutover, where the cutting system will break through the wall of one groove into the wall of the preceding groove. Second, high frequencies are boosted to improve the overall S/N ratio.

There are some more complicated reasons why this curve is not a straight line, but not enough space to explain them here. This preemphasis is in the form of an industry standard, known as the RIAA curve, shown in Figure 1. For everything to come out flat, your preamp must have a response that is the exact inverse of this. It is here that the whole business of precise matching of resistive and capacitive loading comes into play.

If you do not have a test record, you

tor on both channels so that you can hit -17.17 dB on the nose. Remember that even a 1- or 2-dB deviation from the proper RIAA values can audibly degrade your turntable's sonics. Be sure to also match left and right channels as closely as possible. Figure 3 shows the relation-

Figure 5.

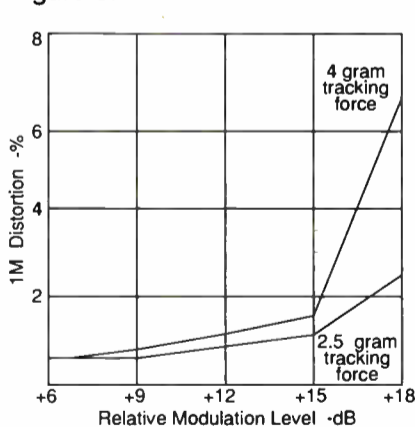


Figure 5. Increasing the tracking force will reduce IM distortion at higher modulation levels. The tradeoff is increased record wear.

ship between capacitance and HF response.

If you have an STR-130 or other RIAA system response test record, you may now verify response of the entire system. Crosstalk can also be checked by logging the right channel response while playing left channel tones, and vice versa. This is illustrated in Figure 4.

Having verified response and crosstalk, there are several other tests that you can perform on the turntable system. One of

Figure 4.

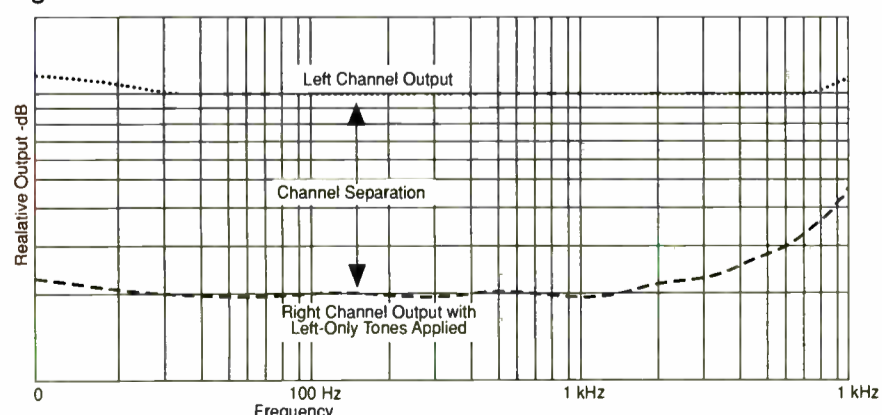


Figure 4. Frequency response is plotted using the STR-130 test record. Plotting right channel output on the same graph while left channel tones are played shows channel separation, or crosstalk.



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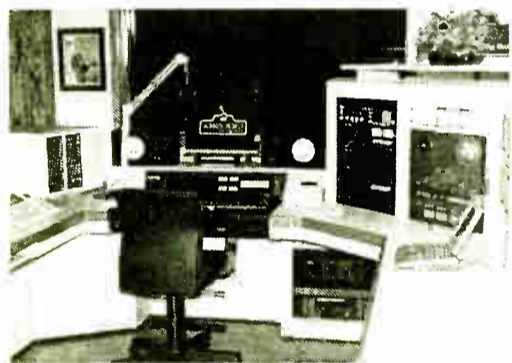
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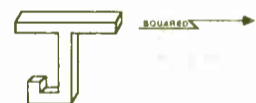
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READER SERVICE NO. 25

High Voltage Supplies Need Regular Upkeep

by John Landry

CLEVELAND After recently experiencing difficulties with the high voltage supply on our Harris MW-50C transmitter, I realized that not everyone is familiar with the proper maintenance of an oil-filled high-voltage transformer. Further, sources for parts are not commonly known. This article is the result of the rock-turning and wild goose chasing I went through to fix the problem.

Oil-filled transformers are commonly used in high-current and high-voltage applications. The service drop to your house and the studios are probably served by oil-filled transformers. The oil serves three purposes: 1) It cools the transformer, like the cooling system of an automobile; 2) It prevents rust and oxidation of the internal connections; and 3) It somewhat insulates parts from buzzing and arcing.

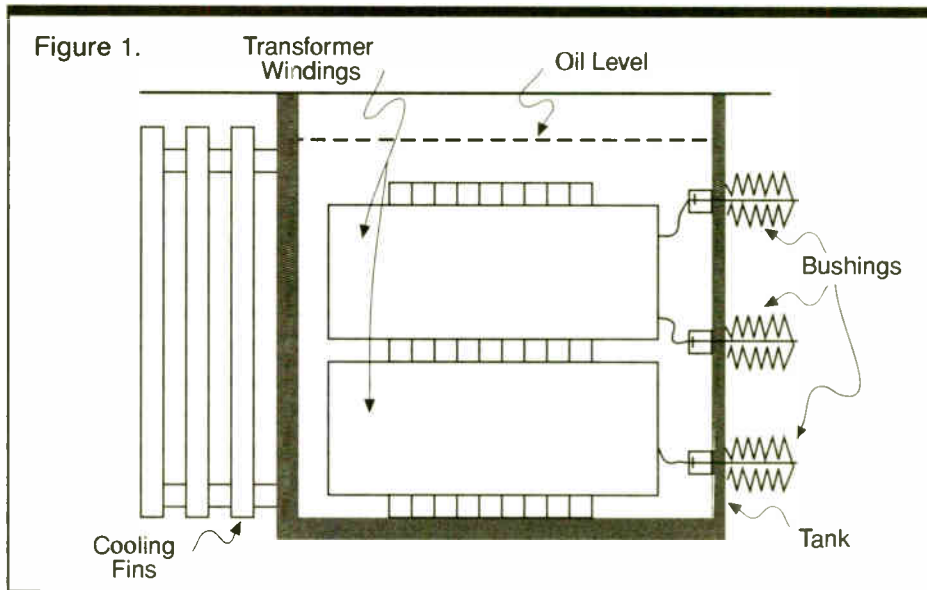
With the transformer immersed in an oil bath, a greater surface area is cooled, and thus the transformer can be made smaller than if it were cooled by air. Figure 1 shows a cross section of a typical transformer. The outer "oil jacket" is called the tank. The insulators on the primary and secondary connections are called bushings. Depending upon the purpose of the transformer or choke, there may even be cooling fins. Some are equipped with level gauges, level glasses (a glass tube similar to those found on steam boilers) and a thermometer.

For proper operation of the transformer, the proper level and condition of the oil is

important. You should, as part of a regular maintenance program, power down the transformer and measure the oil level with a clean dipstick. In our hypothetical transformer, the oil level need only be high enough to get into the top entrance of the heat exchanger.

Because oil does expand when heated, a small increase in the level can be expected as the transformer operates. It is a good idea to turn the inspection plug very slowly and to let any pressure off gradually. Sometimes

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Maintenance Primer

► continued from page 45

the more important is intermodulation (IM) distortion. For this, you will need the CBS STR-112 test record. This disc has a 4000-Hz reference tone to which 400 Hz is added in increasing 3 dB increments, until it peaks at 18 dB above a nominal 5 cm/sec stylus velocity.

The output of the preamp can be observed on a scope, or IM distortion meter if you are so blessed. What you will probably see on the scope is increased clipping of the HF component of the composite waveform.

What you will want to do about it is go over the anti-skating adjustments and increase tracking force for as clean a waveform as possible. Generally, the best IM figures occur when stylus tracking force is at the manufacturer's rated maximum. The trade-off is that this is also the point of greatest record wear. The relationship between IM and tracking force is illustrated in Figure 5.

Following these guidelines should enable you to squeeze a lot of extra performance from your turntables.

□ □ □

When he is not pounding the keyboard for RW, Tom Vernon writes CD-ROM reviews for computer magazines. He does his radio thing at WXPB in Philadelphia. Reach him at 717-367-5595.

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DESIGNS THAT MAKE THE DIFFERENCE



Circle (79) On Reader Service Card

High Voltage Supplies

► continued from page 47

the pressure can be as high as 10 psi.

You should know who the manufacturer of each transformer is and, if possible, endeavor to acquire technical information from them—including parts lists.

General Electric usually includes a schematic on the nameplate of its transformer products, and often a reference to an instruction sheet (usually starts with GEF- or GEH). GE was also very good about stating how much oil is used, the type number and how much you can expect the transformer to weigh, full or empty. Other manufacturers may provide information or they may not. You may

need to track them down.

There are several types of transformer oil. You should make an effort to know how much and what type is used in any oil-filled units you must maintain. The exact manufacturer of the oil is helpful, as there exists a possibility of two dissimilar oils reacting with each other. This is rather rare, and most often the intermixing of two brands will only result in compromising either dielectric strength or thermal transfer characteristics. Therefore, use only the same type of oil, and try to have some on hand for emergencies.

You should inspect on a regular basis for leaks at the bottom of the tank, and

around any bushings. Some transformers have bushings mounted on the side of the tank (like the Harris MW-50), and these will tend to leak over time.

To find out the severity of a leak, simply clean the bushing with a solution such as windshield washer fluid, a 50/50 mixture of Windex and Isopropyl Alcohol, or straight Isopropyl alcohol.

Inspect frequently

Be sure to clean the area around the bushing if it is mounted on the side. Let the transformer run again and inspect after one or two days. If possible, spread cat litter or Oil-Dri on the floor directly under the bushings. A small drip of oil is permissible. Any significant amount of oil is a problem.

Bushings are made of porcelain. Some

are brown in color, some are white. They are usually secured to the tank with a steel collar that is bolted against the tank on the inside. Some may be bolted on from the outside. The electrical contact on the nipple of the bushing is screwed on to a stud that runs through the center of it. There are cork or rubber gaskets against the tank and under the electrical contact.

Please realize that if a bushing leaks, the one thing you should not do is tighten either the bolts on the inside or the electrical contact. The gaskets turn hard with age, a process that is accelerated by the heat and pressure. After 10 or 15 years, no amount of tightening will stop the leak. As well, porcelain breaks, and it is possible for the bushing to split in half as you are tightening. At that point you could have a mess if the oil behind the bushing is under pressure. Sometimes an RTV sealant can be used to stave off leaks, but I have never had success with them.

Routine maintenance

Routine maintenance for oil-filled transformers and chokes should be as follows:

Weekly: Inspect for leaks

Feel temperature (Warm to the touch?)

Check any gauges

Monthly: Clean bushings and wires

If there is no gauge, check level with dipstick

Annually: Have a laboratory analyze oil

5 years: Change the oil and replace any gaskets. While the tank is empty, visually check the transformer windings for any evidence of burning or arcing.

Check connections to windings*

Make readings between windings with an ohmmeter and record them for future reference

Should you require service on any large transformer, you may try calling your power company. Most power companies maintain a shop for their own transformer maintenance, and many are willing to contract out service on customer-owned equipment, sometimes on an emergency basis.

Service locales

GE offers services through its Apparatus Service Shops, located in most major cities, that include testing oil, PCB disposal, and refurbishing work on large transformers of GE make as well as others. They can be found in your local telephone book, or by calling GE supply.

If you find it necessary to get new bushings, they can be ordered from Porcelain Products Corp. of Carey, Ohio. Porcelain Products has made all domestic bushings, and often can supply a direct replacement for a bushing faster than the transformer maker, as well as for now-defunct manufacturers. They can be reached at 419-396-7621. A bushing assembly often includes the cork gasket.

If properly maintained, a transformer should last indefinitely. There are several stations still using 40-plus-year-old transformers with excellent results. It goes without saying that when doing any work on a large transformer make sure the power is off and any capacitors in the equipment it may be connected to are completely discharged.

□□□

John Landry is chief engineer at WKNR(AM) in Cleveland. He can be reached at 216-838-1220.

**Harris part number 736-0119-000. Transformers made in the late '70s use spade lugs here. There are reports of them coming loose and going intermittent. This can cause all kinds of mysterious troubles, including HV rectifiers that blow for no reason.*

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USER REPORT

ERI Handles All Facets of Project

by Robert C. Tarsio
Chief Engineer
WLTW(FM)

NEW YORK New York City has the privilege of being home to one of the largest collections of FM radio stations in the nation. Co-locating these facilities has been the norm for more than 30 years.

The world's first FM combiner system was conceived and built for New York's Empire State Building in the early 1960s. After nearly three decades of service, the original system needed to be replaced with a totally new antenna and combiner system.

The broadcasters using the old system formed an engineering steering committee to oversee the writing of the specifications for the new system. Six manufacturers responded to an RFP with proposals. After reviewing the presentations from each vendor, it became evident that the company selected would need to do more than just drop hardware at curbside for us to install.

Job requirements

The company selected would act as a general contractor and offer experience in electrical, mechanical and structural engineering, along with construction practices. It would have to fabricate and deliver the hardware in a timely and professional manner with strict adherence to a budget.



New antenna and combiner system atop the Empire State Building

Electronics Research Inc. (ERI) was selected to provide a custom, two-level, four-sided panel antenna system and a 15-station constant impedance-bandpass combiner system that included a computerized monitor and alert system. ERI was put in charge of the installation of the antenna and combiner under subcontract to North American Tower Maintenance of Sewell, N.J.

ERI was also contracted to design and supervise the construction of the combiner room on the 85th floor of the building.

This task included room layout, electrical distribution, HVAC, fire safety protection, monitor/alarm and mechanical strengthening. ERI was one of the few companies that possessed the technical scope necessary to oversee a project this diversified and complex.

The antenna design was custom and needed to meet some very stringent phys-

ical and electrical requirements. FM panel antennas generally require a 10-foot horizontal and vertical aperture per bay on a tower. The tower section available did not allow for a 10-foot horizontal aperture. Just less than six feet were available.

ERI tackled this problem with a custom-designed back screen that provided the electrical performance necessary within

the existing space.

This massive antenna was also designed to operate in icy conditions without de-icers, an important feature, as the antenna was put into service during some of the iciest weather at Empire in 30 years.

The antenna consists of two sections comprised of four panels each, using scarcely 20 vertical feet of aperture. Each bay is fed by individual six-inch transmission lines to provide backup protection against a failure of any of the components within the antenna or feed system. All patching can be done at the custom-designed broadband patch

continued on page 50 ►

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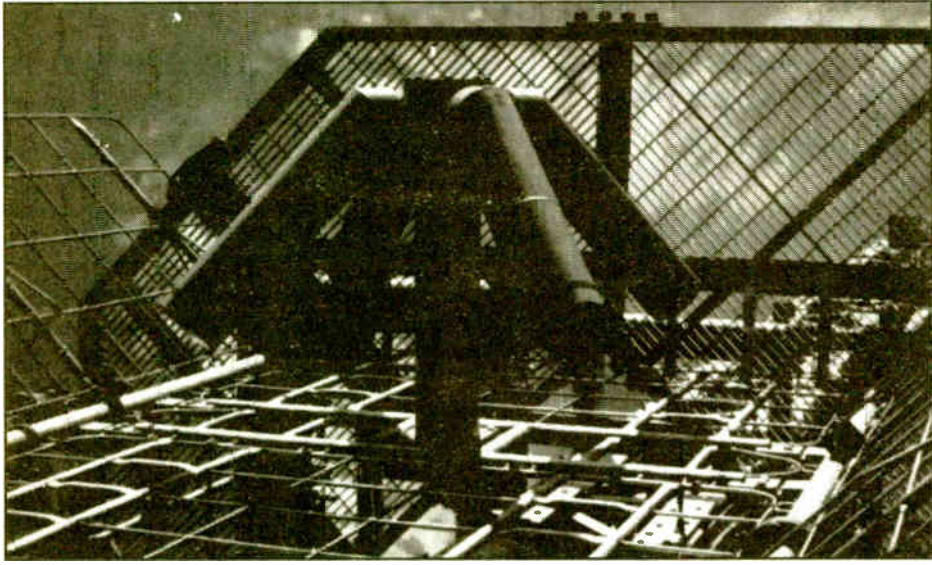
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Assembled antenna mounted on the tower

ERI's Complex Project

► continued from page 49

panel/power divider located in the 85th floor combiner room.

In addition to being able to patch between upper and lower bays of the ERI antenna, a provision was made for an additional port to feed the existing Alford antenna, which would become an auxiliary antenna.

Our specs required full-scale modeling of the prototype, a mock-up of the tower section we would be using at Empire. ERI produced a faithful representation of the tower structure and generated the necessary test data for acceptance.

The combiner system is housed within a contiguous space on the 85th floor of the building. Narrow-band feeds come from

lower floors up to the combiner room. The antenna feeds then are carried inside the building, outside through the dome and up through the tower to the antenna.

The system was designed to multiplex up to 15 Class B FM stations. Currently, 11 stations utilize the system with room for future additions. Each combiner module is comprised of an input and output hybrid and two loop-coupled, four-cavity bandpass filters. Inputs are fed to a consolidated patch assembly at the input of the system. This panel, conceived by ERI, allows any broadcaster to bypass its own combiner module in case of emergency. It also serves as a safety system. Custom-built short-circuit safety devices are installed on each incoming line. Each is interlocked and designed to prevent RF from being applied to the system when work is being performed. Metering determines which stations are operating.

Each module is monitored for internal temperature and VSWR. ERI combiner modules use active temperature compensation to maintain proper tuning over a wide temperature range, an important feature for long-term system integrity.

No simple matter

Every phase of this project had to be carefully planned and executed. Seemingly simple things like receiving hardware at the site were no simple matter at one of the world's tallest buildings. All unloading of material and equipment had to be done during off-hours so as not to disrupt the constant flow of tourists in the building. Hardware had to be unloaded from ERI's semitrailers and carried to various holding areas in the upper floors of the building. All of this work was done under the personal supervision of ERI's CEO, Tom Silliman, who acted as moving man.

The entire combiner system, including support structure, was pre-assembled, tuned and tested on the shop floor in Evansville, Ind. Representatives from our group visited the site and witnessed the final performance tests before the entire system was taken apart, packed and loaded into waiting semitrailers.

The same was true of the panel antenna system. Members of our group witnessed performance tests on ERI's own test range. Throughout all of the testing, both in Indiana and in New York, ERI encouraged the participation of the station engineers and answered many questions.

Cooperative effort

The work performed at Empire was swift and professional. The combiner system was loaded, assembled and tested in six weeks. The antenna and feedlines installed the year before went in without a hitch in about four weeks. The system was turned on during the last week of January 1994. After one year, the system continues to operate at peak performance.

In retrospect, the single most important factor to getting this job done was cooperation. All of the Empire State Building broadcasters closely coordinated the activities of this installation. In the end, ERI demonstrated its ability to complete a very complex and expensive project within the projected time frame and within budget.

□ □ □

For information, contact Jim Kemman in Indiana at 812-925-6000; fax: 812-925-4030; or circle Reader Service 1.

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USER REPORT

Custom Shively Antennas Tackle Terrain

by Chris Reid Murray
Engineering Director
McKenzie River Broadcasting

EUGENE, Ore. Radio broadcasting in Eugene presents a number of challenges. The terrain is varied, and people live anywhere from practically next door to the transmitter site to areas that do not enjoy a line-of-sight path to the broadcast antenna. These conditions make multipath and other propagation problems almost a certainty.

When the Blanton Road FM tower project was conceived in 1989, our objectives were not only to take advantage of a higher antenna elevation, but also to reduce the effects of multipath distortion, to improve the signal for people living near the antenna site and to reduce RF density near the site. We succeeded, and soon after completion of the first station in the project, more stations lined up to use this improved antenna location.

Non-traditional designs

We first applied non-traditional antenna designs in 1981 when KBMC(FM), then a small 3 kW station, upgraded to 100 kW. Unfortunately, the station did not have enough available tower space to mount the standard eight-bay circularly polarized array that the transmitter required to achieve the new ERP. Because the station was broadcasting successfully with a horizontal-only antenna, we kept it that way, using a higher power four-bay array.

The results were mixed. The transmitter is centrally located; by traveling 15 miles in each direction, you can cover about 90

We knew that we would not want to employ standard antenna designs.

percent of the populated area. When we drove 20 to 25 miles away from the transmitter site, the noise floor crept up and the lack of power in the vertical plane was noticeable. Also noticeable, however, was the lack of multipath within the metropolitan area.

Our tests demonstrated how the multipath effects of this facility varied by polarization. We analyzed both the linear and circularly polarized antenna signals. Both broadcast with the same power, from the same site, over varying terrain. The circularly polarized signals performed best when the receive antennas stayed within line of sight. Furthermore, most receive antennas (in cars and homes) are linear, not circularly polarized.

We knew that when it was time to upgrade the other stations' circularly polarized antennas, we would not want to employ standard antenna designs.

We then contacted Shively Labs. We wanted the first array to use five bays with a 70-percent horizontal, 30-percent vertical, power split. A circularly polarized five-bay antenna has equal horizon-



Six Shively antennas overlook the Willamette Valley.

tal and vertical power gains, each at 2.7. This special H/V ratio would provide a horizontal power gain of 3.78, a vertical gain of 1.62. The setup would allow us to use a 35 kW transmitter to make our 100 kW ERP. We could also fit the five-bay array on the 50-foot pole topping our 600-foot tower.

I explained what we wanted to Bob Surette, manager of RF engineering at Shively. By combining my data with Shively's scale model pattern range experience, I was able to unite predicted pattern distortion with the loss of power in the vertical polarization.

To complicate matters further, we needed to reduce the downward radiation at the site, but we also wanted about 20 percent first null fill to better serve the commercial population near the site. We also needed a nearly 50 dB reduction in signal strength 20 degrees below the horizon to protect a television studio only 175 feet from our tower.

The comment I got from one manufacturer was, "How could we build it?" The comment I got from Shively was, "When do you want it shipped?"

Details, details

We discussed the particulars of the site and our timetable, and Shively built a custom antenna, Model 6810-5R-H/V-SS, a high-power five-bay array with radomes, a special horizontal-to-vertical ratio, null fill and special interbay spacing.

The results were better than we expected. We received many phone calls from listeners who noticed the improved signal.

The axial distortion created by the mounting structure and the 70/30 power split produced different results in different azimuths. To the south, where most listeners have no line of sight, the H/V power split is 90/10.

To the east and west hills create our most serious multipath problems. The split is close to 70/30 (providing 42 kW ERP in the vertical plane). The propagation is circular enough to keep car radio antennas humming and linear enough to

give about 4 dB of capture-ratio help to the receivers.

To the north, up the flat Willamette Valley, the split is almost circular at 58/42. The commercial area located in the first null we filled enjoys a healthy signal, and the television station's technical staff appreciates the lack of strong RF fields polluting its studio gear.

After our first 100 kW special H/V antenna hit the airwaves, others soon followed. Shively was called upon again when KAVE(FM)'s 95.3 MHz Class C3 station wanted to locate on our tower. This lower power station's frequency was sandwiched between two 100 kW Class C's, with only 800 kHz on each side.

Intermod problems caused by adding this new station to the site were inevitable.

Shively used special interbay spacing of one-half wavelength to better fit the antenna on the tower and to drastically reduce the upward and downward radia-

tion. As a result, the signals on 94.5 and 96.1 were 80 to 90 dB down, measured at the output of the 95.3 transmitter, and there were no intermod products.

Value of custom design

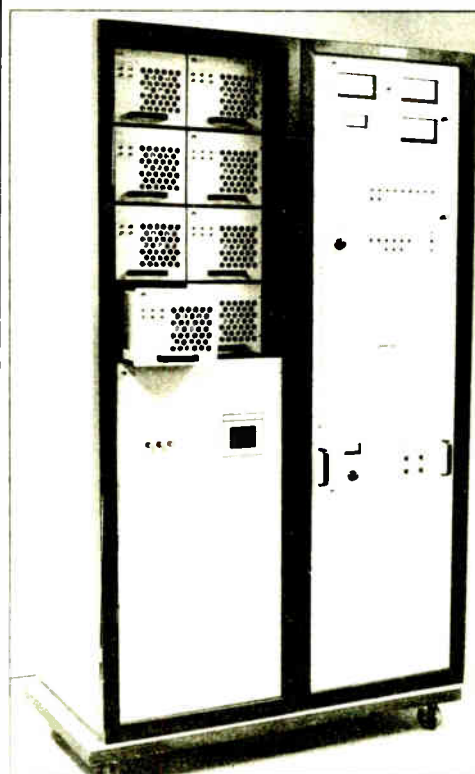
I have enjoyed working with the folks at Shively. They have provided the Eugene radio stations with antennas custom-patterned to optimize the signal in difficult terrain. I have found that the greatest value is spending a little extra time and money to specify a broadcast antenna with special attention to azimuth patterns, vertical patterns and polar ratios.

Of the 13 stations in the Eugene-Springfield market, 11 are now using Shively antennas: four stations employ special H/V polarizations, five stations use special wavelength spacing, and two stations use both. In the radio cume figures in 1989, before our changes, the combined stations' cume was only 144,000 people out of a radio market of 250,000. In 1992, after all the stations had finished construction, the cume increased to 221,000 people. That increase was due in part to the fact that more people were able to listen.

□ □ □

For information, contact Jonathan Clark in Maine at 207-647-3327; fax: 207-647-8273; or circle Reader Service 150.

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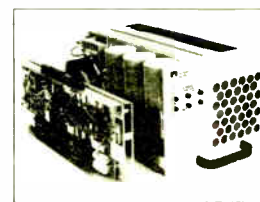
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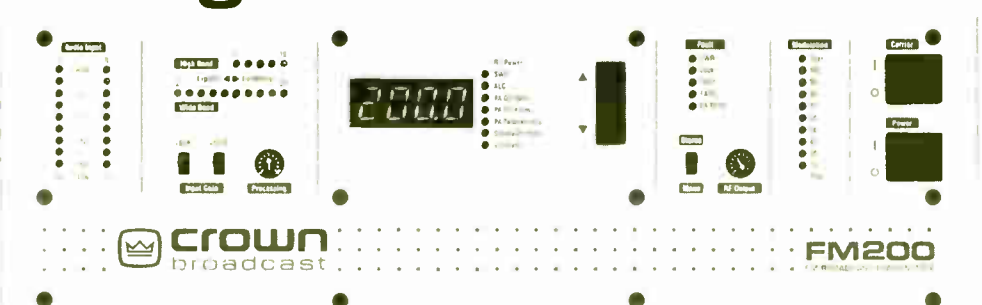
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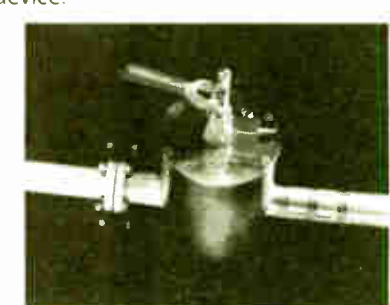
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READER SERVICE NO. 211

USER REPORT

WWRC Upgrade Smooth with Kintronics

by Milford K. Smith
V.P. Radio Engineering
Greater Media Inc.

EAST BRUNSWICK, N.J. When the Radio Corporation of America built WRC in 1923 and commenced broadcasting with "approximately 500 watts to the antenna at the carrier frequency" (Proceedings of the IRE, May 1924), it likely did not occur to those involved in this pioneering radio effort that one day their station would broadcast with a full 50,000 W.

But that's just what happened on March 9, 1995, when Greater Media, the station's current owner, commissioned new transmission facilities that took the 980 kHz facility to the maximum U.S. medium wave power. Kintronics Laboratories played a major role in this likewise major upgrade by supplying all of the phasing and matching equipment for the new daytime and nighttime directional antenna systems.

The upgrade

Greater Media acquired WRC from NBC in the early 1980s. The station received a slightly modified call sign, WWRC, because the heritage three-letter WRC call was to be retained by NBC's Washington TV operation, channel 4. Although WRC was arguably one of the two or three best AM signals in the market, Greater Media immediately began a study to evaluate any potential improvement to the transmitting facility. The relatively recent commission action removing the 5 kW power cap on regional channels, along with months of field measurement

work, paved the way for the just-completed upgrade to 50 kW. The construction permit was issued to WWRC in late 1993.

The proposed WWRC operation would consist of a 50 kW two-tower daytime pattern, a 5 kW three-tower nighttime pattern, a provision for nondirectional operation on two of the three towers and a total of three transmitters and two dummy loads. As if these operational modes were not complex enough, two of the three existing towers were massive, self-supporting, tapered 90-degree structures, while the third was a 143.5-degree guyed tower with a 50-foot structural top hat. Clearly the design and execution of the phasing, matching and switching system would be a challenge.

Know-how

Greater Media wrote the specifications and put the job out to bid with four manufacturers. After a long, intense evaluation process, Kintronics Laboratories was selected to build the system.

Kintronics is routinely involved in constructing systems for international clients in the multihundred kilowatt range and thus offers a lot of know-how in terms of voltage and current handling capabilities. The firm manufactures virtually all of the components utilized in its systems, except capacitors and meters.

The real proof of phasor pudding is in the initial system tuning and the resultant performance. As part of the design process, a sophisticated method of moments modeling was used to synthesize the entire WWRC system and predict all operating impedances and phase shifts. The system

was then completely pretuned at the factory for the anticipated network phase shifts and impedance transformations.

Given the somewhat unusual nature of the top-loaded tower, the use of radically different tower structures and the fact that one nighttime tower operates slightly negative, we were anticipating a marathon session of component changing and in-the-field redesign. But that was not the case. Only one component in the entire system required a change in value, and the tune-up proceeded smoothly. Measured ± 10 kHz VSWRs on both the day and night patterns were under 1.08:1, and most importantly, the system sounds great.

The only real challenges we encountered involved the system logic controller, which is largely relay-based. Kintronics is working with the station to resolve these problems, which have to do with keeping the transmitter control circuits isolated from one another. It seems that in a system of this size, the use of a programmable logic controller to handle the various interlocking and switching functions could add considerable flexibility and reduce the component count.

All in all, WWRC and Greater Media are very happy with the Kintronics product. Given what we know now, I am confident we would make the same choice again.

□ □ □

For information, contact Tom King in Tennessee at 615-878-3141; fax: 615-878-4224; or circle Reader Service 124.

USER REPORT

Scala Antennas Are Integral Part of Translator Network

by Joseph Torsitano
Chief Engineer
KNIS(FM)

CARSON CITY, Nev. Western Inspirational Broadcasters Inc. operates 33 FM translators in four states using more than 90 antennas. Because our operations are totally financed by listener donations, high-quality, reliable service through our translator network is very important. Every translator antenna system we use is designed and made by Scala Electronics. We depend on Scala for superb products and complete technical support both before and after installation.

Coverage planning

FCC rules limit the effective radiated power of translators outside of the primary station's 1 mV/m contour based on the height above average terrain on each of 12 azimuths. Omnidirectional antennas are satisfactory in some cases, but with good planning, directional antennas and directional antenna arrays can be used to operate at full legal effective radiated power (ERP) in each direction, thus maximizing coverage.

Scala manufactures a wide range of directional antennas to fit most coverage requirements. If one antenna

doesn't fill the need, two or more antennas can be combined. Combining directional antennas, however, can produce unpredictable results.

Scala's engineers provide the pre-application planning necessary for a successful directional antenna design. They can accurately plot and tabulate the antenna system's coverage, allowing quick calculation of ERP at any azimuth to insure the system is within the FCC's power limits.

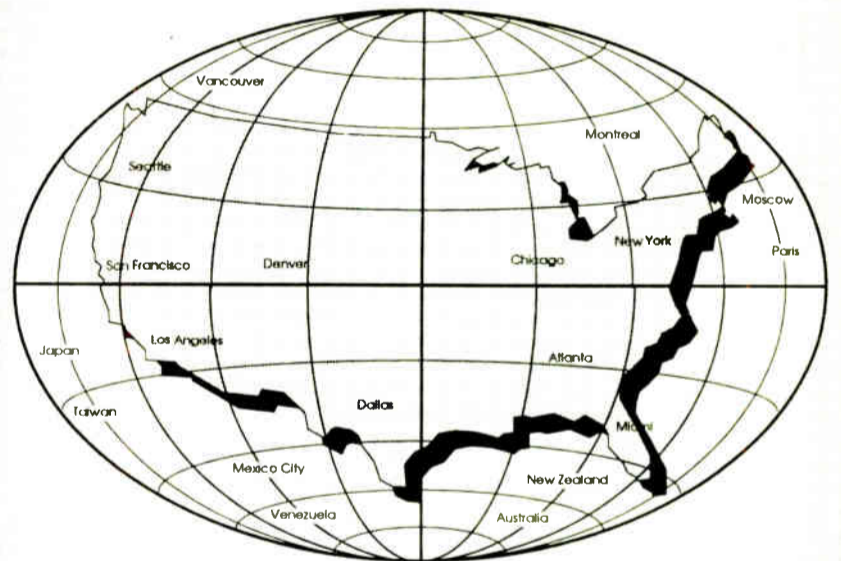
In the sample plot, my main objective is maximizing coverage of a populated area (there's no population to the north). When I gave Michael Bach at Scala the FCC limits on ERP for each radial, he determined that the maximum ERP allowed at each critical azimuth could be achieved with two CA5-150 five-element yagi antennas, skewed in just the right directions, and a special power split. While an omnidirectional antenna would have been limited to 23 W, this setup allowed us 115 W at 230 degrees and 41 W at 120 degrees, increasing the coverage.

Scala's technical staff also designs receive antenna systems to reduce or eliminate co-channel interference. These systems usually consist of two similar antennas and a custom-made

continued on page 54 ►

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USER REPORT

Guardian Dives into FM with Jampro

by Mark McNeil
President
Guardian Communications Inc.

CINCINNATI Guardian Communications Inc. is pleased to have just completed the building of a new tower site for the Albuquerque, N.M., market. Located west of Los Lunas and 20 miles south of Albuquerque, the new site serves New Mexico as far south as Socorro, as far west as Grants and as far north as Santa Fe.

Currently located on the new 589-foot tower are Guardian's 97.7 FM, using a Jampro JMPC-12 antenna, and Komorowski's 106.3 FM, diplexed with Holt's 104.7 FM, using a Jampro JHPC-12. Jampro also designed and built the required bandpass filters and the combiner.

Guardian historically has been an AM religious group with stations in Albuquerque, Baltimore, Cincinnati, Cleveland and Pueblo, Colo., and has only recently begun programming other formats. While always shopping for major FMs, the prices were too high. An opportunity finally presented itself in the form of a major tower project. As this project was Guardian's first dive into Class C FMs, we demanded first-class equipment.

I did not realize how much interest such a project would generate from the various suppliers of towers, antennas, transmitters and related equipment. After weighing all

the options, Guardian chose Harris, with Ken Perkins assisting, to oversee the project and to provide the transmitters, Central Tower to build the tower, and Jampro to provide the antennas, combiner and bandpass filter, with Skyhawk Communications handling the tower work.

The project took six months to complete, with the station on the air by the end of January 1995.

Bulletproof building

For the transmitter building, Maloy Mobile Storage of Albuquerque cut and welded together two 8-foot by 40-foot heavy-duty metal shipping containers. Joined side by side, the containers give us 640 square feet of usable space. Maloy lined the containers with insulation, one inch of solid oak and one-quarter-inch steel plate, and installed three five-ton air conditioners, all placed on poured concrete footers. With so much expensive equipment inside, we wanted a secure, bulletproof building. Vantage Electric of Albuquerque handled all the electrical wiring for the transmitter building.

When the combiner and bandpass filters arrived from Jampro, everyone claimed to have a bad back. These items were big and heavy, with so many bolts in them you would swear that Jampro must have a full-time employee who either is torque wrench mad or once worked for the

Erector Set company. Local engineers Rob Ramseyer and Jim Garcia of RJ Communications put it all together.

After the antennas were hung on the tower, I was assured that Jampro would be there, and they were. Ali Zargar came from California with so much equipment that I'm surprised the airplane got off the ground.

The antennas were designed to put as much signal to the northeast as possible. Initial measurements showed the theoretical signal, which predicted a 70 dBu signal on the north end of Albuquerque, to be very close to actual. However, the signal was not perfect. We noticed some multipath on streets on the southeast side of Albuquerque.

Perfecting the tilt

After a session with Ramseyer, Tim Cutforth of Vir James in Denver, and Zargar and Jim Oliver from Jampro, we decided to add one degree of beam tilt down. Jampro immediately fabricated the required 12-foot part and delivered it via

air cargo the next afternoon. The tower crew came the following morning and installed the downward beam tilt. Unfortunately, the interference was worse.

Someone suggested that perhaps the interference was not multipath off the crest but Fresnel zone instability crossing the hill at Albuquerque International Airport, and perhaps that was why the problem was limited to a few streets north of the airport. Cutforth half jokingly suggested that if one degree down made it worse, one degree up might make it better. The tower crew returned and inverted the beam tilt; the interference was lessened. Now the question is, if one-degree beam tilt up made it better, would some other degree make it perfect?

That is where we are now. The signals are absolute barnburners, with a 100-mile listening radius. Do we live with this minor problem and use the processing to compensate, or do we get exotic and try some more beam tilt? The helpful folks at Jampro are awaiting our decision.

□□□

For information, contact Jampro's marketing director in California at 916-383-1177; fax: 916-383-1182; or circle Reader Service 161.

Scala Antennas Vital

► continued from page 53

cable assembly. We have used three of their phase-canceling antenna arrays with excellent results.

Rugged construction

From 11,000-foot peaks in the Sierra Nevadas to the Big Horn Mountains of Wyoming, our translators are located at the sites of some of the worst winter weather. With heavy-wall aluminum tubing, stainless steel hardware and all-brass sealed baluns, Scala antennas are constructed for reliability and high performance, even in harsh environmental conditions.

In one case where the standard yagi antenna wasn't strong enough, Scala provided a stainless steel boom to make the yagi stronger and more resistant to ice damage. We have used this antenna for three years, while almost every other antenna at this site has been damaged or replaced at least once.

Easy installation

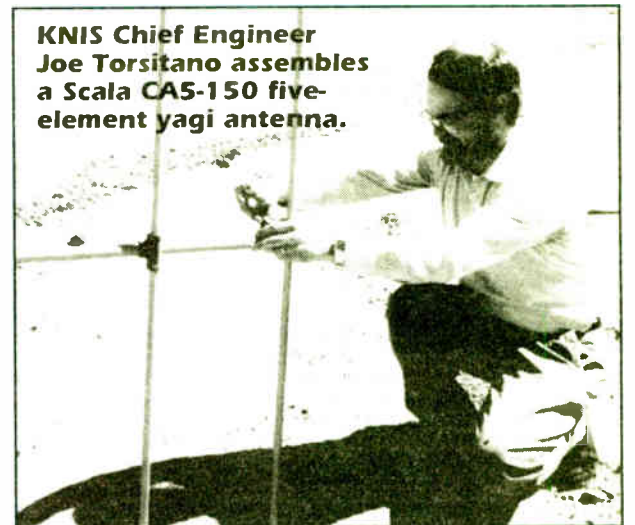
Scala antennas are shipped partially assembled. All hardware and instructions are provided, and assembly time is minimal, typically less than 15 minutes for a five-element yagi.

If replacing an existing antenna, most Scala antennas can be ordered with the same connector type and impedance the system currently uses.

Different mounting configurations are available to meet the needs of any situation. For horizontal polarization, the yagi and log-periodic antennas can be ordered with center or end mounts, allowing them to be installed on a mast or tower leg. Vertical polarized

installations are also possible. For the center-mount antennas, a crossarm and diagonal brace are necessary (available from Scala for the five-element yagis). While Scala does not provide hardware to vertically polarize an end-mount antenna, I have used non-metallic guy cable or fiberglass

KNIS Chief Engineer Joe Torsitano assembles a Scala CA5-150 five-element yagi antenna.



rods to provide the additional support.

I have always found Scala's customer service to be excellent. A crack developed in a balun almost four years after we purchased it. Scala acknowledged there was a manufacturing defect and replaced the balun with no hassles and no charge.

When a neighboring tower fell on one of our arrays, causing enough damage to put the system off the air, Scala expedited our order and sent replacement antennas to us in less than half of their normal delivery time.

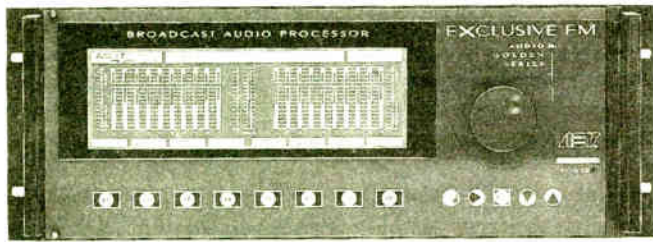
Western Inspirational is planning further development in the translator network. We know that we can rely on Scala to supply the technical expertise and antenna products that translate into high-quality, reliable service.

□□□

For information, contact Dan Fowler in Oregon at 503-779-6500; fax: 503-779-3991; or circle Reader Service 73.

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With over 3,000 units in operation worldwide, the LPB Signature III console represents a standard others are still unable to match. The Signature Series has proved its ability to perform on 6 continents, in settings ranging from metropolitan to jungle. With an incredible record of ruggedness and easy maintenance, it's no wonder over half of the Signature console owners have more than one. Features include 3 inputs per channel, two output buses and plug-in electronics. LPB Signature III consoles are available in 6, 8, 10, and 12 channel stereo and 6, 8, and 10, channel mono models.



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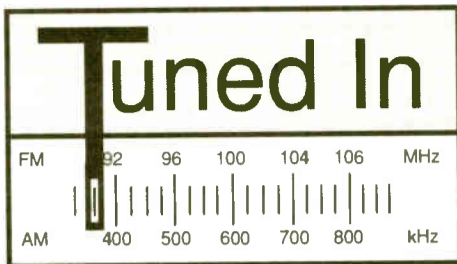
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People, Promotions and Appointments

M.E. "Mac" McClanahan, president of Marti Electronics in Cleburne, Texas, was awarded the title of Senior Member by the Institute of Electrical and Electronics Engineers Inc. (IEEE). According to IEEE President James T. Cain, Senior Member is the highest professional grade for which application may be made.

Bill Kreutz was promoted from manager/Midwest region to vice president/affiliate relations of Westwood One Radio Formats. Kreutz succeeds Neil Sargent, who accepted a position with TM Century.

Computer Concepts Corp. named radio industry veteran Stuart McRae to a sales position in its radio division.



McRae, known for his on-air and programming days and his previous experience with TM Century, now handles all of Computer Concepts Corp.'s products.

JBL Professional appointed Dr. Paul R. Newman its vice president of research and development. Mark Gander, most recently JBL's vice president/engineering, was named vice president/strategic development of the company.

Orban announced the appointment of

Chris Holt as its product engineering specialist. In this new position, Holt provides technical support for both customers and the company's sales and marketing departments.

John P. Pohl was named vice president of marketing for Cobra Electronics Corp. Pohl, who reports to Cobra's COO Steve Yanklowitz, is responsible for the company's marketing, marketing services, product development and customer service groups.

Emory Straus was named consultant/contractor liaison for BEC Technologies Inc., a manufacturer of fiber optic signal distribution products. Straus provides hands-on technical assistance in support of the company's product line.

E-mu Systems Inc. announced the job classification change of company general

manager, Tom McLoughlin, to the post of president. E-mu Systems is a subsidiary of Singapore-based Creative Technology Ltd.

Kirk C. Stirland was named COO of Media Marketing Technologies Inc., a separate company operating independently under the Arbitron umbrella.

Antennaco Inc. announced the appointment of Dennis R. McGovern to the newly created position of director of marketing. McGovern oversees the company's marketing and advertising, as well as continuing to develop a network of domestic and international sales representatives.

TAPSCAN Inc. announced the promotion of Cindy Kimbrough to senior vice president of radio systems. Kimbrough has been with TAPSCAN for 10 years and was vice president of radio sales for eight years.

In his first several weeks at Arbitron, General Manager Pierre Bouvard's theme of "Getting out of the Data Business and Getting into the Radio Business" was extended to the phone system in Arbitron's New York office. Callers no longer hear elevator muzak. Instead, each day a New York Arbitron subscriber is played on the company's phone system. The first station was Infinity's K-Rock.

Company News

Audisar of Seattle announced several installations of its products. Custom Audisar crossover networks were installed in the Ronald Reagan Memorial Library by GMF Sound, Orange Co., Calif.

Audisar standard 9K-600-6 distribution transformers are doing duty in the U.S. Senate sound reinforcement system.

Harris Corp.'s Broadcast Division (Harris Allied) received ISO 9001 accreditation.

An affiliation agreement was announced by Stainless Inc., a design/build engineering firm specializing in communications towers, and North American Tower. Under terms of the agreement, North American exclusively serves Stainless customers.

International Tapetronics Corp. (ITC) has expanded its distribution channels for its analog and digital audio management product lines. ITC appointed Dan Viles' Northeast Broadcast Consultants of Red Hook, N.Y., its representative for customers in the Northeast. ITC commissioned Technical Services Group Inc. (TSG) of Baton Rouge, La., as a value-adding reseller (VAR) for its DigiCenter digital audio management system.

Philips Semiconductors, a supplier of advanced semiconductor products, established a presence on the worldwide web with a home page on the Internet. The company's Internet address is <http://www.semiconductors.philips.com/ps/>.

For the fourth consecutive year, Telect was selected as a GTE Vendor of Excellence. Telect is one of 27 GTE suppliers to earn this recognition.

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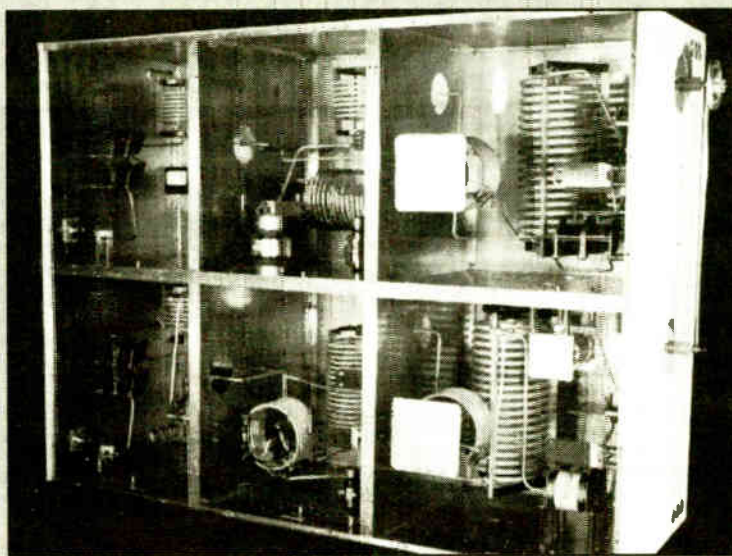
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In recent years, AM broadcasters have sought to increase signal coverage and audio quality in a cost-effective manner. With the emergence of extended band frequency opportunities, or situ-



ations in which existing stations are faced with moving, coupled with the high cost of real estate and zoning changes, diplexing makes sense.

A diplexer can be designed for a series fed antenna system or for an antenna using the Combipole folded unipole. Factors to be considered in the diplexer designed are the transmitter power level and frequency separation. For best results, frequencies should be separated by 15 percent or more.

LBA recently delivered a diplexer for two 15 kW transmitters with up to 150 percent modulation and separation of greater than 50 dB, in spite of frequency separation of only 12 to 13 percent.

For information, contact Jim Bradshaw in North Carolina at 919-757-0279; fax: 919-752-9155; or circle Reader Service 45.

ANTENNACO**Antennaco Low-Power FM Antennas Combine Balanced Feed System, Durability**

MILFORD, N.H. Antennaco Inc.'s new line of receive/transmit antennas are designed for the low-power FM radio broadcast industry. These broadband yagi antennas incorporate Antennaco's balanced feed system with a rugged boom and element construction for durability in harsh environments.

The antennas are designed to offset the impact of wind and ice on their electrical performance. The broadband impedance matching system eliminates the need for field tuning.

Four of the antennas cover the entire FM band. These four-element directional antennas provide 7 dB gain with a 3 dB beam width of 60/90 degrees (E/H). The typical power rating is for installations up to 2 kW.

This line of low-power broadcast antennas complements the company's existing line of RPUs for systems operating from 160 MHz to 960 MHz.

Antennaco develops and manufactures antennas and related equipment for the wireless communication industry. Its antennas cover the spectrum from 30 MHz to 2.5 GHz and are installed worldwide for applications such as data communications, WAN/LAN networks, rural telecommunications, public utilities, cellular and radio and TV broadcasting.

For information, contact Nate Edgcomb in New Hampshire at 603-673-3153; fax: 603-673-4347; or circle Reader Service 122.

OLD STONE CORP.**EZ RAZE Masts Ideal for Indoor, Outdoor Remotes**

EDEN, N.C. Old Stone Corp.'s EZ RAZE self-supporting antenna mast can be easily erected to heights of 10 to 42 feet in just five minutes. Easily transported, the EZ RAZE mast can be stored in the trunk of most compact and midsize cars. This free-standing mast also offers omnidirectional rotation for honing in the base stations and features a safety interlocking mechanism for mast sections.

The mast is ideal for remote broadcast antennas and may be set up inside or outside. Options are available for attachment of lighting equipment or broadcast speakers.

For information, contact the company in North Carolina at 800-538-4977; fax: 804-685-2924; or circle Reader Service 214.



Put The Control Back In Your Control Room.

TM century

It's the Ultimate Digital Studio from TM Century. And it's the ultimate in new technology for giving program directors and air personalities more control than ever before. More local market control than de-centralized satellite networks or other digital systems. More creative control with a design based on live assist but with walk-away capability. More audio quality control, with CD changers rather than multiple hard-disk compressions that decrease your on-air sound quality. And even more risk control,



"I'm sure I'm speaking for the rest of the KVIL personalities... We absolutely love the UDS. I can't even imagine running a radio show without it."

*Ken Barnette
KVIL 103.7 FM
Dallas, Texas*

with compatibility for any other software you have, and flexible enough for expansion and changes. Yet it's the easiest of all systems to use, with features like hot buttons and pop-up windows instead of confusing icons, error-prone touch screens and multi-layered commands. Find out more about The Ultimate Digital Studio, the system designed by radio people for radio people. Call **1-800-TM-CENTURY®**, or **1-214-406-6800**.

The Ultimate Digital Studio®

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World Radio History

Cable Reference Guide

The following is a list of companies that produce transmission line, cables, line connectors, RF line filters and cable management devices. It is not an exhaustive list, and other companies listed elsewhere in Buyers Guide may also manufacture cable products.

Company	TL	CB	CN	FL	WM	Company	TL	CB	CN	FL	WM
Andrew Corp. 10500 W. 153rd St. Orland Park, IL 60462 contact: Robert Leonard phone: 708-873-2859 fax: 708-873-5515	✓	✓	✓			Times Microwave Systems 358 Hall Ave., P.O. Box 5039 Wallingford, CT 06492 contact: Robert Perelman phone: 800-TMSCOAX (867-2629) fax: 203-949-8423		✓			
Cablewave Systems 60 Dodge Ave. North Haven, CT 06473 contact: Mary Ann Dixon phone: 203-239-3311 fax: 203-234-7718		✓				Trompeter Electronics 31186 La Baya Dr., P.O. Box 5069 Westlake Village, CA 91362 contact: Becky Gillmore phone: 800-217-2020 fax: 818-706-1040			✓		
Cole Wire & Cable Co. Inc. 6430 N. Hamlin Ave. Lincolnwood, IL 60645 contact: Lee Abramson phone: 800-323-1403 fax: 708-6733-2243	✓		✓			Lemo USA Inc. P.O. Box 11488 Santa Rosa, CA 95405 800-444-5366 fax: 707-578-0869				✓	
Myat Inc. P.O. Box 425, 380 Chestnut St. Norwood, NJ 07648 contact: Philip Cindrich phone: 201-767-5380 fax: 201-767-4147	✓		✓			RF Industries Ltd. 7620 Miramar Rd. San Diego, CA 92126 contact: Les Perlman phone: 800-233-1728 fax: 615-549-2345				✓	
Belden Wire & Cable 2200 U.S. Highway 27 South Richmond, IN 47374 contact: Kip Coates phone: 317-983-5200 fax: 317-983-5257		✓				Communications and Energy Corp. 7395 Taft Park Dr. East Syracuse, NY 13057 contact: Steve Shafer phone: 800-882-1587 fax: 315-452-0732				✓	
CANARE Cable Inc. 511 5th St. #G San Fernando, CA 91340 contact: Barry Brenner phone: 818-365-2446 fax: 818-365-0479		✓				Microwave Filter Co. 6743 Kinne St. East Syracuse, NY 13057 contact: Tom Parker phone: 800-448-1666 fax: 315-463-1467				✓	
Clark Wire & Cable * 1355 Armour Blvd. Mundelein, IL 60060-4401 contact: Carlyn Buchanan phone: 800-222-5348		✓				Panduit 1333 Schoolhouse Rd. New Lenox, IL 60451 phone: 800-777-3300, ext. 1709 fax: 708-532-1811					✓
GEPCO International Inc. 2225 W. Hubbard St. Chicago, IL 60612 contact: Larry Smith phone: 312-733-9555 fax: 312-733-6416		✓				Rip-Tie P.O. Box 77394 San Francisco, CA 94107 contact: Michael Paul Fennell phone: 415-543-0170 fax: 415-777-9868					✓
Nemal Electronics International 12240 N.E. 14th Ave. North Miami, FL 33161 contact: Benjamin Nemser phone: 305-899-0900 fax: 305-895-8178		✓									

* indicates new address
TL = transmission line CB = cables CN = connectors
FL = RF line filters WM = wire management

CORTANA

Cortana Stati-Cat System Protects All Parts of Tower from Lightning

FARMINGTON, N.M. Cortana Corp. has 13 years of experience protecting broadcast and communication towers from lightning strikes. The Stati-Cat lightning prevention system works on the principle of charge dissipation, providing a continuous low-resistance discharge path for the static electric charge found on tall structures. The system reduces the high-voltage gradient between cloud and tower.

The Stati-Cat system consists of several different units that can be adapted to any tower. The Crow's Nest is designed to protect the top of the tower, fitting over the beacon but allowing lamps to be changed without removing the dissipator. Other units protect the sides of the tower, and the Stati-Kitty discharges the guy wires.

Cortana can provide a client with a custom design, taking into consideration particular problems and the prevalence of storms in the client's area. There is no charge or obligation for requesting a design and quote. Product literature is also free upon request.

For information, contact David Stockmar in New Mexico at 505-325-5336; fax: 505-326-2337; or circle Reader Service 31.

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Radio World
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FAX: 703-998-2966
* No Phone Calls Please

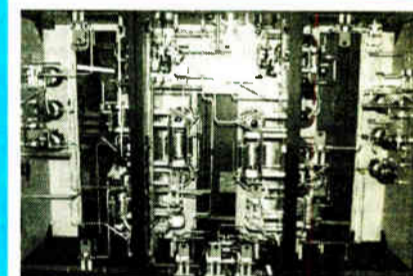
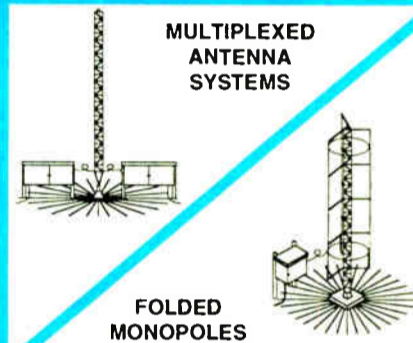
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PHONE: 615-878-3141
FAX: 615-878-4224

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PRECISION

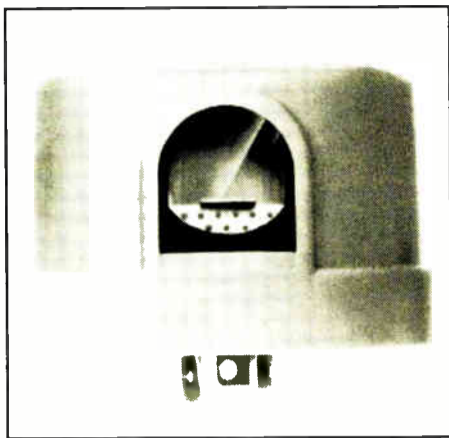
Precision's Outdoor Lighting Controls Comply With FAA Requirements

MIDLAND PARK, N.J. Precision Multiple Controls Inc., a manufacturer of photocontrols for outdoor lighting for more than 35 years, offers specialty controls designed specifically for aviation obstruction lights, beacons and strobe light systems. These models conform to FAA requirements for airway obstruction lighting.

Locking-type models plug into a three-prong photocontrol receptacle. This series incorporates the latest electronic technology and is available in either 120 or 208 to 277 V. Units are available with a 35-foot candle turn-on and a 58-foot candle turn-off, or a standard turn-

on of one- to three-foot candles.

For information, contact the company in New Jersey at 201-444-0600; fax: 201-445-8575; or circle Reader Service 85.



I COULD HAVE BOUGHT A DIGILINK!

Are you thinking about replacing your old cart machines with 'Digital Carts' such as floppies, flopticals, Bernoullis, or Opticals??? Well, think about it a little more! Add up the list price for a digital cartridge recorder, just a single player, AND the floppy disks--- and you will find that you could have bought a Digilink workstation for \$7,995 that gave you 'Live' -AND- 'Automation' capabilities!!!

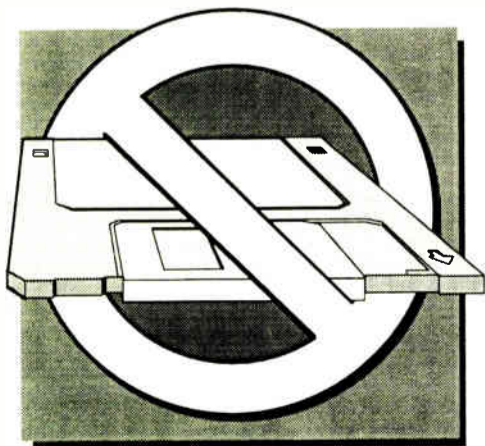
A Digilink workstation stores audio on an internal hard disk and comes out of the box with a capacity of 547 one minute, stereo carts for only \$7,995. Even better, the Digilink hard disk has an average 15 year life. Imagine how many floppies you will break, wear out, lose, and replace over 15 years. That doesn't count all of the floppy disk mechanisms that will jam, break, and simply fail...

Also with a Digilink, you get much more! You can stack up hundreds of 'carts' in the play list and just walk away. You get satellite automation in the Digilink workstation and can optionally add CD players. A digital audio cut and splice editor even comes standard with Digilink. Because Digilink will play and record at the same time, you can play a spot to air while it starts a scheduled network autorecord. You can even network delay with Digilink.

With all of these features, it is easy to see why there are more than 500 Digilink workstations around the world from Paris to Moscow to Taiwan to Jamaica and in your own backyard. Don't suddenly come to the realization that you could have bought a Digilink! Call Arrakis now...

(303) 224-2248

ARRAKIS



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DIELECTRIC

Dielectric Brings FM Stations Together with Constant Impedance Combining Systems

RAYMOND, Maine Dielectric Communications offers high-power FM constant impedance combining systems to combine several FM broadcasters into a single antenna and transmission line system.

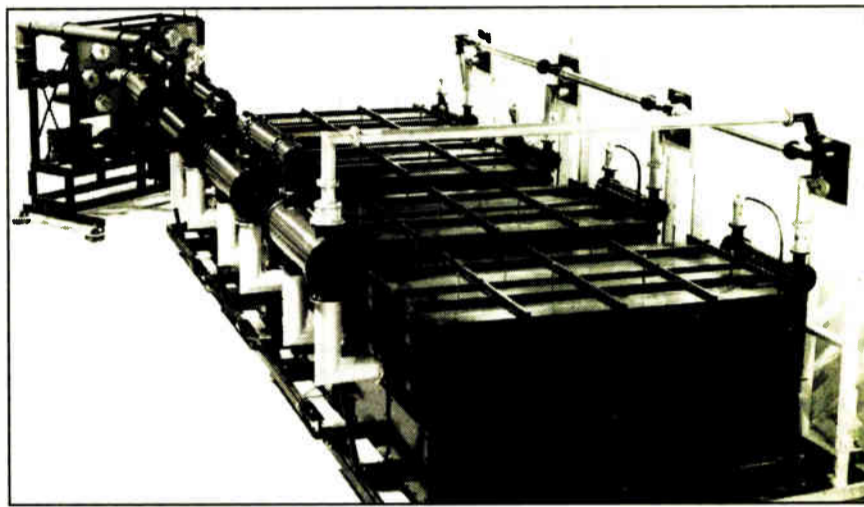
Broadcasters who participate in combined systems share the cost of facilities, such as the tower, antenna and transmission line, as well as a prime broadcasting location that otherwise may be unavailable.

Recently, Dielectric installed a four-station constant impedance combiner for TowerCom's Bithlo, Fla., facility. The installation combines the outputs of four

Class C stations into a single antenna. These stations are TK Communications Inc. (WHTQ), Paxson Broadcasting (WJRR), Press Broadcasting (WTKS) and Nationwide Communications Inc. (WOMX). Each station's average output power is 36 kW for a total combined power of 144 kW.

Computer-aided modeling of the system allowed for installation without expensive and time-consuming modifications in the field.

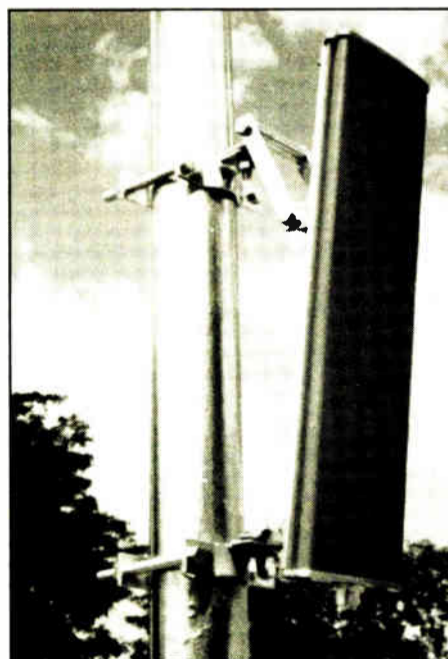
For information, contact Matt Leland in Maine at 207-655-4555; fax: 207-655-7120; or circle Reader Service 59.



COMSAT RSI

Flat-panel Antennas Meet Needs of PCS/PCN Users

DES PLAINES, Ill. Designed to meet the needs of PCS/PCN users, the low-profile, flat-panel antennas from COMSAT RSI/Mark Antennas feature a printed circuit board as a radiating element, electrical downtilt, upper-side lobe suppression, lower-side lobe null fill and low intermodulation characteristics.



Only 1.5 inches deep, these antennas are inconspicuous when mounted on a building or pipe. They cover the 1850-1990 MHz U.S. PCS band and the 1710-1880 MHz E.C. PCN band.

Meeting a wide range of applications, the antennas are available in 65-, 83-, 90- and 105-degree horizontal beam widths, and in lengths ranging from one foot to seven feet, depending on required gain.

The antennas are housed in extruded,

weather-resistant acrylic-styrene-acrylonitrile (ASA) and finished with aluminum end plates. They are manufactured to withstand 100 percent humidity, temperatures between -40 and 160 degrees F, and winds up to 150 miles per hour.

Both 7/16 DIN female and type N female connectors are available as standard. Any model can be furnished with an electrical downtilt of 2, 4, 6 or 8 degrees, and a mechanical downtilt bracket is provided as an option.

For information, contact the company in Illinois at 708-298-9420; fax: 708-635-7946; or circle Reader Service 136.

ACI

Bull's-Eye Panel Antenna Gets New Feed System

DIAMOND SPRINGS, Calif.

Antenna Concepts Inc.'s new feed system for the Bull's-Eye panel antenna with a 10 MHz bandwidth is the result of ACI's focusing its research and development efforts on FM. This antenna was used most recently in a four-bay 50 kW project for the Manila, Philippines, market.

The quadrature-feed system of the Bull's-Eye reduces the number of feed cables, and the potential for cable problems, while enhancing the bandwidth achievable with each element.

In addition, a new, stronger design with tighter specifications has allowed ACI to produce a high-quality notch filter with a rejection figure of 30 dB within 1 MHz of the pass band.

For information, contact Jeryl Schooler in California at 916-621-2015; fax: 916-622-3274; or circle Reader Service 76.

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No. (s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

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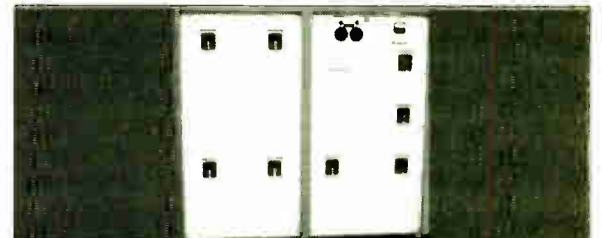


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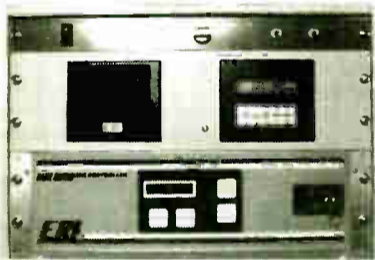
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ERI - ELECTRONICS RESEARCH 812-925-6000

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MARKETPLACE

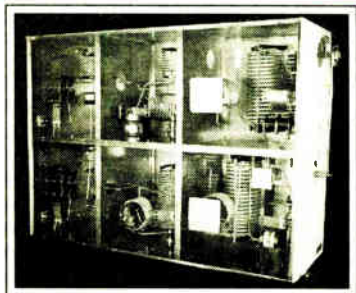
Recently Introduced Products for the Radio Broadcast Professional

Analysis Software Package

ComSitePlus Version 3.6 from Douglas Integrated Software is an integrated communications site RF interference analysis and site management package. This PC-based software provides intermodulation signal level analysis, transmitter noise and receiver desensitization analysis, and eliminates the "shotgun" approach to site design and management. It also features a comprehensive database that organizes all site information.

For information, contact Douglas A. Perry in Florida at 904-656-8673; or circle **Reader Service 141**.

AM ANTENNA SYSTEMS



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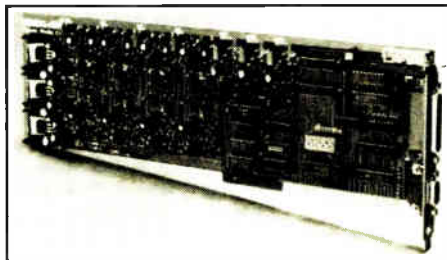
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Circle (39) On Reader Service Card

Audio Switcher

The DMX-4 stereo four-channel audio switcher from Electric Works Corp. mounts directly into a full-length 16-bit slot on any IBM-compatible computer. Four unbalanced stereo inputs under the software control of programmable DAC devices terminate in one balanced stereo audio output.

In addition to the stereo switching, mix-



ing and fading controls, the DMX-4 includes a summed mono balanced audio output and features provision for software selectable external level controls for each source.

Included with the DMX-4 are connections for eight incoming logic closures and the ability to generate up to eight outgoing logic closures through software.

For information, contact the company in Texas at 817-625-9761; fax: 817-614-9741; or circle **Reader Service 51**.

Digital Processor

Taking advantage of the latest in digital technology, Circuit Research Labs (CRL) offers up the DP-100 digital processor.



Built around a 32-bit floating point DSP arranged in a multi dimensional parallel architecture, the DP-100 features a wide dynamic range, fifth-order A/D converters (or an optional 20-bit A/D converter) and AES digital I/O.

The DP-100 includes a digital stereo multiplex generator, automatic gain control, five-band compressor and a three-band limiter.

For information, contact the company in Arizona at 602-438-0888; fax: 602-438-8227; or circle **Reader Service 43**.

Packaged Cable Assemblies

The Gepcord line of packaged audio and video cable assemblies from Gepco International Inc. is designed to free engineers from the time-consuming task of assembling finished cable and connector assemblies themselves.

Gepcord cable assemblies can be customized by length, color, type of connector and application, from a single microphone cord to a complex wiring system.

For information, contact the company in Illinois at 312-733-9555; fax: 312-733-6416; or circle **Reader Service 207**.

Automation System

Sundance Digital Inc. is developing the StationMaster broadcast automation system. StationMaster controls up to 12

Sony serial source machines, eight GPIs and a GVG 100- or Master 21-compatible switcher. StationMaster can also be fully interfaced with the company's FastBreak digital spot playback system to provide seamless integration of digital spot playback with program-length tape playback. This product can also interface with traffic systems for receiving playlists and for returning as-run reconciliation reports.

For information, contact the company in Texas at 214-444-8442; fax: 214-444-8450; or circle **Reader Service 165**.

Turntable Mixer

The Soundcraft D-Mix 1000 turntable mixer offers the professional DJ a solution to maintaining a first-class sound night after night, with a flexible modular format that adapts to any club installation.

In its modular 19-inch format, the D-MIX allows the user to custom configure his console by interchanging mono and stereo modules.

Two mono input modules and six dual stereo inputs are fitted as standard, with an independent stereo DJ booth output provided for speaker monitoring and cueing.

Each step module permits the connection of two switched stereo sources, such as CD players, DAT machines or VTRs.

For information, contact the company in California at 818-893-8411; fax: 818-893-3639; or circle **Reader Service 175**.

Fiber Optic Distribution System

The SIGMANet Series from BEC Technologies Inc. provides cost-effective yet highly flexible and reliable signal distribution via fiber optics.

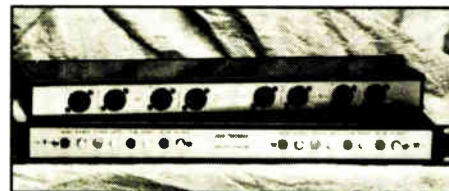
The SIGMANet Series is comprised of the AD2 stereo analog input module and DA2 stereo analog output module; both communicate in 20-bit digital.

The SIGMANet module offers a low-cost, two-channel alternative that can act as a single stereo point-to-point link or can be used to add or drop two channels at a time onto a full 64-channel audio local area network (A-LAN).

For information, contact the company in Florida at 407-855-8181; fax: 407-855-1653; or circle **Reader Service 97**.

Matrix Switcher System

Jasoni's Model 2000 matrix switcher system is designed for use with analog reel-to-reel tape machines to yield high-quality audio during dubbing from reel to another source.



The unit is completely passive and uses XLR connectors for I/O. It features eight output selections and provides immediate checks and correction of out-of-phase material from the source.

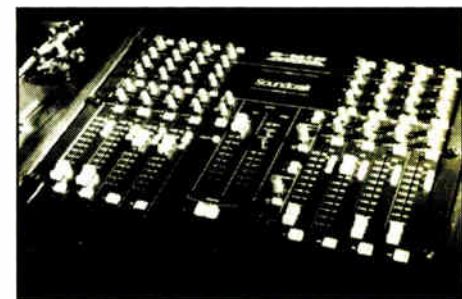
Color-coded buttons provide quick identification of output from the Model 2000.

For information, contact Dan Peluso in

Nevada at 702-791-3394; or circle **Reader Service 146**.

Software Upgrade

Soundcraft's Version 6.13 is a software upgrade for the computer automation and machine control system in the company's DC2000 recording console. This software extends the number of tape machines the DC2000 can control via tape transport controls in the console's master section.



Version 6.13 software is standard in all DC2000 consoles shipped as of January 1995. Upgrades for existing DC2000 consoles are available to customers at no charge.

For information, contact Roscoe Anthony in California at 818-894-8850; fax: 818-830-1220; or circle **Reader Service 12**.

PC-Based Automation System

WireReady NSI's CartReady PC-based automation system runs on any standard IBM-compatible 386/486 computer with 4MB of RAM.

Using an on-screen cart-like interface, CartReady stores digitized audio to a computer hard drive at any standard sampling rate from 16 to 48 kHz, compressed or uncompressed, stereo or mono. Simple XLR plugs provide connections to a station console or mixer or directly to the transmitter input.

While it contains some basic editing functions, CartReady is also compatible with third-party Windows-based editing software such as EdDitor Plus or SAW.

CartReady is adaptable to live-assist and satellite automation, and it can be combined with WireReady's newswire capture software to facilitate news reports.

For information, contact David Gerstmann in Massachusetts at 800-833-4459; fax: 508-879-1199; or circle **Reader Service 92**.

FM Switchless Combiners

A new line of FM switchless combiners from Jampro RF Systems Inc. provide an economical alternative to switching combiners and patch panel combining systems.

This combiner design replaces older switching combiner systems that require a station to be taken off-air before switching occurs. The FM switchless combiner insures that maximum output power is available at the antenna at all times. Switching from one transmitter to another, or to both combined, can be achieved with no lost air time.

For information, contact the company in California at 916-383-1177; fax: 916-383-1182; or circle **Reader Service 180**.

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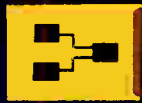
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SSAC**SSAC Lamp Alarm Relay Detects Power Failure**

BALDWINVILLE, N.Y. The new SCR430T universal lamp alarm relay from SSAC Inc. senses a lamp failure on radio and TV towers and other tall structures. One unit can be adjusted to meet most obstruction lighting requirements.

The SCR430T detects the loss of one lamp out of one, two, three or four steadily-on or flashing lamps. Up to four 620 W flashing beacons or up to four 116 W side lamps can be monitored with one unit. Selection of the number of lamps, wattage and their voltages are made via six switches on the unit.

The SCR430T's toroidal transformer constantly monitors the current flowing in the lamps' wiring. When the current drops due to a lamp failure, the SCR430T's LED lights and its out-

put transfers. A trip delay is included to prevent nuisance tripping.

The SCR430T has two outputs: a solid state line voltage output to operate a spare lamp (up to 125 W) or an alarm, and isolated single-pole, double-throw relay contacts rated 10 amps resistive for a remote alarm system.

For information, contact Dave Eastwood in New York state at 315-638-1300; fax: 315-638-0333; or circle Reader Service 169.

**WILL-BURT CO.****Will-Burt Telescoping Masts Solve Line-of-Site Problems on Remotes**

ORRVILLE, Ohio Will-Burt Co.'s Models 6-27-157/167 and 7-34-157/167 telescoping masts eliminate line-of-sight problems for remote broadcasts.

The 6-27-157/167 mast is a 6-foot nested, 27-foot extended pneumatic telescoping unit that is typically used in smaller remote vehicles like cars or small vans. The 7-34-157/167 mast is a 7-foot nested, 34-foot extended pneumatic telescoping unit used for larger vehicles like full-size vans and motor homes.

Both models provide better line of sight to receive antennas and reduce the problem of multipath signals encountered while doing remote broadcasting. Both models typically provide the broadcaster with a wider range for his or her remote; however, the exact remote range improvement varies depending on terrain and height of the receiving antenna.

For information, contact Steven Pinkley in Ohio at 216-682-7015; fax: 216-684-1190; or circle Reader Service 46.

PHASETEK**Phasetek Offers Unipole Kits, TSAs, Transformers**

QUAKERTOWN, Pa. Phasetek Inc. manufactures custom antenna phasing equipment, antenna tuning units, multiplexing equipment and a complete line of RF components and accessories.

The company now offers a complete line of folded unipole kits, tunable skirt assemblies (TSAs), along with antenna accessories for improved bandwidth and efficiency. These kits are available for a number of different tower/antenna configurations.

Phasetek also now offers a complete line of isolation transformers that are made to install various antennas (FM, STL and TV) on insulated towers.

For information, contact the company in Pennsylvania at 215-536-6648; fax: 215-536-7180; or circle Reader Service 205.

STAINLESS**Stainless Designs, Builds Custom Towers for Various Communications Operations**

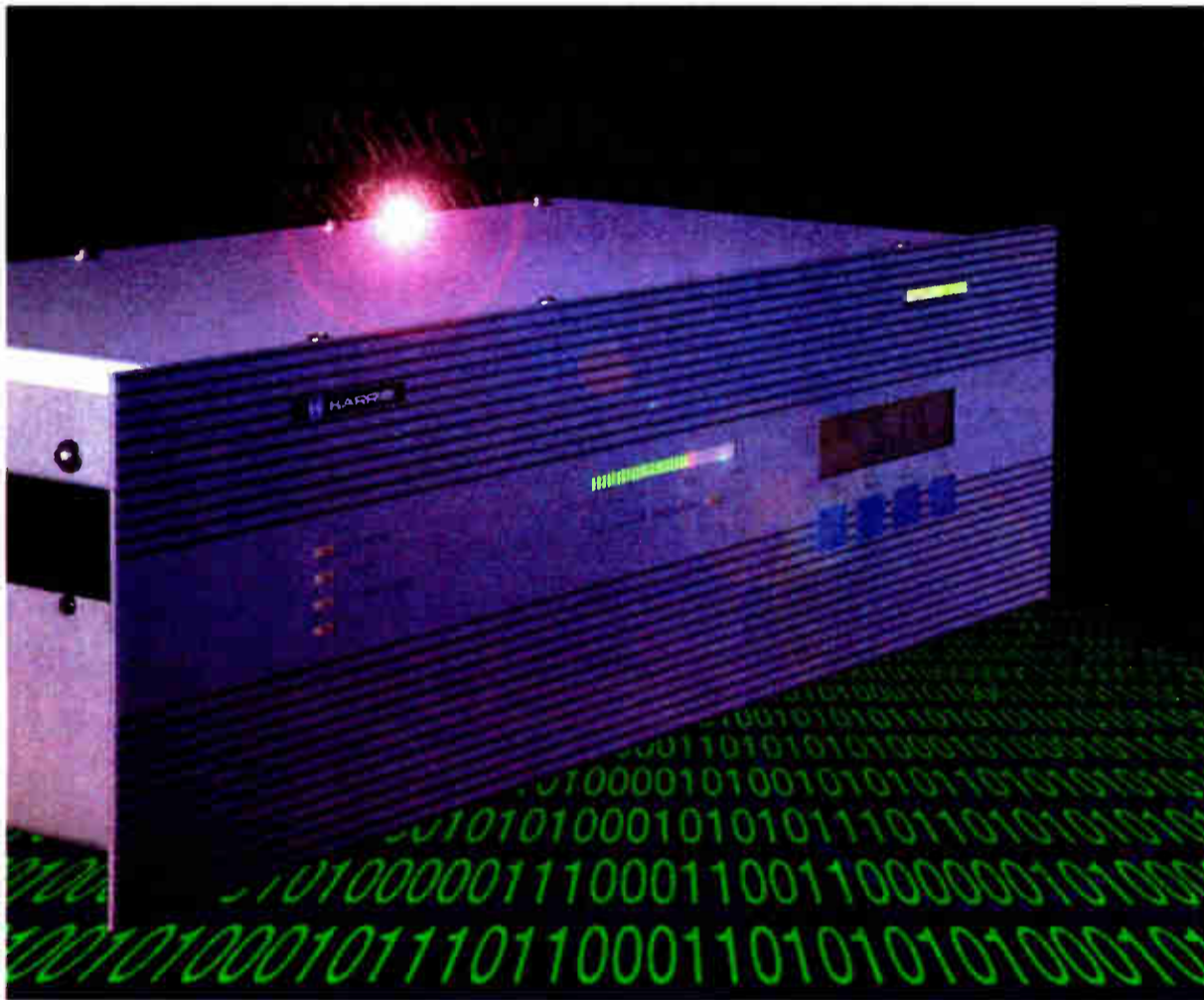
NORTH WALES, Pa. Stainless Inc. plans to complete a number of tower projects this summer, including a four-tower AM array of 400-foot guyed towers for Group W's WINS Radio in New York and a 1,250-foot G-10 for Citicaster's WXTB-FM in Clearwater, Fla.

Among the projects Stainless completed last year was a 718-foot guyed Franklized structure for KDKA(AM) in Pittsburgh. The tower includes a three-foot section-alized insulator at the 218-foot level.

Stainless designs, fabricates and erects custom-designed towers for all types of electronic communications operations. In addition, Stainless Field Services provides tower maintenance and modification services to owners of existing towers.

The company also offers financing and leasing programs, as well as a comprehensive insurance and risk management program designed to serve both radio and TV broadcasters.

For information, contact Peter Starke in Pennsylvania at 215-699-4871; fax: 215-699-9597; or circle Reader Service 18.



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AMPLIFIERS

Want To Sell

Dynaco stereo 120A pwr amp w/PAT-4 stereo preamp; Macintosh MC-2505 solid state pwr amp w/VU meters, nice wooden case; Kenwood KR-4600 stereo rcvr, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301, 203-762-9425.

Altec 361-A amp, \$50; McIntosh MC 250 stereo pwr amp, \$250; Southwest Tech 215-A stereo pwr amp, \$95. D Lundy, 606-546-6650.

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AMPLIFIERS

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LPB DAI-16 distribution amp, new. J Gelo, 813-642-6899.

Marantz 2130 quartz locked tuner w/scope; Marantz 3250 B control pre-amp; Marantz 140 amp w/VU meters, \$595. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

RTS-405 stereo TT preamps (2), used 6 mos then stored, \$140/ea+shpg. B Lord, Lord Bdcg, 3824 SW Myrtle St, Seattle WA 98126. 206-932-4839.

Want To Buy

2x8 or 2x16 DA. George, 908-938-2662.

McIntosh MI-200 rackmount tube amp. 212-343-0265.

ANTENNAS/TOWERS/CABLES

Want To Sell

Harris/Gates Filter 42-158-50, low pass filter for FM xmr 10 kW for 88-95 MHz only, approx 6 ft 1 7/8 hard line, \$300. J Cunningham, KEOR, Rt2 Box 113B, Stonewall OK 74871. 405-265-4496.

Cablewave HCC300-50J 3" air coax, 160' w/3 1/8" EZI gas-pass connector installed, 3 1/8" gas barrier loose, incl hanger, round member adapters, hoisting grips, ground kits, wall/roof feed-thru, all new. K Grap, WCCN, 715-743-3333.

ERI 2 bay, tuned to 100.3, in use since 1986; 400' 1 5/8" coax; ERI isolation transformer used on AM tower at 100.3 MHz. Trey, KDXV, 501-239-8588.

ERI 1105 CP FM, 3 bay tuned to 98.3, needs input xfmr, \$1850. Max, KCMJ, POB 551856, Dallas TX 75355. 214-722-0006.

ADC TTL patchbays (5), 720 total patch points, 144 ea panel, hinged, wirewrapped to D connectors, mating connectors inc, used/good cond, \$495/all. Gary, NCX Communications, 713-787-0040.

Omnicroft GF-4 4 chnl noise gate, exc cond, \$125. W Whitney, Whitney Creative, POB 2411, Overland MO 63114. 314-428-8430.

ADC 1/4" patchbays and cords, NEW, UNDER HALF PRICE, ADC TT patchbays, \$129 up, NEW cords, \$9.95. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.



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2 150' towers, one or both, BO. B Locklear, WO7CN LPTV, Rt 10 Box 190, Lumberton NC 28358. 910-521-3101.

dbx 180 stereo NR, \$225; dbx 208 NR system, \$595. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.



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Rohn 45 G tower sections, \$125/BO. Rick, KBZO, Lubbock TX, 806-763-6051.

Russco CD-100 interface, new, \$35; Radio Labs ST-1 stick-on attenuators (6), new, \$15/ea; Roland MM-4 MIDI through box, new, \$50; Sennheiser HMD 224 X mic/headphone combo, new \$150. G Grassie, RNTC Bdcg, POB 146, Dexter NM 88230. 505-734-5565.

Valley PR-10 with 6 Kepex II, 2 dynamic sibilance processors, 2 maxi-Q and 2 leveller brick wall limiters, mint, low hours, \$2200. M Ravain, Trinity Christian Recording, POB 2479, Flagler Beach FL 32136. 904-439-3671.

UREI LA4 mint pr, \$1095; Lexicon Alex, \$295; bulk eraser, \$49; Stewart direct boxes mono, \$50; 4 Ch, \$95; Cue command decoder, \$125; ABC Network decoder, \$125; NEW Tascam midlizer MTS1000, \$750; Dyna stereo 120 rack mount amp, \$229; Sherwood FM tuner, new tubes, \$49; Infonics 7" reel copier 3 copies, \$125 ea; Crown & Furman elec crossovers, \$95. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

AUDIO PRODUCTION

Want To Sell

Kahn 58-1A Symetra Peak; Gray 602C phono equalizers (3). J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.



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Altec 1567A tube-type mic mixer with meter, vintage; Yamaha RM-804 recording mixers (2), 8 faders, 4 channels, +L&R; Teac Model Two audio mixer, 6 faders to 4 channels with HF & LF selectable rolloff, with Teac MB-20 meter bridge; Shure SE-30 mixer/gated compressor; Shure M-68P mic submixer, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Eventide H910 with blown output section, \$275; DEX1000 digital delay, rack mount with tone cntrls, slight noise problem, \$175; TT patch cables (39), Monster ProLink, \$250; E/V 666 mic, \$200; E/V velocity mics, one pair, BO. P Santo, 617-293-5671.

Good used studio tape 1/2" \$15, 1" \$30, 2" \$55. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Roland E-660 digital parametric EQ, new in box, with specs, \$1000; AKAI X7000 sampling keyboard w/memory, like new, still in box, \$700, \$850 with stand; Scotchcart IIs, new in boxes, 10 4.5 min units, \$60, 20 5.5 min units, \$130, \$180/all; Otari SX70 8-track 1" R-R rcd in like new cond, including new remote cntrl unit with 25' cable interface, 6 1" tapes w/reels & maintenance tape, all books & specs included, \$4000. B Giordano, WODS-FM, 20 Winter St, Boston MA 02108. 617-728-1957.

Want To Buy

Ampex tube mixers, plug-in mic pre-amp modules for PR10's. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

AUTOMATION EQUIPMENT

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Fluke 8000A digital multimeter, \$100. W Haley, 703-832-5247.

Conex 25 Hz encoder w/stop delay, BO. C Gennaro, WJMS, 222 S Lawrence, Ironwood MI 49938. 906-932-2411.

IGM stereo Instacart, \$500; ESE Model 790 1,000 event programmable clock, \$200. M Ripley, KOZE, Box 936, Lewiston ID 83501-0936. 208-743-2502.

IGM Basic II automation brain w/floppy drive backup & switch w/extra cards, framed for 15 audio inputs, extra monitor keyboard, remote control panel, all manuals, extra parts inc power sup and battery backup, \$2000. T Martz, WYSS, 5595 Liberty Rd, Chagrin Falls OH 44022. 906-635-0995.

IGM Rampart system, 4K memory, triple audio cards (6), Carousel controllers (6), 20 amp pwr sup, IGM Rollouts (2), stereo monitor drawer, control and timer drawer, IGM blue racks, no sides or back, IGM 500 system of rollout drawers, monitor, music and input channels, more. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

SMC S-DP-1 22 Carousels, 9 racks, 2 teleprinters, spare parts, manuals, wiring, \$1500. D Morgan, KJYE, 1360 E Sherwood Dr, Grand Junction CO 81501. 303-241-9230.

Sono-Mag 250/252 (3) cart Carousels and manuals; Otari ARS1000 reel pb decks, functional when removed, BO. M Moore, WMYN/WLOE, POB 311, Madison NC 27025. 910-427-9696.

Cetec/Schafer 902 1/2 automation, and manuals; Otari ARS1000 reel pb decks, functional when removed, BO. M Moore, WMYN/WLOE, POB 311, Madison NC 27025. 910-427-9696.

Cetec 7000 automation syst w/48-tray Instacart, BO. J Walker, KWHT, POB 640, Pendleton OR 97801. 503-278-2500.

Want To Buy

Sonomag system w/programmer, stereo Carousels (4), dual cart PB, Otari stereo R-R (5), super clean, you pick up, \$4000. K De Rouen, KEUN, POB 1049, Eunice LA 70535. 318-457-3041.



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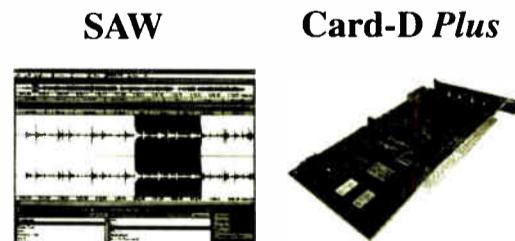
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Harris Criterion 90 2 mono PB (4), gd cond, \$200/ea or trade. WENG, Englewood FL, 813-474-3231.

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Dynamax CTRID stereo R/P cart machine, \$1200/BO; BE 5300 stereo R/P triple stack w/rcd amp, \$2500/BO; BE 3000 mono R/P cart machine, \$895/BO. J Walker, KWHT, POB 640, Pendleton OR 97801. 503-278-2500.

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Ramko Primus R/P stereo cart machine, like new w/manuals, \$1200. 800-397-4146.

Tapecaster X-701 mono plybks (2), xint cond, very clean, w/manuals, \$295/ea; UMC Beaucart 12-123, stereo rcd/plybk, xint cond, very clean, w/manual, \$295. K Lamson, 510-447-7405.

BE 5300C tripledeck, stereo, PB, mint less than 50 hrs, BO. R Kaufman, Pams Prods., POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

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MCI JH110B, 2 trk roll around metal, gd cond. J Gelo, 813-642-6899.

MCI JH110 1" 8 trk, 7 1/2, 15, 30 ips, completely rebuilt, 70% life on heads, in roll around cabinet, \$2700. W Whitney, Whitney Creative, POB 2411, Overland MO 63114. 314-428-8430.

Berlant/Concertone 30 R-R; Scully 270, 14" reel PB; Rollaround stand for ITC 750 R-R R/P. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

Nagra IS 3.75-7.5 ips, 5" reels, resolver, leather case, mint cond, \$2000. C Olson, Modcom, 510-672-5109.

Nagra IV-5 exc cond, many options, factory maintained, \$3900; Revox A-77, gd cond, w/recorder built into speaker cab, \$400. Wolf, Ealing Recording, 312-784-1558.

Otari ARS1000DC (4), gd cond, PB only, \$1500/all 4. D Hess, KTOM, 12 E Washington, Petaluma CA 94952. 707-766-9999.

Otari MX-5050 (2), one w/new 15 ips kit, both meet all specs, new flat balc formica cabinets, \$750/\$950. B Gable, Reunion Ent, 804 Mt Vernon Pkwy, Altamonte Springs FL 32701. 407-646-6827.

Scully 280 4 trk 1/2" rcd in rollaround cabinet, 7.5-15 ips, VGC, manual, tapes, \$900/BO. F Badeaux, The Musik Factory, 1812 Procter St, Port Arthur TX 77640. 409-982-7121.

Studer B-67 7.5/15/30 ips, 1/4" 2 track, w/remote control, manual and cover, exc cond, gd heads, BO over \$1600. R Streicher, Pacific Audio-Visual, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Tascam MSR-8 1/2", 8 track, R-R, dbx, full function, remote, new, \$2200. John, Star Lighter Prod, 10315 Elk Point, Houston TX 77064. 713-890-7000.

Telex stereo copyette 1x1 hspd cass dupli, \$250; Recordex 330 mono 1x3 hspd cass dupli, \$600. G Grassie, RNTC Bdcng, POB 146, Dexter NM 88230. 505-734-5565.

AKAI 1730D.SS 4-chnl stereo surround sound R-R tape deck, \$100+shpg. M Hardy, WMSJ, POB 432, Freeport ME 04032-0032. 207-865-3448.

Ampex 440-C 1/2" 4-trk DC servo, \$800; Ampex 440-C 1/4" 2-trk DC servo, \$400; Scully 280 7 1/2 & 15 very good, \$200; MCI JH 110 8-trk, \$1500; Ampex 440-C electronics, \$100/ea; Ampex 440-C deck DC servo, \$300. D Lundy, 606-546-6650.

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Otari MX70 1" 16/8-trk, mint cond, 8&16-trk 1" heads, 16 chnls rack mounted dbx 180A NR & CB117 remote, \$10,900; Otari MX5050 1/2" 8-trk, mint cond, 8 chnls rack mounted dbx 911, CB116 remote, \$3900. G Kornbluth, A&J Redg Studios, 212-247-4860.

Otari MTR10-2C stereo rec, \$2995; MCI Sony JH1100B, exc cond, \$1250; Otari 5050 stereo in console, \$1500; Ampex 354-2 tube w/440 deck, \$1000; Ampex 440 stereo, exc cond, \$995; Ampex AG350-2 stereo, \$595; Ampex & Scully motors, parts, 8 and 16 track hds, Ampex DC servo capstan motor and amp, \$300. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

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Sony TC-152SD stereo cass deck, w/VU meters, 2 speeds; Casio DA-2 port DAT rcd/ply deck, batt or AC, almost new, in box; Wollensak Model 2851 cass rcd/plybk, heavy duty; ITC Encore R/P mono cart rcd/plyr, S/N 434; Dukane Model 28A18 rcd/pulsers (2), 50 Hz @ 0.45/2.0 sec, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Sony TC-7884 4-trk, needs plybk head, otherwise good cond, BO. J Walker, KWHT, POB 640, Pendleton OR 97801. 503-278-2500.

Cypher Digital Shadow 4700 sync, CDI 4835 remote, cables for MTR10, MX5050 & MX70, \$1995. G Kornbluth, A&J Rcdg Studios, 212-247-4860.

Teac A-3300-SX stereo R-R, 10 1/2" & 7" reels, 1/4-trk stereo, 1/4" tape, complete syst in exc cond, \$400/BO. S Lawson, 707-528-4055.

Teac Tascam 80-8 8-chnl 1/2" R-R; Ampex 351 R-R, vintage; Ampex 1091 stereo rcds (2); Wollensak 2770 cass duper, stereo unidirectional; Penlagon 1100 Series 4-chnl cass duper; Crown 800 Series stereo R-R 10", looks vintage; Nakamichi Model 1000 Type II 3-head cass console/wooden case; Teac 3340-S 4-chnl simul-sync stereo R-R, 1/4"x10"; all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Teac A23405 4-chnl R/P, clean, \$300; Teac A33405 4-chnl, like new, \$500; ITC 750 plybk units, \$150; Anri GX77 7" 3 motors, clean, \$250; Inovonics 370-375 rcd electronics (4), \$140/ea. J Parsons, Parsons Sound Svc, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

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Ampex ATR 100 (2) 4 trk \$3500 ea, 2 trk 1/2" \$4000, (2) 2 trk 1/4" \$2500 ea. 212-343-0265.

Otari 5050-SHD 8 trk 1/2" newly rebuilt, heads have full, life left, \$1800. W Gunn 619-320-0728.

Otari Mark II-IV 1/2" 4-track, multi-track, mint, less than 50 hours, Best Offer. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Hounds-haven Way, San Jose CA 95111. 408-363-1646.

Uher CR134 cassette, \$195; DAT decks with new heads \$550, Tascam ATR 60 8 track with stand, remote, \$3250; Otari 5050-8 no hours on heads, \$1595; Ampex 440B-8, \$2450; Tascam 25-2, \$695; Ampex ATR700, \$695; Scully 16 track 2", \$3450; Tascam 52 top of line, \$950; M79-24 fully rebuilt, \$11,500; Tascam locator for 85-16, \$495; Fostex E22 1/2" limecode deck, \$1400; Fostex A80 8 track with 450 mixer, \$1350; Tascam 5, \$450; Nagra 10" reel adaptor, \$950. W Gunn, POB 2902, Palm Springs, CA 92263. 619-320-0728.

Viking 433 4-track recorder, good condition. Motors, bearings, heads, amp all excellent, needs little work, \$60. Chris Cromwell, 516 Sunset Rd #2, Colorado Springs CO 80909. 719-442-0839 (leave message).

Want To Buy

Nagra 111N operation information. Frank, WMAM, POB 609, Marinette WI 54143. 715-735-6631.

Otari MX-5050-8 8 trk, 1/2" any model. John, Star Lighter Prod, 10315 Elk Point, Houston TX 77064. 713-890-7000.

Sony TC-756-2 for parts, need used playback head for 2-track stereo or whole R-R for parts. R Lee, 304-624-6801.

Old 50s & 60s 3- & 4-trk R-R rcds, mixers, etc needed for immediate use, not collection. M Lambert, Leppolone Electrical Recordings, POB 61, Kalamazoo MI 49005-0061. 616-383-3836.

Scully 280 record electronics. J Parsons, Parsons Sound Svc, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

CD PLAYERS

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Denon 950 FA need work on optical pickups and bearings, manuals, Best Offer. T Martz, WYSS, 5595 Liberty Rd, Chagrin Falls OH 44022. 906-635-0995.

Tascam CD-701 (6) CD plyrs w/RC-701 cntrl unit & RC-7 cntrl unit, \$2500. R Humphrey, WWVA, 1015 Main, Wheeling WV 26003. 304-234-0057.

CONSOLES

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McMartin B801 2, 2 chnl mono, working when replaced, no manuals, \$600/two OBO; McMartin B501 w/manual, \$450/BO; Ampex/Scully, dual channel mono, 8 slide pot, no manual, \$300/BO. B Perry, KEZQ, 30 Trails End, Mayflower AR 72106. 501-470-1728.

RCA BC-2A mono, rough condition, Best Offer. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

Ampex AM10 6x2 mixer \$495. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

McMartin B-801 stereo 8-channel audio console, \$800; Altec 352-A 5-channel mixer amps (2), \$75. D Lundy, 606-546-6650.

Pacific Recorders AMX-18 console with 11 stereo-, 9 stereo EQ-, & 2 mic-modes, Pacific Recorders custom deck with 28" equip turret, 2-turntable return, overhead equipment return (including 1/4" patchbay), good condition, \$22,000/Best Offer. Greg, 212-840-0220.

Wheatstone A-500A 32-chnl frame loaded w/4-mic, 16-SL, 2-LS, 1-SPN & tape cntrl modules, built-in clock & timer, copy bridge, 1 yo, BO. T Camp, WMXC-FM, 334-450-0100.

Yamaha MR-1242 12-channel, 3 bus, 4 sub groups, cue, talk back, monitor controls, 3WAN individual EQ, \$400+shipping. M Hardy, WMSJ, POB 432, Freeport ME 04032-0032. 207-865-3448.

Mackie 1604, \$575; Soundcraft Spirit 24x24, \$3950; Ramsa 820 20x8x16 with meter bridge, \$1950; Quantum 23x16x24 as used by LA Philharmonic, \$4950. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Want To Buy

Western Electric WE-25B for old time style student stn, finder can keep all transformers, only outside cosmetics important. J Vobbe, WLEW Radio, 517-269-9931.

Autogram consoles. V Baker, Positive Radio Group, 703-961-2377.

Ampex T3 AC 10DB manual, schematics, parts list for 10 channel. T Spencer, WODY, R11 Box 224, Bassett VA 24055. 703-629-1161.

Neve, Amek, Sony production or music recording. A Dentone, Audio Answers, 362R Middlesex Ave, Wilmington MA 01887. 508-988-2332.

Neve Melbourne 12 or 16 input, any Neve or API consoles, EQs or mic pres. B Ore, Clockwork, 606 Mamaroneck Ave, Mamaroneck NY 10543. 914-381-0661.

Neve console, any type and parts. 212-343-0265.

DISCO-PRO SOUND EQUIPMENT

Want To Sell

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dbx 2-124 NR syst; dbx 188 dynamic range enhancer; Teac AN-180 NR unit; stereo jack field; Teac 3232 jack field; Tascam PB-32H patch bay; Bose Model 901 active EQ, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

UREI 530, 18 band stereo graphic EQ, \$150; UREI 535, 20 band stereo dual graphic EQ, \$200; DBX 222 type II NR system, \$75; Dolby A-307 NR system, \$175. D Lundy, 606-546-6650.

Yamaha SPX-90 Type II; Audiologic NT66 stereo compressor limiter; DOD R-830B graphic EQ; Spectro Acoustics 210 stereo graphic EQ, 10 bands/channel; Furman LC-2 compressor/limiter with de-ess, adjustable attack & release; Shure M-63 audio masters with gain, bass & treble & hi & lo rolloff, hi end rolloff adj 13KHz-700Hz, low end rolloff adj 30-500Hz hi-lo imp mic, RCA or phone plugs in, 600 ohm balanced or Canon out, all Best Offer. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Want To Buy

Altec Lansing 844A monitor speaker syst, only need one but will consider a pair. R Cramm, KZSN, 5610 E 29th St N, Wichita KS 67220. 316-683-4566.

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Want To Buy

Optimod 9100B. C Strube, 508-470-1627, leave message.

RCA, GE, Fairchild any, also UREI 1176, LA-3, LA2. A Dentone, Audio Answers, 362R Middlesex Ave, Wilmington MA 01887. 508-988-2332.

EV RE20's, \$275-325; Sony ECM377 large dia. condition mic, \$495; RCA 44BX matched set of 3, \$3950; Shure new SM7, \$395; AKG new D112, \$295; Crown GLM200 lavalier like new, \$125. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

HME-WM 252 wireless with SM58 mic transmitter, \$225; Telex transmitter & mic WT-200, \$300; Telex transmitter & mic WT-50, \$250. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

RCA Baby 44 mic, vintage; EV 664 chrome mic, vintage; EV 630 salt-shaker-type mic, vintage; EV RE-15 mics (2); EV 660 mic; Shure 555W unidyn dynamic mic, vintage; AKG D-190E mics (2); Sennheiser MD-421 U5 mics (2), one has mount adaptor; set of lapel mics (5) "Condensor/PiezoElectret" in pouch, 3 w/Canons, 2 phone plugs; Shure 571 dynamic lapel mic w/lie clip, long cord, Canon out, red-velvet-type bag; Shure 444T cntlrd magnetic desk mic, grey w/PTT bar & gain cntl grey; Astatic T-UG8-D104, chrome finish, stand w/PTT bar, new in box, all BO. D Jackson, WQQQ, 19 Boas Ln, Wiltton CT 06897-1301. 203-762-9425.

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AKG, Neumann, 414's, U-87s, KM 84s, 451s, 460s, all condenser mics considered. A Dentone, Audio Answers, 362R Middlesex Ave, Wilmington MA 01887. 508-988-2332.

Neumann/RCA 77DX, 44B, KM84/88, in non-working condition; more obscure ribbon mics from 50s; B+O ribbons; EV RE-20s. A Levinson, Spruce Hill Music, 1002 S 49th St, Philadelphia PA 19143. 215-729-0941.

Any pro mics, any condition, for parts, etc. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

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RCA ribbons, AKG 451's, Neumann KM84's, EV 635A. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

RCA 77DXs/44BXs ribbon, chrome/TV grey, good condition, BO. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Shure 55C and RCA 44's w/call-letter plates. M Harrington, POB 7610, Little Rock AR 72217. 501-223-9056.

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Columbia C6046 27 pair audio cable 2 line & shield, \$50/ft. D Lundy, 606-546-6650.

Johnson ST4-A SCA/multiplex tuner. V Baker, Positive Radio Group, 703-961-2377.

Onan 30kw 3-phase 240VAC gen, good cond, weather resistant housing, \$7500. J Schloss, KICD, 2600 N Hiway Blvd, Spencer IA 51301. 712-262-1240.

Mark Century production library. 385 vinyl albums including Radio A La Corte, Festival & Limited Edition series. Send large SSAE for inventory; Ed Brouder, Man From Mars Productions, 159 Orange St., Manchester, NH 03104-4217.

Paradyne 4951-03 equip rack, black, has blank covers, \$175; Soundolier equip rack, \$120, both +shpg. B Lord, Lord Bdcgt, 3824 SW Myrtle St, Seattle WA 98126. 206-932-4839.

Want To Buy

McMartin AMR-3 AM rcvr manual. Neil, 810-569-8000.

UTC input bridging xmfrs, A-18, A-19, HA-104, HA-106, LS-19, LS-21, LS-40, any single piece of above. L Blackmon, RQ Studio, Larson Rd #4, N Reading MA 01864. 506-668-8973.

James Millen 90903 oscilloscope used for AM modulation monitor, need any svc or instruction manual/info. R Cramm, KZSN, 5610 E 29th St N, Wichita KS 67220. 316-683-4566.

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, Nyny 10003. 212-674-3060.

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McMartin 3-182 AM freq monitor. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

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CCS Micro 56 codec pair, modems, cables for duplex 7.5 kHz transmission via 56 kB digital telephone lines, \$3500; Comrex DXR codecs, modems, cables, \$3500. R Cowell, KNTR, POB 308, Ferndale WA 98248. 360-384-5117.

TFT 7610 R/A remote control system. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

Potomac Instruments TU-16/SU-16 remote control with RF modems; Microwave Associates UR-3X receiver (2). V Baker, Positive Radio Group, 703-961-2377.

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Modulation Sciences CP-803 composite peak processor, \$800; Orban 222A spacial enhancer, \$450. G Robinson, WXTC, 478 E Bay St, Charleston SC 29403. 803-722-7611.

Pacific Recorders multi-limiters (2) audio processing and FM pre-emphasis, stereo pair I/O with manuals, 1 CBS Labs stereo limiter w/manuals, \$500/everything. T Martz, WYSS, 5595 Liberty Rd, Chagrin Falls OH 44022. 906-635-0995.

Aphex Compellor 320; Modulation Sciences Stereo Maxx; CRL peak modulation controller for AM and CRL Audio Gain Controller. V Baker, Positive Radio Group, 703-961-2377.

Orban Optimod 8000A (2); Discriminator/Audio Processor II (4); Gates M6659 AM modulation monitor; Delta ASM-1 (2), tri-band, stereo; CBS Labs Audimax (2). V Baker, Positive Radio Group, 703-961-2377.

Orban 8000 Optimod, recent factory check-out, also have 2 Texar Prisms, BO. A Williams, WQMZ, 501 E Main, Charlottesville VA 22902. 804-977-3030.

Symetrix 511 2-chnl NR unit, rack mount, \$180; McMartin LX50C mixer/preamp for permanent installation, \$120; Orban 424A rack mount stereo limiter & de-esser w/gating, \$240. D Home, CCU, 74-923 Hovley Ln E #250, Palm Desert CA 92260. 619-773-4498.

CBS Dynamic Presence (2); CBS Audimax 4450A (2). V Baker, Positive Radio Group, 703-961-2377.

Limiters, compressors, working or not, tube or S/S, UREI, RCA, dbx, LA-2A, Fairchild, others. M States, Box 81485, Fairbanks AK 99708. 907-456-3419.

CBS Audiomax III Model 444 in working condition, also service manual to same & NuVistor tube type 8056 for Audiomax. G Brelini, 12 Bailey St, Foxboro MA 02035. 508-543-4213.

Gates M3529B tube type compressor/limiter. C Ordway, WNBZ-AM, POB 211, Saranac Lake NY 12983. 518-891-1544.

Fairchild 670 or 660 tube compressor/limiter, Teletronics LA-2A tube compressor/limiter or UREI LA-3A solid state compressor/limiter, call after 3PM CST. 214-271-7625.

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RFC M263 (2), new in box, \$140/both. J Parsons, Parsons Sound Svc, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

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Audio Production (Other)	Leasing	Tapes, Carts & Reels
Brokers	Limiters	Tax Deductable Equipment
Business Opportunities	Microphones	Test Equipment
Cart Machines	Miscellaneous	Transmitter/Exciters
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Want To Sell

Ron Balonis' Broadcast Engineer's Computer Toolbox makes a computer a technical assistant for an engineer. For details, write **Computer Toolboxes**, 118 Rice St., Trucksville, PA 18708 or call 1-717-696-1490 300/1200/8/N/1.

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North Central WV; Top Rated 25kW FM Station; Southern Gospel Format, price \$275,000. Contact: T & W Management, PO Box 2282, Clarksburg WV 26302.

Suburban Corpus Christi Texas C-3 CP with tower and equipment for sale. Agents and minorities welcome. Mazal, 18032 C Lemon, Yorba Linda CA 92686.

Want To Buy

Small AM & FM combo, dark or troubled OK. 718-893-4328.

FM CP any size, anywhere, distressed or dark. Scott Communications, POB 10262, Amarillo TX 79116.

AM stations, medium market, dark or unprofitable. Mr. Ford, 310-423-3899.

Small AM or FM in college mkt. Mr Ford, 310-423-3899.

We just sold our AM & are looking for another project station, especially interested in Western states, but all facilities & areas considered. P Hunn, 315-598-8952.

STEREO GENERATORS

Want To Sell

Sparta 682 stereo generator. V Baker, Positive Radio Group, 703-961-2377.

TAPES/CARTS/REELS & CD'S

Want To Sell

AC CD Library for Jones format contains over 88 discs updated through 1994. BO. Manager, KXGO FM, 707-445-8104.

LP's (1000+), Big Band, MOR, rock and roll, contemporary; 45's (1000+); complete Big Band/MOR on metal reels, recorded on Ampex 456; Contemporary oldies mix on Ampex 456 metal reels. J Gelo, 813-642-6899.

Oldies format rcded on black Scotchcarts IIs w/over 3200 hit songs from 50s thru 80s, \$8150; black Scotchcart IIs, 300 3.5 min, \$1.90/ea. All carts used for 6 mos, +shpg. B Lord, Lord Bdcg, 3824 SW Myrtle St, Seattle WA 98126. 206-932-4839.

Audiopak A-2 carts (425), black, 25 cents/each+shipping; Audiopak A-3 carts (5), blue, 50 cents each+shipping. D Morgan, KJYE-KNZZ, 1360 E Sherwood Dr, Grand Junction CO 81301. 303-241-9230.

Drake-Chenault Great American Country 60+ 10 1/2" R-R tapes w/20+ songs per tape, great sound quality, xint for start-up country gold station, most tapes without cue sheets, some w/, \$500/Best Offer. L Ballance, KFI-KOST-KACE, 610 S Ardmore Ave, Los Angeles CA 90005. 213-385-0101 xt 4150.

10 1/2" 1" percession aluminum reels, \$3/each; new 7" reels & boxes, 50 cents/each. D Lundy, 606-546-6650.

Pams Jingles ref tapes, 1951-1976, BO. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625.

Want To Buy

33 1/3 RPM, latin records from Rico, Tico, Vaya, Palladium, Fania, Roulette, Cotique, Ansonia, International, sealed preferable A Levinson, Spruce Hill Music, 1002 S 49th St, Philadelphia PA 19143. 215-729-0941.

Fidelipac/Audiopak Mastercart II gold or AA-4 light blue in 2:30 through 4:00 lengths, must be in very good condition, call after 3PM CST. 214-271-7625.

TAX DEDUCTIBLE

Want To Sell

Nonprofit religious school seeks donation of satellite equipment to receive programming. Garrett, 915-533-4700.

Small community 501 C3 station needs studio production equipment, low power or carrier current transmitter, shipping and tax letter provided. Dr. Newcomb, Grand River Radio, 19130 Nelson-Parkman, Garrettsville OH 44231. 210-548-2053.

TEST EQUIPMENT

Want To Sell

25 Hz tone generator, good condition. J Gelo, 813-642-6899.

Eico 378 audio generator, to 110 kHz; Monarch FS1-3 VSWR meter; CSC Design Mate II function generator, 1Hz to 1MHz, square, triangle or sine wave; Micronta hand-held signal tracer. all BO. D Jackson, WOQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Tektronix 5111 storage oscilloscope and 3 bay mainframe w/Hokanon P1 module, no probes or manual, \$500. M Ravain, Trinity Christian Rec, POB 2479, Flagler Beach FL 32136. 904-439-3671.

Nems-Clark 120E field strength meter; RCA WX2E field strength meter; Andrew Type 40004A-3 FM line pressure monitor and pump. V Baker, Positive Radio Group, 703-961-2377.

Tektronix Digital Multimeter DM502A auto range, \$295; Tektronix DM501A, \$295; Hewlett Packard distortion analyzer 333A, \$495; Hewlett Packard 353 patch panel 110 dB attenuator, \$75; Ithaco 4302 dual 24 dB/octave hi-lo pass filter 1/10 to 1 MHz, \$295; Weston 666 multimeter, \$100; Eico Model 150, solid state signal tracer, \$100; Heath audio generator 1G-762, \$100; Sencore transistor tester, \$250; Tentelometer tape tension meter, \$200; Con strobotuner, \$250; Ungar Hot Vac 2000 desolder station, \$150. J Price, Price's Rec, 2651 Globe Ave, Dallax TX 75228. 214-321-6580.

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TEST EQUIPMENT...WTS

Tektronix 2215A 60 MHz oscilloscope, new, \$1200. Amrando, KSJV Radio, 1111 Fulton Mall, Fresno CA 93271. 209-498-6972.

Phelps Dodge CP-1000 4 bay, 91.5, 9 yrs old, \$400. M Taylor, KNEO, R1 Box 1E21, Neosho MO 64850. 417-451-5636.

Want To Buy

Heath Kit HD-1250 Grid-Dip Meter/other RF generator. D Paulson, KTAB, POB 691733, Stockton CA 95269. 209-478-0296.

TRANSMITTERS

Want To Sell

20A J02A Harris FM 1K w/MS-15 exciter, \$6800; Technical Material 25 kW 50 ohm RF load, \$950. D Harry, POB #28, Los Gatos CA 95031. 916-624-3431.

Delta ASE-1 AM stereo exciter (2); Dielectric FM switch, 3 1/4" SW xmtrs. V Baker, Positive Radio Group, 703-961-2377.

Nautek AMPFET 400 W solid state AM transmitter, 1990, excellent condition on 1400 kHz. \$4500. T Martz, WKNW, 5595 Liberty Rd, Chagrin Falls OH 44022. 906-635-1400.

Collins 831-62 1979 models (2), with 3'02-2 exciters, excellent condition, currently on-air, selling due to power upgrades, \$25,000/each. C Lawson, Bristol Broadcasting, POB 1389, Bristol VA 24203. 703-669-8112.

BE FX-30 30 W, \$2995. Max, KCMJ, POB 551856, Dallas TX 75355. 214-722-0006.

TTC VM 2500J w TTC 8090 exciter, new in 1991, used 2 years, many spare parts. H Hozapfel, KXGO Radio, 215 4th St, Eureka CA 95501. 707-445-8104.

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QEI 6757 500W needs some work, exciter not included, \$500/Best Offer. J McDonald, KDNK, Box 1388, Carbondale CA 81633. 303-669-3442.

Eimac CV2202 30KW FM cavity with 4CX2000A, new. Elcom Bauer (915) 595-1048.

Elcom Bauer 701BHF 1KW shortwave, 3-10 MHz, new. (915) 595-1048.

Gates BC-1R & BC-5B 2 xmtr tubes & spare parts, sell or part out. W Osenga, WWIT, Box 1369, Canton NC 28716. 704-648-3588.

Harris 2.5H with QEI 675 exciter & new spare tube, good operating condition, \$6500; Continental 315-F 5000 watt AM transmitter, fair to good condition, removed from svc Feb 95 on 1110 kHz, you pick up, \$5000. S King, KGFL/KHPQ, Box 33, Clinton AR 72031. 501-745-4474.

RCA BTA-5T 5 kW AM transmitter, mint condition, large supply of extra parts & tubes included, presently on 980 KHZ with easy conversion to other frequencies. Best Offer including loading. A Anderson, KBMR, Bismarck ND, 701-255-1234.

New McMartin 20 W, B1M-8000 FM exciter, New McMartin B1M1005D FM relay/rebroadcast rcvrs; also some used McMartin B910 exciters 15W. Goodrich Enter., 11435 Manderson St., Omaha, NE 68164. 402-493-1886 fax 402-493-6821

Continental 4.3 kW with 50W exciter on 100.3 MHz, excellent condition. Trey, KDXV, 501-239-8588.

RCA BTA 104 10,000 watt AM transmitter with spare tubes. \$5000. R Martin, KWYD, POB 5668, CO Springs CO 80931. 719-392-4219.

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Want To Buy

10,000 W AM, any make or model. B Hansen, POB 70957, Project City CA 96079. 916-275-6442.

McMartin AM/FM transmitter, any model, exciter or stereo modules. Goodrich Enterprises, 11435 Manderson, Omaha NE 68164. 402-493-1886.

Modulation transformer for an RCA BTA-5F AM transmitter. Allan, 207-985-7547.

Any transmitter/exciter low pass filter and directional coupler for 1 kW FM transmission. M Latham, KAGY, POB 1307, Buras LA 70041. 318-657-5249.

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TURNTABLES

Want To Sell

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AR turntable on walnut base w/Shure RXT-6 cartridge; Russco Cuemaster 3-speed turntable w/grey tonearm, nice, both BO. D Jackson, WQQQ, 19 Boas Ln, Willton CT 06897-1301. 203-762-9425.

Technics SL1200 MKII turntable, \$150 or trade for cart machine. K Diebel, KTJC, 318-728-5852.

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To place ads in this section, use the ActionGram form. To respond to box numbers, write Radio World, PO Box 1214, Falls Church, VA 22041. Attn: _____

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PROGRAM DIRECTORS: are you looking for a very knowledgeable R&B DJ to host a unique show and boost your bottom line? Call me at 800-770-7878 for free 1 hour tape to see what I can do for you.

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AC communicator 15 yrs exp, prefer FL, VA or MD area, will go elsewhere for right opportunity. Pat 908-872-1132.

HELP WANTED

Chief Engineer Wanted... Group owned medium market top AM-FM combo. Experienced applicant must have strong FCC General Radiotelephone, AM/DA, FM, & studio knowledge. Computer/digital a plus. A quality equal opportunity employer. Send resume to: Radio World, POB 1214, Falls Church, VA 22041. Attn: Box #95-4-19-1RW.

RADIO ENGINEER

WCVO (104.9 FM) is currently seeking an SBE certified broadcast engineer with at least 2 years experience. Send resume and salary requirements to:

Dan Franks, WCVO, POB 7
New Albany, OH 43054
Please, no phone calls.

Minorities are encouraged to apply.

ELECTRONICS ENGINEER

Minimum 3 years broadcasting experience, customer service experience, and electronic assembly/repair experience. Will need to provide technical support of products including application, specification, theory of operation, troubleshooting, etc.

Send resume to: J. Murray ORBAN
A Harman International Company
1525 Alvarado St.
San Leandro, CA 94577
EOE

WANTED: TECHNICAL EDITOR FOR RADIO WORLD

- Writing/editing experience required
Strong background in radio production
General knowledge of broadcast equipment and industry trends
Must be willing to relocate to Washington, DC metro area

Send resume, clips, salary requirements (a must) to:
Radio World
Personnel Dept., P.O. Box 1214
Falls Church, VA 22041
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PO Box 1214, Falls Church VA 22041
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Table listing Publisher, Associate Publisher, Marketing Consultant, Marketing Assistant, Production Director, Publication/Desktop Sys. Mgr, Classified/Showcase Production Coordinator, Ad Traffic Coordinator, Ad Production Coordinator, Production Assistant, Ad Coordination Manager, Circulation Director, Circulation Manager, Accounts Receivable, and their respective names.

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Table listing U.S. East, U.S. West, International, Europe, and Japan sales representatives with their contact information.

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Form for Radio World subscription and reader service, including fields for name, address, city, state, zip, telephone, and a grid for selecting services.

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