

**Running
Radio**
See pp. 25-39

Group Owners Favor Deregulation Effort

by Thomas Pear

WASHINGTON Many group owners are pleased with the current deregulation effort in radio that seems to stem, at least in part, from the get-the-government-off-our-back movement ignited by last fall's congressional changeover.

Congressional leaders in this reform movement include House Republican Michael Oxley (Ohio), who seeks to remove anti-foreign ownership barriers from the 1934 Communications Act, and Sen. Larry Pressler (R-S.D.), who seeks to scrap ownership and duopoly rules entirely (see story, page 3).

These actions seem quite appealing to group owners who have often complained about the complex federal regulations that are said to hold back the radio industry.

Apollo Chief Executive Bill Stakelin said his company backs the latest deregulation moves because current regulations are overrestrictive and outdated.

"We stand behind Chairman Pressler and his proposals," said Stakelin. "We support him 100 percent."

Stakelin added that many of the ownership rules and duopoly rules are "unnecessary restraints on a business that struggles to compete."

"It is about time that the industry be looked at as a mature industry that can compete on its own," he said.

Shamrock President Bill Clark agrees. Clark pointed to an unfair regulatory system that restricts radio ownership, but allows cable monopolies.

Desired changes

A duopoly owner in a given market can only own three or four stations, depending on the size of the market, Clark said, but one cable company can control numerous channels, acting as a "gatekeeper" by deciding what channels to relay to viewers.

Easing ownership restrictions, he contends, would "enable radio to compete more effectively with other media."

Clark said the basic question is, "are regulations necessary?" He said that unnecessary regulations require FCC manpower and resources that could better serve other areas.

Unnecessary issues tying up the commission prevent it from quickly ruling on license renewal applications and other "pertinent" decisions that broadcasters need in order to move forward with their broadcasting plans.

Sorenson Broadcasting President Dean Sorenson noted that previous FCC relaxations of ownership rules immensely helped

his operation, and he predicted that additional deregulation would be of even greater assistance to broadcast entrepreneurs.

"The changes they have made recently certainly help our operation," he said.

Sorenson said that previous ownership restrictions only allowed him to own one AM and one FM in the market of Watertown, S.D. But the 1992 rule changes allowed him an additional FM for his duopoly.

Two for one

With existing rules, in markets that have more than 15 stations, an owner can own two stations on each band. On a national basis, broadcasters can own up to 20 stations nationally on each band. The same rules were modified again last fall to allow minorities to own 25 stations on the AM band and 25 on the FM band.

"These are regulations whose day has come and gone," Clark said.

Others also call this movement toward deregulation a welcome proposal. "We are in a new age," said Wayne Vriesman, vice president of radio for Tribune Broadcasting. "We certainly should be

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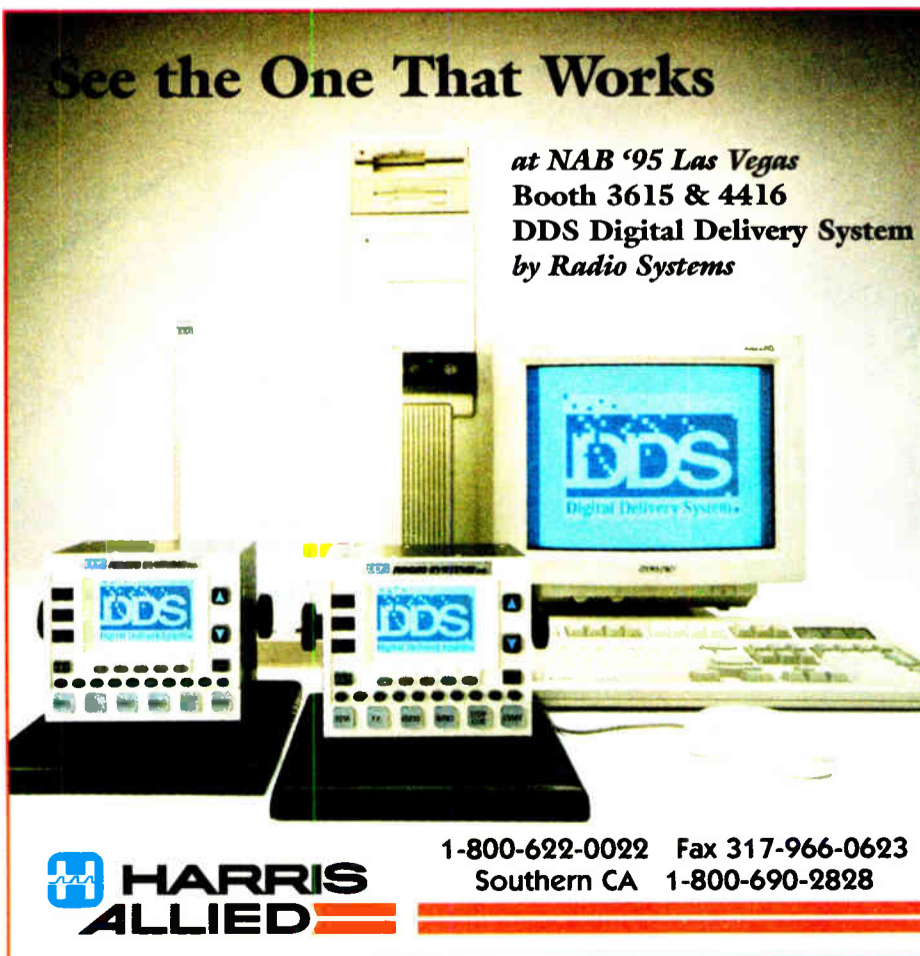
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NEWSWATCH

FCC Examines Spectrum Needs

WASHINGTON Based on a recently released FCC study that examined the spectrum needs of state and local government public safety agencies through the year 2010, the commission has decided that it is a little early to begin allocating additional spectrum for public safety services.

The study report outlines several technical, economic and regulatory alternatives that public safety officials should consider using to add to the communications capacity of the present spectrum allocations they already have.

An FCC written statement said, however, that not allocating spectrum now "does not preclude future spectrum allotments if deemed necessary." And that could include "spectrum that is to be released by the federal government for private sector use."

continued on page 2 ►

NEWSWATCH

► continued from page 1

The report recommends that a gathering of additional data is needed before the FCC would start a spectrum allocation proceeding.

QDE Transfers Distribution Rights To Premiere

Los Angeles Quincy Jones and David Salzman Entertainment (QDE) and Premiere Radio Networks, Inc. recently announced a three-year agreement where Premiere will have the first right to produce, finance and distribute radio pro-

grams and program services developed or supervised by QDE.

The agreement places Salzman on Premiere's Board of Directors. "Premiere's strong management and sophisticated radio syndication operations are a perfect complement to our (QDE) background in broadcasting and will help us continue to expand our presence in the radio industry," a release said.

FCC Closes PCS Auctions

WASHINGTON The FCC March 13 officially ended its first auction for

broadband personal communication services (PCS) licenses, the largest auction of government assets in U.S. history.

The auctions began Dec. 5, 1993, and granted 99 licenses to provide PCS across the United States and its territories and brought in more than \$7.5 billion in high bids, making it the largest auction of government assets in the country's history.

"It is a wonderful honor for us to be able to introduce competition in a robust, vigorous way in the wireless communication business for the future," FCC Chairman Reed Hundt said. "The auctions today represent what our country is capable achieving when we all decide to pull in the same direction."

Representative Michael Oxley (R-Ohio), the vice chairman of the House

Subcommittee on Telecommunications and Finance, said he was impressed by the PCS auctions.

"They have been more successful than I ever dreamed they could be," the Ohio Congressman said.

Oxley, who recently led hearings to repeal anti-foreign ownership of broadcast facilities, said he pioneered the idea of auctioning broadcast spectrum when he introduced broadband auctioning legislation in February 1993.

The legislation then became part of the budget reconciliation package that was signed into law the same year. As the father of the idea, Oxley was honored with gaveling the first spectrum auction that December.

Winning bidders in the auction have until March 20 to make a down payment, bringing their total deposits to 20 percent of their winning bids.

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Ownership Rules under Scrutiny

by Thomas Pear

WASHINGTON Congress is now deciding a number of deregulation issues that would significantly alter the 1934 Communications Act, including the repeal of some EEO laws and anti-foreign ownership restrictions for radio and television broadcasters.

Senate Commerce Committee Chairman Larry Pressler (R-S.D.) promised that the new Republican Congress would "rewrite" the Communications Act, eliminating all ownership restrictions in the process. The move is strongly supported by some of the major broadcasting corporations in the country (see story, page 1).

"The law now governing telecommunications was written in 1934 when state-of-the-art in media meant crowding around a big wooden box to hear the Fireside Chats of Franklin Roosevelt," Pressler said.

Pressler's goal for deregulation is this summer, but House and Senate leaders say that comprehensive telecommunications reform could come as early as this month. Congress is examining a number of proposals.

Within a year, Pressler's bill would remove all ownership restrictions. However, many legislative observers predict that Senate Democrats and moderate Republicans will modify an unrestricted ownership bill maintaining at least some ownership restrictions.

Current restrictions limit the amount of stations a corporate entity or individual can own to 20 on each band, with no more than three or four stations in any given market, depending on the size of the market.

In markets with more than 15 stations, broadcasters could own two stations on each band. But in markets with less than 15 stations, broadcasters would be limited to three stations—two on one band and one on the other.

"This regulation will give new freedom, and new legal and regulatory certainty," Pressler said. "Not only for established companies, but also for upstarts whose only asset is a dream."

Foreign ownership

In additional deregulation action, Representative Michael Oxley (R-Ohio) strongly advocates H.R. 514, a bill that would repeal the anti-foreign ownership clause—section 310—of the 1934 Federal Communications Act. Current restrictions do not allow foreigners to own more than 25 percent of a given broadcast facility located in the United States.

Oxley is the vice chairman of the House Commerce Committee's Telecommunications Subcommittee, and he led a March 3 subcommittee hearing, examining the issue at length.

The Ohio Congressman argues that dropping the clause would eventually create more jobs in the U.S. because it would open overseas markets to U.S. telecommunications carriers and U.S. equipment providers.

"The U.S. always wins when it leads the way on free trade," Oxley said.

Testifying at the hearing against the move, however, Clinton administration officials opposed relinquishing foreign ownership for national security purposes.

"We would not... move to lift the restriction with respect to broadcasting at this time," said Assistant Secretary of Commerce Larry Irving. "The administration believes that we should not be too hasty in lifting restrictions on the amount of

foreign influence over, or control of, broadcast licenses due to the editorial discretion of broadcasters over the content of the transmission."

But Oxley said anti-foreign ownership restrictions originated in the World War One era and are outdated.

"To compete effectively, we're going to have to shake off our old protectionists fears. If we stubbornly refuse to change, we will fail to take full advantage of the greatest technological revolution of all time."

Previously, Oxley received full support from FCC Chairman Reed Hundt, a Clinton appointee, who testified in favor of foreign ownership of broadcast facilities before the subcommittee.

"I believe that action in this area is essential, and the faster the better," he said. "We cannot achieve a competitive global market if foreign communications markets are closed to U.S. competition."

Hundt said that foreign governments use the closed broadcast ownership market as an excuse to go "slowly on embracing competition and opening foreign markets to U.S. competitors."

"I seldom attend an international gathering or bilateral negotiation without hearing the United States criticized for 310," Hundt said.

Affirmative action

Also, both houses of Congress, for example, are examining affirmative action policies with a magnifying glass. The Senate Finance Committee, chaired by Bob Packwood (R-Ore.), voted to repeal special tax certificates for the sale of broadcast and cable operations to minorities. The House of Representatives passed a similar bill, H.R. 831, on Feb. 17, in an effort to help generate revenue for a 25 percent health insurance deduction it granted to the self-employed.

In considering the issue, the Senate scrutinized a Viacom deal that gave the company more than \$400 million in tax breaks under the policy for selling its cable business to African-American businessman Frank Washington.

However, the FCC continues to push minority ownership of stations. Last fall the commission said minorities could own up to 25 stations on each band, as opposed to 20 for non-minorities, and FCC Mass Media bureau Chief Roy Stewart said more minority ownership incentive proposals are forthcoming.

The commission argues that a small jump in the number of minority-owned stations, from 2.7 percent of all stations in 1993 to 2.9 percent in 1994, is unsatisfactory.

In December of last year, the commission issued a Notice of Proposed Rule Making, seeking comments on how to create more ownership opportunities for women and minorities.

The commission specifically examined an "incubator program" where the FCC would provide "regulatory concessions" in return for media operators sharing talent, experience and financial resources for minorities seeking the broadcast industry.

"There is little doubt that minorities, and potentially women, are underrepresented as owners of broadcast stations in the United States," FCC Commissioner Andrew C. Barrett said.

House and Senate Republican leaders argue, however, that affirmative action has

been pushed too far. And many Republican legislators stepped into power promising to target FCC affirmative action policies like minority ownership.

As an example, Republican leaders point to the Justice Department's recent order to Maryland-based Chevy Chase Bank that it advertise with predominantly African-American radio stations as part of a suit settlement with regard to alleged discriminatory banking practices. House Judiciary Committee Chairman Henry Hyde (R-Ill.) called the Justice Department's action "disturbing." And sources said House Judiciary hearings could come as quickly as this summer.

To help speed along the deregulation process, the National Association of Broadcasters (NAB) is gearing up for a grass roots campaign to get station owners to back the Pressler bill.

Already the NAB has sent stations information packets urging them to lobby their senators and representatives in support of deregulation.

According to a statement by the NAB Radio Board, "As the number of radio stations competing for listeners has grown, and the number of other competitors for listeners and advertising dollars continues to increase, owners of radio stations must be able to compete effectively in this new marketplace. The Radio Board believes that the FCC's current restrictions on radio station multiple ownership—both nationally and at the local level—prevent the radio industry from achieving the best service to the American public. NAB, therefore, will support proposals to eliminate all rules that limit the ownership of radio stations." ☺



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Cool Stuff Times Are Here Again

WASHINGTON This year's NAB show promises to be better and bigger than ever. As usual, **RW** and its band of hard-working engineers, writers, sales crew and assorted folk will be there *en force*. Once again this year **RW** will have a booth in the Radio/Audio Pavilion, so be sure to stop by for a chat.

Last year we introduced **RW's Cool Stuff Awards**. We had a great time selecting the winners and scouting out the new products. Well, it is time once again for our panel of experts to descend on the convention and help us select the newest, boldest, most innovative gear on display.

As you may recall from last year, our



panelists' mission is to walk the floor and make note of any product, small or large, simple or complex, that stops them in their tracks and makes them exclaim, "cool stuff!" And once again, on the last day of the show, we'll be stopping by to let you know if your product has been awarded a *Cool Stuff Award*, and to capture the moment and the product on film for the NAB coverage issue of **RW**.

★ ★ ★

As you peruse this issue, spend some time with Alan Haber's Radio Online column in the *Running Radio* section. News of radio on-line and world interconnectivity surfaces on a daily basis, and Alan will do his level best to weed out the unimportant and deliver to you the most timely and topical of stories. Look for it every month in *Running Radio*.

And speaking of "cyberspace," Gentner Communications is now accessible through the Internet. If you are looking for general information, address your e-

mail to: info@gentner.com, and if your query has to do with product support, address is: support@gentner.com. Happy e-mailing.

★ ★ ★

RW has received a lot of mail recently on the issue of cellular towers interfering with AM stations. A very salient point has emerged from all this correspondence: namely, AM stations need to pay more attention to what their cellular neighbors are doing. I suggest more than just pay attention. Scrutinize every detail of any study they produce.

AM operators should study any paper schemes that claim a soon-to-be-erected tower will *not* interfere with their signal. Make sure that the engineers who produced the study are reputable. You have the right to demand that cellular entities use an engineering firm that is reputable and meets with your approval. Sure, new regulations (**RW** March 8) say that the onus is on the paging and cellular operators to not interfere—but when has that ever stopped anybody? And wouldn't it be easier to stop someone from interfering before they start than after they've



started messing with your signal?

Look for the letters in an upcoming *Reader's Forum*.

★ ★ ★

And speaking of digital stuff, I often hear from broadcast engineers who are trying to get a handle on the decision-making process in place at radio stations that have lost their engineering staff. Of course, that is a big concern for equipment manufacturers because they would prefer, I'm sure, an educated buyer.

The best equipment companies already offer seminars and conferences as well as technical support staff. And most of these companies are large and well-financed.

In an effort to address some of these same issues, Tyler B. Callis, formerly of Crouse-Kimzey Co., has just ventured out on his

fax: 817-284-4329.

★ ★ ★

One last item—I recently heard from John C. McWilliams of WZPR-FM in Meadville, Pa. His is a call for help and I promised to write about his problem in the hopes that one of you could help him solve it.

John's station is equipped with an 11-year-old Harris SX-1 transmitter. The unit had operated problem-free until last fall. It seems that whenever the station

NFL Renews with CBS Radio



NEW YORK On hand for the recent signing of a new, four-year pact between CBS Radio and the National Football League were (l to r): Robert P. Kipperman, vice president and general manager, CBS Radio Networks; Paul Tagliabue, commissioner, National Football League; Nancy C. Widmann, president, CBS Radio division, and Val Pinchbeck Jr., vice president, broadcast and programming, National Football League. CBS has held the NFL rights for 15 of the last 17 years.

The new contract covers the network radio rights to a 53-game package. Included are 41 regular season games, 17 Monday night games, 18 Sunday and Thursday night games, two Thanksgiving Day games, four Saturday games and all 12 post-season contests. Spanish-language coverage in the United States, through CBS Americas, includes five post-season contests, ending with the Super Bowl.

own with DFW Digital. If you don't know Tyler, he has a BS in Broadcast Engineering from Bob Jones University in Greenville, S.C., as well as SBE certification as a broadcast AM/FM engineer.

Tyler's company will specialize in consulting in "methods of digital audio manipulation, transmission and RF system integration." Contact him in Dallas-Fort Worth at 817-992-9050 or

gets freezing rain across the insulators and standoffs of its recently installed unipole system, the tuning of the antenna changes enough that the transmitter shuts down. John has tried a variety of things, but no luck so far. He points out that the unipole is a self-supporting tower.

If you have any experience with this problem, please give him a call at 814-724-1111; or fax him at 814-333-9628.

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If you have comments for Radio World, call us at 800-336-3045 or send a letter to Readers Forum (Radio World, Box 1214, Falls Church, VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

Calling Ol' Timers

Dear RW,

I read with interest the story on KDKA's AM antenna, by Jack Layton in the Aug. 24, 1994, issue.

The January 1938 issue of Popular Mechanics magazine ran an article on the same KDKA antenna, but before it was moved to its Allison Park, Pa., site. According to the Popular Mechanics article, broadcasters were aware of the effect of a high angle of radiation, and the design outlined was to eliminate that effect.

Doesn't this antenna design look familiar? Isn't it the same as the "new" NAB Super Antenna, described a few years ago, to lower the angle of radiation? Was the design of the 1937 KDKA antenna faulty?

If there are any "Old Timers" around there, a follow-up article would be interesting.

Richard M. Kruse
Kruse Communications Technology
Brooklyn Park, MN

Prepared to work

Dear RW,

Several articles and letters recently appearing in RW address Underwriters Laboratories Inc.'s safety certification of professional broadcast equipment. Certification of professional broadcast equipment by UL is based on conformance to the requirements of UL 1419, Standard for Safety for Professional Video and Audio Equipment.

UL undertook development of UL 1419 in response to interest expressed by manufacturers and the broadcast industry, which requested that UL develop a standard that specifically addressed professional broadcast equipment.

Certification of professional broadcast

equipment is not a new activity for UL. However, until adoption of UL 1419, UL evaluated broadcast equipment to the requirements used for household equipment—requirements that did not reflect the unique equipment and applications employed by broadcast professionals. UL 1419 was written and published with input from broadcast equipment manufacturers, industry representatives, trade organizations, regulatory officials, broadcast professionals and others.

As a result, UL now has adopted a standard that addresses the specific category of professional broadcast equipment. This new standard helps the broadcast industry in several ways. These include:

- Professional broadcast equipment is evaluated with the understanding that it will be used by trained professionals in controlled environments.
- Evaluation of products to UL 1419 considers the specific nature of the equipment which typically permits evaluation to occur on a non-destructive basis.
- Because the conditions of installation, use and maintenance for professional broadcast equipment are subject to specific conditions in broadcast applications, the more focused investigation permitted by UL 1419 often results in a reduction of the cost associated with the evaluation of broadcast equipment.
- UL 1419 can be used by manufacturers as a basis to design appropriate safety features into products, facilitating product investigations that can be conducted quickly and at lower cost.

As a not-for-profit, independent organization testing for public safety, UL has investigated and certified products used in consumer, industrial and commercial environments for more than 100 years. UL certification work has never been limited to consumer appliances. UL investigates and certifies more than 14,000 types of products each year including such diverse products as building construction products, equipment used in hazardous locations—such as refineries, fire suppression equipment, service station equipment, heating, ventilating and air-conditioning equipment and systems, elevator cars, exit devices, plastics, adhesives, batteries, signaling equipment, circuit breakers, to name a few.

UL is not a regulatory agency and no manufacturer is required to submit products to UL for evaluation. Municipalities, consumers, and others, however, can and do rely on the UL mark. UL certification is relied upon by inspectors and other authorities having jurisdiction as one element in assuring that equipment meets applicable codes and standards including building codes, the National Electrical Code, the National Fire Codes, the federally mandated Occupational Safety and Health Administration (OSHA) requirements, among others. Equipment that is certified by a nationally recognized testing laboratory (NRTL), accredited by OSHA, such as UL is, qualifies and meets OSHA requirements.

Changes and modifications to UL listed equipment do not necessarily mean that the entire product needs to be reevaluated. Depending upon the extent of changes involved, UL may determine

Lift Limits But Use Caution

With the election of a new Republican Congress, there came a promise of major changes in the way government regulates—basically less of it. Congress is now attempting to apply the "less government is better" dictum to the radio industry.

The FCC has already implemented rules that reduce bureaucratic red tape for stations. Now there is a legislative effort to lift most ownership limits, including

restrictions on foreign investments, and to eliminate affirmative action.

Altering the ownership rules may be moot because there are no group owners bumping up against the limit of 20 stations per band nationwide. Owners should be allowed to own as many stations as their group wants as long as they have the means and desire, and the license is available.

But, the FCC should ensure that smaller players can still play—possibly by a tax incentive plan or other means—if congressionally-mandated deregulation results in a no-ownership limit rule whatsoever. Tax incentives and market-incubator options were suggested last year during deliberations when the minority ownership limits were increased from 20 to 25 nationally.

If congressional effort results in the ownership limit increase merely being raised for everyone, then the minority station limit should remain higher than for other owners as it is now.

As for the repeal of the foreign ownership provision of the law, broadcasting stations are a limited resource in this country and represent the unique interests of our population. Allowing total, or even an increased percentage, of foreign ownership would not enhance broadcasting in any significant way. Keep control in the hands of U.S. owners.

The move to deregulation is well-intentioned. Congress, however, should move toward it with prudence, mindful of those it could hurt with its legislation.

—RW

that the modified or changed product is still eligible for listing without the need for further testing or investigation. If further testing or information is required, it is ordinarily not necessary to repeat the entire product investigation. Rather, only those features affected by changes or modifications need be further evaluated.

Broadcast facilities that are interested in or required to have their equipment certified by third party testing and certification organizations may also make use of UL's field evaluation program. Under the field evaluation program, members of UL's engineering staff can visit the site at which equipment is installed, and investigate it for conformance to applicable requirements. Installed equipment which is found to conform to the requirements is identified with a UL field evaluation mark.

UL is sensitive to the importance of minimizing the cost and inconvenience of product investigation and has developed programs to meet manufacturers' specific needs. Manufacturers and broadcast facilities that have further questions about UL's certification of professional broadcast equipment are encouraged to contract UL. UL's engineers are prepared to work with equipment manufacturers and broadcast facility operators to assure that products conform to appropriate requirements and applicable codes in the most efficient and cost-effective manner possible.

Tony Bodetti, Engineering Group Leader
Underwriters Laboratories Inc.
Melville, NY

Common misconception

Dear RW,

Regarding the article "Building Your Own Cable Checker" by Jim Murphy (RW, March 8)—Mr. Murphy's simple and direct approach is appreciated as a convenient, inexpensive, and easy-to-construct solution to the problem of testing

cable continuity and integrity. However, as Secretary of the Audio Engineering Society and a member of its polarity standards subcommittee, I feel compelled to point out that his Figure 1 contains an error—or at least, the perpetuation of one. It shows Pin-3 of the XLR-type connector as common with the tip of the TRS and RCA/phono connectors. In 1992, the AES published the Standard (already in practice by much of the rest of the world) designating Pin-2 as "HI" with respect to Pin-3. (Refer to AES standard for professional audio equipment—Application of connectors, part 1, XLR-type polarity and gender, AES-14, 1992 and ANSI S4.48-1992).

While there remain a few manufacturers still building products with Pin-3 as "HI" and an untold amount of older equipment also wired this way, it would behoove your readers to be aware of this Standard establishing Pin-2 as the proper "HI" pin of the XLR-type connector.

Ron Streicher, Secretary
Audio Engineering Society
Monrovia, CA

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April 19, 1995**

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INTERNATIONAL UPDATE

L-Band DAB Ancillary Service Introduced

by James Careless

TORONTO As the implementation of Eureka-147 for digital radio moves forward, promoters are introducing ancillary services to make the new service more attractive to broadcasters and to grab the attention of consumers.

Canada, a staunch supporter of Eureka-147 for Digital Audio Broadcasting (DAB), used the annual Canadian International Auto Show, which reliably draws tens of thousands of visitors, to debut TravelGuide, an in-car navigation and traffic monitoring system delivered on L-band via Eureka.

The government of the province of Ontario—developer of TravelGuide—set up a working display during the February trade show with the cooperation of Chrysler and Digital Radio Research Inc. (DRRI), the Canadian industry/government group spearheading the drive toward achieving DAB before the end of the century in Canada.

Prototype configuration

Chrysler supplied a convertible to demonstrate a prototype "commercial" configuration of TravelGuide and a minivan to allow visitors to see the system in action on the streets of downtown Toronto.

The car featured a small, in-dash Sony video display that was manipulated by a small remote control. The van used a laptop fixed to a steel pedestal positioned between the driver and passenger seats.

TravelGuide integrates police reports with information on traffic flow gathered both by buses and on-road sensors to provide a data stream that is relayed via L-band to a digital radio equipped with a small monitor screen. Control is executed using either keys or—theoretically for now—voice recognition.

This design offers users two important benefits. They can key in their current location and a destination, and then ask the computer for the most efficient route based on present conditions.

TravelGuide then displays a route on the monitor screen—which is meant to be used primarily before the drive, not during—and also supplies audio instructions to the driver.

The audio instructions include a route overview spoken by the system's voice synthesizer during the on-road demo.

An example: "From Toronto Convention Centre, 255 Front Street West, Toronto, to Pearson International Airport Terminal Two, Toronto—total distance, 35.3 kilometers; 38 minutes."

The system also provides turn-by-turn

on-road instructions as the trip progresses, such as: "One—drive west on Front Street 400 meters to Spadina Avenue. Turn left; select right lane after turn."

Data collected by TravelGuide is continuously updated, and new accidents and other problems are relayed to the driver immediately. The system, in turn, suggests alternative routes as needed.

Currently, there is only enough information collected for TravelGuide to cover downtown Toronto, according to Jackson Wong, the designer of TravelGuide, who is with the Ontario Ministry of Transportation.

Relevant information

"In the future, when you are taking a trip from Toronto to Orlando, Fla., it will receive relevant information for the parts that you're travelling through," Wong said. "So in situations like when there was a snow storm in Alabama several years ago, which was a complete freak occurrence, you would know about it."

From the point of view of the public, TravelGuide was a high-tech novelty, albeit one that is only two to five years away from market, according to government sources.

But for engineers like Wong, the system is proof of the potential for L-band DAB to supply new and different services and to do far more with datacasting than can be done currently with the Radio Data System (RDS).

"RDS format is a fairly modest low-data-rate format" in its current analog configuration, Wong said.

"The kind of format that is being discussed and being deployed for trial here in digital radio makes use of the RDS format at a very high speed, and we are also experimenting with completely new services that RDS cannot cover—things like map display, which obviously requires quantum leaps of more information per second than RDS can carry."

As it turns out, Wong prefers L-band Eureka DAB over other alternatives simply because it has enough bandwidth to handle a broad range of services like "Yellow Pages," stock quotes and paging.

"Everything eats up bandwidth," he said, "and L-band is about the only technology that's 'doable' in the next five, 10, 20 years, that has this kind of capacity. FM-RDS will not."

For the broadcasters who attended the auto show to see the TravelGuide demo, the display was another step on the road to realizing DAB as a fully viable medium that is only a few years away, according to Canadian Association of Broadcasters President and CEO Michael McCabe.

Other services

"I think that by 1997 or 1998 you will start to see the first genuine, fully-operational digital stations," McCabe said. "And people will get not only high-quality sound, they will start to get some of these other services that come along with it."

Certainly the successful unveiling of TravelGuide helped get the point across that DAB is coming, a point hammered home to visitors by a DRRI audio-video display.

Another factor boosting this message was the North American debut of a Philips commercial-grade Eureka receiver, one that DRRI Vice President Duff Roman said is similar to consumer sets now being released in the European marketplace.

Taken as a whole, the TravelGuide/DRRI clearly demonstrated that L-band-delivered data services are both practical and reliable in a mobile environment and that these services need not just be "updated" versions of existing products. They can be new and different, carving out market niches where none existed before.

For the general public, the display showed digital radio as a working reality. They were exposed to the fact that, right now, many of the major stations in Toronto are simulcast via DAB and that someday soon they too will have access to DAB receivers like the Philips model that was on display.

□ □ □

James Careless covers the radio industry in Canada for RW.

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INTERNATIONAL UPDATE

Radio Survives Bosnia Civil War

by Charles Recknagel

SARAJEVO, Bosnia-Herzegovina

In the three years since war came to Sarajevo, local radio has become the most important medium of information and entertainment for this besieged city of 380,000 people.

During the war, most electricity and supplies of paper to Sarajevo from the outside have been cut off, reducing television and newspapers to rare commodities. Local television transmissions may last only a few hours a day and, as electricity is rationed alternately between neighborhoods, many residents lack the power to receive them.

Printing of the city's only daily newspaper, which before the war averaged 100,000 copies for a population of almost half a million, has dropped at times to just 3,000 copies as publishers use whatever amounts and kinds of paper are available.

Depending on radio

But local radio stations have stayed on the air here, usually 24 hours a day, and their number has even multiplied. Before the war, Sarajevo had two private FM stations in addition to a public station broadcasting on FM, MW and SW. Today, there are eight more private stations on FM. All broadcast with 250 W to 1 kW signals within a trapped city whose area is just 10 kilometers long and a few kilometers wide.

How radio operates successfully in Sarajevo is a story of daily ingenuity on the part of both broadcasters and their listeners. It also is a glimpse of how radio can remain the only widely accessible medium in a crisis—even long after all the normal infrastructure and economic patterns of a city have collapsed.

Sarajevo's crisis started in 1991 when the former state of Yugoslavia began dividing into independent nations, including Bosnia-Herzegovina with Sarajevo as its capital. The new country's minority population of ethnic Serbs launched a war of secession and laid siege to the capital in 1992.

Now, after three years of repeated sporadic shelling and occasional cease-fires, and with most supplies other than United Nations' airlifts of humanitarian aid routinely blocked, the once modern city's standard of living has receded toward the last century.

"Our biggest problem, always, is obtaining enough electricity to operate," said Milenko Vockic, director of Radio BiH (Bosnia and Herzegovina), the public radio station. As the official voice of the Bosnian government, BiH is located in Sarajevo's Radio/TV building, a facility which before the war had a power budget of 2 MW.

Current situation

Now the building, which has been heavily shelled and whose windows are covered with plastic fabric, receives 150 kW of power from the city's electrical grid. Radio BiH, broadcasting on two 1 kW and one 500 W FM channels, plus a MW and a SW channel, has reorganized its studio to use just 6 kW of power or, in worst cases, 4 kW.

"We have learned to adapt how we work to our energy supply," Vockic said. "We limit the office lights if we also are using the computers. And often we simply sacrifice the

lights completely and use candles." The station's equipment is all analog, dating back to the Sarajevo Olympics in 1984, and any plans to upgrade to digital have been suspended for the war.

But Radio BiH is energy rich compared to the city's private stations.

At Radio Zid (Wall), broadcasting with a 250 W signal on 89.9 MHz, the studios are built for 5 kW of installed power and need a minimum of 3.8 kW to operate. Yet until the beginning of this year, when besieging forces permitted more electricity into Sarajevo, Radio Zid often could not get enough energy from the city grid

to power its equipment.

"We frequently have had to find alternative sources of power at the limit of the law," said Radio Zid Manager Rade Jevtic. At night the station's staff, like thousands of individual Sarajevo residents, comb the city looking for lines carrying power among government or United Nations or foreign humanitarian organizations that have their own diesel generators when city power is

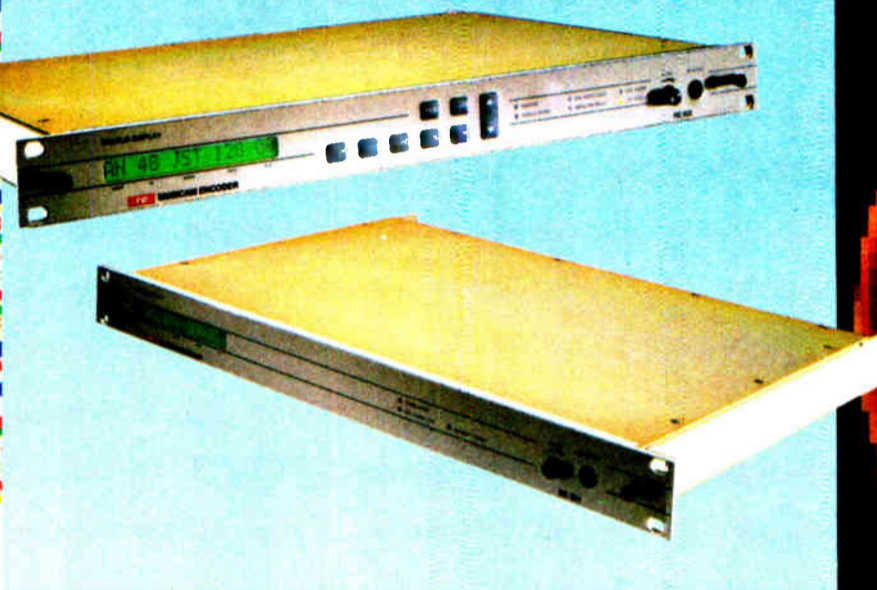


In the Radio Zid (wall) studio

choked off. "Right now, we have a 200-meter cable to a nearby installation which gives us a continued on page 8 ▶



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Radio During War Time

► continued from page 7
good backup," Jevtic said.

"But we still have to go out every morning to take off all of the other pirate wires which have found ours overnight." The station's biggest technical problem, he added, is protecting its equipment from sudden drops in power. The equipment, all digital, is largely contributed by a small Dutch radio network (IKON), with CDs brought by visiting journalists.

Art to listening

To tune in Sarajevo's radio stations, audiences have to be as creative as broadcasters in finding power.

As homes receive only intermittent electricity, listeners boil batteries in salt water to extend their lives, connect radios to the electrical current in telephone lines and hook up to car batteries.

In apartment buildings, some residents bring car engines into the basements, fueling them with natural gas to drive small electrical generators.

The natural gas, which Sarajevo's besiegers cannot block completely without cutting flow to their own allies farther down the pipeline, not only helps create electricity, but it also fuels the wood stoves that provide the only heat in homes and offices. Where light bulbs are scarce, they

make gas-jet lights to illuminate rooms.

With eight private stations, plus public radio, Sarajevo's airwaves are filled with information, news, music and even commercials.

Yet unlike stations in most markets, broadcasters here rarely worry about increasing their advertising share. The city's economy only recently began to stabilize and produce cafés, restaurants and clothing stores again as residents use a secret tunnel to bring in goods from government positions outside the siege lines.

Instead, the stations operate on grants from international or local groups and compete for listeners and a voice in shaping the city's political and social life.

Studio 99, a 1 kW station that started after the war began, is typical of most of

the private FM stations.

"When we began we had some equipment, a little money, and no plan financially how to stay long-term on the air," Director Adil Kulanovic said. "But we had a message we wanted to send."

At Studio 99 the message is that Bosnia, which before the war was a diverse society with a majority Muslim population, should remain a multi-ethnic nation in spite of the war and the group hatreds it has unleashed.

The staff, some 20 full-time and 30 part-time employees, crowd the radio's basement studio to bursting and essentially work for nothing.

"We paid no salaries from July 1993 to October 1994," Kulanovic said. "Then, after two years, people received a single payment of about 66 dollars thanks to a foreign grant."

The station, which is owned by the employees themselves and supported by a club of prominent Sarajevo intellectuals, currently receives monies from UNESCO and puts spare funds into upgrading its equipment: a Soundcraft SAC 200 mixer, Tascam CD and cassette players, and a rotating library of music from the homes of its DJs.

Private radio

The city's other private radio stations share the same characteristics of minimum equipment and unpaid employees.

They range in identity from Radio Hyat, with a Muslim focus, to Radio M, whose only message is the upbeat music it plays non-stop to make the city's living conditions and the ongoing skirmishes on its perimeter bearable.

But while the stations' messages vary, the war has made their formats more similar than different. Amid the talk and music, the characteristic signature of Sarajevo radio is "contact shows" with the sound of people reaching out to each other through the radio for advice, comfort and help.

"War has dramatically changed what is on the radio here," said Amila Omersoftic, general manager of Bosnian Radio and Television, the government broadcaster.

Before the war, public radio aired 60 hours of programming a day on four channels specializing in general programming, youth programming, culture and arts and local interest. Today, public radio airs a total of 24 hours among its channels and has had to educate its listeners in a wholly new way of life.

"In the early days of the war, it seemed we only aired programs on how to go to basements, where to avoid snipers, and how to create your own home heating, plus exchanges of experiences and advice between listeners," Omersoftic recalled. "When we did not know what else to do, we just played pop music to keep up people's spirits."

Now, the early days of the war are long ago and the siege of Sarajevo has settled into a predictable pattern. The shelling of the city, except when halted by cease-fires, has changed from early barrages of cannon fire to a random half-dozen shells exploding around the city daily—too few for people to take shelter in basements, but too many for people to feel safe.

"We have had to adjust to this as our new way of life," said Kulanovic of Studio 99. "But at least on the radio, people can get together and talk about a better future."

□ □ □

Charles Recknagel covers Eastern Europe for Radio World from Prague. He traveled to Sarajevo on special assignment.



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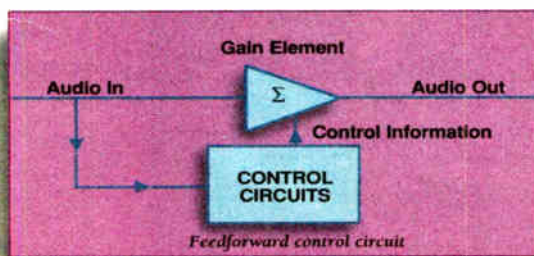
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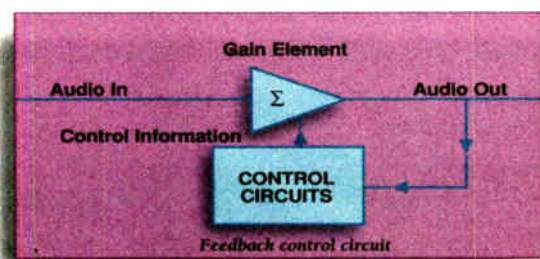


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World Radio History

External Forces Toy with Automation

by Bob Springer

SAIPAN, Northern Mariana Islands Not too long ago, I was called upon to solve an intermittent problem in one of our station automation systems that had eluded my staff for several months.

In tracking down the malfunction, I ended up using several troubleshooting techniques that are sometimes forgotten by experienced station engineers or that have yet to be learned by engineers new to the field.

Three of the SMC 252 carousels in our Gates automation system were advancing the controller very intermittently at various times during the playing of carts, causing two sources to go on air simultaneously. Because this happened only once or twice a week, if that often, it was difficult to track down.

No false signals

When the problem occurred, the cart was immediately tested for the presence of any false 150 Hz signals that might trigger the shift. No false signals were ever found. All of the circuit boards were swapped between carousels, but the problem did not follow any one board, so we could not single any one board out as the culprit.

Connecting an oscilloscope to the output of the cue amplifier and to the output of the power supply gave no evidence of the presence of any noise or AC ripple present. Nothing in the carousel or automation controller circuitry could be proven at fault.

It was proposed that, because the system was more than 20 years old, the carousels were simply worn out and would not operate properly anymore. But, why did the system operate without this problem until just a few months ago? Something had changed.

When the problem started occurring every other day, I had to make a concerted effort to find a solution to the problem. I began to wonder, as the problem was so intermittent, if it might be caused by something completely external, like transients on the AC power line.

When tracking down an intermittent problem, one technique often forgotten is varying the AC line voltage. Thinking the elusive problem might show itself if I varied the AC line voltage, I connected one of the carousels to an AC Variac.

Varied voltage

As I varied the input voltage, the automation system advancing relay of the carousel, which is actuated by the 150 Hz cue signal, clattered like a machine gun. The Variac had not been used for a while, so the contacts were dirty, but the voltage transients caused the symptoms to reoccur with rapid regularity.

I took the carousel electronics to the test bench to track down the bad component that I was certain had to exist. But a couple of hours of testing the cue amplifier board and the 150 Hz switching circuit—even checking the individual components—found nothing amiss.

That left the carousel power supply as a source of the problem, but nothing seemed out of the ordinary there. I connected another Variac to the electronics unit and an oscilloscope to the 24 V DC output of the supply.

By varying the AC input rapidly between 95 and 120 V, I could see the DC voltage change significantly, and the 150 Hz cue switching relay energized with each dip in DC voltage. The power supply seemed to have insufficient filtering to cope with the rapid changes in AC input line voltage.

I used a second technique, also often forgotten, to verify the cause of the intermittent problem. I attempted to create transients to see if I could simulate the

make that much of a difference. But to make sure, I paralleled a 220 mfd capacitor across the input section.

When I switched the heat gun on, the cue circuit relay no longer energized. Finally, I had found the solution to the problem. Evidently, the power supply filtering was no longer sufficient to keep transients from affecting the cue circuitry.

I increased the capacitance of the filter input section in all three carousels and

I began to wonder, as the problem was so intermittent, if it might be caused by something completely external, like transients on the AC power line.

actual condition that was causing the problem.

I plugged a heat gun (the kind used with heat-shrink tubing) into an outlet several feet away from the carousels. Each time I switched the gun on, the relay energized. With the carousel connected in the automation system, turning on the heat gun would have caused the controller to advance.

The original two 1100 mfd capacitors in the DC supply in a pi-type filter with a resistor previously had been replaced with two 1000 mfd capacitors. I did not think that 200 out of 2200 mfd would

returned them to service. The carousels have not caused the controller to advance erroneously since.

If I had not tried to vary the AC input voltage and then tried to create similar conditions to produce AC line transients in which the problem occurred, I doubt I would have ever found the solution.

□□□

Bob Springer is chief engineer for Far East Broadcasting Co. in Saipan, Northern Mariana Islands. Contact him at telephone: +670-322-3841; FAX: +670-322-3060; or e-mail: febcspneng@mcimail.com.

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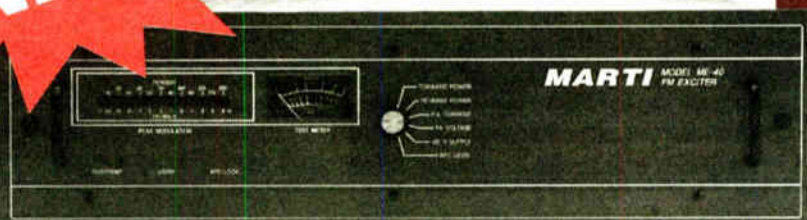
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Owners Favor Changes

► continued from page 1

able to own more than we own now."

However, chances are the final bill will not be so radical as to completely eliminate all ownership restrictions, Vriesman noted. As the bill works its way through Congress, Democrats and moderate Republicans will most likely amend the bill, leaving a few ownership restrictions, he pointed out.

"It will be short of what Pressler proposes," he said.

Because the final bill will most likely include some restrictions, it should maintain some type of minority-ownership regulation, said Vriesman, who is also the joint board chairman for the NAB's radio and TV members. "There should be incentives to include minorities in the (ownership) process," he said.

Those incentives should include, according to Vriesman, keeping tax certificates that give special tax breaks when selling broadcast operations to minorities. Vriesman described the program as "a good idea."

Foreign ownership

The major broadcast powers, however, had mixed feelings regarding foreign ownership restrictions. Vriesman said in general he is for allowing foreign owners of stations, but he sees some dangers in allowing foreign ownership to citizens whose countries do not allow U.S. ownership of their broadcast facilities.

"I would support a relaxation as long as it is reciprocal," he said. "We should be allowed to increase ownership abroad."

Shamrock's Clark said the current foreign ownership limits should be repealed across the board.

He disagrees with allowing a certain percentage of ownership by a foreign national, based on the amount of ownership of broadcast facilities his country allows U.S. residents.

Instead, he said, ownership limits should be raised across the board to reduce complexity. He noted that most foreign countries already provide U.S. broadcasters significantly more ownership opportunities than the U.S. provides for its own citizens.

Reciprocity issue

"Most foreign countries allow more foreign ownership of broadcast facilities," he pointed out.

Stakelin does not favor lifting foreign ownership limits.

"I'm not comfortable with relinquishing control to someone whose blood, sweat, tears and heart are not inbred into the soil of our country," he said.

Sorenson added, "I've always been proud that we have Americans serving Americans." Located in South Dakota, he said he really does not think that a relaxation of foreign ownership restrictions is necessary.

But he conceded that his stations are in small markets and financed by local banks, and that there "might be a need" for foreign ownership relaxations in larger markets.

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The 79 for Class B Use, With 250 Volts on Plate

RCA Radiotron Co., Inc., and E. T. Cunningham, Inc., released the following:

Recently conducted life tests on the 79 have shown that these tubes are satisfactory for Class B operation with 250 volts on the plate.

At regular intervals during the test checks were made to determine the change in power output which took place during the life of the tubes. The results which show that the power output was practically uniform during the test period indicate that the tubes are satisfactory for Class B operation with 250 volts on the plate.

In order to determine whether the tubes are satisfactory from the viewpoint of grid emission, a group of 79's was operated under shield cans with abnormally high voltages applied to the heaters. The change in grid current, which is an indication of grid emission, was so slight that the tubes may be safely operated in Class B circuits at 250 plate volts.

With a plate supply of 250 volts and a type 37 used in the driver stage, the 79 in a Class B stage will give a power out-

put of approximately 8.0 watts. Suitable operating conditions for the 79 are given below:

TYPICAL OPERATION			
OUTPUT TUBE—ONE TYPE 79			
Heater Voltage	6.3	Volts	
Plate Supply Voltage.....	250 max.	Volts	
Grid Voltage	0	Volts	
Plate Current (No signal) ..	10.5	Milliamp.	
Average Plate Current (8 watts output)	46.0	Milliamp.	
Plate-to-Plate Load.....	14000	Ohms	
Average Power Output....	8.0 max.	Watts	
INTERSTAGE TRANSFORMER			
Transformer Ratio (Primary to 1/2 secondary).....	2.6		
Transformer Efficiency	70	Percent	
DRIVER TUBE—ONE TYPE 37			
Heater Voltage	6.3	Volts	
Plate Voltage*.....	233	Volts	
Grid Voltage*.....	-17.0	Volts	
Plate Current	6.5	Milliamp.	

*For convenience in power supply design, the sum of the driver plate and bias voltage is made equal to the plate supply voltage of the 79.

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Fond Recollections of Radio 'Ham'

by Al Parker

HICKSVILLE, N.Y. "Today I am a Ham." I started the process in the early 1960s. I was a shy kid with a gregarious id, a conundrum to be sure. The resolution came in a flash as I observed young Jeff Stone of the "Donna Reed Show" talking to his pals on a walkie-talkie. Imagine the ability to be in complete touch with kid society from the safe cocoon of one's lonely room.

Private people, introverts like me, often have a special relationship with radio. I admit that I missed the "Golden Era," "The Shadow," "Little Orphan Annie"; no secret decoder rings for me. By the time I became really aware of radio, the last vestiges of the "good old days" were fading fast. Years before the walkie-talkie, my parents bought me a little, all-plastic, tube-type AM broadcast radio. I took the thing under the covers with me. It was like a teddy bear with multiple personalities.

A night-owl kid had few alternatives. Long past the time I was supposed to be asleep, I'd be scanning the radio dial for all-night talk shows. New York may not have offered the best quality of life, but for the lover of radio, it was a smorgasbord. Old raconteurs filled the night with storytelling, interviews and shtick. Those insomniac broadcasters became friends, talking me through the night. When I first received that walkie-talkie, I began talking back.

A walkie-talkie

Naturally, on 100 MW, nobody answered. That didn't seem to matter. I listened. The Citizens Band (CB) was different in the early days. I heard call signs and some serious-minded folks. In the early days, CB was fairly civil. Mostly old guys and young nerds inhabited the airways. One notable exception was a kid named Gary. He was already a local legend. When I first heard him he was conducting himself as a full-fledged DJ, spinning discs and doing a fairly credible imitation of "Cousin" Bruce Morrow. Best of all, he could actually hear my puny signal.

Gary invited me over. Standing in front of his house, I was a little nervous. Wow, I was about to meet a famous radio personality. I threw caution to the wind and entered. I was anxious to see his station. It seemed to have a lot more power than mine. Up a short flight of stairs and I was in his room—er, shack. Sitting on his desk was a magnificent transceiver, a reel-to-reel tape recorder and some other boxes with lights glowing red and green.

I was looking at my first AM radio station.

By the time the summer was over, however, Gary had been busted by the feds for running an illegal station. But I had applied for my license and acquired one of Gary's old rigs. My Dad allowed me to sweep some floors and organize some stock so that I might have a few bucks to spend on the new hobby. I had even managed to sneak an antenna onto the roof. I was now a player, albeit on a very modest level.

Over the next several years my entire social life revolved around radio and radio friends. Over the radio I was powerful, charismatic and appealing. I was part of a society, absorbing knowledge through a network of 5 W nerve cells.

In the process of learning how to make my station more powerful, I began to have more curiosity about electronics, at least on a surface level. This superficiality began to bother me more and more. The angst was heightened by the loss of several of my CB buddies to something called "Ham Radio." I became so concerned about the brain-drain that I bought a Lafayette Ham receiver and some study books.

Too intimidating

After looking through the intimidating materials I dropped the idea. I resisted the whole concept of becoming a Ham. It was too much like becoming a Nun. The first stage was a humiliating level called "Novice." Like some religious orders, one had to take an oath of silence, forsaking the spoken word (phone) for communication in code. The process was meant to build character, something in short supply on the CB band. I stuck my head in the sand as long as I could. Two words ended my run on the 11 meter band: "Breaker one-nine!"

Star Trek and CB were more appealing before the proletariat discovered them. The torrent of ill-mannered truckers and other stooges, spurred on by several lousy Burt Reynolds movies, finally overwhelmed the FCC. They gave up on CB at about the same time my buddies and I did.

High school, college and aimlessness. I felt like a balloon floating without a tether. My friends drifted in different directions as well. Radio was the glue holding us together. It wasn't the formal education that gave me a much needed shove in the right direction. Hobbies, like radio, were more of a factor in molding my future.

Eventually, I found my niche in the corporate world. Once I was in the right groove, my star rose quickly. So much of my success was directly attributable to the communication skills and poise attained incidentally from talking into a microphone. All the monkeying with tape recorders, sound mixing, playing DJ over the air, seemed to bear directly on what I

was doing. Skills I took for granted, used only for making my friends laugh, or tormenting radio bad guys, suddenly had a real-world application.

A non-conformist

Companies with nothing to lose are comfortable with risk-taking non-conformists. I loved flying by the seat of my pants, always on the edge. It was intoxicating. As the company became more successful, there was pressure to become more conservative. Eventually I realized without the sharp uphill climb, the job wasn't fun anymore. Youth and ego being what they are, I decided that my talents were being wasted in mundane pursuits like building economic security.

The loss of mission and discipline when I left corporate life was so disorienting I became paralyzed. I became a recluse. I sat in front of the boob-tube until my brain turned to guava-jelly. What's a guy hooked on white-noise to do?

One fateful night, I remembered that old ham-band receiver in the attic. I pulled out the Lafayette HA-800B. I'm ashamed to admit that I never really used it, simply because it required an external speaker. That was apparently too much of a technical challenge for me 20 years earlier. Now I had time on my hands and the know-how to get it working. I still had a CB antenna on the roof. I plugged it in and turned it on around midnight.

I twisted the knob to the 40-meter position. Out of the speaker poured a loud and distorted woman's voice: "This is the world service of Radio Cambodia," or some such thing. I quickly turned down the volume. It sounded like the Tower of Babel again, mixed with Tokyo Rose. It doesn't take long to tire of agriculture productivity reports, Iron Curtain propaganda and frenetic evangelists. This seemed little better than the boob-tube. The next turn of the band-switch changed my life forever.

The 80-meters band—a radio pilgrim's promised band. I spun the tuning dial.

Lots of unintelligible jibber-jabber, made more meaningless by the inexcusable lack of a carrier and one sideband. I knew that I was hearing single sideband. My last CB rig was so equipped. The old Lafayette, 20 years past its prime, wasn't quite up to the task of decoding the squawks without a constant hand on the tiller. About mid-point on the dial I heard a harsh squeal. Switching over to AM eliminated the obnoxious noise. In its place were the warm and inviting sounds of amplitude modulation. I was transfixed.

Even through the mediocre audio chain of the Lafayette, I could tell that some of those signals were broadcast quality. The talk that night, as I drifted off to sleep, was about old Vikings and Rangers. It didn't take me long to realize that these

continued on page 16 ►

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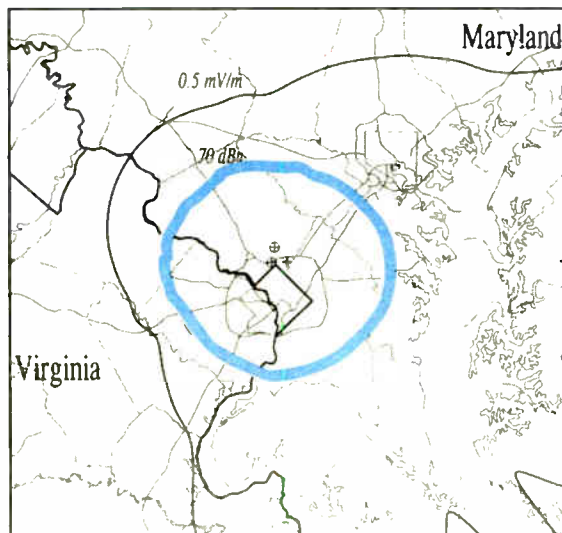
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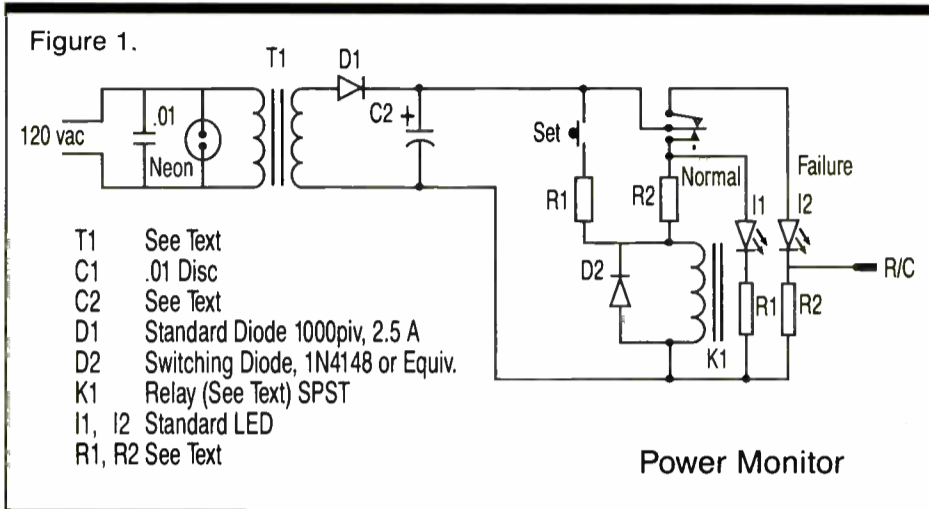
BOTTOMLINE BROADCASTER

Custom-Engineered Failure Module

by Jim Murphy

MORGANTOWN, W.Va. Everywhere you look in the broadcast station, equipment is either fully computerized or run by an on-board microprocessor or microcontroller. Even in less complicated

power failures. It is important that we know when a momentary power outage or large voltage dip has occurred. This is sometimes transparent, especially if our computers are connected to UPS units. If the outage is quick enough, we may only realize the



equipment, such as amplifiers and control circuits, sequential logic and memory are widely utilized. And, as we all know, this type of equipment is extremely susceptible to power glitches and surges, not to mention loss of data and other problems due to momentary power outages.

Most broadcast gear nowadays is equipped with some form of protection. One manufacturer puts a 3.3 Farad capacitor in the power supply, allowing it to operate a full five minutes after a power loss. Another method includes small lithium batteries to keep a memory unit powered or to maintain a certain status in the event of a power failure. These are specific protection techniques and do not solve all the problems caused by

consequences of it, and never suspect the actual outage event. Perhaps we put the blame on glitches, or just point the finger at a specific piece of equipment.

Failure indicator

A quick, simple and cheap way to make sure someone knows of a power outage is the failure indicator shown in Figure 1. In a nutshell, it is a power supply that feeds a relay, and it can be built quickly from junk box parts. There are a couple of special considerations in the circuit that need to be built into your project also. Incidentally, if you are interested in design, these methods can help you build other power supply projects that require known ripple factors and output levels.

Circuit operation is straightforward. DC voltage is available at D1 when power is on. This voltage is placed across K1 when the Set switch is pressed. Once K1 energizes, its contacts provide a holding current through R2. (R1 is shown in case your relay has a smaller voltage rating than the supply.) Because the relay is operated at near drop-off current, any quick dip of power line voltage, or outage, will de-energize the relay. When power returns, the normally-closed contacts will light the failure LED, which will remain on until you reset it.

Now, to the design of your own failure monitor. Rummage around, find a transformer. It will probably be an old filament transformer rated at 12.6 V, so we'll work our design around that value. Our 12.6 V is an RMS rating, and should be multiplied by 1.414 to get the peak excursion of the wave. We'll call it 17 V. With a diode in the circuit as in Figure 2(a), our DC output voltage will be 5.4 V. This is because the diode is off 50 percent of the time, and the remaining voltage under the curve must be averaged across the whole period.

Figure 2(b) shows a capacitor, which will charge to the peak value and stay there. So, our power supply has a range

capacitance is calculated by:
 $C = 0.1 / Rload$

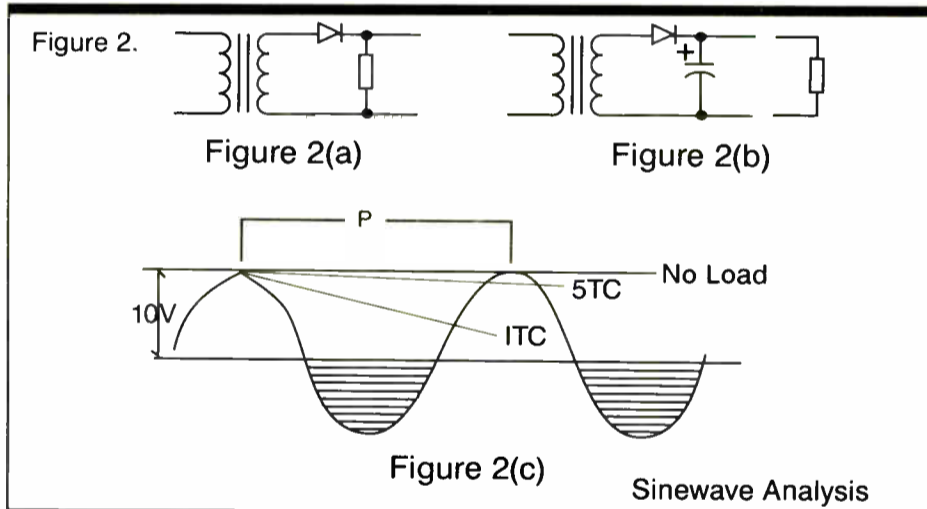
In order to know the load resistance, we must find a relay. Suppose your junk box yields a 12 V relay. (It need only have SPDT contacts.) First you measure the resistance and find it to be, say, 200 ohms. Next, you must determine the dropout voltage point. With an adjustable supply, energize the relay then lower the voltage slowly until the relay relaxes. Let us use 5 V.

For our pull-in, we want to place 12 V across the relay coil. Current through the relay is 60 mA, so our ohms per volt number is 1/.06, or 17. Because the supply is 17 V, we need to drop 5, so our value for R1 is 5 x (17 ohms/volt), or 85 ohms.

Maintaining the dropout voltage of 5 V means we must drop 17 - 5, or 12 V, across R2. This value is 204 ohms (12 x 17 ohms/volt). We need to provide slightly more than 5 V, so make this resistor the next lowest standard value.

Figuring resistance

Now that you have the proper elements for both pull-in and dropout circuits, let's look at the total load resistance. The relay circuit is 285 ohms. If we are using 20 mA LEDs, the resistance in the Normal



of 5.4 V to 17 V—with varying degrees of ripple.

Increase capacitance

When we begin connecting load resistance, the capacitor begins discharging through the load when the diode is off, reducing the average output voltage. See Figure 2(c). The way to solve this is to increase the capacitance. One could just dispense with these calculations, add a few farads of capacitance, and forget about it. Of course we would then need a large chassis just to support the capacitors, and a pickup truck filled with diodes, to replace those burned up by the current surge each time we turn the unit on. So much for that theory.

The formula, $p = 1 / F$ gives us a period of 16 milliseconds for 60 H voltage (Figure 2(c)). If the product of our load resistance and filter capacitor is one-time constant, the voltage across the capacitor will quickly drain off to near 37 percent between pulses. This is not satisfactory; we must set our RC time constant to a much higher value. I use a value at least 6 times greater than 16 milliseconds, or about 100 milliseconds (0.1 sec), so that the slope of the discharge curve is more toward the horizontal. If we know the value of our load resistance, then the

leg will be 50 ohms/volt, or 17 x 50, which is 850 ohms. This is in parallel with the 285, making an equivalent resistance of $(285 \times 850) / (285 + 850)$ 214 ohms. This will be the maximum load on our supply. Our capacitance can be found by dividing 214 into 0.1, which tells us we need at least 500 microfarads to maintain our long time constant.

You might want to use a potentiometer for R2 that will allow you to fine-tune the dropout point and make the unit more sensitive and responsive.

If you cannot come up with a transformer, use a 12 VAC wall wart. In either case, everything can be mounted inside a 4 x 4 minibox. With most of the parts scrounged from your shop, you can probably afford to build a few of these. Place them at your transmitter site or remote RPU site. Then, when you make your weekly visit, see the failure light on, it might answer the question of why your transmitter cycled off and on last week, or why your STL muted for an instant. Not much in the way of bells and whistles, but it is a rugged, dependable bottomline power failure monitor.

□ □ □
 Jim Murphy is director of engineering for West Virginia Radio Corp. He can be reached in care of RW.

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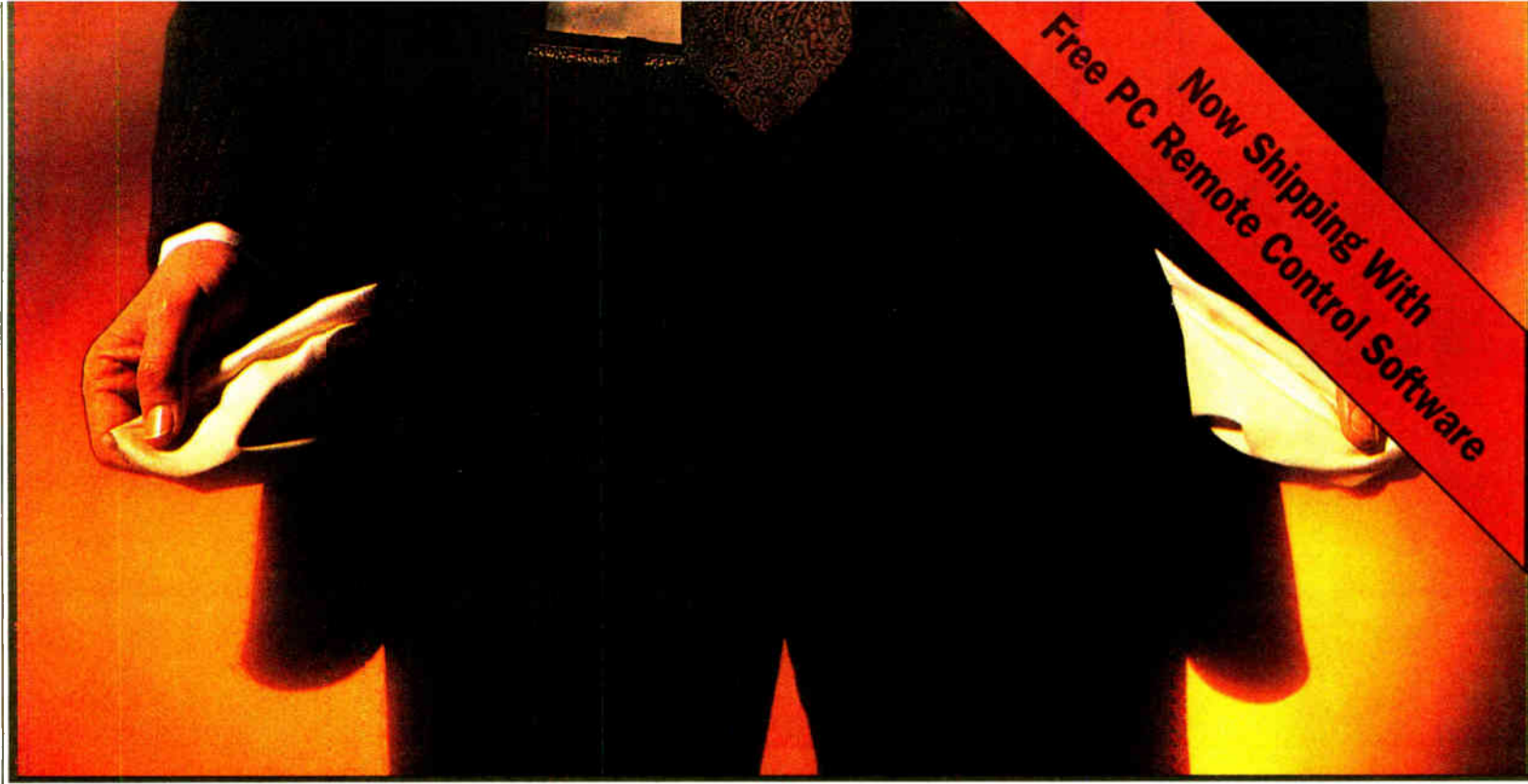
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Circle (211) On Reader Service Card
World Radio History

Memories of Ham Radio

► continued from page 13

were not references to sports teams.

I awoke to the sounds of gentle chimes. Then there was a dog barking and the sounds of cooking. Funny, I couldn't smell anything. An increment closer to full consciousness and I realized that the sounds weren't coming from my own house, but a cabin more than a hundred miles away. It was a Ham radio operator preparing breakfast at sunrise, calling, "C.Q. America!" His signal was so strong I could hear every pop and sizzle from his frying pan.

Another station answered. After some "good mornings" and descriptions of the weather, they launched into a discussion

of the Constitution and Thomas Jefferson. Others from New England joined in. I had a feeling that the State of the Union had been the core topic for many such morning sessions, over many years.

I listened to the AM window that whole day and into the night as I pecked away at the word processor. Apparently AM operators were confined to a 10 kilocycle area between 3.880 and 3.890 on the dial. The window was like a theater. The curtain went up and down as the day advanced, with different players taking center stage.

The AM Group, as I perceived it, seemed to break down into five categories: old buzzards, '60s types, frustrated DJs, politicians

or soon-to-be one of the above.

My favorite group, the "old buzzards," reminded me of the way America used to be. These were mostly retirees, finally getting to live out a life-long dream of playing Ham Radio to their heart's content. The wisdom and knowledge they shared with such generosity was heart warming. All the talk about transformers, tubes and capacitors made the elder statesmen of Ham Radio seem like alchemists. Many had actually built the radios they were using. I didn't understand much of what they were talking about, but for the first time in years, the eager hobbyist in me was stirring.

Some nights the '60s burnout crowd would dominate. The label is a little unfair considering that many of these guys were productive citizens with families. Some were real radio engineers. They were of

that lost generation to be sure, for the subject matter was heavily weighted toward UFOs and New Age matters. It was always fun, if not totally tasteful.

The frustrated DJ types were also strangely compelling. Some had radio stations rivalling small commercial operations. From the banter, I got the distinct impression that I was hearing transmitters converted from broadcast-band use. Mixing boards, cart machines and exotic audio tailoring were utilized along with lots of lanolin on the vocal cords.

AM vs. sideband

The fullness and relaxed nature of those high-powered AM signals seemed such a contrast to the predominant sideband stations. The two modes co-existed, uneasily. The AM group, like all ghettoized populations, seemed to have more soul. They took their second-class status very well indeed. The sidebanders, or slop-buckets, as the old buzzards called them, often disrespected the sanctity of the AM window.

They had all the spectrum space but still begrudged the oppressed minority their small reservation. Maybe they were jealous, maybe they just resented all the fun and superior audio. A sideband rig is a percussion instrument, while an AM rig is a violin. The sidebanders appeared to have forgotten that the main reason for any hobby is fun.

At the very root is the fact that most sidebanders are operating store-bought rigs so complex and miniaturized that they are literally inscrutable. Most AMers improve, repair and even build their radios. Wasn't this the original purpose of amateur radio?

After a few weeks of the genuine Radio America, a crazy idea began to take shape. I pulled out those 20-year-old books and code records. It had been so long since I had focused my intellect on a new body of knowledge. I wondered if I had it in me anymore. I felt like a grizzled old gunslinger coming out of retirement for one more fight.

Safe for the soul

I do not make this declaration lightly. becoming a Ham Radio operator saved my spirit. Learning the theory, rules and Morse code merged with a new love for old radios. As I achieved each level, my confidence grew. As a free-lancer I had little spare cash to apply toward the acquisition of fancy Japanese rigs. A free-lance writing gig could produce ready cash. Not sufficient to net a fancy Kenwood or Icom, but plenty enough for an old Johnson Viking or two. The only proviso was that I would have to make them work.

The theory I learned to pass my test was a drop in the bucket compared to the lessons learned in reviving old tube-type radio gear. I was never so proud of a successful sales meeting or big promotion as I was of that first firing up of an old rig saved from an ignominious fate by me.

Boyish enthusiasm helped me to sincerely promote my product and to enjoy the work. That had all been lost. Each new ego battle or betrayal on the job separated me more and more from that wide-eyed kid I used to be. I rediscovered myself through the warm and inviting world of glowing tubes and disembodied spirits shot out of wires into the sky.

If work is getting you down, the bills growing and your hairline shrinking, get out there and find yourself an old AM rig. Fix it up and make it shine like a bright new penny. When it's done, come play with me.

□ □ □

Al Parker, N2 SAG, lives in Hicksville, N.Y.

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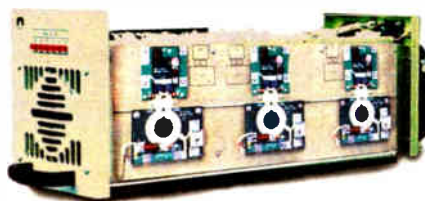
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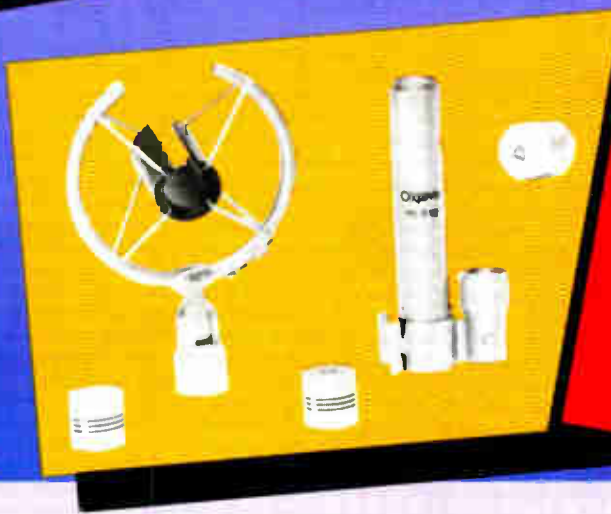


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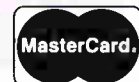
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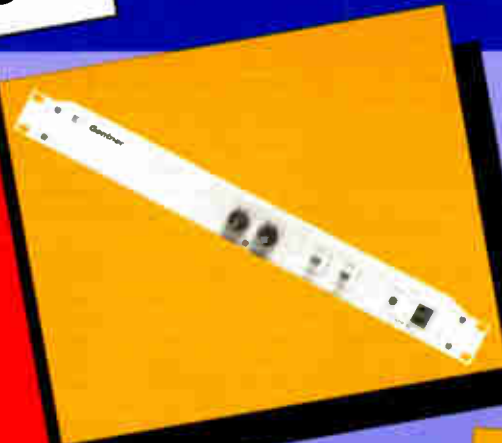
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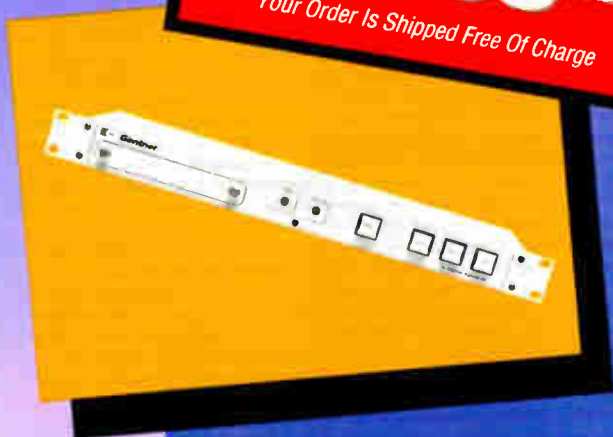


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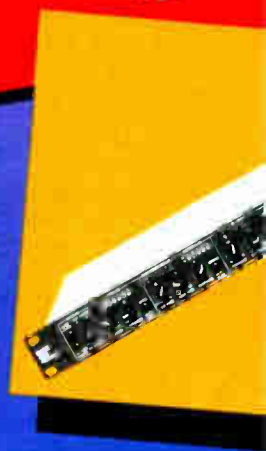
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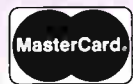
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ROOTS OF RADIO

Print-Through Problems of Early Radio

by Ralph Townsley

WEST LAFAYETTE, Ind. This experience dates back to the early days of audio tape recording in the late 1940s.

The audiology department at Purdue University stated that they were unable to tape record a particular person's voice without excessive print-through. They sent this person to the campus radio station to see if we could determine what was so unusual about this one person's voice.

Print-through was more of a common problem with early audio tape than it is with modern tape. The usual causes were excessive peak recording level, excessive tension during rewind, and mechanical vibration or shock. Any of these aggravated the transfer of the recorded material from one layer of the tape to the adjacent layer of tape on the reel. The result was similar to an echo. This echo could either precede or follow the intended recording. This depended on whether the tape was stored with the tail inside or outside.

Non-symmetrical voice

When we made a tape recording of the individual's voice the print-through was very obvious. I looked at the person's voice on an oscilloscope. With DC coupling on the oscilloscope the voice looked as if it was half-wave rectified. All the excursions were on one side. The other side appeared to be clipped off. It was fairly common knowledge at that time that male voices were frequently non-symmetrical. However, I had never seen anything that demonstrated the effect to anywhere near this degree.

We had two instruments that made further observations of the problem quite interesting. These were not common at the time. One was a Kahn Research Laboratories Symmetrapeak. The other was a really true peak volume indicator.

The Symmetrapeak was a device to convert non-symmetrical waveforms, typical in audio, to waveforms which are symmetrical about the axis. This is done without changing the way they sound to the human ear. This is possible because the ear does not respond to changes in phase harmonics with respect to the fundamental in monophonic audio. In broadcast transmitters, for example, it is usually more desirable to work with symmetrical waves.

When we first received the Symmetrapeak, I made some tests to see how effective it was in performing its purpose. The first test involved applying a near-perfect saw tooth wave to the input and observing the terminated output. The output wave consisted of a series of damped sine waves and appeared symmetrical about the axis.

No difference detectable

The input and output waves looked about as different as any two waves could. It was difficult to imagine how two such different waves could sound anywhere the same. A high-quality audio amplifier and broadcast monitor speaker were hooked up to a switch so that either the saw tooth output or the Symmetrapeak output could be heard. Much to my surprise, I could not detect the slightest difference. Several other persons were asked to take part in the test. Not one could detect any difference in

the A-B test. I then replaced the switch with a fast-acting one. With this switch, it was not only impossible to determine which position the switch was in but it was also impossible to determine when the switch was thrown. Looking back, I now consider the Symmetrapeak as extremely satisfactory. I also consider it one of the very few items of audio processing equipment that was an asset rather than a liability at that time.

The instrument was potted so that it could not be determined what components were used in its construction. It seemed

logical that an all-pass filter would be used to secure the phase shifting without introducing a frequency characteristic. External measurements could be made on phase shift and other factors. However, without knowing the number of filter sections it was not possible to calculate the values of the filter components. Broadcast engineers do not like to work with black boxes. An X-ray photo revealed a four section, all-pass filter. An input and output transformer were 600-ohm to 15 k-ohm impedance. This was all the information needed to determine all the component

values. Fortunately, the transformers were not in the potted section.

The Peak Volume Indicator was an audio engineer's dream for reading actual peak excursions of an audio signal. It had all the desired features of an instantaneous VU meter, but with none of the disadvantages normally assumed to be unavoidable with such a hypothetical instrument. The readout was on a meter that appears to be a standard VU meter. A closer examination showed a more linear dB scale. Also, the scale was marked

continued on page 21 ►

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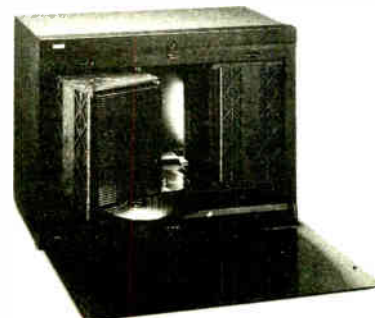
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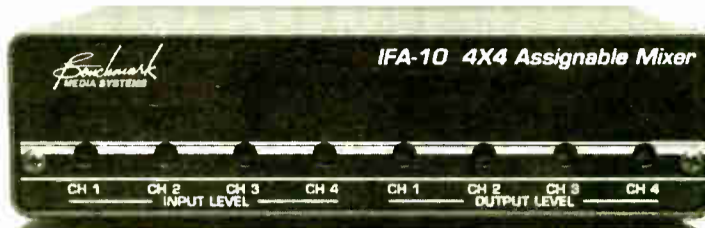
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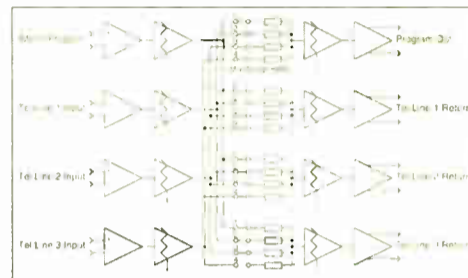
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WORKBENCH

Keep Up to Date on EBS Modifications

by John Bisset

SPRINGFIELD, Va. If you own a DART-384 and are using SEDAT boards, do not seat the boards in just any slot. We had a client who was experiencing loss of lock on one particular SEDAT card. The card would intermittently lose lock and generally "go nuts" while disrupting program audio.

The dish had been realigned several times, power supply voltages checked, the usual troubleshooting techniques. The fix was to relocate the board closer to the power supply. In this case, the board was placed in the far right slot, furthest from the power supply. The SEDAT card is switching 5 V and ground, and draws a lot of power. It's very particular about the cleanliness of data.

To add to the problem, the frame included a total of three SEDAT cards and a DATS card. Fairchild has recommended

not mixing DATS and SEDAT in the same frame, and if you do, make the DATS board the last in the frame (Slot 1, furthest from the power supply). Thanks to my associate, Ed Bukont, for contributing this tip to *Workbench*. Ed can be reached at 703-323-7180.

★ ★ ★

Owners of higher-power Nautel transmitters may want to purchase a piece of half-inch screen mesh. This screening can be found at a garden or hardware store. Atop the power supply cabinet is an opening that runs the length of the transmitter. It's big enough to attract all sorts of things. Old Murphy never quits and seems to devise new and exciting ways for tools, screws, nuts, etc., to find their way toward this opening and into the transmitter.

The large-opening screen was used so as not to restrict air flow but simply to provide a means of discouraging objects from falling into the slot.

★ ★ ★

Dave Biondi at Broadcast Service Co. provided EBS system modifications to the SBE Bulletin Board. For those without access to the bulletin board, here are the modifications you'll need to make to your equipment in order to transmit and receive the shortened EBS tones beginning July 1. The modifications are straightforward and similar to those provided by Burkhardt Monitoring published in a past issue of *RW*.

• Gorman Redlich (all models) - The outputs of the 107-Hz filters for the two-tone decoders go into a diode, a parallel R/C circuit, another diode, and combine into a voltage divider. Where these two diodes tie together, there is a 47- μ F tantalum capacitor. Change this to a lesser value that will result in an unmute time of three to four seconds. You might start at 22 μ F. On the encoder, turn the 1 Mohm Activate Internal Adjust pot counter-clockwise until the tone is at 9 to 10 seconds. This modification may require a slightly longer closure of the activate switch to allow the 47- μ F timing capacitor to fully charge.

• TFT 760 Series - On the decoder board, replace C-13 with a 22- μ F, 25 V tantalum

capacitor. Replace R-26 with a 182-kohm, 1/4-watt, 1 percent resistor. This should cause the decoder to activate in four seconds. On the encoder board, cut the trace at Z-3, pin 1. Then jumper from pin 1 to Z-4, pin 9. This will give 8.5 to 9 seconds of encode tone. A novel option is to add an 8.5/23 second select switch. Install an SPDT switch on the back panel of the chassis, with the wiper going to Z-3, pin 1, and the other switch terminals going to pins 9 and 11. When the switch is thrown to the pin 9 position, 8.5 seconds of tone will be selected. Pin 11 restores the full 23 seconds.

• McMartin EBS-2/TG-2 - Inside the EBS-2 decoder, you will need to parallel R-37 with another resistor which will result in an unmute time of three to four seconds. Try starting with a 560-kohm, 1/4-watt, 1 percent resistor. In the TG-2 encoder, you'll need to adjust the trimpot near the NE555 timer chip clockwise to 9 seconds.

Dave Biondi can be reached at Broadcast Service Co. in Houston, Texas at 713-926-2209.

□ □ □

John Bisset is a principal with Multiphase, a contract engineering and special projects company based in Washington, D.C. 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.

Early Tape Problems

► continued from page 19

dB rather than VU. In operation, the meter appeared much different from a VU meter. The meter pointer upswing was far faster than a VU meter. Normally this would make it difficult to watch.

However, in this case, it stalled momentarily at the peak of the excursion. This gave the operator a far better chance to get a mental impression of the maximum deflection. It made the meter very much less fatiguing to watch than a VU meter. Also, since the deflection corresponds to the true value of the peak, there is no mental fatigue resulting from continuously trying to estimate the amount of error of a VU meter.

A very brief discussion of how some of the meter circuitry operates is in order. The input signal is fed to an infinite impedance detector and to a phase-inverter followed by a second infinite impedance detector. A switch in the output of the detectors permitted either polarity of the signal to be read separately or combined and the highest of whichever side is the highest may be read.

In order to obtain the rapid upswing, the signal to the meter was amplified to approximately 20 times that required for full scale deflection. Thus, as the pointer reached its normal final deflection, it traveled at many times its usual angular velocity. To prevent overshoot, it was necessary to damp the meter movement with much less resistance than that required for critical damping.

In this application, the shaped pulse used to give the rapid rise was terminated at about 90 percent of the final reading. The low damping resistance then prevented any overshoot at all. This was a serious limitation on the selection of meter movements because most cannot meet this requirement even with a short circuit for damping.

The switch in the detector output fed a small capacitor with very low dielectric absorption. The wave form on this capacitor was responsible for the operation of

the balance of the circuitry. It was charged through a vacuum tube diode. The discharge path is through a triode which has its grid negative biased each time there was any upswing in the positive voltage on the capacitor. This momentarily opened the discharge path of the capacitor which, in turn, kept the meter pointer still during this interval.

When the discharge path was again completed, it was to a relatively high negative voltage. This means that the discharge voltage was the start of a "saw tooth" and was therefore quite linear. In turn, the meter return swing was at a controlled rate and was of a constant angular velocity. This added to the ease of watching the meter. It should be noted that the accelerated upswing made the meter appear to move simultaneously with program material as contrasted with the delay always noted with a VU meter.

Now for some of the observations when using these instruments with regard to the aforementioned print through. When these instruments were used with the voice that produced the excessive print through, the peak meter showed the same non-symmetry as the oscilloscope. If the Symmetrapeak was used in the line-up and the peaks on both sides allowed to reach the same levels as the peaks on one side only, without the Symmetrapeak, there was no print-through.

The microphone being used was an RCA 44BX velocity mic. To rule out any non-linearity in the microphone and any amplifiers, the person was placed on the other side of the microphone. The peaks were now on the other side of the axis.

If a person with a reasonably symmetrical voice was used as a reference and the voice was distorted by electronic means to produce the same amount of non-symmetry, the voice would be intolerable. However, this person's voice sounded perfectly normal.

□ □ □

A former broadcast engineer, Ralph Townsley resides in West Lafayette, Ind.

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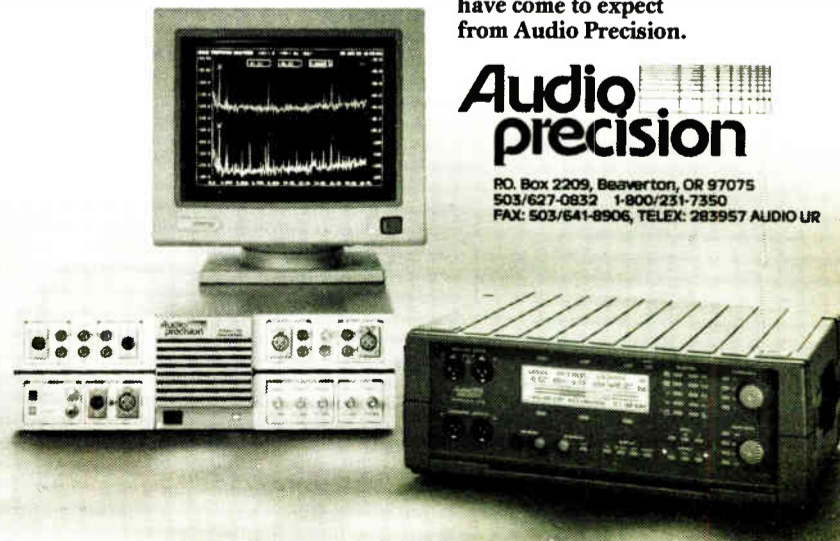
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The System One and Portable One... two families of test sets designed for different jobs, each with the quality and performance that you have come to expect from Audio Precision.



Circle (115) On Reader Service Card

Eimac Tubes Working on Nine Lives

by Marvin Collins

LOS ANGELES Unless you are an engineer, you probably haven't given much thought to the tubes that keep all of us in radio on the air. You simply take for granted that they will perform on demand. And, while tubes are not ordinarily anything to get excited about, I'd like to talk about a very special tube—one that survived two lightning strikes and a rat attack.

During its lifetime, this Varian-made Eimac tube—installed at KFI(AM)—racked up an astounding 87,242 hours of service. That feat earned it the "Oldest Tube" award in Varian's Power Grid Tube

Products contest to celebrate the 60th anniversary of the Eimac product line.

This particular Eimac 4CX 35,000A tube did not get an easy start in life. When we first installed it back in 1978, our transmitter developed arc-over problems. This tube and its mate ran for several days under very adverse conditions for diagnostic purposes—the air between them was ionizing under 120 degree heat.

Survival of the fittest

But that was just the beginning of this tube's adverse experiences. It went on to survive two separate lightning strikes. The first time lightning struck KFI's 750-

foot-high transmitter tower, it blew the transfer switch apart and essentially destroyed the Edison transformer vault. Instead of getting 480 V 3-phase, we got 48 kV. The station was off the air for six hours, but when we got power back, the tubes started glowing and the whole transmitter started right up.

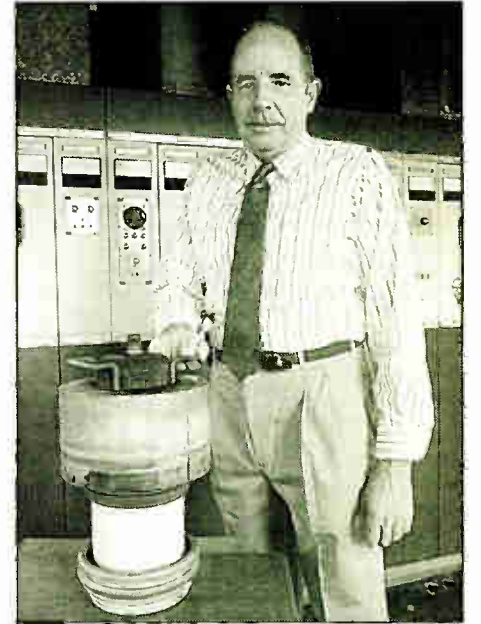
The second time, a lightning bolt blew apart the meter on the transmitter, but again, the tubes kept right on working once power was restored.

If the vagaries of Mother Nature weren't enough to contend with, the "oldest tube" also withstood an assault by a large rat that somehow managed to

climb a transformer in the Edison vault and get in between the primary and secondary. That caused an arc-over which blew out the \$10,000 transfer switch again and ignited a smoky fire that burned the fur off the rat and charred the ice plant around the facility.

And the tube just kept on going.

Some of the credit for the Eimac tube's phenomenal lifespan should go to our Continental Electronics 317C2 transmitter. Continental forces enough cooling air



Marv Collins displays the "Oldest Tube" award-winner.

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For quieter environments, choose the CM-312HS. This low profile hypercardioid mic delivers clear, distortion-free sound that's perfect for controlled broadcasting situations, such as news programming, talk shows, and location interviews — just to name a few.

Now's the time to audition a Crown HS microphone — they're competitively priced, dependable, high performance broadcast mics. All it takes is 30 seconds and you're on. For more information on Crown HS series mics, call Crown at 1-800-342-6939, or your local Crown Broadcast dealer today!



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through the equipment to keep the temperature within the correct range. It also regulates filaments and other parameters properly and keeps tubes operating under correct supply voltage.

Regular, routine maintenance by our staff helps, too. We pull the tubes out quarterly to clean the fins, blow the dust out, and scrub them with a wire brush. And, because our smoggy Los Angeles environment causes dirty build-up, we use degreasing solvent and compressed air on

continued on page 24 ▶

Tips for Extending the Life of Your Tube

1. Make sure not to exceed the maximum ratings established for your tubes. Contact the manufacturer for a copy of the data sheet(s), available at no charge.
2. Control the operating temperature. Ensure that adequate cooling is provided.
3. When line voltage transients exist, regulate the filament voltage to better than ± 3 percent.
4. Set the operating filament voltage of power grid tubes at a value just above the point where the tube is emission limited (applies only to thoriated-tungsten tubes). For Eimac tubes, see Eimac Application Bulletin No. 18 for additional information on this procedure.
5. Periodically clean the cooling elements and the contact areas in the socket.

For a more detailed explanation of extending tube life, contact Varian at 800-414-8823 and ask for Eimac Application Bulletin No. 18.

—Marv Collins

RS-Series Consoles from Radio Systems. 3m France 94.1 the Point Abilene Christian University Advanced Broadcast Systems AEI Music Network Albuquerque Public Schools Alderson-Broadus College American Medical Association American Radio Network Amesi, Inc. Association Francophone D'Iqaliut Audio and Video Wholesaler Audio Broadcast Group B'nai B'rith Perlman Baruch College Beach House Studios Beacon Broadcasting Beaver College Boston University Bradley Broadcast Sales Brandeis University Branson Country Music Network Broadcast Supply Worldwide Broadcaster's General Store Bryant College Cable Radio Network Caldwell College Camp Ramah In the Poconos Camp Waban Capital Memorial Church Carnegie-Mellon University Cedarville College Central Texas College Central Virginia Educational Telecommunications Corp. 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World Radio History

COLE'S LAW

Seven-Year Renewal Ritual in Sight

by Harry Cole

WASHINGTON Have you been experiencing a vaguely familiar sense of dread, maybe panic, that some potentially destructive other-worldly force is approaching with inexorable determination? Aliens? Killer bees? Flesh-eating bacteria? Ring around the collar? Think again. For the first time in several years, the radio renewal cycle cranks up this spring—meaning that all radio licensees will have to undergo that septennial trial by bureaucracy in which their right to operate is on the line.

The renewal process has, of course, changed dramatically in the last 15 years. Used to be that renewals were due every three years; now it's every seven. Used to be that renewal applications involved mountains of paperwork, with a lot of busywork thrown in for good measure; now the renewal form is a postcard requiring just five or so "yes/no" answers, a little EEO information and an engineering certification. Life these days is good, no?

Well, maybe not, as it turns out. While the FCC's current approach to renewals could be seen as an effort to give licensees a good deal of welcome slack, it could also

be seen as providing them just enough rope with which to hang themselves.

Dangerous questions

First, the ostensibly simple "yes/no" questions on the postcard renewal can be dangerous. For instance, as tempting as it may be to just answer "yes" to the question relating to your compliance with the public file rule, you really ought to take the time to review both the rule and your public file.

You need to make sure that you have, in fact, consistently complied with that rule over all of the last seven, count 'em, seven, years (or at least as much of that time as

you have been the licensee of your station).

Did you really put your issues/programs lists in your public file on time four times a year for each of the last seven years? Did you really put all of your ownership reports, annual employment reports, political advertising information, letters from the public, etc., in the file as required when required? Are you sure?

Explain please

If you're sure, answer "yes" to the public file question. But if you're not sure, you should probably include an exhibit explaining why you're not sure. Maybe it was a former (since terminated) employee who messed up, maybe files were lost during studio relocation, maybe your little brother tore them up. Whatever the story, it might be a good idea to be up front with the Commission.

While there's a good chance that the FCC would not question a simple "yes" answer without any explanation, there's also at least a chance that the FCC might find out that "yes" was not exactly the right answer—and if they find that out, you could be in trouble.

Another factor that may be less obvious than all this relates to your program performance. Programming information, of course, is not required to be submitted to the FCC, but that does not mean it's unimportant. If a competing application is filed against your license renewal, your programming during the past license term will likely become all-important.

The comparative renewal process is still alive and well, and with it comes the need for each licensee to be sure to provide a reasonable amount of locally-oriented non-entertainment programming directed

continued on page 72 ►



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Jones Satellite Networks, a subsidiary of Jones Intercable, Inc., is America's largest provider of 24 hour radio formats.

Tube O' Nine Lives

► continued from page 22

the tubes so they'll dissipate heat properly.

I am definitely partial to the Eimac brand. I used a competitive brand several years ago—once. The thing arced over and knocked us off the air. That was the first and last time I used something other than an Eimac tube.

Long-lasting tube

I've been in the radio engineering business since 1954, and I've never seen a tube last this long. In a similar situation with the older design tubes, we thought we'd made a killing if we had one make it to 15,000 hours. This tube's mate (also an Eimac tube) lasted 85,000 hours.

We pulled both tubes out in 1988, not because they stopped working, but because we were getting ready to launch AM stereo and it was a convenient time to replace them with new tubes. We didn't throw them out, though—we kept them both as spares, so there's a chance they could log even more service hours before they're ready to be discarded.

Whatever the combination of reasons for its longevity, there's no question that this particular Eimac tube could give the Energizer bunny quite a run for its money in the "keep on going... and going... and going" category.

□□□

Marv Collins is chief engineer for KFJ(AM)-KOST-FM in Los Angeles and is a contributing writer to RW.

Running Radio

Radio Online
debuts
this issue.
See page 31.

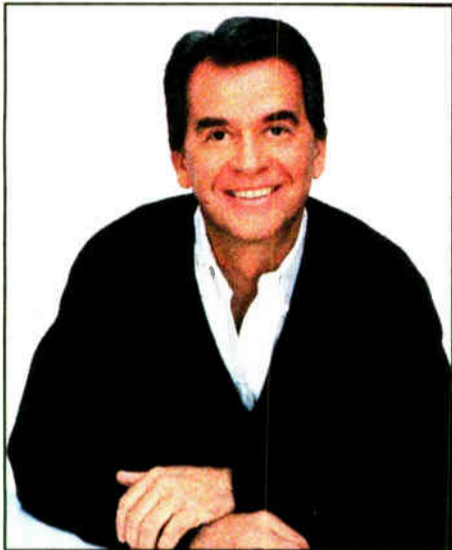
Your Resource for Business, Programming & Sales

Radio, Music Keep Dick Clark Young

by Alan Haber

BURBANK, Calif. Although almost always associated with television—"American Bandstand," game shows, blooper shows and award shows, etc.—the still youthful-looking Dick Clark also has and still maintains a major radio presence.

In addition to his activities with Dick Clark Productions, his television production and entertainment company, Clark is the busy chairman of the United Stations Radio Networks, the successful company he owns with partner Nicholas J. Verbitsky. And, if that is not enough, the man who made Clearasil a household name continues to happily host the enormously popular "Rock, Roll & Remember" radio show (as he has done for 12 years), and "Dick Clark's U.S. Music Survey," both distributed by United Stations.



Dick Clark began his career on the radio.

Rural Radio Network, a string of FM stations in the center of New York State. "One of the things they did was to relay weather in each part of the (state)," Clark said, "and you would pick it up from the next guy and say, 'And here in Rome and Utica, the weather is this, that and the other thing, and now to Albany.'"

Radio network

Clark is amazed that one of his first radio jobs was on a network, "a network that had seven or eight affiliates and no listeners," he noted.

"I still remember hanging around with the morning disc jockey and the guy who recreated the baseball games," he said. "The local team was the Utica Bluesox. He would sit there with the ticker tape and recreate broadcasts... it created a whole mind picture of a ball game. It was just two guys sitting in the studio, one with a ticker tape

and the other with a glass of beer and—" Clark laughed, "—an imagination."

After only five years as a professional broadcaster, Clark arrived in Philadelphia in 1952 at the age of 22, and went to work for WFIL radio and television.

Before this key career move, however, he spent some time as a news anchorman on WKTV, the NBC television affiliate in Utica. He had wanted to continue his television career, but he had what he called "a baby face, and they would not let me be a newscaster, because I did not look old enough to do the news in Philadelphia."

But, because there was no immediate place to put him on the television side, Clark was put on WFIL radio. "And I was delighted," he said. "I was an afternoon jock that did four hours of music...and I doubled on television, so I had the best of both worlds."

Bandstand

In the beginning, at WFIL radio, Clark went solo on the "Caravan of Music." When the Bandstand television program hit it big, its initial host, Bob Horn, came over to do the first and last 15 or 20 minutes with Clark on the radio. The show was renamed Bandstand.

"We played nothing at all similar to that which (Horn) played on television," said Clark. "It was all middle-of-the-road. Very, very tidy—you know, elevator-style music. Very, very popular—nothing that would appeal to a kid. It was a very

strange mix. What they were trying to do was capitalize on the phenomenon of the Bandstand, but they forbade those of us in radio to play the music that made the show popular."

Clark spent four years on the radio version of Bandstand, and then management asked him to become host of the TV version, where he put in an astounding 33 years.

"When they put me on the television show," he said, "I had to stop the radio show." But he never stopped being on radio. For example, in the late 1950s, he did a radio version of Bandstand in syndication, and he did a daily program for the National Dairy Association on ABC Radio.

United Stations

Around 1980, Clark began doing the National Music Survey for the Mutual Broadcasting Company. In 1981, he joined with Verbitsky to set up United Stations, which acquired RKO Radio Networks in 1985 and subsequently merged with Transtar Radio Networks. The new mix was dubbed the Unistar Radio Networks. In February 1993, Clark and Verbitsky sold their majority interest in Unistar.

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PROMO POWER

Managing Your Time 'Proactively'

by Mark Lapidus

WASHINGTON To give the station more market presence during the spring book, I was trying to piece together several major outdoor activities. It was difficult. I wasn't making much progress.

My day was a constant stream of interruptions. The phone was constantly ringing and there was a never-ending stream of salespeople standing at my door with "emergencies." It all came to a head one afternoon when the general manager came to my office to check

out my progress on one of the events.

I had one salesperson sitting in front of me and two salespeople standing in the doorway. I was answering a question on the phone while feeding a document to the fax machine. He said, "I can see you're busy... I just came in to ask you about the concert. Come see me when you get a chance."

Set your agenda

I hustled down the hall to his office as soon as I was able. When I explained to the general manager that I was getting too busy to handle everything, he passed

on these words of wisdom: "Don't let other people set your agenda." The minute he said it, I knew I had to switch my approach to the job.

Instead of being reactive, I became proactive. I also became a happier person at work. Here's how the proactive promotion approach works:

- **Make appointments with yourself:** If you do not stake a claim to your time, somebody else will. Get your dayplanner and map out a full week before you leave the office each Friday. Begin by scheduling time with yourself. I know this sounds unusual, but these really will turn out to be your most productive hours.

The best thing to do is guess a few more hours each week than you will really use.

For example, if you think it'll take you four hours to write the client newsletter, schedule five hours (maybe not all at one time... perhaps two one day and three the next). You'll always find something to do with that extra time; now it will be there if you need it. Another key is to schedule appropriate ventures during the right time of day. If your writing skills are sharper in the morning, that's when you should set aside that time to accomplish writing tasks. If you're more conversational first thing in the morning, jump on the phone when you walk through the door.

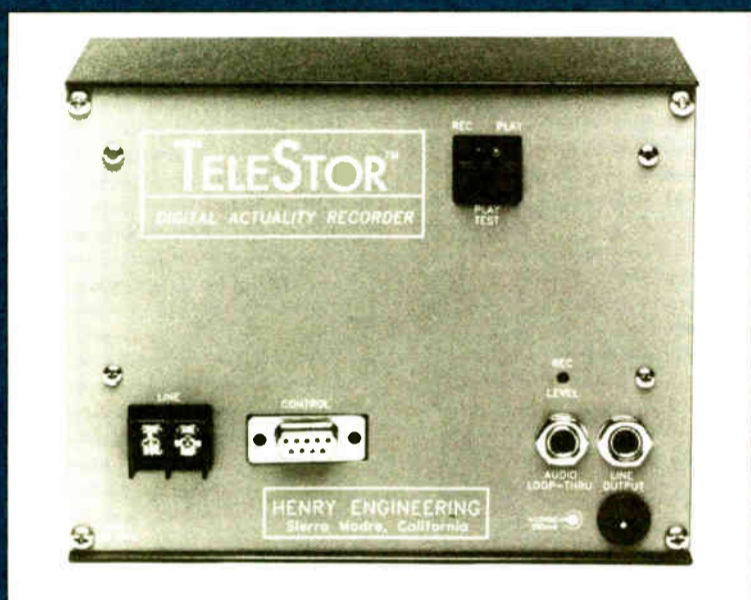
Others can make appointments, too. It's important to have an "open door policy," time during which anyone can drop in and see you at any time for any reason. However, people should understand that when your door is closed (as in shut), you're tied up. They should also know that "open door" visits are meant to be short visits. I know what most promotion people are thinking right now: "...okay... when is this guy going to talk to salespeople? How do I control them...?" Read on.

Keep in mind...

Salespeople sell: One characteristic that makes salespeople good at their jobs is their method of convincing others to see them. Don't take it personally; they will use their technique on you. The most common excuse is the old "emergency" problem. How many times have you heard this one: "I can't wait for the promotion meeting Wednesday. It's a \$5,000 buy and the client's gotta have the promotion by five o'clock today or I won't get the order." Odds are that they've known about this buy for two weeks, but have been too busy to deal with it until the moment they walk into your office. Don't even try to figure out if you're being told the truth. The truth really is irrelevant if money's on the table for your station and the only thing standing between success and failure are your ideas. The better approach is to develop and post "sales office hours."

With the consent of your general manager and general sales manager, set aside an hour each day when any salesperson can visit you without a prior appointment. Best times are either first thing in the morning (8:30-9:30) or the last hour of the day (4:30-5:30). This way, you won't cut into valuable salesperson on-the-street time. If a salesperson needs to see you or talk to you at length on the phone at any other time, he or she needs to make an appointment. Once this system is structured it's vital you stand firm for the first few months; salespeople (like most of us) will take the path of least resistance.

Telephone Tips: Most promotion departments become a dumping ground for anything the receptionist can't answer. I've been routed everything from questions about sports scores to directions to the nearest shopping center to the dial position of other radio stations. This is ridicu-



Hassle-free Widgetry.

Yet another unique, problem-solving widget for the broadcaster. Announcing the Telestor by Henry Engineering.

Telestor takes the hassle out of recording news reports, weather updates, and other "actualities" that are sent via dial-up phone line.

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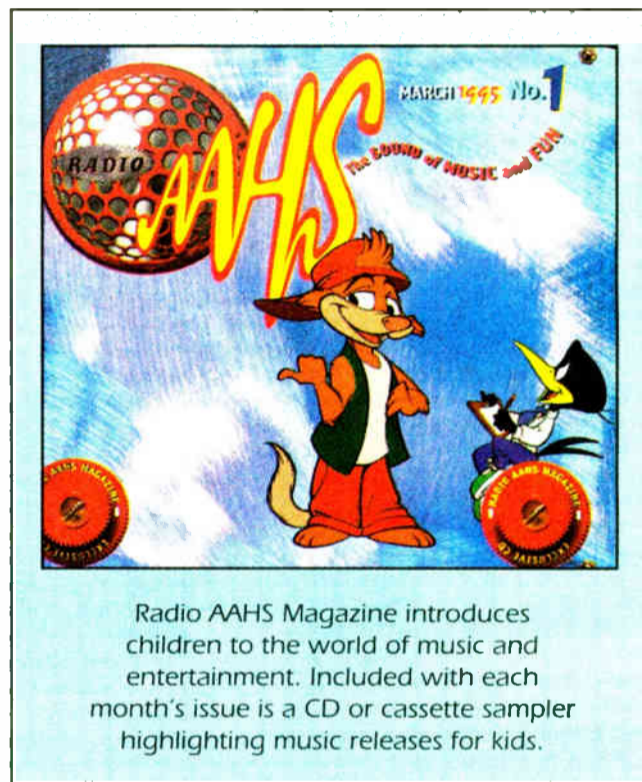
Simply connect Telestor to a regular phone line. It

answers the line, waits for the Touch-Tone password, then records the audio from the line. After the feed, Telestor plays it back to the caller for verification. It can be re-recorded if necessary. If not, the caller hangs up. That's it. The actuality is now ready for instant on-the-air playback.

Telestor stores one message in digital memory, up to 5-1/2 minutes long.

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HARRIS ALLIED



Radio AAHS Magazine introduces children to the world of music and entertainment. Included with each month's issue is a CD or cassette sampler highlighting music releases for kids.

lous. A well-trained receptionist can and should be directed to divert the irrelevant. Next step: get an answering machine or voice mail. (If this can't be done through the switchboard, get a special promotion number.) Feel free to turn the answering device on during those hours you've scheduled time to work on projects. It's more time efficient to return calls than it is to take them unscreened. Perhaps a promotion director can even turn over some of these calls to an assistant or an intern.

Set your own agenda: After you've reclaimed your time, get down to the most important part of being proactive: set your own annual promotion agenda. Decide what activities, contests and appearances will benefit the station. Do this prior to January each year and adjust it as necessary as time goes by. This promotion planning process needs to involve all departments of your station. Everyone needs to sign off on the plan right from the start. If programming and promotion (with input from sales) don't set the agenda, it will be set for them totally by clients. Drive your own car or it will be driven for you. You've got the keys.

□ □ □

Mark Lapidus is director of marketing for Liberty Broadcasting. Liberty owns stations in Washington, D.C.-Baltimore, Long Island, and Albany, N.Y., Hartford, Conn., and Providence, R.I., and broadcasts the "Wolfman Jack Show" on the Liberty Radio Network.

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M A R K E T P L A C E

Talk Prevalent on Christian Radio

by Thomas Pear

DALLAS The popularity of talk radio is not a recent phenomenon. The Christian market, for example, has been chatting about the latest political and social hotbeds for years.



USA Radio Network and Talknet founder Marlin Maddoux

talked about these basic issues for a long time," he said.

In 1982, long before most listeners had even heard of Rush Limbaugh, Armstrong Williams, G. Gordon Liddy or the rest of the conservative talk-pack, Maddoux hooked up to a satellite and began relaying his "Point of View" radio talk show to stations across the country.

At the time, he said "the idea of a live radio, issue-oriented talk show was not only new to Christian radio, it was new to radio in general."

Reflecting trends

Maddoux acknowledges that talk radio played a role in the recent Republican sweep of the House and Senate. But talk radio, he said, is not so much a trendsetter as a trend reflector. "I think Rush Limbaugh reflects a change. I don't think he has caused it."

The trend, Maddoux says, is conservatism, and the Republican electoral landslide is merely proof. Maddoux will, however,

tell you that talk radio did play a role in repositioning ideological thinking amongst the population.

"I think Christian broadcasting, especially Christian issues-oriented

broadcasting, has helped as a catalyst for rethinking in America on the subject of values and morality and so on," he said.

According to Maddoux, what is driving conservative talk radio is a frustration that mainstream media does not give "both sides of the story."

"The country's consciousness has been controlled by the three major net-

According to Maddoux, what is driving conservative talk radio is a frustration that mainstream media does not give "both sides of the story."

works. They have dictated what people discuss, they've dictated how they think, they've dictated what is important and what is not important. And it has been almost a closed-media society," he says.

But talk radio breaks that information monopoly, he claims.

"One of the secrets of breaking that media hold has been talk radio—whether it be Limbaugh, G. Gordon Liddy, Pat Buchanan or myself," Maddoux says.

Even so-called liberal talk show hosts are pinned into giving both sides of an issue because conservative callers are sure to express their opinions on the latest issues of the day, according to Maddoux.

In fact, talk is so popular that even local programmers are broadcasting their own "Point of View" shows, putting a community spin on national issues brought

out in the national show, according to Maddoux.

"We do have quite a lot out there that have their own local show following 'Point of View,' and it's just picking up what we have talked about and applying it to the local situation," he said

Saving AM

Maddoux, who mixes his years of broadcasting experience with experience grounded in years of evangelical faith, recognizes the role talk radio has played in "resurrecting" the AM band. "The

alternative to talk is music, and if a person has a choice to listen to a song on AM or FM, he is going to go to FM."

But he points out that talk radio is not confined to the AM band. "I think it's a mistake to relegate talk to AM stations. Some of the most successful stations that put 'Point of View' on are FM stations," he said.

One of those stations is WSOR-FM in Fort Myers, Fla. WSOR Chief Engineer Dave Coffman agrees that talk is popular on the FM band. "It is very popular on FM," he says. "Talk radio is a hot format now."

Although AM digital audio broadcasting could push the AM band back to programming music, with the availability of near-CD-quality audio, it would only happen "until the new of it wears off," Maddoux says. "There will always be a demand for talk."

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Build Useful Headphone Imaging Network

by Jim Somich

CLEVELAND If you have ever done any serious monitoring through headphones, you are well aware of the difference in perspective when monitoring through phones vs. loudspeakers. The effect of the musicians locked in the middle of your head directly between your ears is unnatural and has no relationship to the effect experienced when monitoring through speakers. Modern recordings are mixed to have the correct perspective when monitored on loudspeakers, not headphones.

While this may not be a big problem for a DJ on the board, it can make mixing production spots or live music very challenging. And while the brain is very effective in "compensating" somewhat for this adverse effect, it cannot completely eliminate it. The result is that what you hear in the phones is not what you hear on the air.

True binaural recordings, or recordings made with microphones mounted in the ears of a dummy head, come closer to recreating reality in headphones. This is because the microphones closely correspond to the location of the listeners' ears,

The ITD for 30 degree off center sound is about 300- μ s, but different frequencies travel around to the far ear at different rates. Low frequencies set up a standing wave at the surface of the head

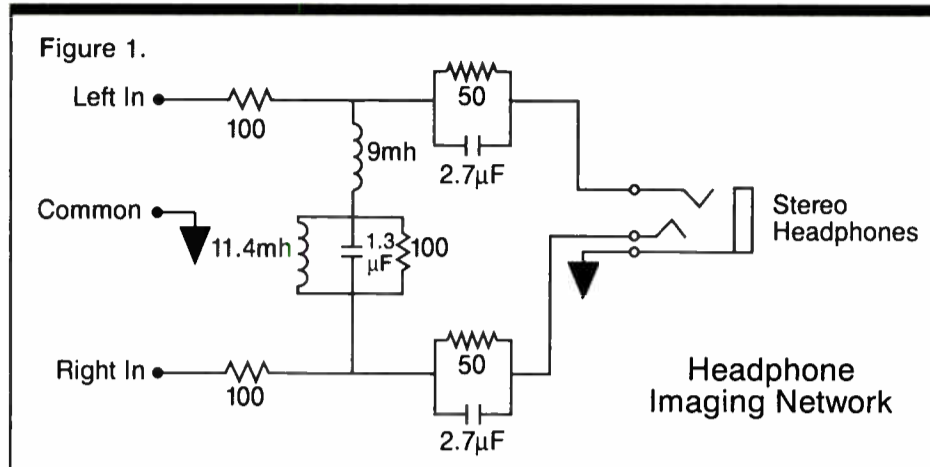
by, so they experience only modest attenuation as they travel to the far ear. As you get higher in frequency, the acoustic wave has a more difficult time wrapping around your head. Soon the

piece of perf board or etch a simple printed circuit.

I have found the headphone imaging network very useful when doing critical mixing. It does much to restore the normal spatial localization cues missing when using headphones. And, besides, it is just a fun circuit to play around with.

□ □ □

Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. He can be reached at 216-546-0967.



and take longer to get around to the far ear than the high frequencies. The network delays low frequencies more than the high frequencies.

Closer is better

It is intuitively obvious that the ear farthest away from the speaker does not hear sound as loud as the ear closest to the speaker. What is not quite so obvious is the frequency dependence of this phenomenon. Low frequencies wrap themselves around your head as they go

sound just travels right past your head, and the far ear is literally in the shadow of the head.

An additional contributor to IAD is the slightly better high frequency response of the ear closest to the speaker. As the sound source moves toward the side, the high-frequency response of the ear on that side improves.

You can experiment with the Bauer circuit by constructing the cross-feed network and monitoring various sources through it. You can assemble it on a



and the frequency response and delay anomalies inherent in normal human hearing are taken into consideration.

If binaural can compensate somewhat for the perspective distortions when monitoring with headphones, is it possible to apply this knowledge to monitoring systems for production audio being mixed for speaker monitoring?

More than 25 years ago, an audio engineer at CBS named Benjamin Bauer became fascinated with headphone monitoring and sought some way to compensate for the "orchestra in your head" phenomenon electronically.

Psychoacoustics 101

Headphone listening is unable to present a normal audio image because much of the spatial localization information is missing. Imagine you are listening to a pair of speakers and you turn off the left speaker. Both ears continue to hear the right speaker. But the right ear is a little closer to the speaker, so it hears the sound slightly before the left ear. This time difference between ears is called the Inter-aural Time Difference (ITD). ITD is the primary cue your mind uses to localize sound left to right (lateralization).

The near ear also hears the sound slightly louder. This is because the far ear is in the acoustic shadow of the head. The loudness difference between ears is called the Inter-Aural Amplitude Difference (IAD).

The circuit illustrated creates a cross-feed, delay and EQ between channels. It is modeled after a circuit designed by Benjamin Bauer more than 25 years ago.

The right channel goes directly to the right ear, but it also gets mixed into the left channel via the electronic delay and EQ circuit.



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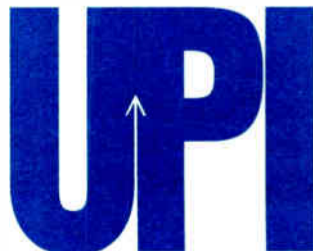
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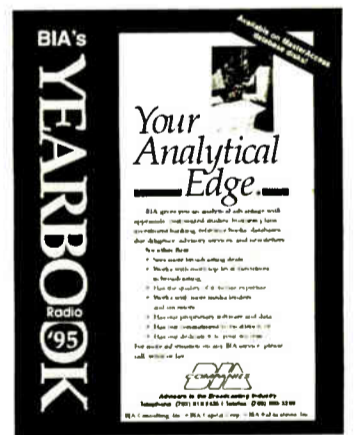
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MANAGER'S NOTEBOOK

Size up That New Career Opportunity

by Sue Jones

BURKE, Va. Congratulations on your promotion! It feels great to have landed a new job that is a promotion or to be promoted within your current organization.

Even if you are moving from one station to another in a lateral move, there are some basic managerial tasks you should do before you actually assume the responsibilities of the new position. Taking care of these tasks at the beginning will help assure a smooth transition into your new position.

Any management position (general manager, sales manager, program director, chief engineer or business manager) with subordinate staff could benefit from these steps. If you have just promoted a staff member to a management position, advising him or her of these steps could help him or her make a strong beginning.

Necessary steps

1. Before you start your first day in the new position, talk with the owner(s) or general manager to learn the expectations of the position and get a copy of the position description. In addition, you should get a list of the deliverables, such as expected revenue amounts, profit margins, budgets and sales reports. You should also find out the dates each of the deliverables is due.

If you are new to the organization, get a

copy of the policy and procedures manual (office manual of operating rules) and subordinate position descriptions. Read all of these documents carefully so that you are knowledgeable about the guidelines the existing staff has been following.

2. The next step is to determine the most important operational issues to you. Examples include: staff members submitting reports to you on time; promptness in reporting to work and to meetings; professional dress; problem reporting and resolution; and accountability for responsibilities. If you have a difficult time determining what issues are most important to you, think of what will anger you if it does not happen when you think it should or if something happens that you think should not happen.

3. Compare the expectations from your manager/owner with your expectations list for your subordinate staff to make sure there are no contradictions. Knowing your deliverable requirements and their due dates may drive your expectations of subordinate staff members. If you must report sales figures by the 10th of each month, you will want your staff to provide you with their individual sales numbers by the 5th so that you can prepare the composite report and forward it to the general manager/owner. Armed with the two lists above, you are ready to start your first day on the job.

4. On the first day, or certainly a day during the first week of your new job, have a

meeting with your entire staff, not just the department heads. It is important to meet with the entire staff so that you can make sure that accurate information is distributed to everyone at the same time. If you meet with just a few of your staff members, they may convey selective information to the others that could be misleading compared with the information you would provide.

There are several purposes for the meeting. It allows you to:

- Convey expectations to the staff. This is the list you made of the most important operating issues. You might be very different from your predecessor. He or she may have accepted reports a day late and you find it unacceptable. It is better for you to advise the staff up-front, long before reports are due, rather than explode when every one of them is a day late. The staff will learn from your unanticipated actions what you want and when you want it. However, this type of learning is by trial and error, which is very time consuming and far more costly.
- Advise staff of operational changes. If you are going to change policies and procedures, you should list those changes for the staff and explain why you are making the change. For example, you may feel that it is important for the sales staff to wear professional dress every day even though the station's former policy permitted dress-down day on Fridays. Explain the reason for your decision to modify the dress guidelines. You may feel that the station's image is harmed if the sales staff meet customers in casual attire.

- Provide personal background information. If you are new to the organization, you may want, at the least, to provide some background information about yourself. This might include education, previous experience and maybe a success story about a previous station. If you have been promoted from within, your staff will know you as a co-worker. It is important

to let them know how your role will be different and what they can expect from you as their managing supervisor. A meeting of this type when you first assume the position's responsibilities helps move you into the managing role for former co-workers who now report to you.

Meeting individually

Within a week, meet with each direct report subordinate staff member (department head). Make sure you have a copy of each person's job description with you during the discussion. Having a copy of the job description is a good double check. It lets the staff member know that you are aware of his or her job expectations. It will also alert you to discrepancies of the staff member's understanding of his or her accountabilities and the station's perception of the job's accountabilities. Ask the direct report staff members to brief you on the work they are doing, their approach and their rationale.

Ask the question: If you could improve anything at the station, what would it be and how would you do it? The answer should give you tremendous insight about the person. If you get the same answer twice or more for improvement ideas, consider it an opportunity area where you should spend time and energy.

Following these five steps has additional advantages:

- Transition from the previous manager to you will be smoother, eliminating misunderstandings and expectations.
- It establishes your leadership position.
- It sets the tone for the new management.
- The staff can get back to their jobs without spending unproductive time at the water cooler speculating with each other about your management style.

Best of luck with the new job; however, you will not need luck. Approaching the new position using these principles will demonstrate your management acumen.

□ □ □

Sue Jones is a senior manager for Computer Data Systems Inc. in Rockville, MD. She can be reached at 703-323-0491.

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The First Step toward 'Cyberspace'

by Alan Haber

WASHINGTON Your station should be online.

To paraphrase the title of an old Elvis album, 50 million cyberhounds can't be wrong. And that is just the number of people negotiating the Internet, which, by some accounts, is growing about 15 percent a month.

Add in the subscribers to some of the commercial online services—over two and a half million on CompuServe, and a million and a half on America Online, for example—and you've got an enormous potential audience for information about your radio station.

Sprouting like weeds

Radio online? You bet. Commercial and non-commercial stations and related services are sprouting like weeds along everybody's favorite information thoroughfare (about 200 are online now, with more being added all the time).

Welcome to *Radio Online*, your bi-monthly guide to steering your station onto the information superhighway. Here, you will learn how to increase awareness of your station in your local area, and realize benefits by reaching out to the nationwide online audience. The cost to plug in, by the way, is relatively small.

First, a couple of assumptions: someone in your station knows how to get from here to there while online, and that same someone (or someone else) knows how to get online in the first place. Choosing a service provider to get on the Internet can be tricky; however, an easy-to-use, Microsoft Windows-based interface is available from Netcom by calling 800-353-6600, or at your favorite bookstore—it is included with the book *Access The Internet!*, by David Peal (SYBEX).

Most online action related to radio happens on the Internet's World Wide Web, which uses graphic and hypertext links to connect to information stored on computers around the world. But wait: the commercial services are starting to play catchup—CompuServe's BP (Broadcast Professionals) forum, and forums like the one maintained by National Public Radio on the Internet, CompuServe and America Online, are solid examples.

Stations like Melbourne, Fla., CHR outlet WAOA-FM (known as WAIA, after the coastal highway that runs up and down the east coast of the Sunshine State) are racking up big successes on the Net with Web pages (type in address <http://www.wala.com/wala.html>—link to sister station, news/talk WTAI(AM), from there). Jeffrey C. Kimmel, general manager, said the station's Web pages, which feature programming and personality information, went up on the Net around the end of September last year.

Logical extension

Kimmel said the pages "seemed like a logical extension of our marketing" to reach people "in their environment." The targets: computer hobbyists and people who work in the Melbourne-area high tech industry. Speaking about the FM outlet, he said he hoped its pages would "increase cume. We hoped that by creating a Web site, we could reach out to people who might not normally tune into our station because of the stereotypes associated with the CHR format." Kimmel said the Web

site has "certainly helped" to increase WAIA's ratings from 7.0 to 12.1 in the last ratings book. He also said that about 70 percent of the many who have accessed the stations' sites are from the local area.

Finding a radio-oriented Web site is easier than calling AAA. Aside from the thrice-weekly postings of new Web sites on the NCSA What's New page (<http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/whats-new.html>), radio stations and services on the Net are accessible as hypertext links through at least five highly-comprehensive radio-oriented Web sites.

For example, KZSU-FM, Stanford

University's radio station, has pages linked to its Web site (<http://kzsu.stanford.edu/index.html>) containing hypertext links to

Radio Online



both commercial and non-commercial stations throughout the United States, Canada, and abroad (<http://kzsu.stanford.edu/other-radio.html>). Daniel Rosenberg, KZSU's

Webmaster (that's the person who oversees a Web site) said the station's own Web area was erected to promote its "identity and presence."

Being on the Web helps further the mission of college radio, and allows college stations across the country to learn from each other, said Rosenberg, who noted that it takes three people only about two hours a week to maintain the site. Contact him at dmr@kzsu.Stanford.EDU to add your station to KZSU's pages.

Other radio station lists on the Net include:

- Radio Stations on the Web, a collection of links maintained by Justin Paulson, general manager of Swarthmore College's WSRN-FM. Paulson says he gets about a half dozen requests a week

continued on page 33 ►

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Telos Answers Your Questions About

LAYER III

by Steve Church

When talking with broadcasters and audio professionals about codecs, Telos President, Steve Church is often asked to explain key issues about this emerging technology. The following are some of the most frequently asked questions about Layer III.

Why did Telos select ISO/MPEG Layer III perceptual audio coding?

Zephyr™, our first product using perceptual audio coding, is specifically designed for use with Integrated Services Digital Network (ISDN). Our decision to use Layer III was obvious as it remains the very best choice for coding at the bit-rates of ISDN. The final report of ITU/R Task Group 10/2 clearly recommends Layer III for ISDN bit-rates and the daily experience of Layer III users further supports those findings.

But Layer II is used more widely for satellite program distribution and is an important contender for DAB. Why is this?

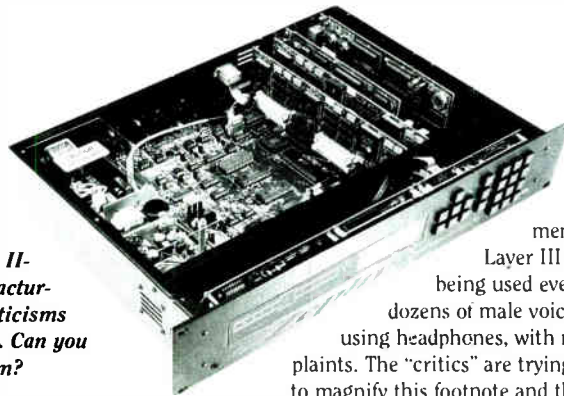
Layer II is the superior performer in applications with bit-rates of 128kbps per audio channel. We have no argument with that. But there is no logic in concluding because Layer II works best for satellite, it should be used for ISDN. That is like saying since your hammer works well driving nails, it is also the best

choice for turning screws!

Some Layer II-only manufacturers have criticisms of Layer III. Can you address them?

Certainly. There have been interviews in several journals with Layer II-only manufacturers who state that Layer III is too complex and too expensive. When one looks at the Telos Zephyr, it is obvious that these are unsound arguments. Complexity and cost are design hurdles that Telos has overcome and we have products that are reasonably priced, easy to use, and incorporate the most appropriate technology.

Another frequent criticism is based on a footnote in the 10/2 report citing a single sample of male voice monitored through headphones. This finding, however, did not prevent the 10/2 task group from



making its final recommendation.

Layer III codecs are being used every day by dozens of male voice talents, using headphones, with no complaints. The "critics" are trying very hard to magnify this footnote and their arguments become weak when one reads the full, final report and examines all the facts.

Do you have other data that supports Layer III's superiority at ISDN bit-rates?

Audio Precision, the world's most respected developer of audio test equipment and procedures, recently released a test suite for evaluating codec performance. This protocol, TechNote 14, can be used to demonstrate two significant deficiencies in Layer II's ISDN bit-rate performance. Layer II is limited to about 10kHz when used on a single 64kbps

Supplement to Radio World

April 5 1995

: ZephyrNet Makes Its Mark

: WFNC Blends Vintage with Digital

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➔ Back



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ZephyrNet™ provides an easy-to-implement terrestrial method for transmitting high quality audio to a large number of locations over ISDN. It is ideal for radio program distribution, backup to satellite systems, and other distributed audio transmissions.

ZephyrNet uses ISDN Primary Rate Interface, known in Europe as S2M. In the Western Hemisphere, each PRI has a capacity of 23 bearer channels allowing 23 mono or 11 stereo (or dual-mono) signals, with each signal going to a different location. In other parts of the world, S2M allows 30 mono or 15 stereo signals.

The functions and features of ZephyrNet are con-

trolled by a provided personal computer (PC) with software using a graphical user-interface. At the program origination (hub) location, audio is fed to a Zephyr transceiver, coded, and, using the Zephyr's data output, transferred to the ZephyrNet Digital Network Hub. (The source audio may alternately originate from one of the remote sites.)

Following the user's programmed instructions, the coded audio is distributed from the hub via ISDN PRI (S2M) to remote locations. At these sites, up to two channels of audio are received by Zephyr™ transceivers connected to standard ISDN BRI (S0) lines.

A marked enhancement of the Telos Zephyr's capabilities, ZephyrNet supplants satellite

transmission by putting the power, convenience and economy of digital telephony at the point-to-multi-point distributor's fingertips.

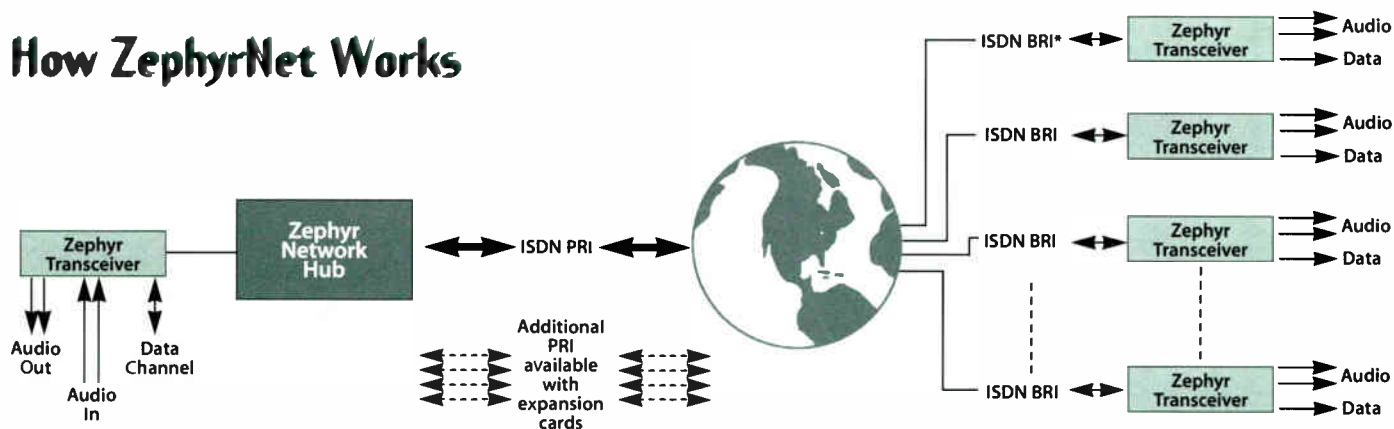
The key to the superior audio performance of ZephyrNet is its use of ISO/MPEG Layer III for audio coding for broadcast quality, 15kHz audio on each channel.



SPECIAL FEATURES OF ZEPHYRNET INCLUDE:

- Automatic dialing and connection to all participating remote sites. Special subsets may also be created. Individual connection and termination can also be easily accomplished. In addition, the Network Backup mode allows ZephyrNet to initiate an automatic dialling sequence as the result of an external command.
- The hub may receive two channels of audio from a single remote site. The audio may be used locally at the hub location or be distributed to the entire network.
- Economical expansion boards permit hundreds of channels of audio distribution.
- Unattended operation with connection and termination at times programmed by the operator. Connections can be made to any number of sites using ZephyrNet's internal clock. Events can be scheduled to occur on a recurring basis (e.g. once per week) or at a single date and time.
- In addition to audio, ancillary data can be transmitted to the remote sites using RS-232 at 9600bps.

How ZephyrNet Works



WFNC Marries Telos' 90s Digital Technology to a 60's Console

At first blush the two don't appear compatible. There's the thirty-year age difference. And, as if that weren't enough, one is steadfastly analog, the other absolutely digital. But a determined matchmaker can produce surprising results.

top-forty sound. "They have an open frame op amp design and passive mixing with a mix bus at 1200 ohms and gobs of output level," says Jordan.

All-talk only since the late 80s, the station originally used a speaker phone to bring callers and hosts together on air.

"The limitations of the speaker-phone system were too great," says Jordan. It just couldn't handle the programmers' growing appetite for more versatile and sophisticated teleconferencing. So, WFNC turned to the ONE-x-Six, in part, because of "the nice clean way it handles conference calling," notes Jordan. "It's perfect for the application."

Jordan found other benefits in the bargain.

"I love the sound," he says. "The circuitry in the Telos actually enhanced it, made it brighter than the

levels of the ONE-x-Six and the two aging consoles, one in the on-air studio, the other in master control.

He put a 1200 ohm step attenuator in the mix minus from the console to trim output to an acceptable range for the Telos. The input to the ONE-x-Six is adjusted by a separate attenuator. Then, taking advantage of one of the two outputs provided, Jordan sends a mix of the host input and caller signals to master control.

In addition to wrestling with the output of those classic Blanchard boards, Jordan has to cope with the fact that WFNC operates in a high RF environment – its studios are co-located with 10kw AM and 100kw FM transmitters. He found that the wide pass band of the audio section of the ONE-x-Six picked up RF. Jordan solved the problem by installing a Western Electric 111C repeat coil with an electrostatic shield he found while scrounging through his junk box.

Was the ONE-x-Six worth the effort? Without a doubt, Jordan says. "I'd recommend the ONE-x-Six to anyone."

A talk-show host himself, Jordan particularly likes the ONE-x-Six's *Next* feature which automatically selects the line that has been ringing the longest.

"Everyone here is delighted with the ONE-x-Six. Sales have gone up, the staff's happier and nobody's spilled coffee in it yet," he quips.

Especially when its a veteran like Terry Jordan, Cape Fear Broadcasting's director of engineering, who successfully coupled a Telos ONE-x-Six with WFNC's 60s-era control boards.

On the air since 1940, the Fayetteville, North Carolina AM station relies on two vintage Blanchard T-40 consoles designed in the mid-60s to oblige the then hot

source."

Housed in a single rack mounting unit are Telos' proven digital hybrid workhorse, the Telos ONE and a six line, broadcast phone system. For system control, the ONE-x-Six also includes Telos' desktop Switch Console.

Jordan explains that the challenge was to reconcile the output

WFNC AM640 News-Talk Radio



LAYER III

ISDN B-channel. In addition, Layer II's joint-stereo mode dramatically reduces stereo separation. Nearly all discrete channel audio information above about 6kHz appears on both channels of the codec's output.

On the other hand, only Layer III permits 15kHz mono on a single ISDN B-channel, a perfect match for mono broadcast. Layer III also offers clearly superior stereo separation as well as dual-mono on two B-channels.



LAYER III

Do you see cascading multiple codecs as a problem?

It appears that, in the near future, most broadcast audio signals will be subject to multiple encode/decode cycles before they reach the listener. Unfortunately, there is no completed research into the effects of cascading using "real-world" broadcast audio chain configurations. More appropriate research must be completed in the very near future.

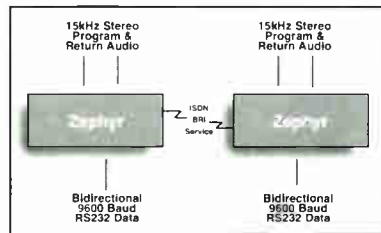
Our view is that one should code only where the bits are unavailable or expensive – and then use the most bits and the most powerful coding method.

Is Layer III the only advantage of your products?

No, there is much more. Zephyr is a complete ISDN transceiver. Unlike other manufacturers who are licensing ISDN terminal adapters, we have developed our own. This has enabled us to enhance the feature set for broadcast users and create a unified, easy-to-use set of controls for both the codec and terminal adapter sections. We have included practical and useful features, such as comprehensive metering, a headphone jack, end-to-end contact closures, and Windows control software. These features are very important to our customers.

What is next for Telos?

Telos has developed products for the broadcast-to-telephone interface for over a decade. Zephyr is our first ISDN transceiver, not our last, and our feature set and range of products will continue to grow as we add functions suggested by Zephyr's users. For example, in 1995 our customers can look forward to nearly



We designed our own terminal adapter specifically for broadcast. Our ISDN Telephone feature even allows you to place a standard voice-grade call to a Plain Old Telephone Service (POTS) phone.

universal compatibility with other Layer III and Layer II products.

We see ISDN as tremendously empowering technology for new and creative programming. Telos is dedicated to getting it into as many hands as possible and making it an easy to use, effective tool.

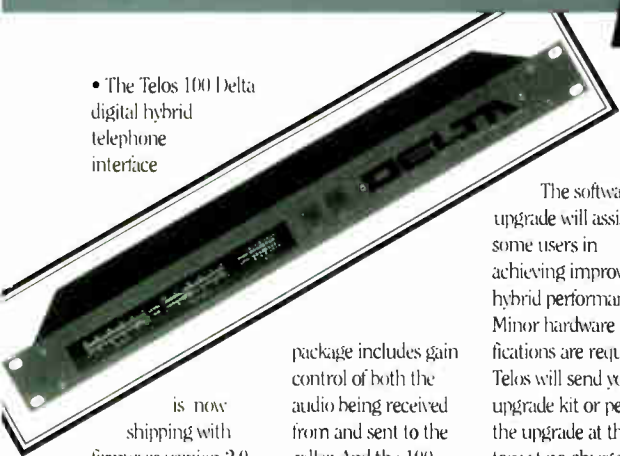
“We see ISDN as tremendously empowering technology for new and cre

“Layer III permits 15kHz mono on a single ISDN B-channel, a perfect match for mono broadcast.”

“Our decision to use Layer III was obvious as it remains the very best choice for coding at the bit-rates of ISDN.”

TECH NOTES TIPS TIDBITS

• The Telos 100 Delta digital hybrid telephone interface



is now shipping with firmware version 2.0. The 100 Delta has always provided the best trans-hybrid loss for natural sounding, full-duplex caller audio. It's digital signal processing (DSP)

package includes gain control of both the audio being received from and sent to the caller. And the 100 Delta is the only digital hybrid to offer Dynamic Digital Equalization, which automatically improves caller audio sound.

The software upgrade will assist some users in achieving improved hybrid performance. Minor hardware modifications are required. Telos will send you an upgrade kit or perform the upgrade at the factory at no charge.

• **Direct Interface users should be aware that the current firmware version for that product is 1.44 and the current hard-**

ware version is E. The latest firmware is recommended for all users, while hardware version D can improve Direct Interface performance when used with the Telos 100 Delta.

Telos will send you an upgrade kit for your Direct Interface or perform the upgrade at the factory at no charge.

• Jay Rose is a Clio-winning producer, Zephyr user, and creator of Zephyrspace, an online listing of

Zephyr users who may be interested in working with others for newfeeds, help with remotes, audio transfers, production, etc. Zephyrspace can be found in several locations on the Internet, including Library 6 of Compuserve's Broadcast Professionals Forum; the rec.audio.pro and rec.radio.broadcasting newsgroups, and at ftp.netcom.com (pub/daw-mac). It will soon be available on the World Wide Web.

Zephyrspace is updated regularly. To be listed, send company or station name, city and state, contact name, voice phone number, and email address to jcrose@tiac.net. If you do not have email, fax the information to 617.232.8869.



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Radio Events Can Be for Fun and Profit

by Thomas Pear

WASHINGTON Stroll by the Valley Forge Convention Center right outside the city of brotherly love next October and your nose just might detect the tantalizing aromas of gourmet dishes prepared by world-renowned chefs.

Or quite possibly prepared by not-so-renowned WWDB(FM) Philadelphia air personalities, who may be able to at least flip you a hamburger patty.



A giant boom box can draw a giant crowd...

Each year the station and its advertisers unpack truckloads of chili, pastry and other kinds of treats for the palate at the station's annual food festival.

Food and fitness

As a couple of the on-air talent prepare dainty dishes with noted chefs, other air personalities walk the festival floor sharing greetings and autographs with attendees.

And if you think that is too fattening for your own good, don't worry. In April the station sponsors its annual health festival, complete with aerobic instructors, gymnastic demonstrations and even phlebomotomists testing cholesterol levels.

Although both festivals share proceeds with local charities, there is still some profit revenue left over for the station, said Promotions Director David Gorab.

The two events are part of a large number of off-air revenue raisers that stations around the country are implementing. And some of these promotions include quite a bit of creativity.

Profitable partnerships

Group W's WMAQ(AM) in Chicago, for example, hooked up with a local television production company, Intersport Television, and scheduled a series of March madness panels at Michael Jordan's restaurant for this year's NCAA basketball tournament. The station programs a news/sports format.

The discussions were scheduled to be aired live on the station's talk show "Sports Huddle," and later on ESPN, said WMAQ Marketing Director Julie Roberts.

Although the tournament had not started

at press time, the station already pulled in more than \$100,000 from promotion sponsorships, Roberts noted.

As the tournament progresses to the Final Four, hour-long panel discussions will feature college basketball coaches making predictions as to which teams will beat their opponents in the next set of match-ups and which teams will be eliminated. "Nobody else is going to have 12 coaches on-air," Roberts said.

Roberts credits Intersports Television for making the event possible. "The cost would be prohibitive without the partnership," she said.

Out of the deal, the television production company gets free publicity from WMAQ, a 50 kW clear channel.

In the fall, WMAQ gets additional off-air revenue by sponsoring tailgate parties during Chicago Bears football games. Although the station is not the official station of the Bears, it can still enter into pre-kickoff and post-game revenue-making ventures, Roberts said.

Pie in the sky

Besides forging joint ventures with other media outlets some stations team up with

companies that specialize in promotional apparatus. The Redwood, Calif.-based Pie in the Sky company helps stations generate additional revenue during live remotes through its line of small blimp-shaped balloons tethered to a fixed location.

Simply tether the balloons to a fixed location, said Pie in the Sky President Michael Handler, and at an altitude of 100 feet motorists can spot them for a couple of miles.

The balloons gives remote sponsors "an opportunity to have a visual presentation



...as can an inflatable one.

as well as an audio presentation," he said.

It also gives stations an opportunity to sell balloon advertising as an added remote feature, pulling in additional remote profit-making dollars.

Studies have shown that potential customers will remember a balloon advertisement for as long as six months.

"Studies have shown there is a high degree of memorability," said Handler, whose company, by the way, also offers a giant inflatable boom-box.

Boom Box Corporation

Speaking of boom boxes, the Boom Box Corp. in Palm Beach Garden, Fla., offers boom-box-shaped studios to stations placed on top of a truck with a hydraulic lift.

The boom-box studio loaded with outside speakers can be raised as high as 36 feet, says Boom Box President Steve Butler. Stations can then sell advertising on the box or a roll-down banner hung from a lifted box that serves as a type of billboard.

But the banner serves as a more effective attention getter than a billboard, Butler noted. It is "so unusual it will knock the socks off of people." And that gets the attention of advertisers.

Tampa's WMTX-AM-FM (Mix 96), for example, makes between \$5,000 and \$6,000 a boom-box outing.

"The box has been one of the most unbelievable tools that we have come across," said WMTX General Manager Jonathan Pinch. "We have people (advertisers) clamoring for the boom box because it draws a crowd."

In addition, stations can gain further revenue from the box by selling advertising on a LED marquis-type message board. Stations can program messages from either the mobile studio or at the station's home studio by remote.

The cost of the box starts at \$128,000, but stations can finance or lease the box for \$2,000 and \$3,000 a month, Butler noted.

Butler promises his company will help stations find sponsors, a task that should not be too difficult because advertisers can realize a "10 to 1" return with the banner advertisement over a billboard ad, he said.

Radio Diner

And then there is the Airstream radio diner exclusively sold through Atlanta-based Measured Marketing.

The nostalgic diner with its 1950s appeal is loaded with the latest broadcast equipment that makes an attractive attention-getter (see RW, Jan 11). With seating for up to 18 guests, it can host a wide variety of promotional opportunities including celebrity interviews and CD listening parties.

"That's inside," said Measured Marketing President Bob Lewis. "If you have good weather you can put up umbrellas and get a lot more people."

Stations can customize the diner to suit their own needs. One country station, for example, selected a black and white cow-print motif for booths, stools, awning and skirting.

"We've basically sold to every format at

this point," Lewis noted.

The diner adds a new twist to an old promotion. Stations can throw coffee-break contests for listeners, where the diner is motored to the lucky winner's workplace for a morning coffee break for the whole office.

Stations can rake in big bucks from the promotion through contest sponsors, Lewis pointed out.

Like the boom-box, an LED message board fixed to the top of the diner allows stations to gain even more advertising dollars.

Cyberspace Beckons

► continued from page 31

from radio stations to add their links to the page; about half of them are from commercial stations, requests from which are on the rise. Add your station by contacting Paulson at justin@secs.swarthmore.edu.

- Software engineer Pete Costello's Shortwave/Radio Catalog (<http://itre.uncecs.edu/radio/>), resident on the Net since last April, includes links to college and commercial stations and radio resources. Costello includes short, helpful descriptions of each link. Contact Costello at pec@joker.ho.att.com.

- Radio Stations on the Internet (<http://www.mit.edu:8001/activities/wmbr/otherstations.html>) is a collection of links attached to MIT's WMBR-FM's Web site (<http://www.mit.edu:8001/activities/wmbr/home.html>). The number of stations listed here has grown from about one or two dozen to about 120 after only eight months online. Contact Webmaster Ted Young at theodric@mit.edu.

- The Yahoo index of radio station links is maintained by Stanford University Ph.D. students Jerry Yang and David Filo. Yang said a few new stations are added each week. Add your station online or contact Jerry at jerry@koni-shiki.Stanford.EDU.

Scratching the surface

Believe it or not, there is much more to radio's online presence. For example, you can get the latest FCC information (including the FCC's Daily Digest) from <http://fcc.gov:70/Oh/AAA/HOME-PAGE.html>.

Next time: how to erect a Web site, and NPR online. If your station has an online success story or if you have discovered something interesting online, let me know at zoogang@ix.netcom.com. Happy surfing.

□□□

Alan Haber is a contributing writer to RW.

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Audio Mixers, New York

Fred Venitsky (pictured) and Jimmy Regan have the distinction of owning and operating the most used Foundation 2000 on the planet.

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FOSTEX

Radio's Dick Clark

► continued from page 25
of it so that you can sell it."

Clark said that "television people are facing what radio's gone through for the past 20 years. Fractionalization of audiences is making the business tough. And the smartest, toughest, street-fightingest, most knowledgeable, go-getting people are in radio, because they have had to survive."

It will come as no surprise to anyone that talk, information and news formats



Bandstand made him a household name, but radio gave Dick Clark his start.

are prevalent on AM radio these days. Clark believes that "there will be a day when FM does that...Some day, somebody on an FM station will say, 'The heck with it, I am doing all news.' And that audience that has been listening to FM for the last 20 years will become mature enough to say, 'Oh, I can find it on the same dial now.'"

Stations, particularly the smaller ones on the AM dial, are finding it hard to keep their local news departments going, or resist a switch to automation because of economic factors. Clark said he is not sure if these problems can be fixed. "It is

just a fact of life," he said. "It is very, very expensive to run a talk operation if you try to generate it all locally. You can put Rush Limbaugh back to back with whoever the heck else is out there... and run an all-talk (AM station) off the satellite... but I think it is going to become increasingly difficult for the (AM and FM) bands to survive side by side."

The AM and FM bands will always be around, Clark explained, "but there will be fewer AMs. And, what is it called in nature? Survival of the fittest. The unfit will not survive because we have raised two decades at least of people who do not even know there is AM on. I do not think

you will find a kid in the world who knows what an AM station is. And, if you keep that going for 20 years, it takes a lot of education to say, 'Hey, you oughta, you know, flip over once and find out what is there.'"

Looking into the future, Clark said "there is one thing that you can count on—the bright programming and business people will survive and make a handsome living. The dreamers and the drifters and the unrealistic people will fall by the wayside."

These days, however, Clark likes the revitalization of personality radio. "I find that invigorating, because, you know, it has always been fun to highlight individuals," he said. "A glorified jukebox is something that I guess anybody can do..."

Clark said radio has the deepest talent pool of any industry he knows. "There is

a lot of good established, experienced people available, and not just confined to major markets," he noted. "You get your money's worth wherever you listen."

Clark said that radio has always had a youthful persona and that it can be maintained through music.

"The line we use on 'Rock, Roll & Remember' has become sort of a signature line: Music is the soundtrack of our lives," he said. "And, when you think about that, everything good or bad, happy, sad, emotional, memorable—anything that has ever happened to you, there is probably a song playing in the background that brings it back to you. The music you grew up with becomes the soundtrack of your own personal little movie. And that is its purpose, that is why it is so terribly important."

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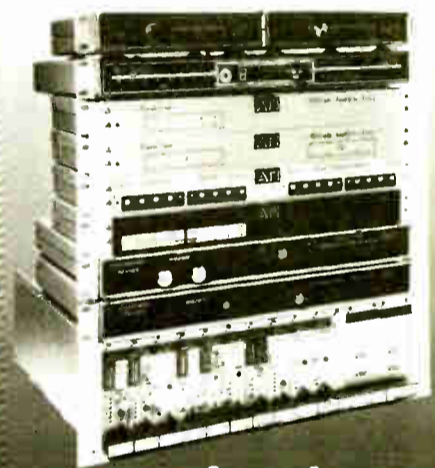
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READER SERVICE NO. 94

STATION SERVICES

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Pie in the Sky Aims High

REDWOOD CITY, Calif. Selling from above is the specialty of Pie in the Sky, a California designer and manufacturer of helium inflatables. The now common-place eye-catching inflatables can be found at retail store openings, rock concerts, trade exhibitions and other locations where crowds are wanted.

Pie in the Sky had a humble beginning in a garage. Michael and Karen Handler spent three years developing the technology to produce helium inflatables of different configurations that were durable enough to be used over and over again.

For information on a Pie in the Sky inflatable, call Michael or Karen Handler at 415-366-7700; fax: 415-366-4306; or circle **Reader Service 19**.

Derry Brownfield Show Surpasses 100-Station Mark

Jefferson City, Mo. "The Derry Brownfield Show" is currently heard on more than 100 stations in 21 states. The one-hour live talk show with listener call-in, airs from 10 a.m. to 11 a.m. Central Time.

The program discusses current events, property rights, work ethic and free enterprise and has evolved into a "Common Sense Coalition." Brownfield, co-founder of the Brownfield Network, an agricultural radio network, brings more than 25 years experience to the network.

For information, contact Chuck Zimmerman at 314-893-7200; or circle **Reader Service 81**.

United Press International Enhances FaxNews

WASHINGTON United Press International completely restructured its facsimile distribution option, UPI FaxNews, to give each subscriber complete flexibility in product options.

For the first time, UPI FaxNews permits each broadcaster to choose, item-by-item, features from UPI's menu. The *a la carte* approach means no prepackaged deals to clog the fax machine and faster delivery of items the subscriber really wants.

For information, contact Howard Dieus at 202-898-8240; or circle **Reader Service 177**.

Live from the House of Blues

NEW YORK CBS Radio debuted a weekly concert series, "Live from the House of Blues," earlier this year. Each week, the broadcast captures the excitement of participating in a live music performance by taking listeners to the various House of Blues clubs for a 90-minute program that will include rock and blues concerts recorded at Cambridge, Mass., New Orleans and Los Angeles venues.

Each broadcast features two or three artists as well as backstage interviews. Fifty-two original broadcasts are scheduled to air as well as monthly special broadcasts. The venture is produced by CBS Radio, House of Blues Productions, Ben Manilla Productions and A*Vision Entertainment.

For information, contact Cate Schley at Ben Manilla Productions at 415-421-1220; or circle **Reader Service 144**.

Online Sports Service

PHILADELPHIA Sports Illustrated and The Sports Network now provide up-to-the-minute sports news, scores and statistics in real time on CompuServe. The "team" brings an extensive array of sports information and materials available to CompuServe. This will include the full text of, and selected photos from, current issues of Sports Illustrated as well as interactive features and content that are designed to take full advantage of the online medium.

For information, contact Stacy B.

Tucker at 215-947-2400; or circle **Reader Service 105**.

Italian Show Returns to Southern Tier

ENDICOTT, N.Y. New York's Italian community can turn to "Dan Giovanni's Italian Carousel" for entertainment and information. The weekly syndicated radio show has been on the air in central New York for the past four years. It is presented in a fun and professional manner by life-long Broome County resident, radio personality Dan Giovanni.

The program features an Italian music format and celebrity interviews from performers such as Connie Francis, Jerry Vale and Jimmy Rosellini.

For information, contact Dan Giovanni at 607-648-3104; or circle **Reader Service 173**.

SW Networks Launches New Programs

NEW YORK "Pure Concrete," a two-hour, hard music radio program launched during the weekend of Feb. 11, as a

continued on page 39 ►

LOOK OUT, AUTOGRAM!!! THEY WANT HIM TO SPILL THE BEANS!

Gil Garcia of Clear Channel Radio/Austin, TX knows what the new "Black Box" can do for your ratings!



The General Manager will pay to have it. The Program Director will give his last CD's to get it. The Engineer is ready to install it, (it's easy!), and the Sales Manager has her own way of getting the information out of Gil! NOT an automation system, processor, or console. Gil knows it's called the CYA-3, he knows the first two letters stand for "Cover Your ___ ?"! Find out what the great new CYA-3 can do for you . . . and what the last letter stands for!

Find out at NAB 95 BOOTH 4719, 4720, 4721.

For AUTOGRAM consoles call:

AUTOGRAM
CORPORATION

1-800-327-6901

1500 Capital Avenue, Plano Texas 75074-8118

(214) 424-8585 ■ FAX: (214) 423-6334

The CYA-3 will save your ___ ? ___, but the **TAB Safety Pen** can save your life! Don't forget to come to our booth to register for it, one will be given away each hour during the show. Also, ask about the NEW RF sniffer pen.

Circle (162) On Reader Service Card



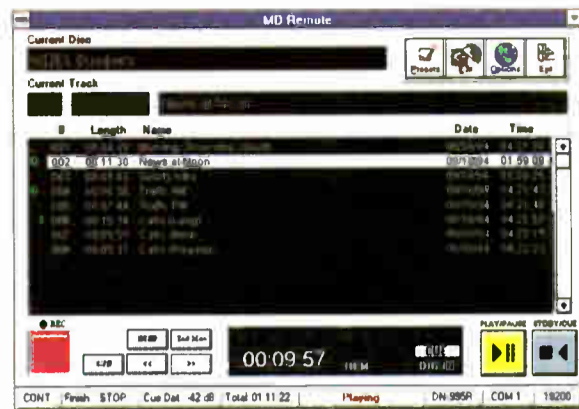
Denon's MD Cart™ Recorders and Players are the modern choice for *any* application that requires repeated recording and playback of audio, from broadcast to post-production. Why? Compared to NAB tape carts, the MiniDisc is free from wow, flutter, jamming, stretching, wrinkling, drop-outs and shedding.

MiniDisc's advantages (including *full* inter-machine, inter-brand compatibility) are quickly making it *the* universal standard. Compared to other digital formats, Denon's MD Cart technology offers the lowest cost per Megabyte of storage, shirt-pocket transportability, and non-contact, optical media reliability.

Obviously, once you've chosen MiniDisc, your next decision is which MD to buy. Features like serial and parallel interfaces, digital and analog signal inputs and outputs, external synchronization, and MD Remote™ software (see side bar), make Denon MD Cart the obvious choice.



DN 990R MD Cart™ Recorder (shown) and the DN 980R/ DN 995R machines



Denon's MD Remote™ Software, running under Windows™, offers a graphical interface for fast, easy control of all functions and modes on any Denon MD Cart machine, including automatic dubbing of tracks or discs between machines, complete with titles and cue point information.

YOU'RE STILL USING NAB CARTS?

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222 New Road, Parsippany, NJ 07054 (201) 575-7810

DENON
The First Name in Digital Audio

STATION SERVICES

News and Services for Business, Programming and Sales

► continued from page 37

weekly offering from SW Networks: The Radio Picture Company.

"Pure Concrete," is hosted by well-known radio personality Bob Elliot, and features the best-selling, "highest octane" hard music on the scene, as well as a special segment called "Dirt."

"Dirt" is designed to give rockers both the latest breaking music news and cutting edge interviews with the most important music celebrities.

For information, contact Corinne Baldasano at SW Networks at 212-833-5400; or circle **Reader Service 161**.

SW Networks is offering up "Country's Most Wanted," a long form country music program that debuted in early February. Carl P. Mayfield, Nashville's No. 1 radio personality (12+ ranking) is hosting the program, featuring the latest and hottest country music as well as interviews with both well-established, legendary personalities and the newest, most exciting stars on the country scene.

For information, contact Corinne Baldasano at SW Networks at 212-833-5400; or circle **Reader Service 138**.

Today's Family Life

TUCSON, Ariz. Today's Family Life produces 90-second programs featuring fast-paced advice for fast-paced families called, "Parent Talk Tip." Best-selling authors Randy Carlson and Dr. Kevin Leman offer practical advice for parenting in the 1990s. From cradle to college, "Parent Talk Tip" addresses issues that help promote healthy family relationships.

For information, contact Warren Bonesteel or Sally Barton at 1-800-776-1070; or circle **Reader Service 69**.

Escape to The Outdoors

SCOTTSDALE, Ariz. Looking to add listeners and advertisers? "Escape to the Outdoors" will help you attract the active outdoor enthusiast in your market with award-winning programs on fishing, hunting, the environment, boating, camping and many other outdoor activities—six days a week, all year round. Escape also features outdoor cooking recipes as well as periodic giveaways of outdoor gear.

In its eighth year, "Escape to the Outdoors" airs on 377 affiliates and is distributed on a barter basis, on cassette, each month. The four-minute items includes two 30-second ads from national sponsors plus a break for the affiliate station to fill with advertising. Programming includes 312 new shows a year, no reruns, and host Bob Hirsch interviews the experts who know the outdoors.

For information, contact Jim Powers at 800-248-9687; or circle **Reader Service 127**.

News from PROMUSIC

BOCA RATON, Fla. PROMUSIC is introducing "The SOUNDTRAX Music Library," "brilliantly" produced in Australia by the Nightlight Music

Group. The Nightlight Music Group is releasing a first group of four CDs containing mainly acoustic music for travel, broadcast, industry and sports. Another 10 discs will be released annually.

Also new from PROMUSIC is the "Music for Sports" library from London. Presently consisting of five CDs, this product focuses on the many aspects of the sports world, from high intensity and action to grace and elegance.

In the sound effects department, PROMUSIC is introducing the MEGA DISC, a compilation of 380 sounds from

jet fighters to cartoon sounds. For A/V and broadcast producers, the FX collection offers a wide variety of sounds on five CDs for everyday use at a very low cost.

For information, contact David Walters or Mike Spitz at 800-322-7879; or circle **Reader Service 212**.

USA Radio Network Hosts "Controversy"

DALLAS Chief Counsel for the American Center for Law and Justice Jay Sekulow debuts on the USA Radio

Network this month. "Case in Controversy" will air every Saturday morning from 9:05 a.m. to 10 a.m., Central Time.

Sekulow and his guests will discuss problems that Christians face on a regular basis as they express their beliefs at school, work, or on the street. He will provide insight and wisdom gleaned from years of practice as an attorney specializing in defending the rights of religious persons in public places.

For information, contact Becky Henson at 800-829-8111; or circle **Reader Service 35**.

E D U

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Because ...

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Customers come back again and again !
- **Digilink replaces ALL tape equipment- carts, reels, etc.**
use it for Live On Air, Production, and Automation !
- **Digilink saves money every day**
No carts to lose, jam, or destroy
No routine maintenance, no heads to adjust, no cleaning
No carts to replace when a hard disk lasts an average 15 years
No reel tape to replace because you cut & splice electronically
- **Digilink costs less than tape equipment.**
The average Digilink with 10 hours of stereo storage is under \$8,000
The \$8,000 list price includes 600 one minute carts worth of storage
That means a Digilink is a \$5,500 machine with \$2,500 in media
- **Our Gemini Live On Air pushbutton control puts carts at your fingertips**
for fast On Air operation, every jock can even have his own set of carts
- **Digilink performs 8 channel multitrack editing for under \$2,000 !**
-or- use our stand alone Trak*Star multitrak Editor for under \$6,000 !
The only multitrack radio editor that can provide 100% On Air backup !
- **Network News, Production, Air, and even Traffic... over 15 studios !**
to transfer audio, text, & schedules in perfect digital on our network



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We are #1, because we are leading the way...

With over 1,000 workstations sold, Digilink is by far the #1 digital audio system for live On Air radio, Production, and Automation. Digilink has achieved this unique success because it is easier to use, does much more, and costs less than any other digital product on the market today.

Digilink does more than other systems because of its abilities in On Air with live, CD, & satellite; in production with its multitrack editor; and in news with text. This makes it so that a Digilink workstation can be placed in each studio of your station to replace cart machines, reel machines, CD players, and often even consoles. At an average price of under \$8,000 per studio, Digilink is actually less expensive than the tape equipment that it replaces while giving you CD quality audio performance, an average media life of over 15 years, and equipment that requires no routine maintenance. You can even create a digital highway around your station by connecting all of your Digilink workstations and scheduling computers on our digital network to transfer audio, text, and schedules in perfect digital between studios.

With its ability to *simultaneously* record, play, crossfade, and network transfer, a single Digilink workstation can do all that is required for recording and playback for an entire studio. It is literally a studio in a box. It can be crossfading out of a CD into a hard disk song, dropping a hard disk jingle over the middle of the crossfade, recording a network audio feed for later playback, and receiving a new spot over the network from the production workstation. Digilink is the complete digital solution to your radio station's studio needs.

To create a *professional* digital broadcast solution you can't simply buy a digital audio board and IBM PC computer. Therefore, Arrakis builds our own DSP board; SCSI board; I-O board; audio routing switchers; video switchers; and modular, broadcast quality cabinets. This makes Digilink remarkably powerful with radio specific features such as digital crossfade and Trak*Star multitrack editing. This also reduces cost so that we are able to sell Digilink for as little as 1/2 the price of other products which have to buy less powerful cards and mark them up. Perhaps most importantly, building Digilink ourselves assures you of long term customer support from a single *broadcast* source. With Digilink, you don't have to be a computer expert, because we are.

Whatever your studio needs- to replace a cart machine, add a new production studio, or add some level of automation, Digilink can do the job. Put a Digilink in one studio today, another next year, add a scheduling computer and network, and you will eventually discover that you have painlessly gone digital one step at a time. There is no question that Digital audio is here *TODAY* - it improves your sound, speeds your production, increases your reliability, and reduces your costs. Call and find out why Digilink is #1 and why customers come back again and again: customers like the United States Air Force who have selected Arrakis Digilink, consoles, and furniture for all of their radio stations worldwide.

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Orban Receives Engineering Award

by Alan Haber

WASHINGTON The spotlight shines on one of radio technology's true legends, engineer Robert A. Orban, when the 25-year-plus broadcasting veteran accepts the National Association of Broadcasters' (NAB) Radio Engineering Achievement award at NAB '95.

Orban, who founded Orban Associates, now part of AKG Acoustics (now owned by the Harman Group), and developed products for both the professional audio and broadcast industries, including parametric equalizers and, of course, audio processing products, was instrumental in the birth of FM processing.

His first product, a stereo synthesizer, which he delivered in the latter part of the 1960s to New York's WOR-FM, one of the first album rock stations in the country, was one of the first of 24 patents he has developed over the years—17 of which are held on audio processing equipment.

The NAB is honoring Orban because of his "significant contributions to both AM and FM radio." In detailing his career, the trade group made note of Orban's heavy contribution to the improvement of AM signal quality.

Orban, who served on the National Radio Systems Committee (NRSC) in the

1980s, "and made significant contributions to the development of several NRSC standards for AM improvement," according to the NAB, will receive his award on April 12 at the NAB '95 engineering luncheon.

Orban's career high points and viewpoints act as benchmarks for gauging the effectiveness of today's radio landscape. For example, when he spoke to *RW* early last year, Orban said that he introduced the Optimod 8000 FM processor because he determined "that all these devices that claimed to prevent overmodulation actually didn't.

And the reason wasn't that they weren't doing their job, but the filters in the pre-emphasis in the stereo generator were messing up the peak levels."

On the subject of the so-called "loudness wars," Orban said that he thought that the concept "was pretty peculiar

because when you think about it, radio is really the only popular mass medium that consciously degrades the technical quality of its finished product."

The reason, he said, is because "there is a paranoia built into the system. Being the program director of a radio station doesn't translate to job security, and so, if a program director believes that being louder is going to help him with the next book, he's probably not inclined to take the risk that might not be true."

Orban's comments on all things digital may seem particularly interesting in light of on-going

developments in the process of bringing digital audio radio (DAR) to market.

"I think that digital audio radio is going to happen," he said, "but it's going to happen fairly slowly because it's going to be fairly costly to build into the radios at first. And it's also going to be a hard sell

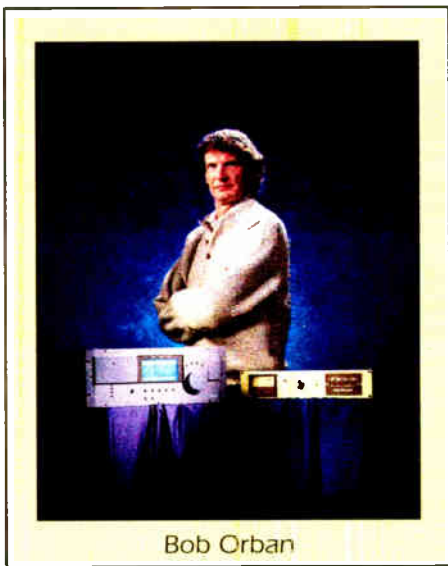
to convince (people) it sounds that much better than FM."

On the subject of quality, Orban said DAR would not "be the big leap that FM was over AM." He added, however, that DAR would "happen eventually."

In the *RW* interview, Orban said "loudness wars on digital" are also likely because "people are probably going to have a little bit more signal parity than they did on FM, and the only thing left to get people's attention is how the audio sounds."

On the subject of the radio broadcast data system (RBDS), Orban said that "it's going to be a valuable ancillary service for FM. It doesn't cost that much to add, and it's going to provide the consumer with very useful information and features. "I think it's very practical." He added, however, "It's eventually going to be obsoleted by the digital delivery media."

Orban commented to *RW* on existing broadcasters' worry about possible competition for satellite-delivered DAB—which the regulatory path was cleared by the FCC earlier this year. "That's an understandable and reasonable concern, because the country doesn't seem to be able to support even the number of radio stations it has right now," he said. "So I think (if) you have that sort of service, you're going to hurt a lot of the local broadcasters and probably result in overall quality degradation because there is going to be less money to do good programming."



Bob Orban

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Visit us in NAB95 Booth 5113-5114.

NAB Convention Offers Full Schedule

LAS VEGAS Audio and video professionals from around the world convene at NAB '95 next week, April 9-13, to see the latest technology at work and to examine the effects of this technology on the future.

The big news at the show for radio broadcasters is the over-the-air digital radio demonstration. For the first time, broadcasters can hear CD-quality or near-CD-quality radio on the AM and FM band. USA Digital is presenting the demonstration, using specially-equipped buses that will travel around Las Vegas during the show.

Seiko Communications will be demonstrating its high-speed digital subcarrier technology for FM radio. Seiko uses this data broadcasting scheme to send information to wrist-watch pagers.

RAB-member general managers can sign up (for an additional \$15) for a day-long seminar on new business development on Monday, April 10, 10 a.m. to 4 p.m.

For \$350, RAB members receive a complete NAB Spring Show Registration, plus RAB's intensive "New Business Development University: What Every Manager Needs to Know." Attendance is limited and restricted to RAB members.

Digital audio workstations, hard disk recorders and digital recorders also garner their share of attention, as do satellite systems and automation systems.

With the possibility of a tapeless television station looming on the horizon, products featuring disk-based technology are a must-see for broadcasters. Of particular interest is Avid/Ikegami's disk-based camera for ENG use. Other attention-grabbers are computer systems designed to control all functions of a facility from a single workstation.

NAB '95 features the broadcast, production and post production hardware, software and services of more than 1,000 exhibitors, filling over 530,000 square feet of exhibit space. The exhibits floor is open Monday-Wednesday, from 9:00 a.m. to 6 p.m., and Thursday, from 9:00 a.m. to 2 p.m., with outdoor exhibits opening a half-hour earlier.

Aside from the various exhibits, the NAB show features more than 250 sessions drawn from the convention's 11 standalone conferences, including NAB MultiMedia World, the 49th Engineering Conference, the Conference on Digital TV Production and a new conference, the NAB/ITS Advanced Teleproduction Conference.

For attendees interested in how digital technologies will impact television broadcasting, Jim Carnes, president and CEO of the David Sarnoff Research Center in Princeton, N.J., heads a futures summit Wednesday morning. After providing an overview of the work being conducted at the Sarnoff Lab, Carnes plans to outline the benefits of digital versus analog and explain emerging compression techniques, the flexibility of digital broadcast service and the significance of new multimedia MPEG standards. Three-dimensional broadcast TV, video-on-demand and data broadcasting are some of the services to be demonstrated during this two-hour session.

NAB MultiMedia World is offering "A Primer on Multimedia and the Internet" on Sunday afternoon. Attendees can learn how the Internet works, what its multimedia capabilities are and how to become an Internet service provider. Other MultiMedia World sessions include a lesson on

the use of multimedia computer systems to create animation and graphics, and an examination of the key technological obstacles affecting the growth of multimedia technologies and applications.

The Broadcast Engineering Conference features a two-part advanced television technology session on Sunday. Part one includes a tutorial on the elements of the Grand Alliance system, while part two provides coverage of developments in wide-screen and HDTV, digital video compression and server-based broadcasting.

In addition to the exhibits and sessions, NAB is featuring a number of special luncheons and dinners. Boutros Boutros-

Ghali, secretary-general of the United Nations, addresses broadcast and government leaders from the United States and

The NAB show features more than 250 sessions drawn from the convention's 11 standalone conferences.

other countries at the NAB's Fourth Annual International Broadcasting Leadership Dinner (by invitation only), Wednesday at 7:30 p.m.

To provide daily assistance to attendees

from outside the United States, the International Business Center, in the Grand Lobby of the Las Vegas Convention Center, offers translation services, currency exchange, refreshments and a lounge. An international trade specialist and other representatives from the U.S. Department of Commerce Foreign Buyer Program are available each day to provide export counseling.

The International Business Center serves as the site for daily conference briefings, beginning at 8:00 a.m. During these briefings, NAB staff plan to give an overview of special events, conference and exhibit highlights, and updates on the day ahead.

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The ADX from PR&E. You've wanted one ever since you first laid eyes on it. You knew it was the only workstation to combine the speed and flexibility of moving fader automation with the creative power of digital editing. Problem was, you just couldn't squeeze a PR&E console and a workstation into the budget. Well here's the alternative.

Introducing the Ensemble. Like all members of the ADX family, Ensemble was created specifically to be the most effective and powerful workstation for radio production. The control surface of the ADX Ensemble gives you maximum control over your mix... right now. No more fooling around with mice, cute little screen faders and unlabeled buttons. You don't have time for that. With the Ensemble, even the most complex commercials, spots or promos are a snap.

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DESIGN THAT MAKES THE DIFFERENCE



Packed Agenda for Radio Managers

LAS VEGAS Radio station managers and owners can learn techniques to help them stay ahead of the competition at the NAB Show's Radio Management Conference. The association has lined up educational seminars and workshops aimed exclusively at radio managers, production and programming directors.

Sunday afternoon's *Small/Medium Market Idea Swap* leads off the Radio Management Conference. The annual event has become one of the show's most popular. Radio professionals discuss everything from programming to cost-cutting ideas.

RW's Ty Ford will walk you through writing copy, sound recording and producing in the *Raise Ratings and Rates with Better Ad Copy* (see related item, this section).

The *Radio Opening Reception* is an annual gathering place for old friends to meet and new contacts to be made. Hosted this year by the ABC Radio Networks, the opening reception is a must-attend event.

After Monday morning's *All-Industry Opening*, small market radio will again be the focus of the morning session. *Twenty-five Management Techniques to Take You to the Top* features five top radio station managers sharing their favorite management techniques. All in all, attendees will walk away with five different philosophies, five different styles and 25 different but effective management techniques to choose from for implementation at their stations.

Small market radio also will be the focus of *Radio Production Workshop*, a session led by the radio industry's most sought after production experts. Develop your skills in the production studio with this group of professionals.

The afternoon sessions head in more technical directions. *Newsroom Technologies* at 12:30 p.m. looks at radio news coverage in the year 2000. Panelists will discuss concepts and technologies to position your news operation to compete in the next century.

Scheduled for 2 p.m. is a look at radio's digital future. *Managers Look at Digital Broadcasting* will feature discussion on whether digital broadcasting is the wave of the future or "a technological boondoggle." Managers debate whether digital broadcasting will usher radio into the twenty-first century or unduly strain the industry's resources.

Small market radio will again be the focus at the *Making Satellite Programming Local* session. Panelists will grapple with the issue of making your station sound as local as possible. Practical questions will be answered by some very successful satellite broadcasters.

Rounding out the Monday afternoon sessions for radio managers are *Managing People New to Radio* and the *Best of the Best Radio Promotions*.

The Radio Advertising Bureau will sponsor sales and marketing sessions beginning on Tuesday at 9 a.m. The NAB/RAB Radio Luncheon at 12 p.m. is radio's big event at the spring convention. In addition to the keynote address, the 10 winners of the NAB Crystal Radio Awards will be announced and Gary Owens will be inducted into the NAB's Broadcasting Hall of Fame.

Tuesday afternoon will feature the *Commissioners' Regulatory Dialogue*. Following an informal "Coffee Break/Ice Cream Social" with the FCC leadership, this session will feature the FCC commissioners in a wide-ranging discussion of communications policy developments affecting broadcasters and other media. This is your chance to ask questions directly of the commissioners.

The RAB will once again sponsor sales and marketing sessions on Wednesday morning. At 1 p.m., settle in for a joint Broadcasters' Law and Regulation, Radio Management and Television Management session. *Station Acquisitions: Buying and Selling Stations in a Changing Regulatory Environment*, features FCC officials, broadcast brokers,

financial analysts, group owners and communications lawyers in a discussion of how broadcasters can expand and maximize their holdings lawfully and according to sound financial plans.

If you like first-hand knowledge of what

the competition is up to, or if you just want to see how others do it, sign up early for the *Radio Station Tours* scheduled for 2 p.m. Wednesday.

Thursday will feature two roundtable sessions for radio managers: *Cross Promoting on Radio and Television* and *Money-makers: Winning Sales Promotion Ideas* (both are joint sessions with the TV Management Conference).

Track Scan System Debuts

LAS VEGAS Euroson America Inc. will unveil the Track Scan System at next week's NAB spring convention. A new product, Track Scan allows full manual control of CDs live on the air, without a user having to handle the media. Features include: NSM 3101 CD Juke Boxes—two standard and expandable in multiples of two; IBM Compatible PC and color VGA monitor to run the system; bar code reader; command module CM-2000—interface to console and audio switching; system software; interconnecting cables, and bar code software and menus.

The Track Scan operates using the NSM 3101 CD changer, a unit that has been in use for years in major broadcast installations.

The system is easy to use because there are no keyboards to operate. The day's music is selected in the on-air studio by a bar code reader pen, and the music for a five hour shift can be scanned in just a few seconds. Standard characteristics of the conventional, single-play system include: maintenance-free system; reliability greater than 200,000 hours MTBF; easier and faster to use than single-play machines; no misplaced or standard CDs; no dusty or scratched CDs; complete control over the playlist; real time RDS data output standard; central location for use in multiple studios; exclusive preview function allows song intro to be previewed and re-cued automatically, and connects to your existing console.

For information, contact Euroson America Inc. at 516-273-4200; fax: 516-273-4240; or circle Reader Service 34.

Exploring 'Net' Ideas

LAS VEGAS Radio and the on-line potential of the Internet will be covered in five separate sessions at the 1995 NAB convention.

Beginning on Sunday, April 9, 3:30 p.m.-5 p.m., the *Primer on Multimedia and The Internet* will give the basics of on how the Internet works, and what important role the newer software plays in navigating the service. Session panelists will include Tom Wilkins, Hewlett Packard; Yves D-Aoust, Teleglobe Canada; Mike Homer, Netscape; Maurice Welsh, Pacific Bell; Mario Vechi, Time Warner; and Randy Whiting, also of Hewlett Packard.

On Monday, April 10, 1 p.m.-3 p.m., the *Computer Technology for Broadcaster Support: BBS, WANS and LANS* session will highlight how radio and television are using computer bulletin boards, LANS and WANS to enhance their programming efforts. Bill Ruck of KNBR(AM)-KFOG-FM in San Francisco will moderate the panel, that will include William Baker, ITC, who will discuss how to set up a radio LAN. Other panelists will include Tom Pozar, of KKSF and KDFC, who will demonstrate with a live Internet hookup and offer radio use tips; and Vic Jester, who will discuss interactive voice systems.

Other sessions pertaining to the On-Line will be held on Tuesday, April 11 and Wednesday, April 12: *Profiting from Multimedia: On-Line Information Services* is scheduled for 1 p.m.-3:30 p.m., April 11 and *Broadcasters in Cyberspace: Untangling the WEB* is scheduled for 9 a.m.-to 10:15 a.m., April 12.

The multimedia session will be moderated by Robert Smith, Interactive Services Association.

Crystal Nominees

LAS VEGAS Forty-five radio stations are in contention for NAB's Crystal Radio Awards. The winners will be named at the the 1995 NAB Convention during the NAB/RAB luncheon on April 11.

The finalists are: KASE-FM, Austin, Texas; KBIG Los Angeles; KCDZ-FM 29 Palms, Calif.; KCMO-FM Kansas City, Mo.; KFGO(AM), Fargo, N.D.; KGO (AM) San Francisco; KGUM Agana, Guam; KISS-FM San Antonio, Texas; KKBN-FM Twin Harte, Calif.; KKCS Colorado Springs, Colo.; KKDZ(AM) Seattle; KKYR-AM-FM, Texarkana, Ark.; KLOS-FM Los Angeles; KMOX (AM) St. Louis; KPRS-FM Kansas City; KQRS-AM-FM Golden Valley, Minn.; KRRV-AM-FM, Alexandria, La.; KSEN(AM) Shelby, Mont., and KSNE-FM Las Vegas.

Also nominated are: KSSN-FM Little Rock, Ark.; KWOA(AM) Worthington, Minn.; KWOX-FM Woodward, Okla.; KZZY-FM Devils Lake, N.D.; WACO-FM Waco, Texas; WAXX-FM Altoona, Wis.; WBAL (AM) Baltimore; WBEE-FM Rochester, N.Y.; WBIZ-FM, Eau Claire, Wis.; WDBO(AM) Orlando, Fla.; WDST-FM, WDSP-FM, Woodstock, N.Y.; WEAS-FM Savannah, Ga.; WHCN-FM, Hartford, Conn.; WILM (AM) Wilmington, Del.; WLNG-AM-FM Sag Harbor, N.Y.; WMT(AM) Cedar Rapids, Iowa; WNCI-FM Columbus, Ohio; WOKO-FM Burlington, Vt.; WPCH-FM Atlanta; WPSK-FM Pulaski, Va.; WRAL-FM Raleigh, N.C.; WSPT-FM Stevens Point, Wis.; WVPO(AM) Stroudsburg, Pa.; WWKI-FM, Kokomo, Ind., and WXTR-FM Waldorf, Md.

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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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Get up to 12 couplers in a neat, compact chassis

- Auto answer & disconnect.
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3CX10,000H3	4CX1500A	4CX250BT
3CX10,000A7	4CX800A	4CX250BC/8957
3CX3000F7/8162	4CPX800A	4CX250B/7203
3CX3000A7	4CX400A	4CX150A/7034
3CX2500H3	4CX350AC	5CX1500B
3CX2500F3/8251		5CX1500A
3CX2500A3/8161		YC130/9019
4CX15,000A/8281		8560AS
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4CX5000A/8170		833A
4CX3500A		833C



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FAX: 415-233-0439

READER SERVICE NO. 83

Radio World

Vol. 19, No 7 Radio's Best Read Newspaper April 5, 1995

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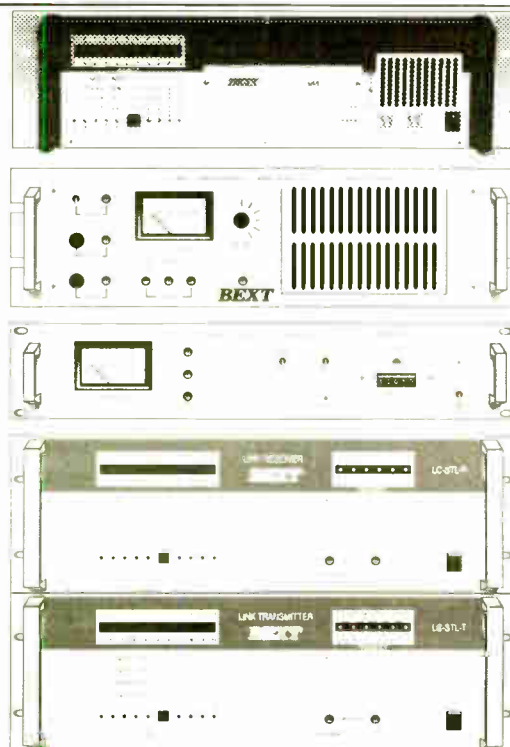
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1045 10th Ave.
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READER SERVICE NO. 113

Full Slate of Law and Regulation

LAS VEGAS NAB's Broadcasters' Law and Regulation Conference is designed to provide broadcasters with a wide range of money-saving and money-making tips. FCC commissioners, FCC staff and leading communications lawyers as well as legal experts will participate in a series of sessions aimed at helping broadcasters understand and control their regulatory future.

Monday morning's sessions features one targeted to small-market radio. *Duopoly and LMA Deals: Creative Combinations in a Competitive Market* will offer insights on how best to take advantage of changing FCC regulations in these areas.

Libel, Privacy and Newsroom Law for Broadcasters: Running a Competitive Station That Complies with the Law will guide broadcasters through the difficult daily decisions affecting programming and news—choices that run the risk of libel privacy and other related claims. How do you avoid these mine fields? And how do you stay on top of your reporter's rights and restrictions? Find out the latest on these critical issues.

Another area of interest to stations in all size markets is addressed in the 12:30 p.m. session, *Contests, Lottery and Casino Ads, Plus Station Promotions—What Is and Isn't Legal*. Contests and

promotions are tools for gaining audience and advertisers. However, the issue of which ones are legal and which might lead to an FCC fine is discussed in this session. Also hear what officials have to say about the growth of casinos on Indian reservations and riverboat gambling.

Learn about the imminent threat (or not) of satellite digital audio broadcasting. In the *Satellite DAB Forum*, a group of experts offer individual perspectives and expectations for the future.

Monday afternoon concludes with a session on *Broadcasters and Taxation: Covering Your Assets*. Leading tax experts offer guidance on how to reduce

taxes, avoid tax hassles and make the most of tax law changes. What is the Multistate Tax Commission and how is it affecting stations? Also, a how-to guide on obtaining refunds on telephone long distance excise taxes.

Tuesday morning starts off with the *FCC Chairman's Breakfast* at 7:30 a.m. Participate in an open discussion with Reed Hundt, chairman of the FCC, on the most critical issues and regulatory developments for broadcasters.

- Other Tuesday session include:
- Meeting Equal Employment Opportunity Obligations in the 1990s: Diverse Staffs and Diverse Ideas;
 - Advising the Commissioners—A Conversation with the Legal Assistants;
 - Employment and Workplace Law for Broadcasters;
 - Defending Your Broadcast License—A Renewal Wake-Up Session.

Wednesday will feature three sessions designed with a focus on small market radio stations, including:

- Upgrading Your Radio Station—A Manager's Guide;
- Avoiding FCC Fines—A Commission Rule Enforcement Primer;
- Music Licensing—Rights, Wrongs and Rate Courts.

Live from Vegas—Back To Hong Kong

LAS VEGAS Hong Kong's Steve James and Harry Wong will originate their drive-time show from the NAB convention, but it will be ISDN-transported back to the Far East island city via a Telos Zephyr and Sprint's digital phone lines.

According to Telos, Metro Broadcasting's 104 FM, the only English-Cantonese station in Hong Kong,

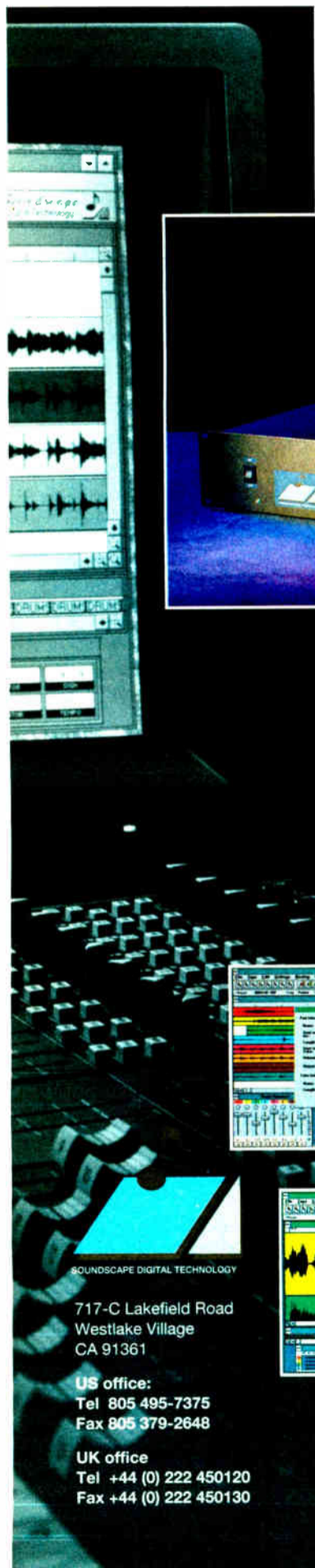


Steve James and Harry Wong

will broadcast the show every day of the convention, 3 p.m. to 7 p.m.

Equipment provided by Broadcast Supply Worldwide will include the Telos Zephyr Digital Network Audio Transceiver, which is capable of 20 kHz audio from a single dial-up ISDN line. Zephyr utilizes the ISO/MPEG Layer III data reduction algorithm.

Also, BSW will give away free station IDs courtesy of Joe Cipriano of the Fox Broadcasting Network, who will do the voiceovers. Via a Zephyr, BSW's booth will be linked to the Fox studios. The free DAT-produced IDs will be offered on April 10 and April 11 from 11 a.m. to 1 p.m.



SSHDR1 FROM SOUNDSCAPE

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The Producer 'we need more tracks'.

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Full chase-lock sync
Software features 8 real time parametric EQ's per rack unit assignable to any of the 8 tracks

Seamless integration with any Windows™ sequencer or editor
Software upgrades add new features (in the works: Time stretch, pitch shift, reverb, compression)
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Thinking of adding music storage to your hard disk system? Wondering if a hard disk can end "cart chaos" on your live morning show? Need to get more work in less time from your production studio, or the newsroom? Implementing a multistation LMA or duopoly operation? Or perhaps you're just taking your first look at a hard disk system to handle local breaks on your satellite music service.

At the 1995 NAB show, there's one place to go for all the answers: Computer Concepts, booth 2503. You probably know us as the makers of DCS, the industry's leading on-air hard disk system. But now Computer Concepts has proven digital solutions for every facet of radio station operation.

To make it easy for you to get the answers you need, we've set up six separate hands-on demonstration areas in our NAB booth this year. Each one is dedicated to a particular on-air or production situation, and equipped with the latest hard disk solutions from Computer Concepts. Every product is backed with the dedicated service and support for which Computer Concepts is known.

For straight answers about digital systems for every radio application, come straight to booth 2503.

If you're not planning to attend the show, call Computer Concepts at 800-255-6350 and we'll fill you in on what's new and what's best.



8375 Melrose Drive, Lenexa,
Kansas 66214 • Tel.: 913-541-0900
Fax: 913-541-0169

CCA to Go Digital

LAS VEGAS As Europe and Canada are gearing up for widespread implementation of Digital Audio Broadcasting (DAB), transmitter manufacturers are gearing up for the sure-to-be-arising market for digital transmitters.

NAB '94 saw the introduction of a digital transmitter from Harris Allied, and European companies—including Thomcast, Telefunken Sender-technik and Rhode & Schwarz—also offered Eureka-

147-compatible DAB transmitters.

This year, Las Vegas will see

The CCA DAB XXX and DAB XL were designed with input from AT&T and are to be compatible with both IBOC- and IBAC-DAB.

the introduction of a line of DAB transmitters from the Fairborn, Ga.-based CCA.

According to the company, the 30 kW CCA DAB XXX and the 40 kW DAB XL were designed with input from AT&T and are to be compatible with both in-band, on-channel (IBOC) and in-band, adjacent-channel

CCA hopes to demonstrate the DAB XL, using IBOC and IBAC, during NAB '95. According to Ron Baker, president of CCA, "A few things still have to fall in place for this to happen, but we are going to give it our best shot."

The CCA DAB line is designed to allay broadcaster concerns about digital broadcasting in the States. While Europe and Can-

ada have settled upon Eureka-147 as the standard for DAB, the United States has yet to

select a standard. By offering a transmitter that is IBOC- and IBAC-capable, CCA hopes to attract broadcasters who want to prepare for DAB, but who are worried about choosing the "wrong" system.

"The broadcaster can buy our DAB series transmitter today to improve his current analog signal and not have to worry about who wins the IBOC or IBAC race," said Steve McElroy, CCA vice president of sales. "Either of the AT&T systems or the USA Digital system will work equally well with our new design."

The DAB XXX is described as a 30 kW transmitter, operating from 3 to 30 kW over various frequencies, and the DAB XL as a 40 kW high-efficiency, single-ended DAB transmitter.

As of press time, the transmitters were in the beta-test stage, but CCA is hoping to be able to ship units by June 1.

NAB Targets Production

LAS VEGAS The NAB plans a series of radio production seminars during the 1995 NAB Convention.

On April 9, RW contributing writer and audio production guru Ty Ford will moderate the "Raise Rates and Ratings with Better Radio Copy" session from 2 p.m. to 4 p.m. The material presented will include hints and tips on how to write better spot copy to keep those listeners tuned in through the breaks. Topics will include working with the client, developing an approach, jump-starting the creative process, writing copy and sound and audio production.

On Monday April 10, award-winning radio producer/voice talent Jerry Hedquest will lead off the "Radio Production Part I" series beginning at 11 a.m. He will reveal his own secrets in coming up with the most creative spots in the session entitled "The Ultimate Radio Production Tool." The session will focus on using imagination, empathy and intuition to make the best spots possible, according to the NAB.

Part II of the "Radio Production" session is entitled, "The Radio Production Workshop," intended for production managers. The moderator will be Dennis Daniel of Topline Design. Panelists will include Holly Buchanan, WMXB, Richmond, Va.; Dave Fox, WHITZ, New York City; Steve Morrison, Topline Design, Ronkonkoma, N.Y.; John Pellegrini, WKLQ, Grand Rapids, Mich.; Rich VanSlyke, WKLS, Atlanta; and Suzanne Ventra, WBZO, Bay Shore, N.Y.

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Dynamic Microphone

Sennheiser's new MD431 II supercardioid dynamic microphone retains the best features of its predecessor, the MD431-U. The MD431 II is designed for live vocals and for speech and broadcasting applications. Its custom-tailored frequency response exhibits a modest rise in the high end for accurate reproduction with maximum speech intelligibility.

The MD431 II's rugged housing incorporates a refined steel-mesh grille and a shock-mounted capsule for high attenuation of handling noise. A sponge shields the capsule membrane from moisture.

Recessed in the MD431 II's handle is a noiseless, magnetic on/off switch that can be locked into position to prevent accidental deactivation of the mic.

For information, contact Joe Ciaudelli in Connecticut at 203-434-9190; fax: 203-434-9022; or circle **Reader Service 126**.

SMART Transmitter

Sine Systems Inc. and Continental Electronics Corp. are co-developing a SMART transmitter utilizing recently developed EDU (Embedded Diagnostic Unit) technology and the Continental 816R series FM transmitter.

EDU is a microprocessor-based diagnostic device located within the transmitter but independent of all regular transmitter monitoring and control functions. It automatically monitors and records the critical operations of the transmitter.

EDU and its companion software package allow critical data to be downloaded from anywhere with the use of an IBM-compatible computer.

EDU provides engineers with a "snapshot" of all transmitter readings at the exact instant of failure or a graph of a particular parameter over several months.

For information, contact either Continental's marketing dept. in Texas at 214-381-7161 or your Continental Electronics District Sales Manager; or circle **Reader Service 218**.

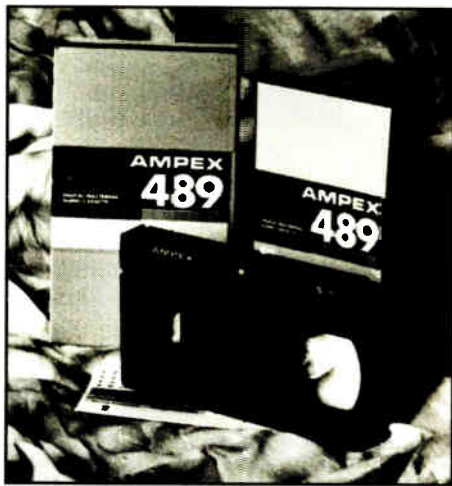


FM Tetrode

Svetlana Electron Devices Inc.'s new YC130 is an exact replacement power tetrode for 35 kW FM transmitters. This tube is designed with a full-power filament that assures long-life performance. In addition, the YC130 is manufactured with high alumina ceramic doped with chromium and molybdenum. The stronger bond allows a high processing temperature.

Each YC130 is RF-tested at the company's factory in Russia, and comes with a three-year/12,000-hour warranty.

For information, contact George Badger in California at 415-233-0429; fax: 415-233-0439; or circle **Reader Service 141**.



Extended-Play ADAT Tape

Ampex Recording Media Corp. offers Ampex 489 Extended Play (EP) tape, an extended-play version of its 489 Digital Mastering tape for ADAT eight-track digital recorders.

This extended-play tape increases an ADAT's program time from 40 to 60 minutes, enhancing the ADAT's capabilities in post production uses.

Ampex accomplishes extended play through the use of PEN (polyethylene-2.8-naphthalene), a thinner, high-performance base film. PEN offers improved dimensional stability and 60 percent less thermal shrinkage at high operating temperatures.

For information, contact the company in California at 415-367-3888; fax: 415-367-4669; or circle **Reader Service 78**.



Test System

Audio Precision's System Two is a PC-controlled signal generator and analyzer for testing both digital and analog audio. Compared to the company's System One, System Two offers significant advances in performance, ease of use and digital interface testing capabilities.

System Two provides complete facilities for measuring every parameter specified in AES3, the governing document on professional serial digital audio transmission. Measurement capabilities include jitter and FFT of jitter, pulse amplitude, eye patterns, delay, word width, bit activity, sample rate and high-level decoded status bits.

System Two Dual Domain can inject variable amounts of jitter, vary rise and fall times and amplitude of the pulse train output, and inject normal mode or common mode interfering signals. It also generates and measures while locked to almost any house sync signal, including NTSC, PAL and SECAM video.

For information, contact Tom Mintner in Oregon at 503-627-0832; or circle **Reader Service 68**.



Cable Tester

The CT-6 from Sescom Inc. is designed to test various combinations of audio and

video cables. It advises the user of cable shorts, improper phasing, opens and intermittents.

The CT-6 is constructed in a rugged aluminum housing with three switches with integral LEDs that test XLRs, one-quarter-inch stereo, 3.5 mm, RCA, F, BNC and five-pin DIN for MIDI. The unit operates on two AA batteries.

The user plugs a cable into the CT-6 then, while shaking the cable, depresses the buttons one at a time to determine the condition of the cable.

For information, contact Franklin J. Miller in Nevada at 702-565-3400; fax: 702-565-4828; or circle **Reader Service 32**.

Rumor:

"Harris

Allied

is in the

TV

Hall."

1995 NAB, Las Vegas, April 10 - 13

NAB 95 Exhibitor Directory

The 1995 Exhibitor Directory is a listing of information provided by exhibitors who responded to an RW NAB questionnaire. Past and potential NAB exhibitors were asked about new and established products scheduled to be shown at NAB this year. Questionnaires returned by the deadline are included here, N/A for booth number means a booth assignment had not yet been made.

360 Systems 2116
Intro: Instant replay hard disk audio player; OnScreen/II PC computer software program in windows that provides visual information about DigiCart's drives, directories and cuts; PC Hot-Keys PC software for DigiCart/II; Series 2500 DigiCart/II's with standard digital I/O in AES/EBU, AES/EBU, AES/SMPTE & IEC 958 Type II format, as well as conventional analog I/O.
Contact: Doug Leighton, Mktg. Dir.
5321 Sterling Center Dr.
Westlake Village, CA 91361
818-991-0360

A

Accu-Weather Inc. 19205
Intro: Forecast with ISDN technology, Switched 56 digital transmission, and Comrex. Forecast includes local weather forecasts, on-air presentations by broadcast meteorologists.

Acoustical Solutions Inc. 13419
Intro: AlphaSorb acoustical wall panels and hanging baffles - high performance sound absorbers.

Also: Alpha Wedge, Alpha Pyramid and Sorex acoustical foams, ceiling tiles, Soundtex fabric wall covering, Audioseal sound barrier and barrier/absorber combination blankets, Alpha Enviro wall panels, Alphaflex ceiling banners.

Advent Communications Ltd. 19377
Intro: NewSwift digital Ku-band motor satellite uplink; NewSwift D-SNG manual flyaway satellite uplink system; G-Band digital mantes flyaway system.

Also: Up converters, Up/down converters, down converters; modulators; modems; VSAT/DAMA systems; Comms packages; test and monitoring systems.

A.E.Q. SA 5307
Intro: ACD-30001 audio codec (Switched 56 and ISDN compatible); ISO/MPEG Layer II and 6.722 modes); MUSICAM audio editor module for MAR system application (up to 8 tracks).
Also: RE-02 portable mixer with telephone line extender; BC-500 mixing console; BC-2000 mixing console; AM 03 audio monitor; MP-10 portable mixer; MAR system hard disk application for broadcast automation; TH-02EX digital hybrid with telephone one extender; Systel 3000 teleconference system.
Contact: Gerardo Vargas, Dir.
2211 South 48th St., Ste. H
Tempe, AZ 85282-1008
602-431-0334

AEV SNC 2716

The Aircraft Production Music Libraries 19203-4
Intro: Jazzvertising jazz-based CDs featuring co-pilot split tracks for assembly.
Also: 64 + CDs featuring Speed Search; American Music Series - historical period music; Rock Sweepers - guitar riffs and effects for radio and TV; ADS Up music for commercials over 500 CVB on 2 CDs.

AKAI Digital 5021
Intro: DR8 hard disk recorder.
Also: DR4 hard disk recorder; DD1500 digital audio workstation; S2800/3000/S3200/CD3000 digital samplers.

AKG 2910
Intro: C680 BL microphone, WM5900 wireless system, C577 on-air talent miniature lavalier microphone and D230 dynamic omnidrive reporter's interview microphone.

Alesis 18372
Intro: Matica 500 & 900 audio amplifiers with wide bandwidth and dual channel power for production monitoring applications; Monitor Two studio reference monitors, 10" 3-way, utilizes SuperPort venting technology; Q2 Dual Channel Octal Processing master effects with digital input/output enables eight audio effects run simultaneously by using digital patch bay visible on display.
Also: ADAT 8-track modular digital multitrack audio recorder; AI-2 multipurpose audio/video interface chase synchronizer; AI-1, AES/EBU, SPDIF digital interface with sample rate converter; Monitor One near field studio reference monitor.

Altronic Research Inc. 15800
Intro: Model 3500 Digital Calorimetry for air-cooled dummy loads.
Also: Model 67150, A-150 MW air-cooled dummy load.
Contact: Doug Starkey, Mktg. Dir.
P.O. Box 249
Yellville, AR 72687
501-449-4093

Amco Engineering Co. 12510
Intro: Line of enclosures for monitoring applications; Line features 3 base units - vertical, sloped front and low silhouette.
Also: Enclosures for electronic/electrical packaging, in single or multibay configurations. Variety of heights, widths, and depths.

AMS Neve N/A
On Display: Capricorn digital mixing console, 55 Series broadcast console, Logic 3 digital console, as well as other established products.

Andrew Corp. 19914
Intro: Vertically polarized shadowmaster antenna; new 6-foot grid antennas for STL; 3 1/8-inch HRL line rigid line; EIA flange connectors from 2 1/4-inch through 5-inch; new wide-band connectors for EQ20-elliptical waveguides; top-mount ALP antennas; digital ValuLink; 4.5 meter dual-reflector Earth Station antenna; MT 050 low-volume automatic membrane dehydrator. MRS 052 slim line manual regenerative dehydrator.
Contact: Bobbi Rick, Exhibit Mgr.
10500 W. 153rd St.
Orland Park, IL 60462
708-349-3300

Anton Bauer Inc. 11210
Intro: Digital Trimpac battery with 2.75#1.25kg design provides more energy than two equipment slide-in type batteries; Lifesaver dual charger provides field charge capability; Lifesaver Q2 charger for travel or back-up applications; Ultralight satellite light fixture includes Ultralight 2, mated to a gold mount bracket.



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,



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KVIL 103.7 FM
Dallas, Texas

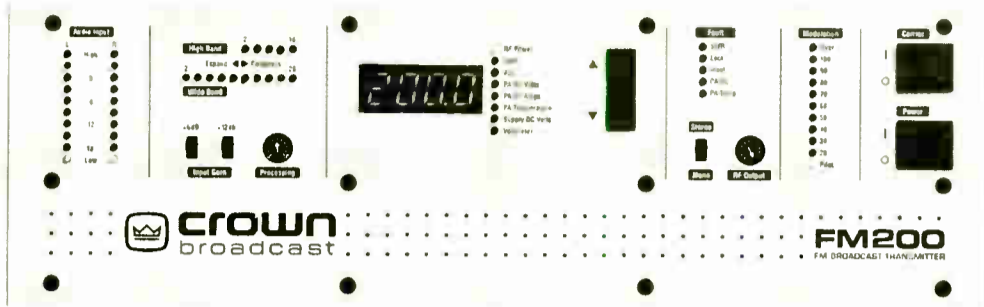
with compatibility for any other software you have, and flexible enough for expansion and changes. Yet it's the easiest of all systems to use, with features like hot buttons and pop-up windows instead of confusing icons, error-prone touch screens and multi-layered commands. Find out more about The Ultimate Digital Studio, the system designed by radio people for radio people. Call 1-800-TM-CENTURY®, or 1-214-406-6800.

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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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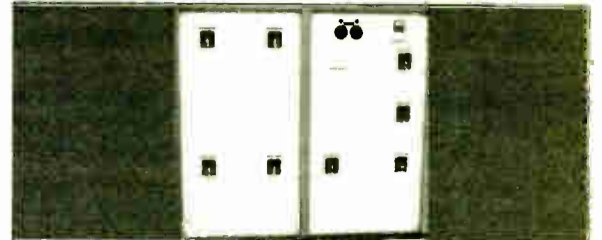
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AXS is an entirely new approach to digital audio controllers. It starts with superb audio using the premium quality apt-X™ system. AXS is easy to learn, easy to use, and powerful beyond words.

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Jocks love AXS: A fast 99 page, 28 button Jock F/X panel that can be time linked and remote wired is standard.

Use a software driven four-channel stereo audio switcher with on-screen control or the powerful eight-channel dual-buss routing switcher, or include both if you wish. AXS is controlled through a trackball, touchscreen, keyboard, buttonbox, telco or remote modem.

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READER SERVICE NO. 106



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The most powerful way to record, edit and air phone-bits

A Digital Recorder specifically designed to record phone calls and play them back quickly and easily.



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1001 Ridge Avenue
Clearwater, FL 34615

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READER SERVICE NO. 18

The CircuitWerkes DTMF-16 TouchTone Decoder



Inexpensive & Convenient Control

- Decodes all 16 DTMF tones.
- Bridging input & high current opto-isolated outputs.
- Jumper selectable beep-tone acknowledges commands.
- Momentary or Interlocked Latching output modes.
- Available with built-in AC-2 autocooper to form a dial-up remote control.
- Suggested list price is an economical \$189.

The DTMF-16 is excellent for interfacing various networks to automation, controlling remote satellite receivers, repeaters, etc. The compact, light & rugged DTMF-16 can be put almost anywhere to provide the remote controls that you need. For more info, contact your favorite broadcast supplier or call us.

CircuitWerkes

6212 SW 8th Place
Gainesville, Florida 32607
(904) 331-5999 / Fax 331-6999

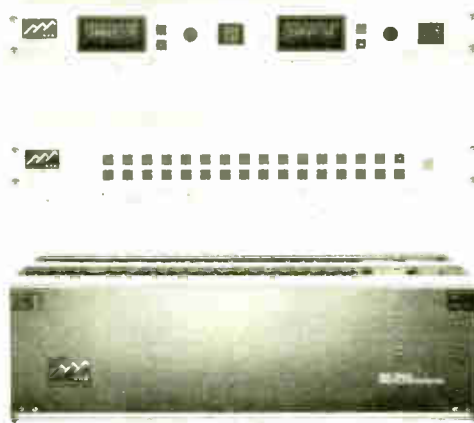


READER SERVICE NO. 129

BROADCAST AUDIO ROUTING SAS 32000 SWITCHER



Specifically designed for Radio, the SAS 32000 Stereo Audio Routing & Mixing System is perfect for directing signals throughout any size broadcast facility. Typical applications include remote routing, monitor switching, ISDN interface assignment, and control room output / transmitter routing.



Unlimited summing of inputs is standard and allows for mix-minus feeds, IFB and voice-over work. System sizes up to 32 x 16 stereo in one 3 RU frame. The modular matrix configuration expands to 192 x 192.

- Serial RS-232 ports for terminal and modem control; RS-485 for local panels.
- Destination-oriented modular control panels adapt to console fit as well as standard rack mount.
- Custom and turnkey systems available.



Sierra Automated Systems & Engineering Corporation
2112 North Glenoaks Blvd. Burbank, CA 91504 818.840.6749 Fax 818.840.6751

SIERRA AUTOMATED SYSTEMS
BROADCAST & COMMUNICATIONS

READER SERVICE NO. 198

BROADCAST INTERCOM SAS 32000 MATRIX



The SAS 32000 Series Matrix serves to create a powerful and flexible system for application specific communications. Designed for radio broadcast, it's ideal for point-to-point intercom, mix-minus feeds, mixer emulation, IFB and teleconferencing. The system is field expandable and user programmable from a central terminal/PC.



- System size configures up to 32 x 32 square using a single 3RU central frame.
- 8 or 16 pushbuttons per station.
- Alphanumeric 'dial up' access to any destination.
- Programmable talk/listen, group call, call answer, and conferencing.
- Alpha-numeric LED display identifies signal paths.
- 3-pair wiring between stations and central matrix.



Sierra Automated Systems & Engineering Corporation
2112 North Glenoaks Blvd. Burbank, CA 91504 818.840.6749 Fax 818.840.6751



SIERRA AUTOMATED SYSTEMS
BROADCAST & COMMUNICATIONS

READER SERVICE NO. 41

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1-800-336-3045

Aphex 2125

Intro: Tubessence Model 107, a dual-channel thermionic microphone preamp. Models 320A and 323A enhanced "A" Series Compellers. Dominator, a multi-band peak limiter, Model 722.

Also: Airchain FM audio processing equipment. Four-channel Logic-assisted Gate, Model 105. Model 106 Easyrider, a four-channel compressor. Expander Gate Model 622. Aural exciter Model 250 and Model 104 Aural Exciter Type C2 with Big Bottom. Audio processing rack Model 900. 8000 Modular Audio Distribution System.

Contact: Brad Lunde, Dir. of Sales & Mktg. 11068 Randall St. Sun Valley, CA 91352 818-767-2929

Apogee Electronics N/A

Intro: AD-1000 digital conversion system; Master tools UV22 encoding software for Digidesign; Master Dat with "type-3" designs.

Arrakis Systems, Inc. 4725

Intro: Gemini live radio, triple play and record digital workstations, control surfaces and mixing consoles; Disc & AVCR satellite store & forward receivers and network origination systems.

Also: 1200 series consoles: compact; 5 & 10 channel consoles with P&G faders, cue, talkback, mix minus; 12,000 & 22,000 consoles: modular console in 8, 18, & 28 input mainframes with 8-bit control bus for air.

Contact: Jon Young, V.P. Sales 2619 Midpoint Dr. Fort Collins, CO 80525 303-224-2248

Asaca/Shibasoku Corp. of America 17406

Intro: CM147/207 14" (700 lines) and 20" (900 lines) HR multi-standard color monitors with digital control; series of mid-range multistandard color monitors; ACL-400 40 cartridge tape library w/ digital betacam; Betacam SP, D3, MIT or S-VHS; VH03AZ VTR dropout counter.

Also: Line of audio and video test, monitoring and systems products, including audio and video signal analyzers; audio and video routing switchers; auto setup, high resolution and digitally-controlled monitors; display assessment systems; closed-captioning equipment; decoders; digital audio generators; distribution amplifiers; dropout counters; encoders; envelope delay measuring sets; erasable, rewritable magneto-optical disk audio files; video disk recorders; still stores; mass storage systems; GCR and HDTV equipment; signal, sync and sweep generators; tape cleaners, evaluators and rewinders; video cart systems; and video noise meters.

Associated Press N/A

On Display: AP All News Radio, an all-news radio network delivering turnkey news and information programming, live, 24 hours a day. AP NewsDesk, a news management software. NewsDesk captures, sorts and edits wire copy, computes script read time and creates custom categories. Also features a pronunciation guide, a calendar and an atlas.

ATCI 13643

Intro: Inclined orbit satellite tracking systems. Vanguard instruments portable spectrum analyzer, satellite receiver and monitor. PROFLINE voice and data digital electronics.

ATI-Audio Technologies Inc. 16602, 16702

Intro: DA412XLR and DA206XLR quad and dual 1 x 3 audio DA with XLR-type input and output connectors.

Also: Vanguard series consoles, NanoAmp small mixers and headphone amp. MicroAmp series microphone, line, phono, monitor and distribution amplifiers. System 10000 distribution line and microphone modules. Studio Metering System 5.

Contacts: Ed Mullin or Sam Wenzel 328 W. Maple Ave. Horsham, PA 19044 215-443-0330

Audi-Cord Corp. 4416

On Display: NAB cartridge machines.

Contact: Andrew Rector 1845 W. Hovey Ave. Normal, IL 61761 309-452-9461

Audio Accessories Inc. 13642, 13742

Intro: Project Patch, a reconfigurable interface system that allows fast, easy studio wiring through preterminated patch bays and cables.

Also: Audio jack panels and jacks, prewired audio patch panels, patch cords and patch cord holders, Polysand, video panels, RS-422 patching, Edac connectors and accessories, and nickel-plated patch cords.

Audio Precision 4113

Intro: System Two, a comprehensive digital and analog domain test instrument including a complete measurement of AES/EBU interface parameters, plus analog and

digital performance levels to support measurement of 20-bit converters. APWIN, a Windows-based software for System One and System Two.

Also: System One testing system and Portable Plus One, a portable test set.

Contact: Thomas E. Mintner, Dir. of Sales & Mktg., USA 5465 SW Western Ave., Ste. J Beaverton, OR 97005 503-627-0832

Audio Processing Technology 4007-9

Intro: MCE800/MCD800. The MCE800 encoder operates in conjunction with the MCD800 decoder to permit distribution of up to eight channels of high-quality audio over a digital network. DRT128, a compact, portable unit designed to deliver high-quality audio in outside broadcast and limited bandwidth applications.

Also: DSM100, a digital audio transceiver that allows CD-quality stereo audio to be carried over ISDN or similar low-capacity digital telephone circuits. Pro-Link ISDN Manager, combining an ISDN T.A. with a six-channel IMUX. ACE100 series of PC and Mac digital audio expansion cards together with the X-console, a digital audio editing software, will be demonstrated.

Contact: John Knapp, Sales Mgr.

Edgewater Water Road Belfast BT3 9JQ Northern Ireland, U.K. 44-1232-371110

Audiarts Engineering 2211

Intro: R-60 on-air audio console features six-source line selector, module extenders, gold contact switches, Penny & Giles faders, Sifam meters, 16-bit digital audio performance and Simple Phone module.

Also: MR-40 multitrack audio production console, with four mono mic/line input modules and eight stereo line modules.

Contact: Rick Strage, Prod. Mgr. 7305 Performance Dr. Syracuse, NY 13212 315-452-5000

Audio-Technica U.S. Inc. 11206

Intro: AT-MX341a SmartMiser automatic telephone mixer with digital switching. ATH-M40 and ATH-D40 precision studio phones. ATM75 head-worn cardioid condenser microphone for hands-free studio performance. AT815b and AT835b cardioid shotgun microphones that operate on battery or phantom power.

Also: AT4050/CM5, a multipatter, large diaphragm capacitor microphone for studio applications.

Audion Labs 1603

On Display: VoxPro on-air digital audio editor designed to replace reel-to-reel machines in control newsrooms.

Contact: Charlie Brown, CEO/Pres. 190 Queen Anne Ave. N Seattle, WA 98109 206-285-1735

Audiopak 4219

P.O. Box 3100 Winchester, VA 22604 703-667-8125

Auditronics Inc. 2721

Intro: 2500 Series audio console system for radio on air and production with music or talk formats. Features program, audition, and 2 mix-minus buses; 3 frame sizes available.

Also: AirMaster 90 series desktop audio console system; 210 series - drop-in audio console system with 12, 18 and 24 input mainframes; 801/851 series - on-air and production audio console system; 1900 Mix-Minus system. modular

Take it...



1994 Editors' Choice for Best New Mic
ELECTRONIC MUSICIAN MAGAZINE

1995 Sound Products of the Year Award
THEATER CRAFTS MAGAZINE

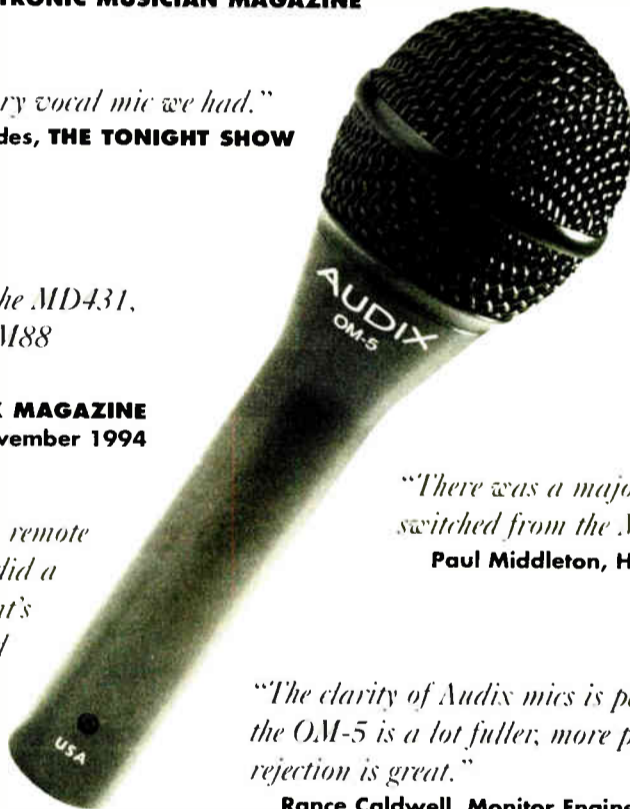
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Mark Frink, MIX MAGAZINE November 1994

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RADIO WORLD February 1995



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"There was a major improvement when we switched from the M88 to the OM-5."

Paul Middleton, House Engineer for BONNIE RAITT

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Rance Caldwell, Monitor Engineer for CROSBY, STILLS AND NASH

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In just one year, the Audix OM-5 has made a big impression. The reasons are clear—unmatched quality, uncolored reproduction, higher gain before feedback, and the Audix reputation for the very highest quality.

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World Radio History

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rack-mounted mix-minus/IFB audio system.
Contact: Robert C. Greenwald, III
Sales Eng
3750 Old Getwell Rd.
Memphis, TN 38118
901-362-1350

Autogram Corp. 4719-21
Intro: CYA-3.
Also: A number of consoles, including the RTV-20, the Pacemaker 1032, the AC-8, the Mini Mix 8A and the Mini Mix 12A. Autoclock, which measures time and temperature. Autocount, a countup clock.
Contact: Ernest T. Ankele, Jr.
1500 Capital Ave.
Plano, TX 75074
214-424-8585

Avcom of Virginia Inc. 11502
Intro: PSA-37D with new features: 4-digit LCD frequency read out; Horiz. positions the display on screen; Selectable 12 or 18 VDC LNA/BDC power for feedline powering of system components; Bat Mon displays the voltage of internal battery pack on the LCD.
Also: Portable spectrum analyzers; satellite receivers; microwave accessories.
Contact: Charlie Odom, Int'l Sales
500 Southlake Blvd.
Richmond, VA 23236
804-794-2500

A-Ware Software Inc. 2210
On Display: MusicMaster, a flexible music scheduling and inventory system. Features an advanced scheduling algorithm that improves average turnover control: interfaces with nearly every automation and traffic system available. Includes foreign language and special government reporting modules for many countries. Paperless in-studio module also available.
Contact: Scott Wirt, V.P.
22600 Arcadian Ave.
Waukesha, WI 53186
414-521-2890

B

Belar Electronics Laboratory Inc. 3119
Intro: FMSA-1 FM digital stereo analyzer, the digital stereo companion to the Wizard, RBDS-1, an RBDS monitor.
Also: Complete line of FM, AM and TV modulation monitors, modulation analyzers and frequency monitors, including the Wizard for FM, the Wizard for AM and the FMM-2/FMS-2 FM test set.
Contact: David C. Hirsch, Mktg. Dir.
119 Lancaster Ave.
P.O. Box 76
Devon, PA 19333
610-687-5550

Belden Wire and Cable N/A
Intro: Plenum RGB cables in 3, 4, and 5 coaxial cable versions; High flex RG-59/U and RG-11/U triaxial camera cables in several jacket colors.

Also: Serial digital video cables; AES/EBU digital audio cables, mic and musica instrument cables; line level audio cables, precision video coax, triax cables; camera cables; fiber optics 50 ohm transmission cables and power cords.



Audio-Technica's new studio phones, the ATH M40 and ATH-D40

Benchmark Media Systems Inc. 10052
Intro: Audoworld interface, combining a two-way recorder interface with switch selectable operation as a line amplifier or mono mix amplifier; the Junior Audio Director Plus, a stereo mode controller with four switch selectable inputs per channel; DA-102DM, a two-channel audio distribution amplifier featuring two sets of front-panel 13-segment LEDs for monitoring left and right channels simultaneously.
Also: The System 1000 uses 14 different cards and four power supplies, along with numerous controllers and accessories; the Microframe series, a 1 RU modular frame housing 16 ampifiers and two power supplies; line of mode controllers, mic amplifiers, meter systems and interface amplifiers.
Contact: R. Rory Rall, Sales Mgr.
5925 Court Street Rd.
Syracuse, NY 13206-1707
315-437-6300

Bext Inc. 3815
Intro: Solid state SF Series MOSFET amplifiers, with up to 5000 W FM.
Also: 27 models of FM amplifiers in 30 configurations, from 100 to 30 kW; STL systems, from 1.5 to 15 W; exciters from 1 W to 150 W; UHF or VHF solid state or tube amplifiers from 2 W to 40 kW.
Contact: Dennis Pieri, G.M.
1045 Tenth Ave.
San Diego, CA 92101
619-239-8462

beyerdynamic 11214
Intro: EQ Magix from SPL, a high-quality microphone pre amp designed for live or studio use. Features variable gain, 48 V phantom power use, phase reverse, a defeatable insert point and a 30 dB pad for line use. DT 200 series headphones and headsets, available in on-air or monitor versions, with a choice of dynamic or condenser elements.

Bradley Broadcast Sales 1903
Intro: Tascam's DA-P1 portable pro DAT machine with XLR, Telos One-x-Six telephone talk system. Panascheme wood equipment racks and studio furniture. Innovative Quality Software SAW computer-based audio editing software. Gentner TS-612 telephone talk system. Yamaha ProMis 01 digital audio mixer. 360 Systems Instant Replay morning show sampler.
Also: Telos Zephyr digital audio codec. Telos telephone hybrids. Middle Atlantic Rack products.

Broadcast Electronics Inc. 3625
Intro: FM-5C 5 kW solid state FM transmitter. FM-250C 250 W solid state transmitter. AM-500 500 W solid state AM transmitter.
Also: AudioVAULT, a digital audio storage system. CORE digital automation system. Air Trak 90 console. Mix Trak 100 console. Operating studio. Disc Trak digital cart machine. Dura Trak 90A cart machine. FM-30B 30 kW FM transmitter. AM-5 5 kW solid state AM transmitter.
Contact: Dave Newton, Mktg.
4100 N. 24th St.
Quincy, IL 62301
217-224-9600

Broadcasters General Store 3007
Intro: DNF Industries ST-2005/SM slow motion VTR controller. SW 1x8 RS-422 switcher.
Also: SAW digital editing software by Innovative Quality Software. RFC-1/B dial-up remote controller by Sine Systems, as well as the company's Thermal Sentry transmitter temperature monitor. American Recorder Technologies cleaning products for recording equipment.

Broadcast Programming 3625
Intro: Music-on-HardDrive, complete music libraries on computer hard drive. Digitalease, an affordable, complete digital equipment and radio programming package.
Also: Full line of digital radio programming formats, including new '90s alternative (Radio X) and '70s greatest hits (Heart of the Seventies). Weekly Chartbreakers hit CDs. Playlist Plus scheduler. The Localizer. Recurrent CDs. BP Consulting Group. NAB-only special on music libraries.
Contact: Keith Chambers, Mktg. Mgr.
2211 Fifth Ave.
Seattle, WA 98121
206-728-2741

Broadcast Richmond 5625
On Display: Solid state Nautel radio transmitters and various studio systems.

Broadcast Supply Worldwide 1825
Intro: Roland DM800 digital audio workstation. 360 Systems Instant Replay.
Also: Vo>Pro, DigiLink, Telos Zephyr and Mackie Consoles.
Contact: Tim Schwieger
7012 27th S W
Tacoma, WA 98466
800-426-8434



Also: Frequency extenders for high-quality audio feeds (up to 8 kHz) on standard analog phone lines. Telephone couplers, wireless cue systems for

Burk Technology 3702
Intro: Audio test equipment, emergency alert equipment and automatic transmitter control equipment.
Also: Transmitter control packages featuring the ARC-16 system for full-time or dial-up control. Walkaway packages using the APC-16 with AutoPilot transmitter control software. LX-1 six-input stereo selector for audio switching.
Contact: Dan Rau, Sales Mgr.
7 Beaver Brook Rd.
Littleton, MA 01460
508-486-008E

Canare Cable Inc. 11118-22
Intro: AES/EBU/SPDIF impedance transformers for digital equipment.
Also: Star Quad microphone cable.

CBSI 2113
On Display: Classic traffic and billing software system for duopolies, consolidated operations, and multiple and single stations; Elite system; InterAcct, an interactive accounting system; Digital Universe, an advanced generation digital audio storage and management system; CustomRemote; Custom Reports; PowerPlus; CustomNet and CustomMusic software programs.

CCA Electronics Inc. 4421
Intro: FM transmitters and exciters.
Also: FM, AM, MW and shortwave radio broadcast transmitters up to 65 kW.
Contact: Steve McElroy/Howard M. Ginsberg, V.P. Sales
360 Bohannon Rd., P.O. Box 426
Fairburn, GA 30213
404-964-3532

Central Tower Inc. N/A
Circuit Research Labs Inc. (CRL) 2719
Intro: DP-100 FM digital processor, based on a 32-bit floating point DSP processor. Includes a true digital stereo multiplex generator, AGC, five-band compressor and four-band limiter. SC-100 RDS/RBDS and SCA generator, featuring complete front panel ASCII keyboard and easy-to-use menu system.
Also: DAA-50, which decodes AES/EBU, IEC958, SPDIF and EIAJCP-340 signals into stereo analog audio. Amigo FM and Amigo AM processors. Audio Signature digitally controlled processing system. AM-4S, featuring C-QUAM-compatible stereo limiter.
Contact: Valerie Hummer, Mktg. Dir.
2522 W. Geneva Dr.
Tempe, AZ 85219
602-438-0888

Communications Data Services Inc. 1811
Intro: Additions to CDS dial-up on-line services, including LPTV interference study, AM groundwave analysis, LMA duopoly study, ZIP codes for contours and mapping services.
Contact: Mark Holland, G.M.
6105 Arlington Blvd.
Falls Church, VA 22044
703-534-0034

Computer Concepts Corp. 2503
Intro: Digital audio products including newsroom editing, multitrack production, live assist control and Cartrack cart selection system.
Also: Digital Commercial System (DCS) audio storage system.
Contact: Kevin Alcock
8375 Melrose Dr.
Lenexa, KS 66214
913-541-0900

Comrex Corp. 12105
Intro: DX200 MusicLine, an ISO/MPEG Layer II codec for full bandwidth stereo on ISDN and Switched 56 lines. Upgraded G.722 DXR.1 and DXP.1 digital audio codecs capable of bidirectional 15 kHz mono on an ISDN line.
Also: Frequency extenders for high-quality audio feeds (up to 8 kHz) on standard analog phone lines. Telephone couplers, wireless cue systems for ENG and SNG, and special-purpose remote audio consoles.
Contact: Lynn Distler, V.P. Mktg.
65 Nonsset Path
Acton, MA 01720
508-263-1800

ComStream Corp. 5615
Intro: Developments in satellite radio networks, as shown in the demonstration of the new Public Radio Satellite System from National Public Radio (NPR). ABR700 digital audio receiver, supplied with a live NPR satellite feed.
Also: Products for transmitting high-quality audio, video and data in efficient, adjustable bandwidths. Live demonstrations of these products working for television, radio and data service producers.
Contact: John Schmuhl
10180 Barnes Canyon Rd.
San Diego, CA 92121
619-458-1800

Comtech Antenna Systems Inc. 13402-3
Intro: EC8 microprocessor control system with optional IBM-compatible software. "C" or "Ku" fly-away antenna for SNG-type applications.
Also: Complete line of satellite antenna systems from 35 inches to 7.3 meters. Offsat antenna, for SCPC uplink requirements.

Comtek Inc. 17521
Intro: BST-25 frequency-synthesized base station transmitter, featuring front-panel tuning to any one of over 100 frequencies. PR-50, a wireless cuing and IFB product.

Connectronics Corp. 13627
Intro: Accessories for Big Ears, a parabolic microphone reflector.
Also: Audio and video wire and cable patch bays and patch panels. Bodge plugs.

FM STUDIES

- **SPACING/INTERFERENCE SEARCHES** to locate a channel
- **DETAILED INTERFERENCE STUDIES** optimizing site location and directional antenna designs (calculates allowed ERP on all 360 bearings)
- **TERRAIN ELEVATION RETRIEVAL** determines HAAT for 8 or more radials
- **DISTANCE TO CONTOURS** plots projected coverage
- **POPULATION COUNTING** to determine potential listening audience
- **COVERAGE MAPS AND OVERLAYS** depicts signal coverage, zip code boundaries, received signal level, terrain shadowing and more

dataworld
A SERVICE OF DW, INC.

(301) 652-8822 (800) 368-5754

Circle (136) On Reader Service Card

Continental Electronics Corp. 3619
 On Display: Complete line of radio broadcast transmitters, antennas and other RF equipment.
 Contact: Steve Claterbaugh
 P.O. Box 270879
 Dallas, TX 75227-0879
 214-381-7161

Cooper Sound Systems 13619
 Intro: ENG-style four-channel stereo audio mixer, featuring analog meters, Jensen coupled inputs and outputs, insert points and channel outs, PFL and an ergonomic design.
 Also: CS 106 + 1 audio mixer, featuring up to seven fully modular input channels and an output module with a comprehensive communications system. CS 108 + 1 audio mixer, featuring two more input channels than the CS 106 + 1.

Corporate Computer Systems Audio Products (CCS) 3813
 Intro: A demonstration of the new CDQPrima digital audio codecs, featuring bidirectional 20 kHz stereo, ISO/MPEG Layer II and G.722 audio, and SMPTE time code. PACE Lite, a desktop version of the PACE digital newsroom editor. PrimaNet, an instant audio network based on the CDQPrima codec. POTS codec, providing program-quality audio on regular dial-up phone lines. POTS codec
 Also: PACE, a full-function, standalone editing system with networking and audio routing switcher control capabilities. CDQ1000, CDQ2000, CDQ2001 and Micro series digital audio codecs.
 Contact: Art Constantine, V.P. Sales
 670 N. Beers St., Bldg. 4
 Holmdel, NJ 07733
 908-739-5600

Cortana Corp. 3909
 On Display: Stat-Cat lightning prevention system.
 Contact: David Stockmar, V.P. Sales
 P.O. Box 2548, Farmington, NM 87499-2548
 505-325-5336

Crown Broadcast 3203
 Intro: FM-XA-1K and FM-XA-2K 1 kW and 2 kW expandable solid state FM transmitters. Crown AirForce Wings System, allowing network-fed radio stations to sound local while retaining the benefits of the network feed.
 Also: Integrated FM transmitter packages. FM30, FM100 and FM200 integrated transmitter/exciter packages. Audio amplifier and microphone lines.
 Contact: Mark Potterbaum
 1718 W. Mishawaka Rd.
 Elkhart, IN 46517-1000
 219-294-8050

Crown International 46515
 Intro: CM311-HS microphone.
 Also: Amplifiers, microphones and IQ computer control.

CTE International SRL 3201
 7 Zona Ind Mancoasale
 I-4200 Reggio Emilia, Italy
 39-588-516663

Cutting Edge Technologies 4203
 Intro: Unity software version 4.X, providing a wide range of processing settings for every format.
 Also: A demonstration of the Unity 2000i FM and the Unity AM processors. Showing of the Dividend Composite Filter, which provides full spectral protection, including RBDS and other SCA signals. Dividend boosts main channel modulation and reduces multipath distortion.
 Contact: Danielle Cline, Mktg.
 2101 Superior Ave.
 Cleveland, OH 44114
 216-241-3343

Dalet Digital Media Systems 5007-9
 Intro: Traffic scheduling software under Windows; ISDN application for transferring audio files and logs to distant sites; advanced satellite automation.
 Also: On-air navigator module for live assist and music automation; multitrack editor.

Dan Dugan Sound Design 13619
 On Display: The Model D automatic mixing controller, the live mixing assistant.

Datacount Inc. 5419-20
 Intro: Revision 7 of the DARTS traffic and billing system, which maximizes the benefits of computers with faster CPUs and expanded file sizes. New traffic features include multistation combined traffic, customized history reporting, data export to spreadsheet programs. DARTS 7 also interfaces with automation systems to download logs for automatic reconciliation and with Novell and Lantastic LANs.
 Contact: Debbie Hamby
 P.O. Box 3078
 Opelika, AL 36801-3078
 205-749-5641

Datatek Corp. 13824
 Intro: The D-2800 Routing Switcher System for analog audio, digital audio, analog video, digital video, time code and data routing.
 Also: The D-25000 series of 20-by-10 and 20-by-20 routing switchers for analog and digital audio and video, as well as analog and digital audio distribution amplifiers, A/D and D/A converter modules.

Dataworld 20814
 Intro: Detailed ethnic and demographic reporting in tabular and graphical (map) formats. A large on-line database provides instant access to information and Internet communications capabilities are available too. New ethnic/demographic shading overlays for any base map are also available.
 Also: Allocation map books, coverage analysis, terrain digitizing, AM, FM, TV, LPTV and wireless cable databases, interference studies and directories—all with 24-hour remote access.
 Contact: John Neff and Bob Richards, Sales
 4827 Rugby Ave., Ste. 200
 Bethesda, MD 20814
 800-368-5754 or 301-652-8822

DB Elettronica Telecomunicazioni SpA 4201
 Intro: 300 W FM transmitter with built-in digital stereo coder. Digital stereo coder for FM stations. 300/600/1000 W FM MOSFET amplifiers. TD116 and RD116 digital encoder and decoder for aural STL.
 Also: 2500/5000/10000 W FM tube-powered amplifiers with high-efficiency HMV cavity, solid-state modular FM amplifiers, FM exciters and transmitters, analog STL transmitters and receivers, antennas and accessories.
 Contact: Luciano Ditadi
 Via Lisbona, 38
 Padova 35127, Italy
 39-49-8700588

Delta Electronics Inc. 4125
 On Display: R.E. Ammeters, operating impedance bridges, receiver/generator, AM stereo exciter and monitor, coaxial transfer switches, antenna monitor, splatter monitor, noise generator and high-power pulse reflectometer.

Denon Electronics 4004-5
 Intro: The DN80R portable MiniDisc (MD) recorder, which includes features found in better DAT and reel-to-

reel portables, but with the advantages of MD.
 Also: The DN790R professional tape recorder with Dolby S Noise Reduction, the DN740R professional double cassette deck, the DN1400F 200-CD jukebox with two transports. CDR63 and CDR74 ultra-high-quality recordable CD blanks and a free upgrade for DN990R and DN980F MD cart machines.
 Contact: Mike Stelts, Prod. Mgr.
 222 New Rd.
 Parsippany, NJ 07054
 201-575-7810

Developing Technologies 12802/2203
 Intro: The dB Technologies model AD122 stereophonic A/D converter and model 3000 digital optimizer. Sanken CSS-5 shotgun stereo mic.
 Also: Sanken COS-11 omni-directional miniature electret lavalier mic. Brainstorm SR-15 + time code distripolyzer.

DG Systems 1809-10
 On Display: DG Systems provides multimedia transaction networking services to the broadcast advertising industry, including accurate and timely digital delivery of CD-quality audio commercials and associated traffic instructions from advertising agencies and production studios to radio stations.

Rumor:
"Harris Allied is in the Radio Hall."
 1995 NAB, Las Vegas, April 10 - 13

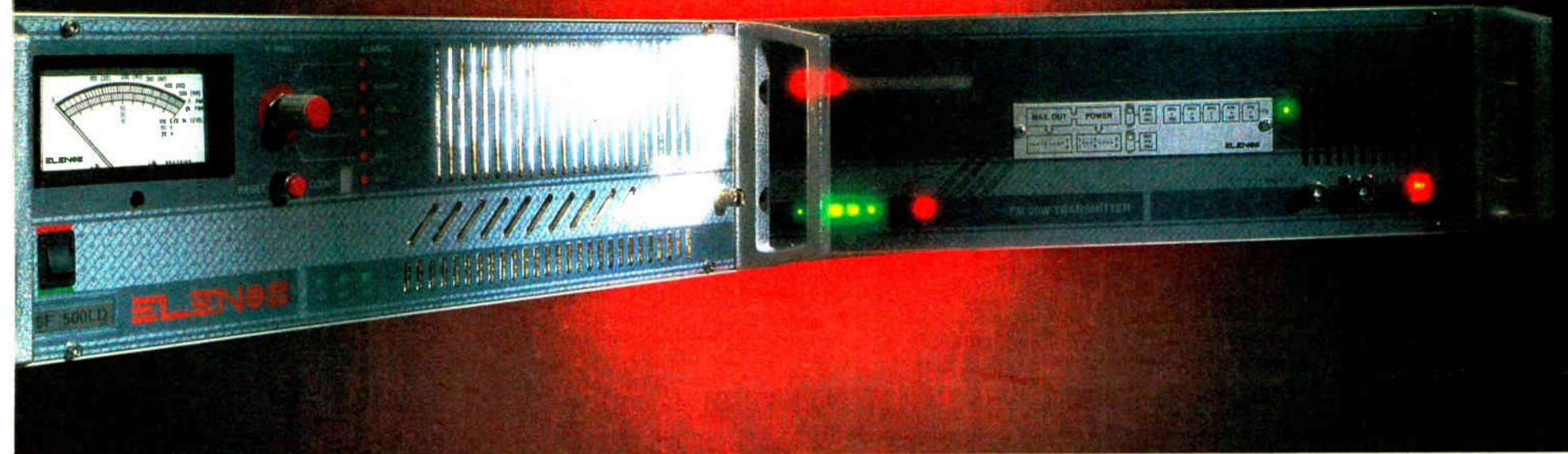
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Circle (54) On Reader Service Card



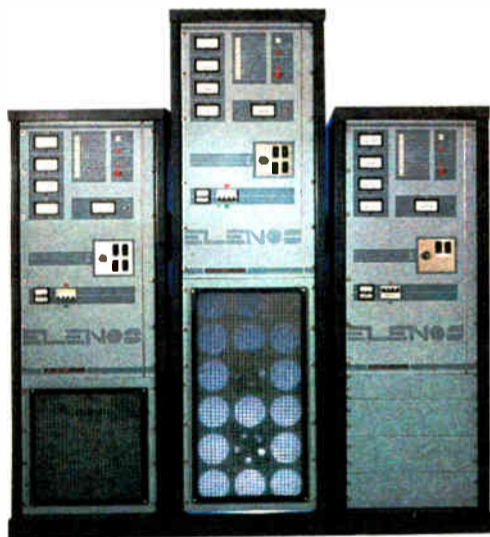
Elenos, of course.

*E*stablished in 1977, Elenos has based its company philosophy on a precise commitment: investment in research. As a result of this commitment, Elenos is now able to offer a range of specialized products capable of providing the best possible solutions to radio broadcasting problems: • FM Power amplifiers • FM Solid State amplifiers • Exciters • Radio link • Filters • Combiners • Aerials • Remote Control RF Diagnostic. As always, Elenos guarantees quality, high-level technology, compactness, interface capabilities, energy saving, reliability and greater attention to operational

problems.



RF DIAGNOSTIC REMOTE CONTROL



FM TUBE AMPLIFIERS RACK SERIES

*C*reada en 1977, Elenos ha basado la propia filosofía empresarial en un preciso empeño; invertir en la búsqueda. Dicho compromiso permite hoy en día a Elenos de ofrecer una gama de productos especializados en condiciones de resolver de la mejor manera las problemáticas broadcastin: • FM Power amplifiers • FM Solid State amplifiers • Exciters • Radio enlace • Filters • Combiners • Antennas • Remote Control RF Diagnostic. Elenos desde siempre es una garantía de calidad, tecnología, compacidad, interfaciabilidad, ahorro de energía y fiabilidad otorgando una mayor atención a los problemas operativos.

ELENOS

BROADCASTING EQUIPMENT COMPANY

Via G. Amendola, 9 44028 Poggiorenatico Ferrara Italia Tel. 39/532 829965 Fax 39/532 829177
73 Oak Street Plymouth MA 02550 USA Ph. (508) 830-0448 Fax (508) 747-4696

DGS Pro-Audio 4605
 Intro: Four-, eight-, 10- and 12-pair digital multipair cables for digital transmission. GAC-2 low-noise cables, speaker cable, universal panel-mount XLR connectors and color-coded quarter-inch phone plugs.
 Also: Deltron XLR connectors, RCA plugs and quarter-inch phone plugs and Gotham audio cable, including unbalanced, 34 pairs and Ultra-flexible, double-shielded microphone cable.

Dynair Electronics Inc. 13805
 Intro: System 2000 routing systems for digital transmission at 400 Mbps in new configuration sizes and with stereo audio. Series 36 now provides stereo audio for 36-by-36 routers.
 Also: Digital X serial digital video and AES audio router switches to 400 Mbps. Genesis modular line of digital interfacing and conversion equipment. Dynoptics fiber transmitter/receiver line for audio, video and data.

Dic Digital 18385
 Intro: New 8mm digital audio cassette for multitrack recording applications. Cassettes are available in 15-, 60-, 90- and 120-minute lengths.
 Also: Complete line of DAT products. Recordable CDs and magneto-optical discs, as well as 8mm videotape and Betacam SP.

Dynatech NewStar Multimedia 17124
 Intro: EditStar script-based, non-linear editor designed specifically for broadcast news automation. NewStar for Windows newsroom automation system now includes capability to run under Microsoft Windows '95 and Windows-NT operating systems.

Electro Voice 15717
 Intro: RE2000 studio condenser mics, which feature ultra-quiet, high-sensitivity and smooth "tube-like" sound.
 Also: RD50, RD50N/D, 635A, 635N/D, RE20, RE27, RE38, RE45, RE16, ELX1-A, S-60A and S-80A microphones.
 Contact: Peter Igel, Brdcast./Prod. Mktg. Spec. 448 Post Rd. Buchanan, MI 49107 616-695-4750

ENCO Systems 5619
 On Display: The DAD486x digital audio delivery system, DOS-based software coupled with industry-standard computer hardware, provides powerful digital audio recording, editing, library management, program scheduling and multiple output reproduction capabilities.
 Contact: Larry Lamoray, V.P. Sales/Mktg. 24403 Halsted Rd., Farmington Hills, MI 48335 810-476-5711

Elenos SRL 1225
 Intro: SF series solid-state transmitters up to 4 kW with improved protection characteristics. ELC 60/S exciter with stereo coder included.
 Also: Low-cost eight-channel MNDS TV System. Compact series of tube amplifiers. Rack series of tube amplifiers up to 30 kW.
 Contact: M. Cilloni, Mktg. Mgr. Via G. Amendola, 9 Poggio Renatico (FE) Italy 39-532-829965

Energy-Onix 4707
 Intro: Two composite frequency-agile STL systems, a 100 W exciter/transmitter with excellent specs and RPU transmitters and receivers.
 Also: The ECO series grounded-grid triode tube FM transmitters ranging from 1 to 11 kW. The MK series of FM grounded-grid triode tube transmitters from 1.5 to 50 kW. The SST series of low-power transmitters from 30 to 500 W and the legend series from 1 to 10 kW. Multiple preset dual-frequency shortwave transmitters.
 Contact: Ernie Belanger 752 Warren St., Hudson, NY 12534 518-828-1690



Dielectric Communications 15720
 On Display: A complete line of VHF, FM and UHF broadcast components, including antennas, transmission line, waveguides, filters, combiners and associated RF components. Also offered are HDTV-adaptable antenna and transmission line systems that can be used in current NTSC configurations as well as future ATV configurations.

Econco 4823
 On Display: High-quality rebuilt power tubes and klystrons for radio and TV transmitters.
 Contact: Debbie Baker, Sales 1318 Commerce Ave., Woodland, CA 95776 800-532-6626

Dolby Labs 16567
 Intro: DP24 AC-3 decoder for decoding Dolby AC-3 digital audio coding. New features for the Dolby DSTL digital studio-transmitter link.
 Also: Dolby Fax System for linking studios worldwide via ISDN. Model 740 Spectral Processor for personalized audio processing.
 Contact: Kevinn Tam, Dir. of Mkt. & Sales 100 Potrero Ave. San Francisco, CA 94103 415-558-0210

EEV Inc. 17136
 On Display: Broadcast tetrodes for AM/FM transmitters.

Electric Works Corp. Multimedia 1808
 On Display: A new line of multimedia, audiovisual, pro audio, consumer audio and audio automation hardware and software, including multipurpose BMX-4 stereo four-channel audio switcher and I/O board for PCs, the AS-28 eight-channel stereo audio switchers, the DCE digital clip editor for apt-X audio cards, and CDI custom CD player controllers.
 Contact: Pete Charlton, Pres. Box 1-36992 Ft. Worth, TX 76136 817-625-9761

Dorrough Electronics 91311
 On Display: Audio level meters featuring the Dorrough trademark of peak and average for both analog and digital audio.

FACT:
"Harris Allied is in Both Halls."
TV Hall #16001
Radio Hall #3615
 1995 NAB, Las Vegas, April 10 - 13

The **NEXT Generation All Digital**
 Audio Processing System

 Come hear CRL's new all digital **DP-100** in action!
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 Circuit Research Labs, Inc.
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Circle (168) On Reader Service Card

ERI (Electronic Research Inc.) 16604

Intro: ARS-1003 Automatic transmitter recycler; engages the transmitter interlock system when reflected power exceeds limits, breaks supply of RF to the system, sets RF power indicating device, resets transmitter, logs and reports sequence of events; RFSS-3125 RF Safety Switch; addresses OSHA's "lock out/tag out" requirement for protection of workers from accidental exposure or electrical trauma when maintaining the antenna system or tower. SKIP Site Keeper Integrated Pager; monitor and automatically reports status of 16 transmission site conditions including: tower lights, VSWR, transmission line pressure antenna icing conditions, building, tower base or anchor trespass. Fourteen output functions permit automatic or manual responses to alarms. Contact: David Davies

7777 Gardner Rd
Chandler, IN 47610
812-925-6000

ESE 13606

Intro: ES-996 six-digit two-inch red slave clock, ES-126/ES-127 half-inch and one-inch time and date displays, ES-217/XLR 1 x 4 audio DA, ES-181 modem-based master clock/time code generator and ES-185 GPS master clock/time code generator.

Also: Digital clocks and timers, master clock system products, audio level indicators and impedance matching interfaces, audio and video DAs and SMPTE time code generators, readers, inserters and converters.

Contact: Brian Way
142 Sierra St.
El Segundo, CA 90245
310-322-2136

Euphonix

Intro: CS2000 B broadcast system, a digitally controlled audio mixing system suitable for on-air and post production. The system includes 12 mix-minus feeds and optional multiformat mixing buses, that can be configured for SurroundSound mixing.

Also: CS2000 audio mixing system, digital controlled analog audio mixing with options available for music, TV, audio, post and film audio post markets.

Eventide Inc. 2707

Intro: The DSP4000B, H3500B and H3000B+ Ultra-Harmonizer brand effects processors with special broadcast/post production software and the latest additions to its full line of audio and video broadcast obscenity delays. VR and VP series digital audio loggers, with models that can record more than 500 hours on a single DAT tape, divided among up to four or 24 channels.

Also: BD980 and BD941/BD942 obscenity delays.

3603

Contact: Gil Griffith, Sales Mgr.
One Alsan Way
Little Ferry, NJ 07643
201-641-1200

E-Z UP International Inc.**4821-2**

Intro: Eclipse and Encore model E-Z UP Instant Shelters for indoor/outdoor instant displays. Fully self-contained, these instant shelters set up without the need for ropes or poles. Also, the new E-Z UP instant monitor stand that provides quick displays for promotional material and company videos.

Also: E-Z UP Instant Shelters to help keep cool and to grab attention on remote locations. All E-Z UP products can be silk-screened with station call letters or slogans for high visibility.

F**Fiber Options Inc.****16573**

Intro: 177B, Y/C Component Video; 315B, AES/EBU Digital Audio; 1240SB, Video and Digitally processes stereo Audio for Single-mode fiber; 1121B, Long Haul Broadcast Grade Video.



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Circle (120) On Reader Service Card

World Radio History

Fidelipac Corp. 3122

On Display: Dynamax DCR1000 Series with magneto-optical drive system. CTR 10 Series cartridge machines, related accessories and cartridges; DCR 1000 Series digital cartridge machines with magneto optical drive; MX Series Modular console; Broadcast Audio Series VI console.

Contact: Roger Thanhauser, Pres.
P.O. Box 808
Moorestown, NJ 08057
609-235-3900

Firstcom Music 13623

Intro: Musiquick Search Software, keyword search program.

Also: Sound Designer II, Sound Designer, Nashville; The Promo Library and maximum impact, digital production library, Sound Ideas SFX packages.

Flash Technology Corp. of America 1819

Intro: Series of dual beacons for medium- and high-light intensity; Antenna lighting. ElectroFlash FTB 312 Medium Intensity Dual Beacon; ElectroFlash FTB 224 and 225 High Intensity Dual Beacons; ElectroFlash AOL 302-D Dual Antenna Obstruction Light.

Also: SMART Obstruction Lighting Hardware—System Monitoring and Reporting Telemetry; EAGLE Obstruction Lighting Software; ElectroFlash FTB 310 Medium Intensity White Beacon; ElectroFlash FTB 205 High Intensity White Beacon.

G, H**Gentner****Communications Corp. 5621**

Intro: Updated version of ET100 portable teleconferencer; enhancements to TS612 multiline telephone talkshow telephone system.

Also: Telephone interface; hybrids; couplers; talk show systems; teleconferencing systems; transmitter remote control; audio processing; patch panels; audio distribution amplifiers.

Contact: Elaine Jones
1825 Research Way
Salt Lake City, UT 84119
801-975-7200

Gecco International 13251**Gorman Redlich Mfg. Co. 1913**

Intro: EAS Equipment

Also: Digital antenna monitors for AM directional arrays; Model CRW NOAA weather radio; EBS encoders and decoders.

Contact: Jim Gorman
257 W. Union St.
Athens, OH 45701
614-593-3150

Haffler/Rockford Corp. 3903

Contact: Rick Gentry

641 S. Rockford Dr.
Tempe, AZ 85281
602-967-3565

Halland Broadcast Services Inc. 5625

Intro: New update discs for adult contemporary and country music CD libraries.

Also: "Rock 'n' Roll Graffiti" oldies CD library; "The Seventies" AC-Gold CD library; "The Eighties Plus" AC library; "Halland's Country Hits" country music CD library.

Contact: Steve Steinberg
1289 East Alosta Ave.
Glendora, CA 91740
818-963-6300

Hallikainen & Friends 4223

On Display: Election Central software runs on networked IBM compatible computers: DRC200 transmitter control system brings hypertext to transmitter control; DRC190 transmitter control system brings basic programming to transmitter control; TVA series of monoaural rack mount audio mixers include Audio Follow Video, allowing their use on air, newsroom, dubbing stations, etc.; TEL171 digital telemetry adapter updates Moseley TRC-15A remote control systems to digital metering; ITO178 interfaces the TEL 171 to IBM compatible computers.

Harman Professional Audio Group 2910

TOP 10 REASONS TO SHOP FULL COMPASS



Your AM station will sound like an FM.



Your station's TSL, AQH and CUME will soar.



Your jocks will quit complaining.



Your news guys will sound like a million bucks.



Three words: stay under budget.



You like dealing with those guys in Wisconsin.



Rumored moving sale going on now.



B-stock is the word.



Great stuff really cheap.



Full Compass won't walk any deals!*

Technics

SA-GX190 100W/Ch Receiver

- 100w/ch into 8 ohms class-H amplifier with 2-dB of dynamic headroom
- AV remote control
- Digital AM/FM tuner with 30 presets
- Five audio inputs
- Bass and treble controls, balance control and muting switch



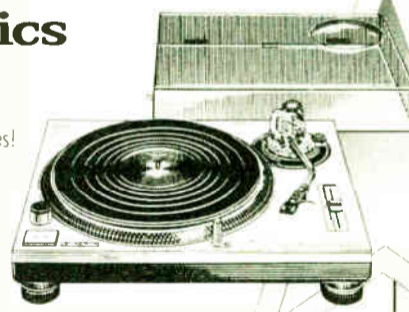
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Technics

SL1200 MK2 Turntable

For all those golden oldies!

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Technics

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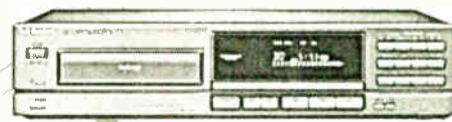
5618 Odana Road • Madison, WI 53719
FAX 608•273•6336

Technics

SL-PG350 Programmable Compact Disc Player

- MASH 1-bit DAC system for accurate small signal reproduction
- Advanced digital servo system offers improved playability by optimally adjusting servo operation for each disc
- Random play and auto cue
- Time fade for automatic fading at your selected time
- 20-step random access programming

Low Price, Call.



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* Must send or fax copy of competitor's price quote dated within 30 days.

Circle (89) On Reader Service Card

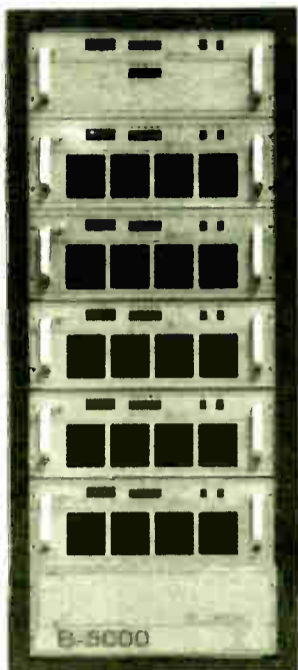
World Radio History

Products & Services Showcase

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5' RACK

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B-4000	2000 - 4400
B-5000	3000 - 5500



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READER SERVICE NO. 64

The CircuitWerkes TeleRadio Remote Controlled Listen Line



You can find out what's on the air in all of your markets without ever leaving your chair!

With the TeleRadio and a phone, you are ready to check up on your station *and* all of your competitors in real-time. You'll never have to get another station air-check plus you can punch around the dial as if you were right there. When the TeleRadio answers, its internal radio begins playing down the line to you. You control the tuner with the buttons on your phone. The TeleRadio is the next best thing to being there yourself.

The TeleRadio features include:
Ten random memory presets
Remote scanning, tuning, band change & memory set.
Remote controlled external audio jack lets TeleRadio double as a standard coupler for IFFB, etc.

List price is just \$689.

CircuitWerkes

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(904) 331-5999 / fax 331-6999

READER SERVICE NO. 201

On • the • Air

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On•the•Air is a new, easy-to-use and affordable software for radio broadcasting. It works on Macintosh and allows direct-access to 12 pages of 16 sound files in CD-Quality. Direct-to-disk playback is achieved through the Apple Sound Manager™ or with the Digidesign Audiomedia II™, SoundTools™ or ProTools™ systems.



For more information:
Softron Media Services
Chemin des 2 Maisons, 61
1200 Brussels - BELGIUM
Phone: +32 2 771 7371
Fax: +32 2 771 17 66

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RADIO AREA BOOTH 4210

READER SERVICE NO. 155

UNIVERSAL SCPC XE-1000



SCPC BROADCAST AUDIO RECEIVER

New, affordable, frequency-agile receiver, direct channel entry by keyboard, selectable companding 1:1, 2:1, 3:1, wide/narrow bandwidth, de-emphasis selectable, 950-1450 MHz, line output 600 ohms, muting, transponder agile, LNB power supply, 50-channel memory, full baseband output, high-quality audio. Every needed feature at a sensible price (lowest in the industry). Write or call for full information on this quality receiver—the answer for your station. Networks call for prices.

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Communications Specialists Phone: (614) 866-4605 Fax: (614) 866-1201

READER SERVICE NO. 53

Going Digital?

When You're Ready, We're Ready.

WireReady® NSI

Reason #1:
CartReady™ Ends
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Hassles Forever

Turn your 386 or 486 computer into a perfect triple-deck or reel-to-reel replacement with **CartReady™** production live-assist software (\$1299) from **WireReady NSI** and a CardD digital audio card from Digital Audio Labs. We're LAN-compatible and completely modular, so you can start with one studio now and add others later.

If your radio station is making the switch to digital, **WireReady** has a product that suits your every need.

Call today.

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WireReady® NSI, Framingham, MA

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READER SERVICE NO. 7

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Radio World

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Falls Church, Va
22041

Phone:
800-336-3045

FAX:
703-998-2966

Harris Allied 16001, 3615

Intro: Harris DX Series EPAC for high-power digital solid-state medium-wave transmitters; Audio-Metrics CD-10E; Oktava Microphones.

Also: Harris FM and MW transmitters; Harris FM transmitters with DIGIT Digital FM excitors; MW transmission equipment: sound enhancement and recording systems: ISDN and Switched 56 equipment; Digital audio network transceiver; register Data Systems Phantom: Telephone and digital audio delivery systems.

Contact: Martha Rapp
3200 Wisman Ln.
P.O. Box 4290
Quincy, IL 62305-4290
217-222-8200

Henry Engineering 5625

Intro: Telesor digital actuality recorder for automatic recording of news reports, weather updates and other actualities sent to broadcast stations using regular dial-up phone line.

Also: Matchbox, USDA, Stereoswitch, Misminus Plus and other problem-solving interface products.

Contact: Hank Landsberg, Owner
503 Key Vista Dr.
Sierra Madre, CA 91024
818-355-3656

HHB Communications Ltd. N/A

Intro: Advanced Media Products Blank CDR discs.

Also: PORTADAT professional portable DAT recorders and accessories: HHB BitBox CDR optimizer: Cedar audio restoration products: Coles microphones: HHB DAT tape.

Holiday Industries Inc. 12908

Intro: New ankle current meter for directly measuring RF induced currents in the body in accordance with the latest revision of the ANSI RF exposure standard.

Also: Broadband isotropic RF field strength meters for measuring potentially hazardous electric and magnetic fields in the vicinity of transmitting facilities.

Contacts: Burton Gran, Pres. or
Michael Leighton,
Sales & Mktg.
14825 Martin Dr.
Eden Prairie, MN 55344
612-934-4920

Industrial Acoustics Co. 14039

Intro: STC 64 Noise Lock Acoustic Door.

Also: High-performance window and wall systems to provide ultimate noise isolation for proper broadcasting.

Inovonics Inc. 1625-8

Intro: AM modulation monitor, Model 540; David-II FM stereo processor/generator, Model 716; FM Stereo generator, Model 708; RBDS encoder/decoder computer interface.

Also: NRSC AM Audio Processor, Model 222; FM Audio Processor, Models 250, 255, 260; FM Mod-Monitor, Model 530; SENTINEL All-Mode Diagnostic Receiver, Model 550; RBDS Encoder, Model 710; RBDS Decoder, Model 510; On-Screen Audio Level Display Keyer, Model TVU.

Contact: Jim Wood, Pres./C.E.
1305 Fair Ave.
Santa Cruz, CA 95060
408-458-0552



Intraplex Inc. 3904-5

Intro: Model 4464 MPEG Audio Layer II codec for ISDN lines. Includes bi-directional stereo MPEG audio, auxiliary data channel, built-in bonding-compatible inverse multiplexer and built-in ISDN terminal adapter: PT-250 MPEG stereo transmitter and PR-250 MPEG stereo receiver, incorporating ISO/MPEG Audio Layer II coding algorithm, allowing transmission of 20 Hz to 20 kHz stereo audio in 64 kbps.

Also: STL Plus, a linear, uncompressed STL/TSL multiplexing system for T1 lines: digital multiplexers for T1, E1 and satellite applications, with plug-in modules for compressed and uncompressed audio, voice and data.

Contact: Christine Doyle
3 Lyberty Way, Westford, MA 01886
508-692-9000

Itelco SpA 18514

Intro: 1 and 5 kW FM transmitters fully solid state; 2 kW UHF TV transmitter fully solid state: TV R.O. system.

J, K

Jampro RF Systems Inc. 16617

Intro: FM switchless combiner system; JIDC and JIDF interdigital combiners and filters for low-power FM applications: frequency match tower; rigid coaxial transmission line and all related components; complete line of passive RF components.

Also: Penetrator series sidemount antenna; JCPD circularly polarized flat panel antenna and JAHD arrowhead dipole antenna: JBC and JBPC combinator systems.

Contact: Barbara Kee
6340 Sky Creek Dr., Sacramento, CA 95828
916-383-1177

JBL Professional N/A

Intro: The EON 10-inch two-way powered speaker system, incorporates monolithic 60 W power amplifier for low-frequency section and monolithic 25 watt power amplifier for high-frequency driver.

J.N.S. Electronics Inc. 1625-8

Intro: DRLF 700 digital microwave terrestrial link: RFM8323 FM receiver: DFM 8252 composite sense module. Pilot, L&R.

International Datacasting 4122-3

Intro: SR121/MA MPEG PRO Digital Audio Receiver; SR251/DA DataNet Data Broadcast Receiver; Media Manager

Also: Satellite digital audio and data broadcast products for point-to-multipoint distribution: the FlexRoute digital audio and DataNet broadcasting systems, along with corresponding network management system.

Contact: Pierre Lemoine, Dir. Int'l Sales
2680 Queensview Dr.
Ottawa, Ontario
Canada K2B
613-596-4120

International Tapetronics Corp. (ITC) 1410

On Display: DigiCenter 33, NEWS, CD control systems, virtual console, PD MATE; DPR-612: audio routing switcher; expanded networking management: multitasking operations in workstations: Multi Volume HDD Backup; new recording templates: Expanded Integrated Mixer Operations; Increased Operator Interfaces; Enhanced Traffic and Music Interfaces; Virtual Scheduler.

Contact: Charlie Bates, Sales & Mktg. Dir.
2425 S. Main St.
Bloomington, IL 61704
309-828-1381

Also: 8000 modular configured rack frame system, 30 modules that can be selected for monitoring, switching and control; applications studios, D-MUX 500 highly linear digital multiplexer CD quality.

Contact: John Stannard, V.P.
P.O. Box 32550
San Jose, CA 95152
408-729-3838

Jones Satellite Networks N/A

Intro: Z Spanish, a Spanish radio network that combines danceable music with the style of well-known Spanish-language talent.

Also: Other radio formats, including CD Country, Soft Hits, U.S. Country, FM Lite, The Team, GTO (Good Time Oldies) and Adult Choice.

Contact: Gene Ferry, Nat'l Affil. Sales Mgr.
8250 S. Akron St.
Englewood, CO 80112
800-876-3303

Joslyn Jennings Corp. N/A

On Display: Capacitor models: applications include communications, power, electronic, semi-conductor lab, dielectric heating equipment, medical MRI and heart defibrillator. Full line of relays, coaxial relays, contactors, interrupters and test equipment.

Contact: Dwane Gisi, Dir. of Mktg.
970 McLaughlin Ave.
San Jose, CA 95122
408-292-4025, ext. 358

Kay Industries 2507

On Display: Phasemaster rotary phase converter.

Kintronic Labs Inc. 2119

Intro: High-power RF contractors for 0.5 to 1 MW applications.

Also: Directional antenna phasing system for AM: AM multiplexing system: AM dummy load series: line of RF components.

Contact: Tom King, Pres.
P.O. Box 845, Bristol, TN 37621
615-878-3141

Killer Tracks 10455

Intro: TuneBuilder self-editing music software.

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PI Potomac Instruments, inc.
932 Philadelphia Ave., Silver Spring, MD 20910
Phone 1-301-589-2662 • Fax 1-301-589-2665

Larcen-TTC 12500
Intro: FMS500, 500 W solid state FM transmitter.

LDL Communications 15855
On Display: Larcen's complete line of FM transmitters, ranging from 30 W to 25 kW. Six models of power levels up to 8 kW are solid state.

Lectrosonics Inc. 11232
Intro: All-new UDR200 synthesized UHF receiver with helical resonator front end design. UMC190 and UMC195 antenna multicouplers for compact UHF receivers. A-GPU UHF ground plane antenna and A-Y3U UHF Yagi antennas.

Leitch Inc. 15748
Intro: 32 x 16 audio router, 32 x 32 audio router, audio DA with programmable sub module.

Logitek 2725
Intro: Ultra-VU high-resolution audio meter, Mini Rate Gate low-cost digital audio sample rate converter.

Also: Bright-VU low-cost LED bargraph audio meters. TR2 12-channel rackmount console. Pre-10 low-cost 10 x 2 routing switcher.
Contact: Tag Borland, Pres.
3320 Bering Dr.
Houston, TX 77057
713-782-4592

Loral Microwave-Narda 5425
Intro: Model 8718 survey meter using electromagnetic radiation measurement. Hand-held meter that displays field readings in any units as direct readings against standards. Features single-touch automatic zeroing.
Also: Model 8520 broadcaster compliance meter, to comply with FCC and OSHA limits for exposure to RF radiation. Electric and magnetic are measured separately with a single probe attached to meter.
Contact: Robert Johnson,
Instrument Sales Mgr.
435 Moreland Rd
Hauppauge, NY 11788
516-231-1700

LPB Inc. 2727
Intro: SALSA digital audio systems. New feature for the SALSA production system. CD recorder option for SALSA production, allowing users to download backups to CD or dump all spots to their own customized CDs. FM stereo transmitter for limited area broadcast applications.
Also: 7000 series audio consoles in 12- and 18-channel configurations. Signature III series audio consoles. PSSA/PSRA 30, 60 and 100 W transmitters.
Contact: John E. Devecka, Sales Mgr.
28 Bacton Hill Rd.
Frazer, PA 19355
610-644-1123

The Management 2109-11
Intro: New versions of the AXS digital audio automation system, the DCM Digital Cart Machine, the DCE digital clip editor and the DLR digital long-form recorder. The AXS system has new extended features for time announcement, linked announcer intros, a remote access telco/RPU interface for attachment to standard audio interfaces and Powerfill, designed for real-time audio segment fill for CD and hard disk music system.
Contact: Pete Charlton, Pres.
Box 1-36457
Ft. Worth, TX 76136
817-625-9761

Manhattan Production Music 13633
Intro: Apple Trax music library, a collection of CDs that is indicative of today's hottest radio music including hip-hop, hot country and alternative rock.

Mark IV Pro Audio Group 15717
Intro: Klark Teknik DN3600, a stereo programmable graphic equalizer that is digitally controlled and has 66 memories; DN 3600 computer control for up to 66 stereo DN 3600 programmable graphic equalizers via Windows, and DN 728 RM remote control option for DN 728 digital delay allowing access to any of 64 memories via simple switch matrix.

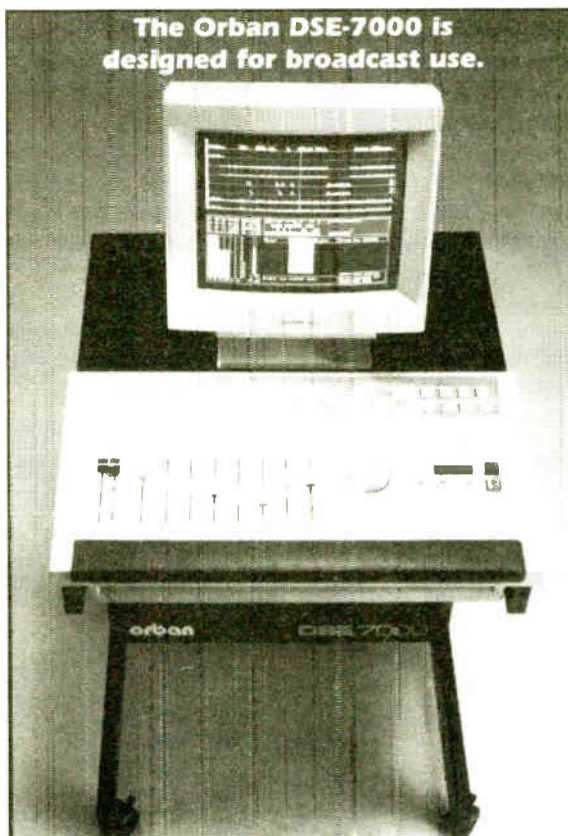
Marti Electronics 4119-20
Intro: Frequency-agile remote pickup unit and Marti 40 W FM exciter.
Also: STLs, RPUs and subcarrier generators and demodulators.
Contact: Jim Godfrey, Dir. Sales & Mktg.
1501 N. Main St.
Cleburne, TX 76033
817-645-9163

Maxell Corp. of America 18136
Intro: Digital Betacam featuring higher output and lower noise, durable binder, filler dispersion, smooth base film and rigid cassette tolerances.

Micro Communications 19401
Intro: 7/8-inch EIA and 4 1/16-inch EIA coaxial transfer switches, FM all-band dipole antenna, FM interdigital bandpass filters, coax breakaway section and non-radiation studies.
Also: 1 5/8-inch EIA, 3 1/8-inch EIA and 6 1/8-inch coaxial transfer switches, switching combiners, multistation combiners, interference filters, hybrid combiners and directional couplers.
Contact: Debra Bureau
P.O. Box 4365, Manchester, NH 30108-4365
603-624-4351

Micron Audio Products Ltd. 16451
Intro: TX-505 wireless microphone system and Micron SDR portable diversity receivers, SQN-IIIa location stereo audio mixers.

Microtechnology Unit. 412
P.O. Box 21061
Faleigh, NC 27619
919-870-0344



Modulation Sciences 11113-5
On Display: RDS-X data receiver, a live-working demonstration for message signs and other applications. RDS-1 RBDS generator, PRD-3000 RBDS decoder/monitor/analyzer, FMM-2 FM modulation monitor/analyzer, MYB-2 StereoMaxx spatial image enlarger, CP-803 composite audio processor, DSCA-188, data subcarrier generator, SCA-186 subcarrier generator, DSCA-1.2 data subcarrier receiver.
Contact: Judy Englert
12A World's Fair Dr.
Somerset, NJ 08873
908-302-3090

Moseley Associates Inc. 1419
Intro: Starlink 9000 all-digital, open-architecture modular system for CD-quality audio transmission, facility for remote control and stereo/SCA/RDS generation. Complete range of plug-and-play modules: ISO MPEG/ADPCM, 16-bit linear digital audio, D/I and variable rate mux, speech/fax/data card, T1/E1/ISDN/Switched 56 drivers, Intelligent remote control, Integrated network management.
Also: MRC 2 and MRC 1620 remote control products; PC control software for MRC 2 and MRC 1620; PCL 6000 STL (aural); DSP 6000 digital transmission equipment for STLs; PCL 6000 multichannel STL.
Contact: Jamal Hamdani, Pres. & CEO
111 Castilian Dr.
Santa Barbara, CA 93117-3093
805-963-9621

MPR Teitech Ltd. 4410
Intro: Polaris road reporter's kit featuring ISO/MPEG Layer II/G.722 code, ISDN terminal adapter; Capella card with ISO/MPEG layer II sampling rates, AES/EBU in and out, S/PDIF in and out, G.722 and sample rate converter; LII Blue Layer II audio codec includes remote control software, G.722 flash prom updating, built-in multiplexer, J.52 and anc sample rates; Audition Jr! listening test system.
Contact: Mary Ann Seidler
Obere Hauptstrasse 52
D-85354 Freising, Germany
49-8161-42400

Murphy Studio Furniture 3122
On Display: A full line of furniture for the broadcast studio will be found at the Fidelipac booth.
Contact: Dennis Murphy
4153 N. Bonita St.
Spring Valley, CA 92077
619-693-4658

Myat Inc. 15714
Intro: New test-quality reducer/capter devices for EIA rigid line to type "N" female and 7/16.
Contact: Rita Stange, Sales Adm.
380 Chestnut St., P.O. Box 425
Norwood, NJ 07648
201-767-5380

Nagra Kudelski SA 11805
Intro: ARES-C solid state recorder with PCMCIA support. Nagra Lysis integrated information system and broadcast architecture for radio including hardware and software for sound editing, scheduling, broadcasting, administrative tasks, statistical analysis and news editing.

National Supervisory Network (NSN) Services 5101-2
Intro: InSat Satellite Internet terminal system provides access to and from any location on earth. World's first VSAT Internet system.
Also: ComStream digital audio products; Gilat satellite data products.
Contact: Kelly Hethcote, Dir. Audio Sales
Box 578, Avon, CO 81520
800-345-8728

Nautil 2421
Intro: NS Series AM transmitters in power ranges of 6 kW to 60 kW available with AM stereo. Can be serviced while on air and has dual exciters.
Contact: Gary K. Manteuffel, Brdct. Sales
201 Target Industrial Cir.
Bangor, ME 04401
902-823-2233

Nemal Electronics 13636
Intro: Flexible composite audio/video cables that include multiple video and audio lines. Audio lines are 22 AWG shielded pairs with drain wire and are available either with or without a color-coded inner jacket. Extra durable multi-pair field cables.

Neotek Corp. 1907-9
Intro: MPX-4A four-channel microphone preamplifier. MPX-4D four-channel digital controlled microphone preamplifier, EQ4X-M1 microphone and four-band parametric equalizer, multisource media monitoring system.

Network Music Inc. 13122
Intro: Network Classical Library of 15 CDs featuring the greatest composers of all time.

Neutrik 2127
Intro: A/B Series XLR connector with the smallest size and the highest packing density. Connectors feature up to 12 poles in miniature configuration. Easy Patch patch panel available in 96 bantam and 48 "B" gauge styles.
Also: XLR audio connectors including solderless 1/4-inch phono/jack "combo" connectors, bantam and 1/4-inch jack panels, patch cords, miniature and sub-miniature, jacks, plugs, speaker connectors and a full line of XLR accessories.
Contact: Ellen A. Wagner, Mktg. Comm. Coord.
196 Lehigh Ave.
Lakewood, NJ 08701
908-901-9488

NPR Satellite Services 4221-2
Intro: Now offers ComStream digital audio equipment that increases network control and maximizes network efficiency.
Also: Full-time satellite channels using C-band, SCPC transmission. The satellite space is on Galaxy IV, Transponder 1 and 3, that can accommodate both digital and analog audio transmission.

NSM Consumer Electronics 5201
Contact: Jon Taylor
40 Cain Dr.
Brentwood, N.Y. 11717
516-273-4200

Orban 2910
Intro: 8202 stereo encoder, a compact standalone unit with all-digital processing. Designed for large network applications, especially those using digital program distribution. New features for the DSE7000 include time compression and expansion by +/- 25 percent, networking capability to the ENCO audio delivery system, and V5.0 software with enhanced graphics and help screens, vari-speed copy over two octaves and reverse audio.
Other updates include PC software for the Optimod-FM 8200.
Contact: Howard Mullinack
1525 Alvarado St.
San Leandro, CA 94577
510-351-3500

OSC 18463
Intro: 16-Track Tool, a breakthrough in Pro Tools digital playback technology. Software enhancement for the Deck II hard disk recording program that quadruples the playback track capacity of any four-channel Digidesign Pro Tools systems allowing playback of 16 simultaneous, independent tracks of CD-quality digital audio.



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The DATAWORLD LMA/DUOPOLY Market Survey Contour maps present a precise electronic verification of overlapping and intersecting contours.

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- ▶ A Touch-screen interface and a proper graphics environment allows to carry out each and every function with a fingertip. Virtual keys "on screen" invites to operate the System in an intuitive and friendly way.

Specifications and requirements:

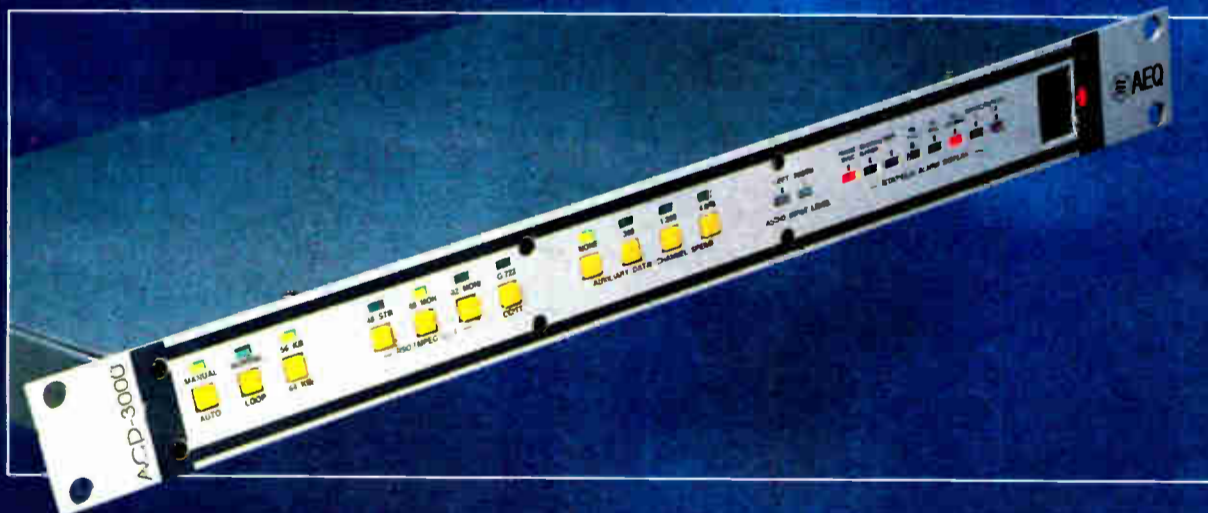
- ▶ Audio coding and decoding in conformity with ISO/MPEG Layer II.
- ▶ Versions for DTMF or Continuous Data Channel telecommand.
- ▶ Automatic News Recording System activated by DTMF.
- ▶ Runs on PC 386 DX 33 or higher, with 2 Mb RAM minimum, requiring DOS 5.0 or higher.
- ▶ Also operates under many popular LAN's O.S. like NOVELL 3.11, Personal Netware, LanTastic, etc.
- ▶ Drivers for Touch-screen, mouse or track-ball included.
- ▶ 16 bits A/D and D/A conversion.
- ▶ AES-EBU format digital inputs and outputs.
- ▶ 31.25 seconds of stereo audio per each Mbyte, at 48 MHz and 256 Kbits/sec.
- ▶ Storage capacity from 5 to 80 hours of stereo audio on hard disk.
- ▶ Unlimited storage on optical rewriteable disks (capacity for 6 hours of stereo audio each).

Features:

- ▶ Language selection
- ▶ Access selection by groups of users.
- ▶ Selectable file sort criteria.
- ▶ Password assignment for remote users (journalists or stations) of the Automatic News Recording System.
- ▶ Automatic News Recording remote controlled by users or journalists.
- ▶ Automatic news edition.
- ▶ Audio file management and edition.
- ▶ Manual and automatic play lists.
- ▶ Multiple templates with up to 24 simultaneous immediate access keys.
- ▶ Printable transmitted advertisement log lists.
- ▶ All work station associated to the System are multitask, enabling the management of the transmission, recording, play list and template edition and automatic transmission from any of these.
- ▶ The System can be expanded from a single basic configuration, incorporating more work stations.
- ▶ The software is PC compatible and also LAN standard, proportioning a maximum flexibility and adaptability of software and hardware.
- ▶ Audio resources are stored in a common server for all users, enabling real time access to any audio file from any work station, even from various of these simultaneously.

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- ▶ The ACD-3.000 is a full-duplex coder and decoder offering up to 13 KHz of analog bandwidth simultaneously in both received and transmitted signals, depending on the selected mode of operation.
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- ▶ The ACD-3.000 offers the flexibility of user defined operating modes. The selection is made on the front panel keyboard, and is fully indicated by LEDs, as well as the communication status and alarms.
- ▶ 24 STEREO, 48 MONO, 32 MONO and G.722 modes are available.

Features:

- ▶ Input / output bit rate selectable at: 56 or 64 Kbits, with any of the operating modes.
- ▶ Manual and automatic synchronization. Last synchro. configuration is stored in memory, for a fast resynchronization, in the event of a power failure.
- ▶ Auxiliary Data Channel available when the ISO/MPEG Layer II algorithm is selected.
- ▶ LOOP and TEST modes available.
- ▶ Error alarms for digital audio port, synchro status, bit stream, equipment, etc.

Specifications:

- ▶ Two analog inputs (transformer coupled).
- ▶ Two analog outputs (transformer coupled).
- ▶ Digital interfaces V.35 and X.21 & RS-422.
- ▶ RS-232 interface for Auxiliary Data Channel.
- ▶ 16 bits Sigma-Delta A/D and D/A converters.



AEQ AMERICA, Inc.: 2211 South 48th Street, Suite H - Tempe, AZ USA 85282
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 Carpinteria, CA 93013
 800-281-2683

kpbs contribution transport. RE 532 RBDS encoder for FM data transmission. RE 533 coder low-cost RBDS solution for broadcasters. RE 4500 component digital video codec.
 Contact: Maria Street, Sales Sec.
 31029 Center Ridge Rd., Westlake, OH 44145
 216-871-7617

Radio Systems 3615
 Intro: DDS Digital Delivery System, a UNIX-style multi-user operating system that can service multiple audio channels and multiple studios from a single CPU. User interfaces include a 1/3 rack Cart Emulator control panel with easy-to-use cart machine functions, and the Sound Slate multicut access panel.
 Also: RS-Series consoles, available in 6-, 12-, 18- and 24-channel models. TI-101 telephone interfaces. DA-16 distribution amplifiers. Master clock and timer systems, both analog and digital.

Register Data Systems (RDS) 2121
 Intro: RDS Traffic for Windows, a Windows-based traffic system.
 Also: The Phantom digital automation system. Traffic Master I, II, III single-user traffic systems. System 6, 7 multi-user traffic systems.
 Contact: Russell Nelson, Sales & Mktg. Rep.
 404 General C. Hodges Blvd.
 Perry, GA 31069
 800-521-5222

RE America Inc. 18378
 On Display: RE 660/661 Layer II audio codec for transporting up to 20 kHz stereo over ISDN lines. RE 662/663 Layer II audio codec, which multiplexes up to three ISDN lines for 384

RF Technology Inc. 13128
 Intro: High-performance heterodyne fixed links (1.5 to 15 GHz), ultra-portable UPL Series transmitters (1.5 to 15 GHz), HRC-Series ENG central receive systems and SVX-Series analog/digital C-, X-, and Ku-band SNG systems.
 Also: D-Series portable transmitters/receivers (1.5 to 15 GHz).

Otari Corp. 1414
 On Display: RADAR multitrack hard disk recorder. MR-10 MD recorder/player. CDC-600 dual drive, 360 CD-capacity CD changer. B-10 broadcast production and on-air console. Also Concept I digitally controlled 24-bus analog console with fader and mute and snapshot automation.
 Contact: Lee Pomrantz, Nat'l Sales Mgr.
 378 Vintage Park Dr.
 Foster City, CA 94404
 415-341-5900

Also: Existing libraries of music and sound effects.
 Contact: Alain Leroux
 941-A Clint Moore Rd.
 Boca Raton, FL 33487
 407-995-0331

Prophet Systems Inc. 5421
 Intro: Many new features have been added to make even fully automated stations sound live and professional. Time and temperature announcements allow satellite and hard drive automated stations to insert the current time and temperature at will, enhancing listener enjoyment. Backtiming modules make running a live shift easier and ensures that music plays during automated times.
 Contact: Kevin Lockhart
 111 West 3rd
 Ogallala, NE 69153
 800-658-4403

QEI Corp. 4419
 Intro: Quantum 10 kW solid state FM transmitter, 1 kW solid state FM transmitter, 710 digital stereo generator with AES/EBU, Model 50E, 150E, 300E FM exciters, Cat-Link AES/EBU digital audio transport, Quick-Link spread spectrum RPU system.
 Also: Cat-Link, FMQ Series transmitters, 691 Modulation Monitor.
 Contact: Jeff R. Detweiler, Sales & Mktg. Mgr.
 P.O. Box 805
 Williamstown, NJ 08094
 800-334-9154

Pacific Recorders & Engineering (PR&E) 3025
 Intro: ADX Ensemble digital audio workstation with an on-board automated mixing surface housed in a convenient roll-around package. Comes fully equipped, featuring touch-sensitive faders and snapshot automation of mix settings. The ADX Eight is a replacement for conventional eight-track linear tape decks.
 Also: BMX III air console, AMX stereo production console, RMX Razmixer air console, production multi-track console and custom furniture.
 Contact: Barbara Laramie
 2070 Las Palmas Dr.
 Carlsbad, CA 92009
 619-438-3911

Phasetek Inc. 5427-8
 Intro: New high-voltage RF switches, new isolation units.
 Also: Custom phasing and branching equipment, antenna tuning units, RF components, RF inductors, RF connectors switching systems and multiplexing equipment.
 Contact: Kurt Gorman, Pres.
 550 California Rd., Unit 11
 Quakertown, PA 18951
 215-536-6648

Radio Computing Services (RCS) 5403
 Intro: ProSonix full-featured digital multitrack audio editor. NewsLink computerized newsroom with digital audio option.
 Also: Master control all-digital, paperless, cartless radio studio. Selectro music scheduling software. SongTrack for creating music tests, callouts, etc. RCS Traffic fully automated commercial scheduler. Linker scheduler for rotating non-music, non-commercial links like PSAs, promos, jingles and liners. Pro-Rate sales software.

Radio Design Labs (RDL) 2407-8
 Intro: In the RDL Stick-On Line, the ST-MXL3 mic level output line mixer and the ST-TC1 telephone system coupler. In the Rack-Up Line, the RU-VA2 video attenuator, RU-LA2D IHF-PRO interface, RU-UDA4 unbalanced audio DA, RU-MP2 adjustable stereo mic preamp, RU-BLA2 adjustable stereo line amp, RU-DBA3 balanced audio DA and the RU-MDA3 mic DA. In the New Transformer Group, the TX-10B bridging input transformer, TX-1A adjustable line transformer, TX-LM2 line matching transformer and the TX-70A 70/25 V input interface. The RC-1U rack chassis and the JP, a universal jack panel.

Potomac Instruments 2510-11
 On display: Series of monitors, audio analyzers and generators, automatic remote control system, various meters, program audio analyzer, programmable transmitter controller with DOS-compatible software, tower light monitor and instrumentation amplifier.

PRECO Inc. N/A
 On display: Werclife tape eraser Model 220 with Hi8 or DAT throughputs of 270 tapes per hour.

Promusic Inc. 13047-8
 Intro: Dozens of new releases in music and sound effects libraries.

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Roland Corp. U.S. 4713
Intro: The DM-800 digital audio workstation, a self-contained eight-channel hard disk recorder and editor offering automated mixing, non-destructive editing, parametric EX, video display outputs and more. Also being shown is the RSS-10 Roland Sound Space processor.
Also: The DM-80 digital audio workstation and the SN-550 fully digital noise elimination system that utilizes two separate noise reduction circuits.
Contact: Erika Lopez, Sales & Mktg. Spec.
7200 Dominion Cir.
Los Angeles, CA 90040
213-685-5141

Also: Audio accessories; Rackem 'N' Stackem Series.
Contact: Franklin J. Miller, Pres.
2100 Ward Dr.
Henderson, NV 89015
702-565-3400

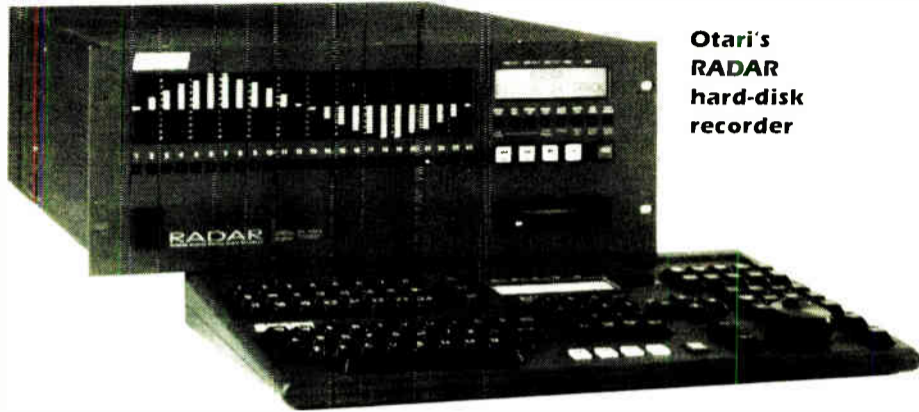
Shively Labs 4425
Intro: UHF broadcast antennas; MMDS repeater antennas.
Also: Complete line of FM broadcast antennas and such related gear as combining networks, transmission line, pressurization equipment and pattern work.
Contact: Jonathan R. Clark, Mktg. Mgr.
56 Harrison Rd.
Bridgton, ME 04009
207-647-3327

Contact: Oscar Bonello, Pres.
3 De Febrero 3254
Buenos Aires, A429
Argentina
54-1-701-8622

Spectral Inc. 4801
Intro: Media Filer, digital audio file converter; Translator, eight-channel digital audio signal forward converter for Alesis, Yamaha, Tascam and Spectral; Prisma Music, music production user interface for NE Prisma DAW.
Also: Prisma, Audio Engine.
Contact: Mark Doenges, V.P. Mktg.
18800 142nd Ave. NE
Woodinville, WA 98072
206-487-2931

Switchcraft 5011
On Display: DSX panels in hard-wired and modular configurations from eight to 84 circuits. Patch cords and other accessories also available.
S.W.R. 15745
On Display: Full range of FM transmitting antennas; FM directional antennas; rigid transmission line and components; multistation combiners.
Contact: Edward Edmiston, Pres.
619 Industrial Park Rd.
Ebensburg, PA 15931
814-472-5436

Rules Service Co. 1528



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Stainless Inc. 16608
Intro: Tower leasing program details available. Offered to tower users of all types for building or upgrading antenna support structures without the up-front capital commitment of an outright purchase.
Also: Complete tower design, fabrication, erection, modification and maintenance; antenna support structures for all broadcast, two-way and other applications; Inspection and structural analysis of existing towers; full-service field operations for antenna installation, repairs and regular tower maintenance.

Storeel Corp. 18114
On Display: Tape storage, mobile and static, for all formats; setup trucks for tape and CDs; select storage for all small formats, including CDs.

Studio Audio & Video N/A
Intro: SADiE PC-based digital audio editor, version 2.2. Features SCSI CD-R, DDP 8mm CD mastering format, back-up to Exabyte, 16-, 20- and 24-bit editing and a hardware controller interface.
Also: SADiE digital editor.
Contact: Julian Mitchell, Mktg. Mgr.
1808 West End Ave., Ste. 1119
Nashville, TN 37203
615-327-1140

Symetrix 1911
Intro: Model 610 broadcast audio delay for profanity delay on live and taped radio talk shows.
Also: Model 528E voice processor featuring EQ and dynamics processing for radio and TV announcers; Model 601 digital voice processor for programmable digital processing for radio and TV announcers.
The Synclavier Co. 3901
Intro: EditView 4.0; S/Link 2.0.
Also: PostPro random access hard disk based multitrack recorder/editor.

Systems Wireless Ltd. 13634
Intro: BE300 wireless video system for sending video and audio on four user-selectable channels on 2.4 GHz with a range of up to two miles. Lectrosonics UDR200 UHF wireless microphone diversity receiver, allowing user-adjustable frequency selection and featuring GaAS FET front-end filters and six-pole helical resonators in a single-space, half-rack configuration.
Also: System 800 UHF wireless headset system interfacing to any standard cabled intercom system. Features tone squelch, full duplex operation and an operating range of up to 2,000 feet; Matrix Plus point-to-point digital intercom system; Vega Model RMT-10 wireless IFB system.

TASCAM — TEAC Prof. Div. 17167
Intro: M 501B I/O production console; DA-P1 portable DAT recorder; ES-61 audio edit controller.
Also: Remainder of TASCAM's product line.
Contact: Roger Maycock, Mktg. Support Rep.
7733 Telegraph Rd.
Montebello, CA 90640
213-726-0303

Tektronix Inc. 16528
Intro: TSG2000 signal generation platform; Model 764 digital audio monitor; VM100 video measurement set.
Also: AM70 hand-held digital audio analyzer/generator; AM700 mixed-signal audio measurement set; WFM90 hand-held waveform, vector, picture and audio monitor.

Telos Systems 4203
Intro: Zephyr digital audio network transceiver, transmits bidirectional 15 kHz stereo audio over single ISDN line; ZephyrNet ISDN point-to-multipoint hub for audio program distribution and backup to satellite.

Sandar Electronics A/S 15661
Intro: AD-2000 16 x 16 AES/EBU router in one rack unit; PESE 2.3 software for PC control of routers.
Also: VAA-2000 16 x 16 video/stereo audio router in three rack units; AA-2000 16 x 16 stereo audio router in one rack unit; VD-2000 16 x 16 and 32 x 32 digital video router in three rack units.

Shure Brothers Inc. 11800
Intro: M367 six-input portable microphone mixer designed for professional applications in ENG/EFP and general audio mixing. Handles up to six microphones or line-level signals and can be used with any balanced, low-impedance dynamic or condenser microphone.
Also: VP3 portable receiver powered by a single 9 V battery, delivering seven hours of operation. Weighs 8 ounces and measures 5 inches x 2 1/3 inches. Pivoting "rubber-duck" antenna can be set in either a horizontal or vertical position to optimize reception.



Shure's portable microphone mixer

Scala Electronic Corp. 15707
Intro: FM transmitter combiners, cavity filters and isolators.
Also: Professional antennas for FM translators and low-power transmitters; precision monitoring antennas for FM broadcast stations; antennas for STL and RPU systems.
Contact: Ellis Feinstein, Pres.
P.O. Box 4580
Medford, OR 97501
503-779-6500

Scientific-Atlanta 13828
Intro: SRC-3500 remote control unit for model DSR-3610 encore receiver.
Also: DSR-3610 encore receiver.
Contact: Executive Acct. Mgr.
420 N. Wickham Rd.
Melbourne, FL 32935
407-255-3053

Scott Studios Corp. 2714
Intro: Scott System '95, a new touch-screen hard disk digital audio system with 9GB hard drives, on-screen-telephone recorder/editor, hot keys that start hundreds of recordings at a touch, Wall of Carts with all audio at a touch, Full Day's log editing.
Also: CompuCarts cart machine replacement; Net Catcher for recording and storing of network audio for delayed playback.
Contact: Dave Scott, Pres.
13375 Stemmons Freeway, Ste. 300
Dallas, TX 75234
214-620-2211

Sierra Automated Systems 2710
Contact: Al Salci
2112 N. Glenoaks Blvd.
Burbank, CA 91504
818-840-6749

Smarts Broadcast Systems 5416-7
Intro: Digital hard disk automation and editing systems; LAN networks; GUI interface (live screen); Version 7 office systems on new screens.
Also: Hard disk audio systems; satellite automation.
Contact: Jan Schad, Mktg. Dir.
P.O. Box 284
Emmetsburg, IA 50536
712-852-4047

Studio Technologies 3003
Intro: Studio Comm Series Model 60 central controller and Model 61 control console; Studio Tools family of professional audio products, including the Model 80 stereo analog audio distribution amplifier and the Model 85 AES/EBU digital audio distribution amplifier.
Also: Studio Comm series monitoring and communications; IFB Plus Series two-channel IFB unit for mobile trucks; Mic Pre-Eminence microphone preamplifier; line of stereo simulator units for on-air and production use.

Studio Technology 3615
Contact: Vince Fiola
4 Pennsylvania Ave.
Malvern, PA 19355
215-640-5880

Superior Electric 5113-4
Intro: Stabiline SL series uninterruptible power supplies and SP Series standby power supplies.
Also: Stabiline WHR series automatic voltage regulators; Stabiline WHC series power conditioners; Stabiline PQI series transient voltage suppressors/RFI filters; Stabiline BCR and PPC power conditioners.
Contact: Ted Gladis, Mktg. Asst.
383 Middle St.
Bristol, CT 06010
203-585-4500

Svetlana Electron Devices Inc. 5313
Intro: YC130 replacement tetrode for 35 kW FM transmitters; 4CX3500A replacement tetrode for 5 kW FM transmitters; 3CX3000A7 replacement high mu triode for FM transmitters; 3CX2500F3 replacement triode for AM transmitters.
Also: Wide variety of tetrodes and triodes for the radio broadcast market.
Contact: George Badger
3000 Alpine Rd.
Portola Valley, CA 94028
415-233-0429

Seem Audio A/S 4604
Intro: DDC-1 digital/digital converter; SEEPOR modules for the portable mixer.
Also: Radio broadcast mixing consoles

Solid Electronics Laboratories 5103
Intro: FM composite processor Model DCP-1, performing the functions of instantaneous limiting and composite low-pass filtering in a single structure.

Solid State Logic 16621
Intro: Axiom digital production system, a fully digital audio mixing console with an integral hard disk multitrack/editor; SL-9000 J Series total studio system, an analog mixing console with optional hard disk multitrack/editor.
Also: OmniMix digital surround audio/video system; Scenaria digital audio/video system; SL-8000 GB on-air production console.

Solidyne 5007
Intro: Solidyne 2500 digital audio consoles; Solidyne 262 Turbo digital audio processor; PC-based digital audio for broadcasting; Audicom 922 full automation systems; voice-quality phone call reconstruction.
Also: Automatic recording of incoming phone calls from journalists; virtual radio systems.

Sennheiser Electronic Corp. 12035
Intro: MD421II cardioid dynamic microphone with ability to handle high sound pressure levels; EM2004 tuneable UHF diversity receiver; MEG7 shotgun back-electret microphone capsule offering high directionality; BF105S body pack transmitter system with lavalier microphone.
Also: EK 4015 miniature UHF true diversity receiver for interference-free signal transmission; SK250 16-channel UHF high-power pocket transmitter; K6/ME64 cardioid back-electret microphone capsule with powering module featuring smooth frequency response.
Contact: Laura Sordi, Mktg. Coord.
P.O. Box 987, 6 Vista Dr.
Old Lyme, CT 06371
203-434-9190

Sescom Inc. 13600
Intro: Rackem 'N' Stackem electronics.

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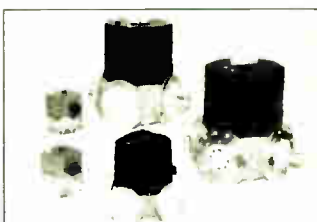
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Tennaplex Systems Ltd. 15707
On Display: Kathrein broadband FM CP panel antennas.

TFT Inc. 3609
Intro: EAS Model 911 and accessories for Emergency Alert System (EAS) compliance.
Also: AM, FM, and TV monitors; analog and digital STLs; FM exciter and synchronous booster system.
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2002 Academy Ln.
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Trompeter Electronics 12800-1
Intro: 45- and 90-degree BNC connectors; J24 WMST jack monitor; serial digital; RGB.
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V

Valentino Inc. 12102
Intro: Valentino Production Music and Sound Effects Libraries "ROM Reference Disc," a complete audio catalog on CD-ROM for both PC and Macintosh.
Also: 80-CD production music library; 44-CD sound effects library. Both are single collections, not combinations.
Contact: Thomas Valentino, Pres.
500 Executive Blvd.
Elmsford, NY 10523
914-347-7878

Vega 15717
Intro: Model T-678 Pro Plus synthesized miniature UHF body pack wireless microphone transmitter.
Also: R-662 four-frequency UHF wireless mic receivers; PRO PLUS VHF and UHF hand-held wireless mic transmitters; VX-20 audio-video wireless mic. Q600 wireless belt pack intercom system.

W

Ward-Beck Systems 15704
Intro: RS 8216 16 x 16 stereo routing switcher; MF82-4 four-DA assembly; M8207 audio compressor; M8208 remote level distribution amplifier.
Also: Renaissance audio consoles; D8212 distribution assembly and card family; MicroCOM II communications systems.
Contact: Eugene L. Johnson, Mng. Dir.
841 Progress Ave.
Scarborough, Ontario M1H 2X4
Canada
416-438-6550

Wegener Communications 16335
Intro: Digital audio workstation with store and forward.
Also: Digital audio satellite receivers, addressable network control system.

Wheatstone Corp. 4709
Intro: Audioarts Engineering R-60 on-air audio console. Standard features include a six-source line selector, module extenders, gold contact switches, Penny & Giles faders. Audioarts Engineering MR-40 radio production and/or on-air console. Comes standard with four mono micline input modules and eight stereo line modules.
Contact: Ray Esparolini, Dir. Sales
7305 Performance Dr.
Syracuse, NY 13212
315-455-7740

Whirlwind Music Dist. Inc. 12507
Contact: Bonnie Gardner
100 Boxart St.
Rochester, NY 14612
716-663-8820

Wireworks Corp. 13602
Intro: TE-3Plus microphone cable tester that tests XLR, TRS and BNC cables, and ESP: express service panels built to specifications.
Also: The company's established line of microphone multicable components group products; multipin disconnnet audio cabling components: the System 502, audio/video cabling equipment combining features of audio and video in one configuration. Microphone splitters, microphone and speaker cables.

Will-Burt 16114
Intro: Mechanical telescoping mast with positive retraction in 30-foot and 38-foot heights.
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Contact: Steven Pinkley, Commercial Sales Mgr.
P.O. Box 900
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WireReady NSI 2108
Intro: StormReady storm closing tracking software.
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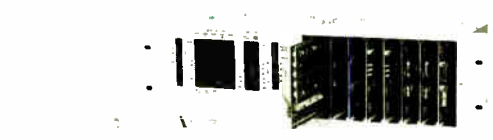
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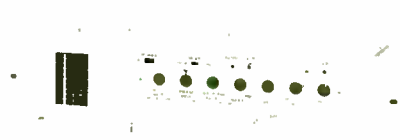
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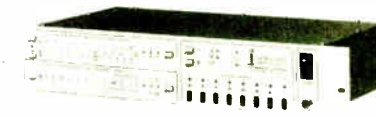
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Learning Your Way around Windows

by Richard Mertz

FAIRFAX, Va. For many years, I have resisted using Microsoft Windows and Windows-based programs. I don't really know why. I guess all the programs I normally used, i.e., word processing, spreadsheets and my own custom written stuff, did not need any extensive graphics capability or graphical user interface (GUI) that Windows provides. I only used a mouse in conjunction with a schematic drafting program. Before I started using the drafting program, a mouse was an undesirable rodent that normally inhabited the warm confines of a transmitter final cabinet or phasor. Or maybe it was due to the fact that I was one of a few people who actually found some enjoyment in assembly language programming.

I have a friend who has always maintained that Windows can make a 386-33 run like an old XT. Well, whatever the reason, some time ago I came to the realization that I would have to learn something about how to install, use and maintain Windows. Many of you may remember my network articles about Windows for Workgroups.

A Windows explosion

Over the past few years there has been an explosion of Windows-based software on the market, much of it making its way into broadcast environments. It is easier for computer newcomers on the

staff to point and double click a mouse button than to enter lengthy, often unfamiliar commands at the DOS prompt. (Entering PROGRAM_NAME.PGM /S /E is meaningless to most people.) With Windows, you highlight the program you want and double click the left mouse button. (Left-handed individuals would double click the right mouse button.)

Anyway, there you are, sitting in front of your computer. You point at the desired program and double click. Your 540MB hard drive whirs into action. The red hard drive lamp of the front of the case flashes rapidly. And, voilà, your program is ready to go. There are those times, however, when this seamless operation fails and you get one of those wonderful, windowed messages indicating that a fault has been detected bringing your work, and sometimes your computer, to a screeching halt.

Hunting for answers

What can you do? Is it a software problem or is your hardware setup wrong? In these instances I have had to hunt for the answers. This was especially true when I was installing a CD-ROM drive and sound card. How do you find out which interrupt is not being used? (An interrupt is the method a peripheral card, like a modem, serial port, CD-ROM or disk drive, uses to tell the microprocessor it has data that requires attention. When two peripheral cards use the same interrupt, neither of them works or

the whole computer locks up.)

During my frequent, sometimes too often, visits to the computer stores, I began to notice more and more programs that purported to be the answer to what ails your Windows. There are "uninstallers," checkup programs, advisors and the like.

At first I picked up a copy of Setup Advisor from TouchStone Software Corp. I think what attracted me was the promise on the box claiming it was an aide for the installation of peripheral devices. I also may have been attracted to the sale price of \$16.95.

Once installed, I started the program in motion. It began searching for disk drives, sound cards and memory when it locked up. Undaunted, I rebooted the computer, loaded Windows and started Set Up Advisor. It once again jumped into action. This time it stopped and announced that a general protection fault had been detected. Windows and my computer had once again halted.

A computer, to me, is a tool. It enables me to do a better, more efficient job. When a computer repeatedly crashes and locks up, it's like using a rusty box of tools. You have to stop, oil them and coax them to work. I don't think so. My time is valuable.

Check it out

During my next visit to a computer store, I picked up a copy of WIN Check It, also from the folks at Touchstone. This program bills itself a fix-up, tune-up, uninstaller, setup, check-up and clean-up program. Into drive B it goes and we're off and running.

Once started, WIN Check It starts by examining the computer memory, configuration, peripherals and the like. Once the scan is completed, you get a display showing how much memory is available and what peripheral is connected where. WIN Check It also detects which programs are no longer set up in Windows

and makes it easy to delete the entry in the WIN.INI files and to remove the associated dll files.

(You can also do this with DOS edit, but it takes longer and requires some hunting to find all the associated files.) This is the uninstaller feature. The program detects duplicate files on your hard drive and provides a utility to delete those not needed. One feature I found helpful was the setup utility. Within this feature is a listing of the more popular peripherals. Select the peripheral you intend to install. The program suggests address and IRQ (interrupt) settings that are unused in your computer. This is one of the nicer features.

WIN Check It also features a series of benchmark tests that report the speed and performance of the computer, much like the tests in the DOS version of Check It. While WIN Check It makes life a little easier in troubleshooting problems, it is not exactly what I was looking for. I wanted a program that would check out my computer, report what's going on, recommend a course of action and even do it automatically. (That would be an efficient use of time.)

An alternate method of checking out your computer is to run MSD.EXE, which comes packaged with Windows. While not as fancy as WIN Check It, you get essentially the same information. Hit the Print command and hard copy from the printer documents what MSD has found. You can use the IRQ and address data to determine the best way to set your new peripherals.

Another thing; if Windows happens to lock up and won't load, type WIN /B at the DOS prompt. Windows will create a text file as it loads. The file called "boot-log.txt" will indicate which program failed to load or what file Windows couldn't find. Yes, there is life after involvement with Windows.

□ □ □

Richard Mertz is a principal at the consulting firm of Suffa and Cavell, Fairfax, Va. He can be reached at 703-591-0110; through Compuserve, 730,3026, or on the Internet at rmertz@dgs.dgsys.com.

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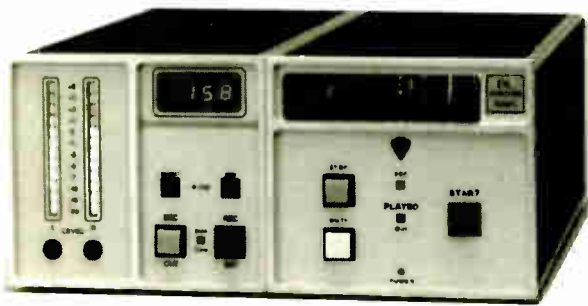


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For information, contact Andy Rector in Illinois at 309-452-9461; fax: 309-452-0893; or circle Reader Service 146.

Seven Year Cycle...

► continued from page 24

to the needs and interests of its community of license.

Theoretically, your quarterly issues/programs lists should provide some insight into what you believe to have been your most significant programming during the license term. But your lists are, at best, probably pretty sparse in the way of information.

Would you be able to flesh them out with much detail if the need arose?

And what about all of you who have jumped on board the LMA bandwagon? Bear in mind that seven years ago, when you last filed renewals, LMAs were still pretty close to science fiction. Since then, they have been embraced by the FCC and the industry alike. What we don't know is how they will fare in a comparative renewal context.

For example, let's just say that you are brokering all but two hours of air-time each week to somebody else. Arguably, any claim you might make to a "renewal expectancy" would be limited to those two hours of programming a week.

Would your programming be enough to support a renewal expectancy claim? What about if the challenger proposed not to broker any time, but rather to offer its own programming 100 percent of the time? Unfortunately, we have no answers to any of these questions because this is the first chance for them to have been raised.

And also unfortunately, much like your standard flesh-eating bacteria, by the time you realize you might have a problem along these lines, it may be too late to do anything about it.

After all, if it turns out that you haven't done enough in the way of locally-oriented non-entertainment programming for the last seven years or so, it will be hard to correct that problem now without a time machine or some unusual form of divine intervention.

We don't want to cause panic in the streets of radio land, so we hasten to point out that, historically, there really haven't been that many comparative renewal challenges overall.

Still, one is all it takes if that one is directed against your station. As noted, this is the first renewal cycle since the advent of LMAs, and station values have seemed to be going up recently. The opportunities to file for unoccupied frequencies in reasonably attractive markets have largely dried up in the last several years. All in all, there is good reason to proceed warily into the renewal process, being sure to dot all your Is and cross all your Ts. Close consultation with your communications counsel before you file has never hurt. Good luck.

□ □ □

Harry Cole is a principal in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

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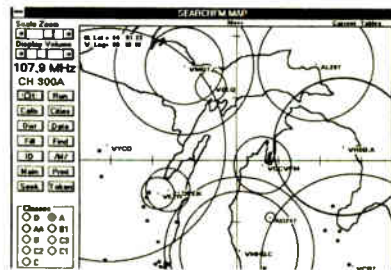
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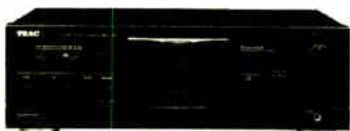
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Berlant/Concertone 30 R-R; Scully 270, 14" reel PB; Rollaround stand for ITC 750 R-R R/P. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

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.

MCI JH110 1" 8 track, 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.

Nagra IS 3.75-7.5 ips, 5" reels, resolver, leather case, mint cond, \$2000. C Olson, Modcom, 510-672-5109.

Nagra IV-5 excellent condition, many options, factory maintained, \$3900; Revox A-77, good condition, with recorder built into speaker cab, \$400. Wolf, Ealing Recording, 312-784-1558.

Otari ARS1000DC (4), good condition, PB only, \$1500/all 4. D Hess, KTOM, 12 E Washington, Petaluma CA 94952. 707-766-9999.

Otari MX-5050 (2), one with new 15 ips kit, both meet all specs, new flat balc formica cabinets, \$750/\$950. B Gable, Reunion Enterprises, 804 Mt Vernon Pkwy, Altamonte Springs FL 32701. 407-646-6827.

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Marantz PMD-201 cassette machine, \$175. G Robinson, WXTC, 478 E Bay St, Charleston SC 29403. 803-722-7611.

MCI JH110B, 2 trk roll around metal, gd cond. J Gelo, 813-642-6899.

Scully 280 4 track 1/2" recorder in rollaround cabinet, 7.5-15 ips, VGC, manual, tapes, \$900/Best Offer. F Badeaux, The Musik Factory, 1812 Procter St, Port Arthur TX 77640. 409-982-7121.

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Tascam MSR-8 1/2", 8 track, R-R, dbx, full function, remote, new, \$2200. John, Star Lighter Production, 10315 Elk Point, Houston TX 77064. 713-890-7000.

Telex stereo copyette 1x1 high-speed cassette dupli, \$250; Recordex 330 mono 1x3 high-speed cassette dupli, \$600. G Grassie, RNTC Broadcasting, POB 146, Dexter NM 88230. 505-734-5565.

Ampex ATR 100 (2) 4 track \$3500 each, 2 track 1/2" \$4000, (2) 2 track 1/4" \$2500 each. 212-343-0265.

Otari 5050-SHD 8 track 1/2" newly rebuilt, heads have full, life left, \$1800. W Gunn 619-320-0728.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Houndshaven Way, San Jose CA 95111. 408-363-1646.

Want To Buy

Nagra 111N operation information. Frank, WMAM, POB 609, Marinette WI 54143. 715-735-6631.

Otari MX-5050-8 8 track, 1/2" any model. John, Star Lighter Productions, 10315 Elk Point, Houston TX 77064. 713-890-7000.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Ampex 300 tube two-track with half-inch heads. Other Ampex tube electronics. 907-456-3419.

CD PLAYERS

Want To Sell

Denon DN950FA in fine shape, recently factory repaired, \$750. J Leutzinger, KIXQ, 2620 Dogwood Rd, Joplin MO 64801. 417-624-1310.

Denon 950 FA need work on optical pickups and bearings, manuals, BO. T Martz, WYSS, 5595 Liberty Rd, Chagrin Falls OH 44022. 906-635-0995.

CONSOLES

Want To Sell

Gates 4 channel mono, \$125. M Van Ouse, WTLR, 2020 Cato Ave, State College PA 16801. 814-237-9857.

Ramko DC-8MS 8 mixer post/18 inputs, stereo, solid state, full documentation, rebuilt, \$900. J Cunningham, KEOR, RT2 Box 113B, Stone-wall OK 74871. 405-265-4496.

McMartin B801 2, 2 channel mono, working when replaced, no manuals, \$600/two or Best Offer; McMartin B501 with manual, \$450/Best Offer; Ampro/Scully, dual channel mono, 8 slide pot, no manual, \$300/Best Offer. B Perry, KEZQ, 30 Trails End, Mayflower AR 72106. 501-470-1728.

RCA BC-2A mono, rough condition, BO. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

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

Neve/API 12 to 24 inputs, anc condition, willing to purchase EQs and mic pre, seperately. B Ore, Clockwork, 606 Mamaroneck Ave, Mamama-roneck NY 10543. 914-381-0661.

Ampro T3 AC 10DB manual, schematics, parts list for 10 channel. T Spencer, WODY, Rt1 Box 224, Bassett VA 24055. 703-629-1161.

Neve consoles: any condition or parts
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Neve, Amek, Sony production or music recording. A Dentone, Audio Answers, 362R Middlesex Ave, Wilmington MA 01887. 508-988-2332.

Western Electric WE-25B for old time style student station, finder can keep all transformers, only outside cosmetics important. J Vobbe, WLEW Radio, 517-269-9931.

Neve console, any type and parts. 212-343-0265.

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Harris CPU-MSP95 stereo audio processor w/stereo gen, \$500. J Leutzinger, KIXQ, 2620 Dogwood Rd, Joplin MO 64801. 417-624-1310.

Orban Optimod 8000, currently on air, \$1100; Texar Prism (2), recent factory check, \$1600/pr. A Williams, Charlottesville VA 22902. 804-977-3030.

CBS 4440A Audimax; 4000A Volumax, RCA BA-45 amp, BA-46 limiter module, BA-47 AGC module. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

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Pacific Recorders multi-limiters (2) audio processing and FM pre-emphasis, stereo pair I/O w/manuals. 1 CBS Labs stereo limiter w/manuals, \$500/everything. T Martz, WYSS, 5595 Liberty Rd, Chagrin Falls OH 44022. 906-635-0995.

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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.

RCA, GE, Fairchild any, also UREI 1176, LA-3, LA2. A Dentone, Audio Answers, 362R Middlesex Ave, Wilmington MA 01887. 508-988-2332.

Teletronix, UREI, dbx, Fairchild, Pultec EQ's. 914-381-0661.

MICROPHONES

Want To Sell

Neumann-Gefell U57, mint restoration, \$2200, Neumann U87i (vintage U87) from Russia, VGC, \$1200. 2 Viricoustics from RCA London, Smithsonian quality, in ATA cases \$1100/ea. Possible trades. Klay Anderson 801-272-1814.

Summit Audio TPA200B dual tube mic preamp, phase reverse, pad, phantom power, in box, mint, must sell, \$1100. B Ore, Clockwork, 606 Mamaroneck Ave, Mamaroneck NY 10543. 914-381-0661.

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.

AKG C422EB, large diaphragm stereo, rem pattern cntrl, phantom power, 20-meter cable, winscreen and shockmount, exct cond, \$1850; AEA MS-38 DM dual mode ms matrix decoder, line-level in and out, \$250; AKG D-140 cardioid, \$225/pair. R Streicher, Pacific Audio-Visual, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Electro-Voice 635A dynamic omni directional mic, good condition, \$50. M Winsick, Glad Productions, POB 1120, N Collins NY 14111. 716-337-0065.

Want To Buy

B&O mics; RCA BK-11A or 74B pair; Stellavox ABR; Nagra QGB. R Brown, 203-677-4828.

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-wkg cond; 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.

Shure 55C and RCA 44's w/call-letter plates. M Harrington, POB 7610, Little Rock AR 72217. 501-223-9056.

77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights & audition lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

RCA 77DXs/44BXs ribbon, chrome/TV grey, good condition, BO. R Kaufman, Pams Prod-s, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

RCA ribbons, AKG 451's, Neumann KM84's, EV 635A. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Telefunken, Neumann, RCA, AKG microphones. 914-381-0661.

MISCELLANEOUS

Want To Sell

Giant Radio Boom Box trailer w/4 kW generator, BO. D Matyis, KVET, Austin TX, 512-495-1300

Collectors item, news machine teletype printer; RCA 1 kW xmtr w/tubes circa 1948, inc tubes. Vern, POB 1340, Oroville CA 95965. 916-533-1340.

Gentner 2000, remote control, \$2050. S Ross, Quinn Bdcng, 733 N Green St, Brownsburg IN 46112. 317-852-9119.

High voltage xfmr, 208-220 input (3 taps), 2900-3000 V at 600 mA output, \$180 + shpng; high voltage choke, 10H, 10 kV, \$80 + shpng; capacitors (2) 5 ufd at 7.5 kV, 20 ufd @ 2 kV, 10 ufd at 2 kV, no PCBs. K Lamson, 510-447-7405.

Phasemaster T-12000 rotary single phase to 3 phase convertor, gd cond, BO. B Faulkner, KRKX, Billings MT. 406-652-8400.

Zercom Telephone Interface 1989 model, \$150. J Leutzinger, KIXQ, 2620 Dogwood Rd, Joplin MO 64801. 417-624-1310.

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Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recordings, 228 East 10th, N YNY 10003. 212-674-3060.

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McMartin TBM 1005D FM broadcast receiver, new, for rebroadcasting, simulcasting, translators or monitoring of RF, modulation, or injection. ALSO: (used) AM/FM modulation monitors, Buy or Sell, Repair & Calibrate McMartin, Belar. Call Goodrich Ent Inc., 11435 Manderson St., Omaha, NE 68164. 402-493-1886 fax 402-493-6821.

Endberg BA-6 alert monitor, \$225. G Robinson, WXTC, 478 E Bay St, Charleston SC 29403. 803-722-7611.

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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Advanced Micro-Dynamics TC-8, \$1000/unit. Winnebago Bdcng, POB 4056, Appleton WI 54915.

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TFT 7610 R/A remote control sys. J Vobbe, WLEW, 935 S Van Dyke Rd, Bad Axe MI 48413. 517-269-9931.

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Want To Buy

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Pams Jingles ref tapes, 1951-1976, BO. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625.

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25 Hz tone generator, gd cond. J Gelo, 813-642-6899.

Phelps Dodge CP-1000 4 bay, 91.5, 9 yrs old, \$400. M Taylor, KNEO, R1 Box 1821, Neosho MO 64850. 417-451-5636.

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- | | |
|---------------------------|--------------------------|
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